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Encyclopædia Britannica;
OR, A
DICTIONARY
OF
ARTS and SCIENCES,
COMPILED UPON A NEW PLAN.
IN WHICH
The different Sciences and Arts are digested into distinct Treatises or Systems;
AND
The various Technical Terms, &c. are explained as they occur in the order of the Alphabet.
ILLUSTRATED WITH ONE HUNDRED AND SIXTY COPPERPLATES.
By a Society of GENTLEMEN in SCOTLAND.
IN THREE VOLUMES.
VOL. I.
EDINBURGH.
Printed for A. Bell and C. Macfarquhar;
And sold by Colin Macfarquhar, at his Printing-office, Nicolson-S
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Plate LXVI
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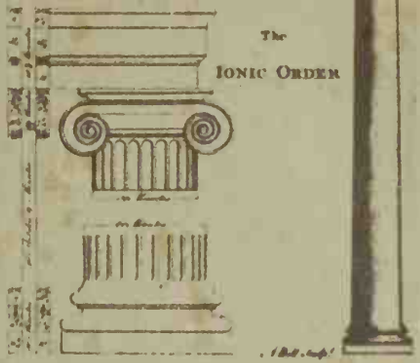

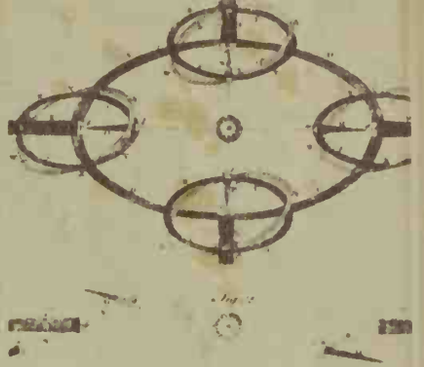

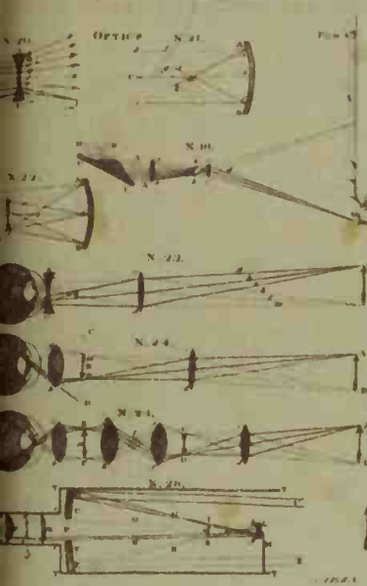

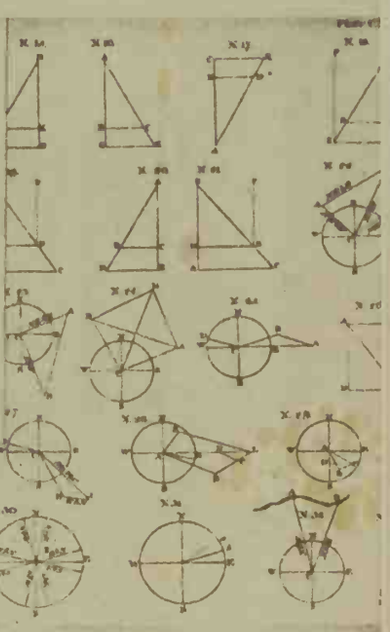

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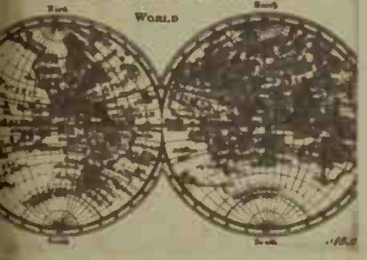

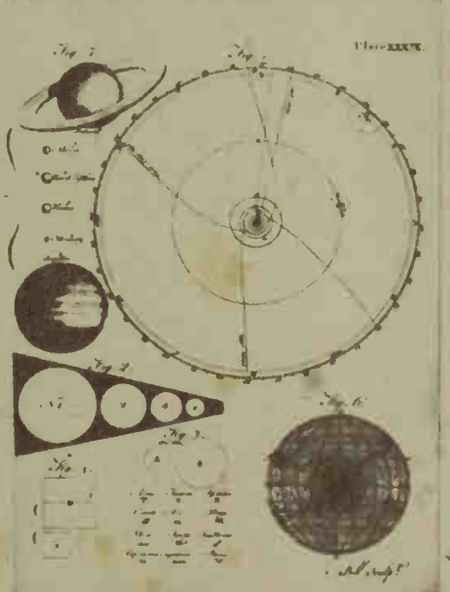

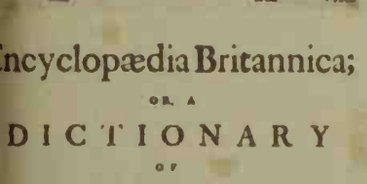

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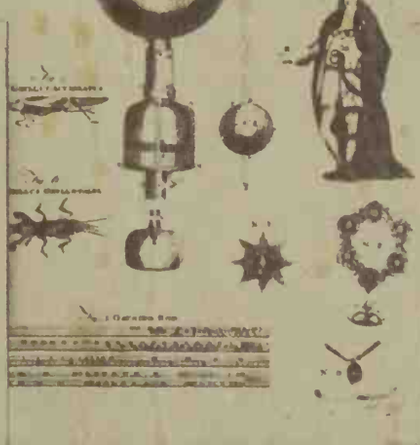

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"LET KNOWLEDGE GROW FROM MORE TO MORE
AND THUS BE HUMAN LIFE ENRICHED."

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VOLUME

13

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FOUNDED A.D. 1768

ENCYCLOPÆDIA BRITANNICA

Volume 13

JIRASEK *TO* LIGHTHOUSES

JIRASEK, ALOIS (1851–1930), was the most important Czech novelist of the period before 1914 as well as a great national figure. Born at Hronov, Bohemia, on Aug. 23, 1851, he was a secondary-school teacher until his retirement in 1909. He wrote a series of historical novels imbued with faith in his nation and in progress toward freedom and justice. He was particularly attracted by the Hussite period, to which he devoted his most famous work, the trilogy *Mezi proudy* ("Between the Currents"; 1891), *Proti všem* ("Against All the World"; 1894) and *Bratrstvo* ("Brotherhood"; 1899–1908). Artistically more significant is the five-volume portrayal of the Czech national revival, *F. L. Věk* (1888–1906); and his best work is probably his last major novel, *Temno* ("Darkness"; 1915), in which he painted a vivid picture of Bohemia in the grip of the Counter-Reformation. His novels are based on careful historical reading; and his rich and detailed descriptive passages give his work a colour and individuality which offset the conventionality of the characterization. During World War I he publicly expressed the desire for national independence, notably when he read out the "national oath" at a demonstration in Prague on April 13, 1918. He died in Prague on March 12, 1930. (R. Av.)

JIRGALANTA (Dzhirgalantu; formerly called Khobdo or Kobdo), the chief town of the Khobdo *aimak* (district) in the western part of the Mongolian People's Republic, lies in an intermontane basin north of the Mongolian Altai chain. Pop. (1959 est.) 5,800. Khobdo was founded in the 18th century as a trade depot linked commercially with Peking. After World War II it was renamed Jirgalanta, Mongolian for "valley of happiness." It is an important commercial and communications centre joined by a motor road to Ulan Bator, the capital of the Mongolian People's Republic, and to Bisk, a rail terminus in Altai territory, U.S.S.R. There is a wool-cleaning plant, a butter factory and a printing works.

Khobdo *gol* ("river") descends from the Mongolian Altai and enters the Khara-Usu lake about 27 mi. N.E. of Jirgalanta. It is 310 mi. long and partly navigable for small boats. (K. Sm.)

JIRJA (Girga), a town of upper Egypt in the Sawhaj *muhafazat* (governorate), is 316 mi. S. of Cairo by rail and 95 mi. S.S.E. of Asyut by road. Pop. (1957) 41,202. It stands on the west bank of the Nile at a sharp bend where the river on the east undercuts limestone bluffs. Jirja derives its name from the ancient Coptic monastery of Mara Girgis dedicated to St. George. The town is noted for its pottery; it is the seat of a Coptic bishop and also possesses a Roman Catholic monastery, reputedly the oldest in Egypt. About 10 mi. S. are the ruins of the ancient city of Abydos (*q.v.*). (A. B. M.)

JITTERBUG, name applied from the latter 1930s to an exuberant, youthful form of ballroom dancing of U.S. origin. It is danced to bright, syncopated fox trots in 4/4 time, and in what is variously described as swing, jive or jump tempo. Patterns include lindy hop steps (1929; name inspired by Charles Lindbergh's transatlantic flight) and sectional teen-age dances, such as the flea hop, Jersey bounce and west coast swing. Jitterbug was spread internationally by the U.S. armed forces during World War II. A later evolution of jitterbug was rock 'n' roll (1955). (A. Mu.)

JIU (Jiul; Ger. Schyl), a river of Rumania and a left-bank tributary of the Danube, with sources on the southern slopes of the Retezatului (8,238 ft.) and Cîndrelu (6,726 ft.) mountains. The two headstreams flow respectively eastward and westward in the longitudinal trench of the basin of Petroşani. South of Petroşani the Jiu cuts through the crystalline granites and schists of the Transylvanian Alps in a wild, deep gorge (the Surduc or Vulcan Pass), and flows southward past Târgu Jiu and Craiova, across Quaternary sands and gravel deposits to join the Danube 30 mi. W. of Corabia. Its length is about 216 mi. and its chief tributaries are the Motru and Gilort. Petroşani is the centre of Rumania's leading coal-mining (lignite) district. The old route through the Vulcan pass follows the erosion surface or platform above the river, used by shepherds for many centuries before modern roads and the railway were constructed.

JIVAROAN, an independent linguistic stock of South American Indians consisting of the Jivaro, the Antipa, the Aguaruna, the Huambiza and the Achuale tribes. Living on the lower east slopes of the Andes in eastern Ecuador and Peru, they are a tropical forest group. Their territory includes the headwaters of the Tigre and the Pastaza, the Morona excepting for its lower reaches, all of the Santiago drainage including the Upano, the Paute, the Zamora and the lower portion of the Alto Marañon river. They raise manioc and a few other crops but also subsist largely on wild

fruits, fishing and hunting (principally with blowgun and poisoned darts). The women make pottery and the men weave cotton cloth on hand looms; men wear wrap-around skirts and women dress in full robes pinned over one shoulder. Related families live dispersed in single community houses rather than in villages.

In the 1960s the estimated Jivaroan population was about 20,000. A warlike people with a long history of vigorous resistance to invasion, they traditionally feud among themselves. They skin and shrink the heads of their victims to small-orange size by boiling and then dehydrating; features are carefully preserved. These heads (tsantsas) are used in elaborate rites. Head-hunting, formerly practised over a wide area in northwestern South America, has given the Jivaros considerable publicity.

See also INDIAN, LATIN-AMERICAN; ECUADOR; SOUTH AMERICAN LANGUAGES.

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(M. W. St.)

JOAB (fl. 1000 B.C.), Jewish military commander under King David, his mother's brother, figures chiefly in the biblical second Book of Samuel. He led the commando party which captured Jerusalem for David, and as a reward was appointed commander in chief of the army. He played a leading part in many of David's victories (*e.g.*, against the Ammonites and Edomites) and led the loyal force which crushed the rebellion of David's son Absalom. Utterly devoted to David, Joab thought he knew David's interests better than David himself did; hence his killing of Absalom when David had commanded that his life be spared. Joab showed characteristic ruthlessness in the treacherous murder of two of his potential rivals: Abner, Saul's former commander in chief, who had killed Joab's brother Asahel, and Amasa, who mustered the men of Judah for David against the rebel leader Sheba. Joab obeyed under protest when ordered by David to carry out a national census. During David's last days he supported his son Adonijah's abortive bid for the throne, and was executed by the successful Solomon. (F. F. B.)

JOACHIM: *see* MURAT, JOACHIM.

JOACHIM I (1484–1535), elector of Brandenburg from 1499, was born on Feb. 21, 1484, the son of the elector John Cicero and the brother of Cardinal Albert, archbishop of Magdeburg and Mainz. When he succeeded as elector he soon showed his energy in reasserting his position; he preserved the internal peace of his principality by curbing those warlike members of the nobility who had not yet settled down as landowners and grain producers. In the imperial election of 1519 Joachim, originally a supporter of Francis I of France, voted, after some hesitation, for Charles of Spain (the Holy Roman emperor Charles V); but he remained for some time the receiver of an annuity from France, and his relationship to Charles was rarely friendly. Like his brother Albert, Joachim was a friend of humanistic studies, including both astronomy and astrology; and he founded the first university in his territory at Frankfurt an der Oder (1506). Yet he remained a stubborn enemy of the Reformation, against which he attempted to organize political resistance, though he could not prevent the conversion to Lutheranism of his wife, Elizabeth (d. 1555), daughter of King John of Denmark. He died at Stendal on July 11, 1535.

See T. von Buttlar, *Der Kampf Joachims I. von Brandenburg gegen den Adel* (1889); L. Zscharnack, *Das Werk Luthers in Brandenburg* (1917). (H. Lz.)

JOACHIM II (1505–1571), elector of Brandenburg from 1535, was born on Jan. 13, 1505, the elder son of Joachim I. By his father's last will he received only the Old and Middle Marks, while the New Mark was given to his brother John. As a boy he had been in personal contact with Martin Luther for a short time, and the idea of redemption by faith made a permanent impact on his mind; but he never intended a complete break with the Roman Catholic past. In 1539 he allowed the free exercise of the Reformed teaching in the electorate. He himself took communion in both kinds and established a new ecclesiastical organization in Brandenburg, but retained much of Catholic ceremonial. He made repeated attempts to make peace between the Protestant princes and the Holy Roman emperor Charles V. In 1542 he led the German forces on an unsuccessful campaign against the Turks. In the war of the League of Schmalkalden he sided with the emperor. Together with Maurice (*q.v.*) of Saxony, he persuaded Philip of Hesse to surrender to Charles after the imperial victory at Mühlberg in April 1547 and pledged his word (which Charles failed to honour) that Philip would be pardoned. He supported the "Interim" issued from Augsburg in May 1548 and took part in the negotiations for the treaty of Passau (1552) and the religious peace of Augsburg (1555). Pleased by his attitude, his estates, in return for political concessions, twice (in 1540 and in 1549–50) undertook the redemption of the considerable debts that he had accumulated by his passion for building and court festivities. He secured the archbishopric of Magdeburg and the bishopric of Halberstadt for one of his younger sons, Frederick, in 1551; and on Frederick's death (1552) these sees passed to his brother Sigismund. Joachim died at Kopenick on Jan. 3, 1571, leaving his electorate to his eldest son, John George.

See P. Steinmüller, *Einführung der Reformation in die Kurmark Brandenburg durch Joachim II* (1903). (H. Lz.)

JOACHIM OF FIORE (FLORA or FLORIS) (*c.* 1135–1202), biblical commentator and philosopher of history, was influential in the later middle ages and Renaissance in reformist circles, and indirectly even in modern totalitarianism. He is in some respects a precursor of the Renaissance.

The loss of most southern Italian archives and the tendency for legends to cluster around Joachim's name make the reconstruction of his biography difficult. He was born in Celico in Calabria, probably the son of a notary. The traditional biography has him educated at the court of Roger II and making a trip to Constantinople and Palestine, when he is supposed to have been converted from his worldly life to God. Around 1160 he returned to Calabria to become a Cistercian monk at Sambucina. By 1177 he was abbot of the monastery at Corazzo. Attaining a great reputation as a prophet and holy man in the last decades of his life, Joachim visited popes and royalty, including Richard the Lion-Hearted in Messina during the third crusade, 1190–91. In 1188 or 1189 he left Corazzo and retired to the Sila (a barren Calabrian plateau) where he founded a community of hermits at San Giovanni in Fiore, from which the Florensian order arose. Its rule was approved in 1196 by Pope Celestine III, and it carried on a rather undistinguished existence until 1633. The departure of Joachim from the Cistercians aroused some bad feeling at the time, but it is doubtful whether Cistercian hostility persisted for long. Joachim died March 30, 1202.

Because of the wealth of pseudo-Joachite writings, Joachim's canon is in some doubt. Definitely authentic are his three major works—*Concordia novi et veteris Testamenti* (1519), *Expositio in Apocalypsim* (1527) and *Psalterium decem chordarum* (1527)—and the following shorter tractates which, unlike the preceding, have all been edited in modern times: *De articulis fidei*, *Adversus Iudeos*, *Tractatus super quatuor Evangelia* and *De vita sancti Benedicti et de officio divino secundum eius doctrinam*. Most probably by him, or by a close disciple reflecting his views, is the book of coloured drawings and figures, *Liber figurarum*, discovered in 1937, giving a new insight into Joachim's thought. It possibly influenced Dante. A lost tractate, *De essentia seu unitate Trinitatis*, attacking Peter Lombard's concept of the Trinity was condemned by the fourth Lateran council in 1215, the only work of Joachim ever expressly and fully censured by Rome. The most notable and influential of the pseudo-Joachite writings are commentaries on Jeremiah (*c.* 1240) and Isaiah (*c.* 1260).

In general Joachim's teachings were on two subjects—the nature of the Trinity and the meaning of history. Joachim attacked the Lombard for separating too sharply the unity of God from the Persons so that he, in effect, made a quaternity of God. The relations of Joachim's trinitarianism with the many other 12th-century theories in both east and west have yet to be worked out, but his stress on the threeness of God is distinctly Byzantine.

Joachim argued, on analogies between the Old Testament and Christian history and on the equality of Persons in God, that a new third age was soon to appear, an advance on the second as the second had been an advance on the first. The period of the Old Testament had been primarily the age of the Father, characterized by law and fear; the period from Jesus to about 1260 was that of the Son, characterized by grace and faith; and the third age, which would complete history, was that of the Holy Ghost, characterized by love and spirit. Each age recapitulated on a higher level the first, so that certain general predictions could be made. Each age, like the first, was to last for 40 generations and have a precursor as well as an initiator. The birth throes of each were violent, producing a series of antichrists (*q.v.*). Around 1260 the Saracens and Jews would be converted and mankind would enter on its highest destiny. St. Benedict had been the precursor of the final age, which would be a spiritual age led by *viri spirituales,* who would be monks. The monastery, traditionally the prototype of paradise, would embrace all mankind.

Although essentially conservative and even backward looking, Joachim became a chief impetus or justification for radical movements in the later middle ages and Renaissance. His views were bandied about shortly after his death by various sides in the struggle between Frederick II and the papacy. Joachite activities reached a peak near the crucial date of 1260 at the University of Paris and in movements, at least partially inspired by the abbot, like those of the Flagellants (*see* FLAGELLATION) and "Apostles." The rigorist wing of the Franciscans known as the Spirituals saw in their founder the initiator and in their order the "spiritual men" of the new age (*see* FRANCISCANS: *Reform Movements*). In spite of the disappointment of 1260, attempts to sustain Joachim's reputation as a thinker and prophet were more or less successful, and he enjoyed a high reputation, although not unassailed, until the 17th century.

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(M. W. BD.)

JOACHIM, JOSEPH (1831–1907), Hungarian violinist, was born at Kittsee, near Pressburg (Bratislava), on June 28, 1831. He first studied at Budapest where at the age of seven he appeared with his master S. Serwaczyński. Later, in Vienna, he studied with Joseph Böhm and in 1843 he went to Leipzig where he studied with Ferdinand David and Moritz Hauptmann and led the Gewandhaus orchestra. In 1844 he paid the first of many visits to London, where he was sponsored by Mendelssohn and achieved an outstanding success. In 1849 he led the orchestra at Weimar and four years later the orchestra at Hanover, where in 1863 he married the singer Amalie Weiss. In 1868 he was appointed director of the Hochschule für ausübende Tonkunst where he acquired a great reputation as a teacher. The following year he founded the Joachim quartet, consisting originally of Joachim, Ernst Schiever, Heinrich de Ahna and Wilhelm Müller, which became renowned throughout Europe for its performances of the late quartets of Beethoven. Joachim died at Berlin on Aug. 15, 1907. Technical virtuosity was subordinated by Joachim to aesthetic values and he thus brought about a reform in program making. He was greatly admired for his interpretations of works by Bach, Mozart and Beethoven, and his playing inspired the violin concerto of Brahms that is dedicated to him. The reputation in England of Beethoven's chamber music was chiefly established by the Joachim quartet. Joachim's compositions include several works for violin and orchestra, among them the "Hungarian" concerto.

See A. Moser, *Geschichte des Violinspiels* (1923); *The Memoirs of Carl Flesch,* Eng. trans. by H. Keller (1957).

JOAN, SAINT, OF ARC (*c.* 1412–1431), called LA PUCELLE or THE MAID OF ORLÉANS, the peasant girl who, acting as she believed under divine inspiration, led the French to a momentous victory at Orléans and Charles VII to his coronation at Reims but was soon afterward captured and burned by the English as a heretic; the greatest national heroine of her compatriots, one whose achievement was a decisive factor in the revival of France at the crisis of the Hundred Years' War.

Joan was born and baptized *c.* 1412 at Domremy, a village in the French part of the duchy of Bar, between Champagne and Lorraine, situated on the Meuse river and under the jurisdiction of Chaumont in Bassigny. Her father was Jacques Darc, her mother Isabelle Romée. She had three brothers, Jacquemin, Pierre and Jean, and one sister, Catherine, who died young. Joan learned her faith and her prayers from her mother, who also taught her to sew. She sometimes led the village cattle out to pasture, and with the other young girls she would go to dance and sing under the "Fairies' tree" which stood near the village. She was remembered by her friends and neighbours as a hardworking, good, simple and exceptionally pious child. She afterward revealed to her judges that from the age of 13 a voice from God taught her self-discipline ("à se bien gouverner"); later the voice told her to go to France, where she would raise the siege of Orléans. She declared that she frequently saw St. Michael, St. Catherine (of Alexandria) and St. Margaret (of Antioch). These "voices" were to guide Joan throughout her life.

Vaucouleurs and Chinon.—The crown of France at this time was in dispute between the dauphin Charles, as the son and heir of Charles VI, and the English king Henry VI, whose armies, in alliance with the Burgundians, were occupying nearly all the northern part of the kingdom (*see* FRANCE: *History;* HUNDRED YEARS' WAR). The apparent hopelessness of the dauphin's cause at the end of 1427 was aggravated by the fact that, five years after his father's death, he had still not been consecrated at Reims, the traditional place for the crowning of French kings, as Reims was well within the territory held by his enemies. As long as the dauphin remained unconsecrated, the rightfulness of his claim to be king of France was open to grave question in the minds of the people.

On the insistence of her "voices," Joan left Domremy and went to her "uncle" Durand Laxart (in fact the husband of her mother's cousin) whom she persuaded to take her, in May 1428, to Robert de Baudricourt, captain of Vaucouleurs, the nearest stronghold still loyal to the dauphin. On this first occasion Baudricourt paid no attention to Joan, and she returned to Domremy, whose inhabitants, shortly afterward, had to take temporary refuge at Neufchâteau from Burgundian raids. There Joan and her family resided with a woman named La Rousse. Joan left Domremy again in Jan. 1429; and this time Baudricourt eventually decided to allow her to go to the dauphin at Chinon. After visiting Nancy at the invitation of Charles II, duke of Lorraine, she left Vaucouleurs for Chinon about Feb. 13, 1429, dressed in men's clothes and accompanied by two squires—Jean de Metz or de Nouillompont and Bertrand de Poulengy—and four other men. They had to cross territory which was in enemy hands: they went through St. Urbain near Joinville to Auxerre and crossed the Loire river at Gien; at Ste. Catherine-de-Fierbois Joan wrote to the dauphin. She reached Chinon after traveling for 11 days.

Arriving about midday, Joan at once went to the castle occupied by the dauphin. He was uncertain whether to receive her and took counsel, receiving conflicting advice; but two days later Joan was granted an audience. The dauphin had hidden himself among his courtiers but she made straight for him and told him that she wished to go and make war against the English and that she would have him crowned at Reims. On the dauphin's orders she was immediately interrogated by ecclesiastical authorities in the presence of Jean, duc d'Alençon; and a further examination was held at Poitiers, where for three weeks Joan was questioned by eminent theologians and canonists. She told them that it was not at Poitiers but at Orléans that she would give proof of her mission; and without further delay she dictated letters of defiance to the English (March 22). In their report on the examination the churchmen suggested that in view of the desperate situation of Orléans the dauphin would be well-advised to make use of her.

Joan returned to Chinon. During April, at Tours, the dauphin provided her with a military household: Jean d'Aulon was her squire; Louis de Coutes and a certain Raymond were her pages; her chaplain and confessor was an Augustinian monk, Jean Pasquerel; and she had two heralds. She was joined by her brothers Jean and Pierre. She had her standard painted and Pasquerel had

a banner made for her; when the question of a sword was brought up, she declared that it would be found in the church of Ste. Catherine-de-Fierbois, and one was in fact discovered there, behind the altar.

The Relief of Orléans.—The troops were mustered at Blois and on April 27, 1429, they set out for Orléans. The city, defended by Jean, comte de Dunois (*q.v.*), had been besieged since Oct. 12, 1428; it was surrounded, except on the northeast, by a series of strongholds established by the English. Joan and Étienne de Vignolles, surnamed La Hire, one of the French commanders, entered with supplies on April 29. She was lodged in the house of Jacques Boucher, treasurer to the duc d'Orléans, and was told that action must be deferred until further reinforcements could be brought in.

On the evening of May 4, when she was resting, Joan suddenly sprang up, apparently inspired, saying she must go and attack the English. She had herself armed and hurried out to the east of the city toward the English fort of St. Loup, where, indeed, an engagement of which she had not been told was taking place. The French captured the fort. The next day Joan addressed another letter of defiance to the English. On the morning of May 6 she crossed to the south bank of the river and advanced toward the fort of St. Jean-le-Blanc; the English immediately evacuated it in order to defend a stronger position in the nearby *bastille des Augustins*, but Joan and La Hire attacked them there and took the fort by storm. Very early on May 7 the French advanced against the fort of Les Tourelles, which, dominating a bridge, now broken, across the Loire, had formed part of the original defenses of Orléans. Joan was wounded but quickly returned to the fight and it was thanks to her tenacity that the French commanders maintained the attack until the English capitulated. Next day the English were seen to be retreating toward Meung-sur-Loire; because it was a Sunday Joan refused to allow any pursuit.

From Orléans to Reims.—Joan left Orléans on May 9, 1429, met the dauphin at Tours and moved thence to Loches. She urged him to make haste to Reims for his coronation, but he still hesitated since some of his counselors were advising him to undertake the conquest of Normandy. Ultimately Joan's importunity won the day. It was decided, however, first to clear the English out of the other towns along the Loire. Joan now again met her friend the duc d'Alençon, who was made lieutenant general of the French armies. They moved off together, arriving before Jargeau on June 12; on Joan's initiative the town was attacked and taken. The bridge at Meung-sur-Loire was captured on June 15, and then Beaugency was attacked, whereupon the English retreated into the castle. Despite the hostility of the dauphin and of his favourite, Georges de La Trémoïlle, and the reserve of Alençon, Joan now received the constable de Richemont (*see* ARTHUR III, duke of Brittany); after making him swear fidelity she accepted his help. Shortly afterward the castle of Beaugency was surrendered.

The French and English armies came face to face at Patay, on June 18, 1429. Joan promised success to the French, saying that Charles would that day win a greater victory than any that he had so far had. The victory was, indeed, complete: Sir John Fastolf fled and the earl of Shrewsbury was taken prisoner (*see* PATAY, BATTLE OF). In writing of it, the chronicler Enguerrand de Monstrelet, although a partisan of Burgundy, freely acknowledged that Joan had now won so much honour and renown that all felt that the king's enemies had no longer any power against her.

Instead of pressing home their advantage by a bold attack upon Paris, Joan and the French commanders turned back to rejoin the dauphin, who was staying with La Trémoïlle at Sully-sur-Loire. She was with him at St. Benoît-sur-Loire, then at Châteauneuf, arguing all the time to overcome his hesitancy and the advice of hostile counselors. She was not unaware of the danger and difficulties but declared them of no account, insisting on the necessity of going swiftly to Reims: "De tout cela je ne tiens aucun compte; maintenant il faut aller à Reims," she said. Ultimately she won Charles to her view.

From June 25, 1429, the army began to assemble at Gien; it was from there that the dauphin sent out the customary letters of summons to the coronation. Joan wrote two letters: one to the people of Tournai, always loyal to Charles; the other to the duke of Burgundy, Philip the Good. She and the dauphin set out on the march to Reims on June 29. On their reaching Auxerre, the city promised (July 1) to submit when Troyes, Chalons-sur-Marne and Reims had done so; this assurance was accepted and they moved on toward Troyes. Before arriving there, Joan wrote to the inhabitants, promising them pardon if they would submit. They countered by sending a friar, the popular preacher Brother Richard, to take stock of her; but though he returned full of enthusiasm for the Maid and her mission, the townsfolk decided after all to remain loyal to the English. The dauphin held a council and Joan proposed that the town should be attacked; the next morning she began the assault and the inhabitants at once asked for terms (July 10). The royal army then marched on to Chalons; despite an earlier decision to resist, the count-bishop, Jean de Montbéliard-Sarrebrück, handed its keys to Charles. At Chalons Joan met some people from Domremy, including her godfather, Jean Morin, who had come especially to see her. On July 16 the royal army reached Reims, which opened its gates to Charles. The consecration of the king took place on July 17. Joan was present at the consecration, standing with her banner not far from the altar. After the ceremony she knelt before Charles, calling him her king for the first time. That very day she wrote to the duke of Burgundy, adjuring him to make his peace with the king and to withdraw his garrisons from the royal fortresses. Meanwhile her father and Durand Laxart had come from Domremy to see her again.

From Reims to Paris.—The king left Reims on July 20, 1429, and for a month the army paraded through Champagne and the Île de France. At Provins (Aug. 2), Charles decided on a retreat to the Loire, which implied abandoning the plan to attack Paris. The loyal towns which would thus have been left to the enemy's mercy expressed some alarm; Joan, who was opposed to the decision, wrote to reassure the citizens of Reims on Aug. 5, mentioning a fortnight's truce made with the duke of Burgundy, after which it was hoped that he would yield Paris. In fact, on Aug. 6, English troops prevented the royal army from crossing the Seine at Bray, so that it fell back on Provins, much to the delight of Joan and the commanders. They returned to Château-Thierry and thence set out toward Dammartin. Everywhere acclaimed, Joan was now, according to the chronicler Georges Chastellain, the idol of the French. For her part, she was enchanted with the people and the land and expressed the wish that, if it pleased God, she might, when she had finished her days, be buried in that district: "Voyez, quel bon peuple. Plaise à Dieu que je sois heureuse quand je finirai mes jours de pouvoir être inhumée dans cette terre." She confided to Renaud de Chartres, the archbishop of Reims, that she would now like to go back to tending her parents' flocks.

At Montepilloy, near Senlis, on Aug. 14, 1429, the French and English armies again came face to face as at Patay; but this time only skirmishes took place, neither side daring to start a battle, though Joan carried her standard up to the enemy's earthworks and openly challenged them. Meanwhile Compiègne, Beauvais—whence the bishop, Pierre Cauchon (*q.v.*), fled precipitately—Senlis and other towns surrendered to the king; soon afterward, on Aug. 28, a four months' truce for all the territory north of the Seine was concluded with the Burgundians.

Joan, however, was becoming more and more impatient; she thought it essential to take Paris. "Par mon martin," she said to Alençon one day at Compiègne, "je veux aller voir Paris de plus près que je ne l'ai vu." She and Alençon were at St. Denis on Aug. 26, and the Parisians began to organize their defenses; Charles arrived on Sept. 7 and an attack was launched on Sept. 8, directed between the Porte St. Honoré and the Porte St. Denis. The Parisians could be in no doubt of Joan's presence among the besiegers: she stood forward on the earthworks, calling on them to surrender their city to the king of France. She was wounded, but continued to encourage the soldiers; nevertheless, she had ultimately to abandon the attack. As an act of devotion she offered her armour and sword at the shrine of St. Denis. When,

next day, she and Alençon sought to renew the assault, they were met with a command to retreat.

From Paris to Compiègne.—Charles VII retired to the Loire, Joan following him. At Gien, which they reached on Sept. 22, 1429, the army was disbanded and Alençon and the other captains went home. Only Joan remained with the king. She wrote to the citizens of Troyes on Sept. 22, but that letter is lost. Later on, when Alençon was planning a campaign in Normandy, he asked the king to let Joan rejoin him, but La Trémoïlle, Raoul de Gaucourt and Renaud de Chartres dissuaded him. With the king, therefore, Joan went on to Bourges, where she stayed three weeks in the house of René de Bouligny, councilor general of the finances; 26 years later his wife, Marguerite La Touroulde, was to recall her goodness and her generosity to the poor. At Montfaucon-en-Berry Joan met a clairvoyant, Catherine de La Rochelle, who told Joan that she wished to effect a reconciliation between the duke of Burgundy and the king of France. Joan replied that in her view no peace could be found save at the lance's point; and she told Charles that the woman's pronouncements were foolish and empty. In Oct. 1429 she was sent with Charles, sire d'Albret, against St. Pierre-le-Moutier; it was through her courageous assault, with only a few men, that the town was taken. They then laid siege to La Charité-sur-Loire. Short of munitions, they appealed to Riom and Clermont, but the supplies arrived too late, so that after a month they had to raise the siege, just before Christmas.

Joan then rejoined the king, who was spending the winter at Meung-sur-Loire. They moved to Sully-sur-Loire in Feb. 1430. Late in Dec. 1429, Charles issued letters patent ennobling Joan, her parents and her brothers. Early in 1430 the duke of Burgundy began to threaten Brie and Champagne; the citizens of Reims became alarmed and Joan wrote to them on March 16 and 28 to assure them of the king's concern and that she would come to their defense. Burgundy moved up to attack Compiègne; the townsfolk determined to resist and, in late March or early April, Joan left the king and set out to their aid, accompanied only by her brother Pierre, Jean d'Aulon and a small troop of men at arms. She arrived at Melun between April 17 and 22, and it was no doubt her presence that stimulated the townsfolk to declare themselves for Charles VII.

At Lagny-sur-Marne, Joan joined the young girls of the town in prayer for a dead baby, which then returned to life long enough to receive baptism. When she learned that a Burgundian mercenary, Franquet d'Arras, was in the vicinity, she went out to engage him, and after a hard fight Franquet was captured. Joan at first planned to exchange him against a Parisian supporter of the king; but on hearing that her protégé was dead she allowed the *bailli* of Senlis to try Franquet and condemn him to death.

Joan was at Compiègne by May 14, 1430. There she found Renaud de Chartres and Louis I de Bourbon, comte de Vendôme. With them she went on to Soissons, but the townsfolk there refused them entry (May 18). Renaud and Vendôme therefore decided to return south of the Marne and Seine rivers; but Joan refused to accompany them, preferring to return to "her good friends" in Compiègne.

Capture by the Burgundians.—On her way back, at Crépy-en-Valois (May 22, 1430), Joan heard that John of Luxembourg had laid siege to Compiègne; she hurried on and entered Compiègne under cover of darkness. The next afternoon (May 23) she led a sortie and twice repelled the Burgundians, but was eventually outflanked by English reinforcements and compelled to retreat. Remaining till the last in order to protect the rear guard while they crossed the Oise river, she was unhorsed and could not remount. This was early in the evening. She gave herself up to Guillaume, bastard of Wandonne, who took her to Margny with her brother Pierre and Jean d'Aulon. The duke of Burgundy came to see her. The people of Reims were apprised of Joan's capture by Renaud de Chartres, who accused her of rejecting all counsel and of having acted utterly wilfully.

John of Luxembourg sent Joan and Jean d'Aulon to his castle at Beaulieu in Vermandois. As she tried to escape in order to return to Compiègne, he sent her farther away, to the castle of Beaurevoir, between Cambrai and St. Quentin. There, though she was very kindly treated by his wife, Jeanne de Bethune, and by his aunt, she became more and more distressed at the predicament of Compiègne; her desire to escape became so great that she jumped from the top of a tower, falling unconscious into the moat. Not seriously hurt, she was taken to Arras, a town belonging to the duke of Burgundy, when she had recovered.

News of Joan's capture had reached Paris on May 25, 1430. Next day, the University of Paris, in the interests of the English cause, requested the duke of Burgundy to hand Joan over for judgment either to the chief inquisitor or to the bishop of Beauvais, Pierre Cauchon, in whose diocese she had been captured. The university wrote also, to the same effect, to John of Luxembourg; and on July 14 the bishop of Beauvais presented himself before the duke of Burgundy asking, on his own behalf and in the name of the English king, that the Maid be handed over in return for a payment of 10,000 francs. The duke passed on the demand to John of Luxembourg, who hesitated until Nov. 21; but by Jan. 3, 1431, Joan was in the bishop's hands. The trial was fixed to take place at Rouen. Joan was then imprisoned in a tower of the castle of Bouvreuil, which was occupied by the earl of Warwick (Richard de Beauchamp), commander at Rouen. Thus it came about that Joan, whose offenses against the English king were common knowledge, was brought to trial before a court concerned with matters of faith and morals. Her judges were to be the bishop of Beauvais and Jean Le Maistre, vice-inquisitor of France.

The Trial.—From Jan. 13, 1431, statements taken in Lorraine and elsewhere were read before Cauchon and his assessors; they were to provide the framework for Joan's interrogation. Summoned to appear before her judges on Feb. 21, she asked for permission to attend Mass beforehand, but it was refused on account of the heinousness of the crimes with which she was charged. She was ordered to swear to tell the truth and did so swear; but she always refused to reveal the things she had said to Charles. Cauchon forbade her to leave her prison, but Joan insisted that she was morally free to attempt escape. To the two English soldiers who stood guard outside the door of her cell, there were, therefore, added a further three, who remained always inside the cell with her; and she was chained to a wooden block and sometimes put in irons. Between Feb. 21 and March 24 she was interrogated about a dozen times, either in the castle chapel or in her prison; on every occasion she was required to swear anew to tell the truth, but she always made it clear that she would not necessarily divulge everything to her judges since they were the enemies of King Charles. The report of this preliminary interrogation was read through to her on March 24; apart from two points she admitted its accuracy. On the following day, which was Palm Sunday, she asked to hear Mass. Told that she might do so if she would change into women's clothing, she retorted that clothing did not affect the soul and it was not contrary to the church's law for a woman to wear male clothing.

The trial proper began a day or so later and it took two days for Joan to answer the 70 charges which had been drawn up against her. These were based mainly on the contention that her whole attitude and behaviour showed blasphemous presumption: in particular, that she claimed for her pronouncements the authority of divine revelation; prophesied the future; endorsed her letters with the names of Jesus and Mary; claimed to be assured of salvation; immodestly wore men's clothing; and dared to claim that her saints spoke in French and not in English. Perhaps the most serious charge was of preferring what she assumed to be the direct commands of God to those of the church militant; this was interpreted as a withdrawal of that belief in the church which is expressed in the clause *et unam sanctam ecclesiam catholicam* in the Apostles' Creed.

She was questioned again on March 31 on several points over which she had been evasive, notably on the question of her submission to the church militant. In her position, obedience to the court which was trying her would inevitably be made the test of such submission. She did her best to avoid this trap, saying she knew well that the church militant could not err; but it was to God that she held herself answerable for her words and actions.

The trial continued: the 70 charges were reduced to 12, which were sent for consideration to many eminent theologians in Paris as well as at Rouen.

Meanwhile, Joan fell ill in prison; she was attended by two doctors, since it did not suit the earl of Warwick that she should die with the trial unresolved. She received a visit on April 18 from Cauchon and his assistants, who exhorted her to heed their advice. Joan, who was seriously ill and obviously thought she was dying, begged to be allowed to go to confession and receive Holy Communion and to be buried in consecrated ground. But they continued to badger her with their admonitions until May 2, receiving only her constant reply, "Je m'en attends à Notre Seigneur," "Je m'en rapporte à ce qu'autrefois j'ai répondu" ("I am waiting on Our Lord," "I hold to what I have already said"). They became more insistent on May 9, threatening her with torture if she did not clarify certain points. She answered that even if they tortured her to death she would not reply differently, and added that in any case she would afterward maintain that any statement had been extorted from her by force. In face of this common-sense fortitude her enemies, by a majority of ten to three, decided three days later that torture would be useless. Joan was informed on May 23 of the decision of the University of Paris that if she persisted in her errors she would be handed over for punishment (*i.e.*, execution) to the secular authorities. A young theologian attempted once more to change her mind, but she maintained the truth of what she had said in the trial.

Abjuration, Relapse and Execution.—Nothing more, therefore, could be done. She was brought out of prison, for the first time in four months, on May 24 and was taken to the cemetery of the church of St. Ouen where the sentence was to be read out. First she had to listen to a sermon by Guillaume Erard, one of the theologians; during his peroration he violently attacked Charles VII, provoking Joan to interrupt him: "Ne parlez pas du roi, car il est bon chrétien, parlez de moi." She thought he had no right to attack the king, a "good Christian," and should confine his strictures to her. After the sermon was ended she asked that all the evidence on her words and deeds should be sent to Rome "à notre saint père le pape, à qui et à Dieu le premier je m'en rapporte." But her appeal to the pope, to whom, under God, she would be answerable, was ignored, and they began to read out the sentence abandoning her to the secular power. Hearing this dreadful pronouncement, Joan quailed, saying she would do all that the church required of her. She was, therefore, presented with a form of abjuration, which must already have been prepared. She hesitated in signing it, eventually doing so "pourvu que cela plaise à Notre Seigneur," on condition it was pleasing to Our Lord. She was then condemned to perpetual imprisonment or, as some maintain, to imprisonment in a place habitually used as a prison.

In any case, the English insisted on her returning to her former prison; she obeyed the order of the vice-inquisitor that she should wear women's clothes. But two or three days later, when the judges and others visited her, they found her again in male attire; she said she had made the change of her own free will, preferring men's clothes. They then pressed other questions, to which she answered that St. Catherine and St. Margaret had censured her "treason" in making an abjuration. These admissions were taken to signify relapse, and on May 29 the judges and 39 assessors agreed unanimously that she must be handed over to the secular authorities. The next morning, May 30, 1431, Joan received from Cauchon permission, unprecedented for a relapsed heretic, to make her confession and receive communion. Accompanied by two Dominicans she was then led to the Place du Vieux-Marché. There she endured one more sermon, and the sentence abandoning her to the secular arm, that is, to the English, was then read out in the presence of her judges and of a great crowd. The executioner seized her and led her to the stake, lighting the pyre. One of the Dominicans, Martin Lavenu, consoled Joan, who asked him to hold high a crucifix for her to see and to shout out the assurances of salvation so loudly that she should hear him above the roar of the flames. To the last she maintained that her voices were sent of God and had not deceived her.

Few witnesses of her death seem to have doubted her salvation; and 26 years later, at the rehabilitation, all witnesses agreed that she had died a faithful Christian. The executioner had never before found his task so fearful; he afterward declared that Joan's heart would not burn and that he found it intact amid the ashes. A few days later the English king and the University of Paris formally published the news of Joan's execution.

Rehabilitation.—Almost 20 years afterward, on his entry into Rouen in 1450, Charles VII ordered an inquiry into the trial. Two years later the cardinal legate Guillaume d'Estouteville made a much more thorough investigation. Finally, on the order of Pope Calixtus III, proceedings were inaugurated which revoked and annulled the sentence of 1431. Joan was canonized by Pope Benedict XV on May 16, 1920, and the church celebrates her feast on May 30. The French parliament, on June 24, 1920, decreed a national festival in her honour; this is held on the second Sunday in May.

Character and Importance.—Joan's place in history is assured. Her relief of Orléans undoubtedly proved a turning point in the Hundred Years' War; and her achievement in reviving the courage of the French people and their faith in the Valois dynasty is in no way belittled by acknowledging that the reconciliation between Charles VII and the duke of Burgundy (1435) was yet to provide the practical basis for a French recovery which could in any case hardly have been averted once England in its turn began to be rent by civil war. Beyond this, the story of Joan's mission will probably always be a source of controversy for historians and psychologists. Innumerable facts about her campaigns and about the motives and actions of her supporters and enemies are subject to dispute: whether, for instance, she made one or two visits to Robert de Baudricourt; how she was able to convince the dauphin at their first meeting at Chinon; whether Charles's perambulations after Reims represent triumphant progress or scandalous indecision; what Cauchon meant by "perpetual imprisonment"; whether Joan, after her recantation, resumed men's clothes really of her own free will and at the bidding of her voices, or, as one story has it, because they were forced upon her by her English jailors.

Assessments of Joan's character and mission can be equally varied; some will agree with the church that she was a saint, others dub her a deluded hysteric. It is interesting to know that statues of all the three saints of whom she had visions and whose voices she allegedly heard stood in the church at Domremy. Joan liked gay clothes and undoubtedly enjoyed the acclamations of the crowds. Her sturdy piety must at times have been infuriating: she was constantly ordering that the entire royalist army go to confession, and she lost valuable tactical advantages by refusing battle on Sundays or festivals, saying that God would make it up to them, they would win other victories. Her answer to her judges, demonstrating the pointlessness of employing torture, shows her practicality; she could shrewdly turn off stupid questions, replying to a query as to whether St. Michael had long hair by asking why it should have been cut off.

But essentially Joan exhibits the basic characteristic and stamp of the genuine prophets and saints, utterly subordinated to a particular task which they believe has been inexorably laid upon them by divine command; Joan differs from many of them only in that she seems never, except for a few days near the end, to have swerved from her appointed path.

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JOAN THE MAD (Sp. JUANA LA LOCA) (1479–1555), nominally queen of Castile (1504–55) and Aragon (1516–55), and mother of the emperor Charles V, was important only for the legal rights and the genetic misfortunes she transmitted to her descendants, the Spanish Habsburgs (*see* HABSBURG). Joan was the second daughter and third child of Ferdinand II of Aragon and Isabella I of Castile, and was born at Toledo on Nov. 6, 1479. In 1496 Ferdinand married her to Philip of Burgundy as part of his policy of winning allies against France. Joan seems to have inherited her mental instability from her maternal grandmother, Isabella of Portugal. It showed itself from at least as early as 1502, in the first place as extravagant, if justified, jealousy of her philandering husband. After the deaths of her elder brother, Juan (1497), and sister, Isabella (1498), and Isabella's son Miguel (1500), Joan became heiress to Castile and Aragon. (*See* PHILIP I of Castile.)

On her mother's death (1504), Philip claimed the crown of Castile. In his struggle with Ferdinand of Aragon for the control of that kingdom, both seem to have been agreed that, whoever won, Joan must not be allowed to exercise any power. The shock of Philip's sudden death (1506) plunged Joan into irremediable insanity. In 1509 she retired to Tordesillas where she was kept under guard, living in depression and squalor with the embalmed corpse of her husband close at hand. In 1520, Juan Padilla, the leader of the *comunero* revolt, captured Tordesillas; but he failed to induce Joan to sign a document lending the authority of her royal name to the *comunero* movement. Joan died at Tordesillas on April 11, 1555. Apart from the emperor Charles V, Joan had one other son, Ferdinand (1503–64), who succeeded Charles as emperor, and four daughters: Eleanor (1498–1558), who married successively Manuel I of Portugal and Francis I of France; Isabella (1501–25), who married Christian II of Denmark; Maria (1505–58), who married Louis II of Hungary; and Catherine (1507–78), who married John III of Portugal. It seems likely that Joan transmitted her mental instability to her great-grandson Don Carlos and, through the many Habsburg intermarriages, in an attenuated form also to Charles II of Spain. (H. G. Ko.)

JOAN I (1326–1382), queen of Naples from 1343 to 1382, of the Angevin dynasty, was the daughter of Charles, duke of Calabria (d. 1328), and the granddaughter of King Robert, whom she succeeded in 1343. In the same year, in accordance with a betrothal of 1333, she was married to her second cousin Andrew, younger brother of Louis I (*q.v.*) of Hungary. There was, however, no affection between them; and the designs of their cousins of the houses of Taranto and Durazzo on the Neapolitan crown spread an atmosphere of intrigue. When Andrew was murdered (1345), Joan was accused of having been privy to the crime.

The grand seneschal Niccolò Acciaiuoli hoped that Joan's marriage (1347) to Louis of Taranto would reduce tension, but Louis of Hungary led an expedition against Naples. Joan fled to Avignon, in her county of Provence, to seek protection from Pope Clement VI. Acquitted of the charges relating to Andrew's murder, she sold Avignon to the papacy for 80,000 gold florins (1348).

Returning in triumph to Naples in Aug. 1348, Joan and Louis withstood another Hungarian attack (1350–52); and Louis was crowned with her in May 1352. Internal strife, however, continued, encouraged by dissension between Joan and Louis, which ended only with the latter's death (1362). Joan then married James III (IV) of Majorca, but his efforts to recover his own kingdom kept him mostly absent from Naples till his death in 1375.

The period 1370–74 was less unhappy for Joan. Papal support and the shrewd counsels of the grand seneschal Niccolò Spinelli helped her to restore order. Also, negotiations in 1371–73 put an end to the ancient quarrel between Angevins and Aragonese over Sicily: Frederick III of Sicily acknowledged himself a vassal both of Naples and of the papacy, and Joan recognized him as "king of Trinacria," renouncing her own claims to rule the island.

At the papal schism of 1378 Joan unfortunately recognized the antipope Clement VII. Pope Urban VI, himself a Neapolitan and enjoying the support of the Neapolitans, excommunicated her. Charles of Durazzo (*see* CHARLES III), with Hungary's support, then prepared to depose her. To defend herself Joan confirmed her alliance with Charles V of France and adopted as her heir his brother Louis; but Louis could not come to her help in time. While her fourth husband, the military adventurer Otto of Brunswick, whom she had married in the winter of 1375–76, was immobilized in Puglia, Charles of Durazzo seized Naples and imprisoned Joan in the castle of Muro in Lucania, where she was put to death in the summer of 1382 (May 22 or July 27?).

Joan was a patron of the poets and scholars of her time, including Petrarch and Boccaccio.

See E. G. Léonard, *Histoire de Jeanne Ière, reine de Naples, comtesse de Provence,* 3 vol. (1932–37), and *Les Angevins de Naples* (1954). (E. Po.)

JOAN II (1371–1435), queen of Naples from 1414 to 1435, was the daughter of Charles III. Her first husband, William of Austria, having died in 1406, she was a widow when she succeeded her brother Ladislas (*q.v.*) on the throne. Fickle, sensual and unsure of herself, she was soon entangled by her entourage in a web of intrigue. The *condottiere* Muzio Attendolo Sforza, who had served Ladislas well, thought himself indispensable to her and hoped to control the kingdom; but Joan's lowborn 26-year-old lover and grand chamberlain, Pandolfello Alopo, had him arrested on a charge of working for the French party. Soon, however, fearing Sforza's soldiery, Alopo came to terms with him and they agreed to share power. Against this arrangement, the Neapolitan barons decided that a proper husband must be found for Joan. Jacques de Bourbon, comte de La Marche, was chosen. He arrived with a retinue of adventurers and was made a partner in the government, but soon made himself hated by behaving as a king in his own right. Alopo was condemned to death, Sforza was imprisoned, the queen was thrust aside and even the barons who had called Jacques in were slighted. Revolt broke out, and Jacques had to give up power and finally to leave Naples (1416).

Joan's next favourite was the nobleman Giovanni Caracciolo, called Sergianni, whom she made grand seneschal. He sent Sforza off to Rome, where Braccio da Montone had seized control from the forces left there by Ladislas. Sforza expelled Braccio; and the newly elected pope, Martin V, anxious to restore papal authority in the States of the Church and the traditional relationship between the papacy and Naples, soon came to terms with Joan and sent a legate to crown her queen (Oct. 1419). In Naples, however, Sforza and others formed a strong faction against Sergianni and began looking to the pretender Louis III (*see* LOUIS, kings of Naples); and the distracted pope finally acknowledged Louis as Joan's heir. Joan then appealed to Alfonso V of Aragon, whom she promised to adopt. Louis III's fleet failed to take Naples, and Alfonso arrived there in July 1421.

The heavy cost of maintaining Aragonese troops and employing Braccio against Louis led Alfonso to intervene more and more in Neapolitan affairs. Resenting this, Sergianni persuaded Joan that Alfonso wanted to dethrone her. They therefore invited Sforza back to Naples as protector. In 1423 Alfonso arrested Sergianni and besieged Joan in Castel Capuano, but Sforza arrived to save her. Taken by Sforza to Aversa, she there revoked her adoption of Alfonso and adopted Louis. Milan declared itself for Joan and for Louis against Alfonso, and Castile attacked Aragon itself. Alfonso went hastily home, and the forces left by him under his brother Peter soon had to evacuate northern Italy.

Sforza and Braccio both died in 1424, Louis was sent to govern Calabria, Sergianni seemed supreme in Naples. Sergianni, however, afraid of the barons' influence, tried to keep Joan isolated and even made new advances to Alfonso. Finally Covella Ruffo, duchess of Sessa, had Sergianni assassinated (1432).

Alfonso reappeared at the end of 1432 in Italy; and in April 1433, Joan disinherited Louis and readopted Alfonso—only to readopt Louis in June. In 1434, however, Louis died, leaving his claims to his brother René. Joan died on Feb. 2, 1435.

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JOAN OF NAVARRE (*c.* 1370–1437), queen consort of Henry IV (*q.v.*) of England, was the daughter of Charles II the Bad, king of Navarre, and Joan, daughter of King John II of France. In 1386 she married, as his third wife, John IV, duke of Brittany, by whom she had at least eight children. Two sons, John V (d. 1442) and Arthur III (d. 1458), became dukes of Brittany; daughters married an Alençon, an Armagnac and a Rohan. Regent for two years after her husband's death (1399), she married (Feb. 7, 1403) Henry IV of England, whom she had already married by proxy in 1402. If his motive was a Breton alliance, it was disappointed: Joan lost all influence in the duchy and there was trouble about her dowry. A certain xenophobia was early evident against her in England; with the king's death in 1413 and the adoption of an active anti-French policy this seems to have increased. In 1419 she was accused of witchcraft, imprisoned, and her dowry revenue was profitably confiscated by the government. She was released in 1422 and the rest of her life was on the whole uneventful, though her entourage was accused of espionage in 1425. There was still trouble in extracting her dowry from a hostile Brittany, but in the end she was not too badly provided for. Childless by Henry IV, she died on July 9, 1437, at Havering-atte-Bower, Essex.

See A. Strickland, *Lives of the Queens of England,* vol. iii (1840); A. Le Moyne de la Borderie and B. Pocquet, *Histoire de Bretagne,* vol. iv (1906). (P. S. LE.)

JOAN, POPE, a mythical female pope supposed, under the title of John VIII, to have reigned for two and one-half years between the pontificates of Leo IV (847–855) and Benedict III (855–858). The earliest extant source for the story is the *De septem donis Spiritu Sancti* ("The Seven Gifts of the Holy Spirit") of the French Dominican Stephen of Bourbon (d. 1261). In his account the woman pope is not named and is described as a clever scribe who became first a papal notary and was elected pope in about 1100. Pregnant at the time of her election, she gave birth during the procession to the Lateran palace, whereupon she was immediately dragged by her feet out of the city and stoned to death. The story was widely spread during the later 13th century, mostly by the friars and primarily by means of interpolations made in many manuscripts of the *Chronica pontificum et imperatorum* of the Dominican Martin of Troppau (d. 1278). The female pope was now alleged to have lived in the 9th century, perhaps partly because in some manuscripts there was available space after the entry on Leo IV.

To allow for a pontificate of two and one-half years it was now asserted that she died in childbirth during an ordinary papal procession and was buried where she died. Support for this story was derived from the fact that papal processions used to avoid a particular street, allegedly where the disgraceful event had occurred. A monumental stone, bearing an inscription which no one in medieval times had enough classical learning to decipher, was declared to be her tombstone.

The name Joan was not finally adopted till the 14th century; other variants were Agnes or Gilberta. According to the legend, Joan was an Englishwoman, but her birthplace was given as Mainz and some writers tried to reconcile these conflicting statements by explaining that her parents migrated to Mainz. She was alleged to have fallen in love with an English Benedictine monk and, dressed in man's clothes, to have accompanied him to Athens. From there, having acquired great learning, she moved on to Rome and became a cardinal and then pope.

From the 13th century onward the story appears fairly regularly in literature. Followers of Martin of Troppau include the English chronicler Ranulf Higden, and Boccaccio and Petrarch. During the 16th and 17th centuries the story was used for Protestant polemics. Scholars such as Aeneas Silvius, afterward Pope Pius II, and Caesar Baronius regarded the story as unfounded, but it was a Calvinist, David Blondel, who made the first determined attempt to destroy the myth in his *Éclaircissement familier de la question: Si une femme a été assise au siège papal de Rome* (1647).

See J. Döllinger, *Fables Respecting the Popes of the Middle Ages* (1871).

JOANES (JUANES), **JUAN DE:** *see* MACIP, VICENTE JUAN.

JOANNES SCYLITZA: *see* SCYLITZES, JOHN.

JOÃO PESSOA (formerly PARAÍBA), a city and port of northeast Brazil, capital of Paraíba state, on the right bank of the Paraíba do Norte river, 11 mi. above its mouth and 65 mi. N. of Recife. Pop. (1956 est.) 137,726. João Pessoa is connected by rail with Natal to the north and with Recife and Maceió to the south; it is also served by air. Its port is Cabedelo, the leading port of the state, with which it is connected by rail and highway. Colonial buildings include the church of Nossa Senhora das Neves (Our Lady of the Snows) and the Franciscan convent and church. There are a number of parks and squares, and bathing beaches are nearby. Among the industries are a portland cement plant and factories producing cigars and footwear.

Founded in 1585, the city was successively known as Filipea de Nossa Senhora das Neves, Frederikstad and Paraíba. In 1930 the name was officially changed to João Pessoa in honour of the state president who was killed in the Vargas revolution.

(Js. J. P.; X.)

JOASH (JEHOASH; in the Douai version of the Bible, JOAS), the name of two kings in the Bible.

JOASH, son of Ahaziah (*see* AHAZIAH, 2) and king of Judah, obtained the throne by means of a revolt in which Athaliah (*q.v.*) perished; his accession was marked by a solemn covenant and by the overthrow of the temple of Baal and of its priest. In this the priest Jehoiada took the leading part. The Second Book of Chronicles adds several new details, including a tradition of a conflict between the king and priests after the death of Jehoiada (xxii, 11; xxiv, 3, 15 *et seq.*). The king perished in a conspiracy, the origin of which is not clear.

JOASH, son of Jehoahaz and king of Israel. Like his grandfather, Jehu, he enjoyed the favour of the prophet Elisha, who promised him a triple defeat of the Syrians at Aphek (II Kings xiii, 14 *et seq.*). The cities which had been taken from Jehoahaz by the Syrians were recovered and the relief gained by Israel prepared the way for its speedy extension of power. When challenged by Amaziah of Judah, Joash uttered the famous fable of the thistle and cedar, and a battle was fought at Beth-shemesh, in which Israel was completely successful (II Kings xiv, 9–12).

JOB, BOOK OF, a book of the Old Testament, is not only the finest expression of the Hebrew poetic genius; it must also be accorded a place among the greatest masterpieces of world literature. Its theme is the eternal problem of unmerited suffering. The book is found in the third and latest section of the Old Testament canon known as the Writings, or Hagiographa (*see* BIBLE: *Outline of the Books of the Bible: Old Testament*).

Contents.—The Book of Job falls into five main sections:

i–ii:	prologue
iii–xxxi:	dialogue between Job and his friends
xxxii–xxxvii:	speeches of Elihu
xxxviii–xlii, 6:	speeches of God
xlii, 7–17:	epilogue

Prologue and Epilogue.—Although the bulk of the book is in poetic form, the prologue and epilogue are prose. This is probably an old folk tale recounting the story of Job, an Edomite of such outstanding piety that he is mentioned in conjunction with Noah and Daniel in Ezek. xiv, 14, 20. The name Job was common in the Middle Bronze Age, being found in texts ranging from the 19th to the 14th century B.C. Whether the folk tale is preserved in its original oral form, or whether it has been retold by the poet of the dialogue, is not known. However, the fact that an Edomite sheikh is commended by the Hebrew God suggests a date before the 6th century B.C., and the language makes a date in the 8th century probable. At any rate, the story was employed by the poet as a framework for his great work.

Some scholars have maintained that the sections describing the Satan and referring to Job's wife (i, 6–12; ii, 1–10) are later additions. If this is so, the poet seems to have had the prologue before him in its present form when he wrote the dialogue.

The Satan, a member of the heavenly council of God (*cf.* Ps. lxxxii, 1; lxxxix, 5–7; Jer. xxiii, 18; Job xv, 8), acts as an *agent provocateur* to test whether or not Job's piety is rooted in self-interest. Faced with the appalling loss of his worldly possessions, his children and finally his own health, Job refuses to curse God. Three

of his friends, whose names identify them also as Edomites, now arrive to comfort him. At this point the poetic dialogue begins. The conclusion of the tale, as given in the epilogue, describes the restoration of Job, who receives double his original possessions and lives to a ripe old age.

Dialogue.—Although most scholars have dated this section to the 4th century B.C., there is a growing tendency to regard it as two centuries earlier; viz., 580–540 B.C., during the period of the exile. This precise dating is based on the fact that the dialogue shows clear literary dependence on Jeremiah, whereas the equally obvious connections with Isaiah xl ff. suggest the dependence of the latter on Job.

This great poem opens with a heart-rending soliloquy by Job (inspired by Jer. xx, 14–18) in which the sufferer curses the day of his birth. The shocked friends are roused from their silence, and there follow three cycles of speeches (iv–xiv, xv–xxi, xxii–xxvii) in which the friends speak in turn. To each such speech Job makes a reply. The personalities of the friends are skilfully delineated, Eliphaz appearing as a mystic in the prophetic tradition, Bildad as a sage who looks to the authority of tradition, and Zophar as an impatient dogmatist who glibly expounds what he regards as the incomprehensible ways of God.

Eliphaz begins (iv–v) by recounting a mystical vision which revealed to him the transcendence of God and the fact that all men are by nature morally frail. He suggests that suffering may be disciplinary, although this is irrelevant to Job's plight. Finally, he urges contrite submission to God. Job chides his friends for failing him in his hour of need, and charges God with being his tormentor (vi–vii).

Bildad (viii) suggests that the fault may have lain in Job's children, and reiterates Eliphaz' call to humble submission. Job then retorts that this doctrine of God's omnipotence is no answer but a serious problem, for God appears to be merely omnipotent Caprice (ix–x). He is convinced that if he could only meet God in open debate he would be vindicated, but he soon recognizes the need for an impartial third party who could intervene and protect him from God's overpowering might.

Zophar re-echoes his predecessors' views on God but goes the full length of accusing Job himself of sin, and once more urges Job to a contrition which for him could only be hypocritical (xi). Job continues to insist that God is capricious, and defiantly challenges him (xii–xiv), but is bewildered when no reply is forthcoming. His longing for death as a welcome release leads him to ask whether man might not hope for a revival after death, but this daring hope is rejected forthwith.

The second cycle opens with Eliphaz accusing Job of blasphemy and almost exultantly describing the fate of the wicked (xv). In his reply (xvi–xvii), Job returns to the idea of a third party to the debate. But now this umpire or judge has become an advocate, a counsel for the defense. After Bildad has again expatiated on the fate of the wicked (xviii), Job continues to develop his concept of the intermediary (xix). In xix, 25 he actually quotes from an earlier Canaanite epic which is echoed elsewhere (xx, 17; xxvi, 13). The *gō'ēl,* or Vindicator (Redeemer), of this sadly corrupted passage has long been identified with God himself, so that Job "appeals away from the God of orthodox theology to God as He must be" (W. O. E. Oesterley and T. H. Robinson, *An Introduction to the Books of the Old Testament,* The Society for Promoting Christian Knowledge, London, 1934, p. 169).

But scholars in increasing numbers are recognizing the Vindicator as the third party of ch. ix and xvi (the "umpire" or "witness"). Like the Satan of the prologue, this figure, who is a reflection of Baal-Hadad, the fertility god of earlier Canaanite religion, is a member of the divine council. Who better could be the mediator of salvation than the one who, according to the Canaanite myth, had himself suffered and died through the machinations of the gods but through whose resurrection came fertility and life to the world? Such a foreshadowing of the Christian message of the suffering and triumphant Saviour is both striking and daring. This heterodox concept explains why the crucial passages in ch. xvi and xix and the text of ch. xxv–xxvii have been so mutilated by later orthodoxy. Zophar in ch. xx, though freely admitting that the wicked may indeed enjoy some prosperity, describes how they fall victim to inevitable nemesis. Job, however, maintains that the wicked do not end thus, but live on to a ripe old age (ch. xxi).

Eliphaz begins the third cycle by accusing Job at last of specific sins (xxii) and again counsels Job to humble himself before God. But Job cannot find this God, who seems to be completely indifferent to him (xxiii–xxiv). The conclusion of the dialogue is in serious disorder, with speeches placed in Job's mouth that could only have been uttered by the friends. Bildad's speech may be rearranged thus: xxvi, 2–4; xxv, 2–6; xxvi, 5–14. Again he expatiates on the divine power. All of Job's reply that remains seems to be xxvii, 1–6. The final speech of Zophar must be represented by the fragment preserved in xxvii, 7–23. It would appear that the dialogue was intentionally mutilated at this point because of its daring views, which were offensive to orthodox Judaism.

Ch. xxviii is regarded as a later addition by most scholars, since it is hardly in place at this juncture in the dialogue, especially in the mouth of Job. It is a magnificent hymn in praise of Wisdom. Certain verbal similarities suggest that it may have been composed by the author of the speeches of God. Ch. xxix–xxxi contain a monologue by Job designed to answer the charges of Eliphaz in ch. xxii. In them occurs an adumbration of the highest moral ideal to be found in the Old Testament. Nevertheless, some scholars would regard this section too as secondary, especially since, as W. Bovey has observed, "the keen and questioning seeker of the early chapters is presented to us as an unattractive snob well satisfied with his own good works" (*The Hibbert Journal,* 36:360; George Allen & Unwin Ltd., 1937/38).

Speeches of Elihu.—Although a few scholars have maintained that this section formed part of the original work, most reject it as a later insertion. Except for ch. xxxiii, the speeches merely reiterate the trite dogmas of the friends. Although in poetic form, the style is different from that of the dialogue. Very significant is the fact that there is no mention of Elihu in the dialogue or anywhere else in the book, yet the Elihu speeches are familiar with the dialogue, frequently quoting verbatim from it. Ch. xxxiii is of special interest, for it appears to contain the writer's notes and comments on the dialogue, often citing passages from it. If this be so, it may be of importance for the reconstruction of the mutilated conclusion of the latter, since the author seems to have had the dialogue before him in its original form. He refers to the superhuman intermediary and describes him as the agent of Job's subsequent restoration. Worthy of notice is the writer's emphasis on the disciplinary value of suffering.

Speeches of God.—This section, accepted by most scholars as a genuine part of the original poetic work (with the probable exception of the descriptions of Behemoth and Leviathan, xl, 15–xli, 34), suddenly introduces God in a majestic theophany, whereupon he thunders at Job in three speeches (xxxviii, 1–xxxix, 30; xl, 1–2; xl, 6–xli, 34) interspersed with two short speeches by Job (xl, 3–5; xlii, 1–6). The theme of God's words is the divine might in the world of nature. If the speeches are accepted as genuine, the conclusion to be drawn is that God's ways are incomprehensible to the finite mind of man. Job, through this "existentialist confrontation," stands in a new relationship to God: no longer based on hearsay, but the result of an act of personal faith expressed in repentance. The discussion is thus raised to a new plane.

Many scholars, however, deny the originality of this section. They point out that it presents a very different Job from the sufferer of the dialogue. In the latter he maintains his integrity till the last, whereas in this section he repents "in dust and ashes"; in the dialogue he yearns to face God in open debate, but when at last confronted by God here, there is no suggestion of an argument. The real problem Job faces in the dialogue is left untouched. Further, there is no hint of the vindication of Job presupposed by the dialogue and Elihu's notes on it in ch. xxxiii. Rather, the Deity bludgeons the sufferer mercilessly with ridicule and biting sarcasm. Worst of all, after the divine speeches have expounded the might and majesty of God in terms exceeding those of the friends, the epilogue has God say to Eliphaz, "'My wrath is kindled against you and against your two friends; for you have not spoken of me what is right, as my servant Job has'" (xlii, 7)! The fact that

ch. xxxiii, after tracing the course of the dialogue, makes no reference to the theophany strengthens the evidence against this section and suggests that it is an even later addition than the Elihu speeches.

The Problem of Theodicy.—*In Mesopotamia.*—The problem of divine justice posed by the prosperity of the wicked and the suffering of the righteous finds its earliest expression in the literature of Mesopotamia. A Sumerian poem, probably from the period following the overthrow of the Sumerian 3rd dynasty of Ur, in the 2nd millennium B.C., when much of the land was under the sway of Amorites and Elamites, tells how illness and suffering befell a righteous man. However, when at last he humbled himself before his god and made confession of sin since, as he said, "Never has a sinless child been born to its mother" (S. N. Kramer, in M. Noth and D. W. Thomas [ed.], *Wisdom in Israel and in the Ancient Near East;* Leiden, E. J. Brill, 1955, p. 179), he found deliverance from his misery.

Toward the end of the 2nd millennium B.C., when once more a foreign invader, the Kassites, had overwhelmed the land, the Babylonians were driven to question the traditional religious concepts. It was clear that the wicked were not always punished, nor the righteous rewarded. If suffering was to be regarded as evidence of sin, then it must be assumed that unwitting sins were often the cause of such punishment. Otherwise they could only reluctantly conclude that divine justice did not parallel its human counterpart. Two poetic works dealing with this theme were produced during this period.

The first is the "Poem of the Righteous Sufferer," a composition extending originally to some 480 lines. It takes the form of a monologue by a noble who has been deprived of wealth and power and smitten with a loathsome disease. The sufferer complains that all his former piety counts for nothing and holds the god Marduk responsible for his plight. Eventually, through the medium of three dream experiences, he is restored to health and makes his way to offer thanksgiving at the temple of Marduk. There is no real solution to the problem: merely that Marduk smites and Marduk heals—blessed be Marduk!

Slightly later than this text is another work, known as the "Babylonian Theodicy," cast in the form of an acrostic poem of almost 300 lines. It consists of 27 strophes and is a dialogue in which the participants speak in alternate strophes. The first speaker bewails the fact that he has experienced only misfortune. His friend urges renewed piety. However, the sufferer finally forces his friend to admit that the gods themselves created man prone to falsehood and injustice. The poem ends with an appeal by the sufferer to the deities to grant him mercy. Here, too, no satisfactory solution is achieved.

In Israel.—The belief was current in Israel, as in Mesopotamia, that evil was always punished and virtue rewarded. In the prophetic writings evil results in doom for the nation, but this is modified in the course of time so that a righteous remnant may escape destruction. Punishment for the sins of fathers might also be visited on their children (Deut. v, 9). The historical works edited during the exile and permeated with the Deuteronomic point of view exhibit the same doctrine (*cf.* also Deut. xxviii; Lev. xxvi). The gradual emergence of a belief in the moral responsibility of the family as opposed to the nation appears in passages such as II Sam. xxiv, 17. Assyrian domination, however, and the later Babylonian conquest which resulted in the exile led to the collapse of the nation as the unit and to the rise of individualism. This was accompanied, as in Mesopotamia, by a questioning of many traditional beliefs, among them that of divine justice. The doctrine of individual responsibility finds its earliest expression during the exile in the teaching of Ezekiel (ch. xviii; especially xviii, 2 = Jer. xxxi, 29) and is reflected in popular sayings (Prov. xii, 21; xiii, 21).

The problem of theodicy was raised by the prophets Habakkuk (i, 2–4, 13) and Jeremiah (xii, 1–4) at the time of the Babylonian invasion. It finds its fullest and finest expression in the Book of Job during the exile and later. In the difficult days of adjustment after the return of the exiles to Palestine, many in Israel were deeply disturbed by the problem, as the prophet Malachi indicated (ii, 17; iii, 14 f.). Some orthodox circles sought to explain the prosperity of the wicked as merely temporary (Ps. xxxvii, xlix, lxxiii). The afflictions of the righteous were less easy to explain away, and some thinkers regarded them as having a salutary disciplinary value (Prov. iii, 11 f.; Ps. xciv, 12 f.; so also Job v, 17; xxxiii, 14–22). A profound and original approach to the problem was taken by the unknown prophet of the exile whose writings are preserved in Isa. xl f. In his Servant Songs he developed the noble concept of the vicarious suffering of the nation for the sake of all mankind (*see* ISAIAH, BOOK OF).

When a doctrine of immortality finally made its appearance, the problem of injustice in life became less perplexing. This is undoubtedly the reason why no discussion of theodicy has been found in the literary remains of ancient Egypt; the Egyptians' fully developed belief in immortality allowed rewards and punishments to be projected into the future life. In Mesopotamia no such belief ever emerged, while in Israel it was late in developing. The earliest clear references to a resurrection are to be found in Is. xxvi, 19 and Dan. xii, 2, usually dated to the 3rd and 2nd centuries B.C. respectively. Prior to this time an attempt was made by one writer to find compensation for his sufferings in a spiritual fellowship with God in this life (Ps. lxxiii, 23–26).

Many refused to accept this new doctrine. Ben Sirach rejected any possibility of immortality (Ecclus. xvii, 30) and consequently suggested that suffering had a disciplinary value (xxxii, 14) and affirmed that the inequality was redressed at the time of death when one's children reaped the reward (xi, 26–28). The author of the Book of Ecclesiastes, who likewise refused to accept the doctrine, was also forced to deal with the problem of theodicy (vii, 15), and emphasized the inscrutability of God's ways (viii, 17; ix, 2–3, 11). On the other hand, the writer of the Wisdom of Solomon, who believed in a spiritual immortality of a Platonic type, easily dismissed the problem (iii, 13, f.; iv, 1, 7–14).

Literary Form and Style.—A few scholars, beginning in the mid-18th century, have attempted to demonstrate the influence of Greek tragedy upon the form of the book. This has not met with acceptance by most critics. Apart from the difficulties of date, there is little in the work of a truly dramatic nature. Neither is it a philosophical discussion in the style of the Platonic dialogues. It is a deeply religious poem with dramatic possibilities.

The book is a skilful blend of many genres: folk tale, hymn, individual complaint, prophetic oracle and didactic poem. The poetry is of a very high order and exhibits such formal features as strophic structure, a rich use of metaphor and simile as well as irony.

Solution to the Problem.—The various sections must be distinguished. In the prologue Job's calamities are presented as a test of disinterested piety. In the dialogue the friends support the orthodox view that suffering is the result of sin. Having pointed out that this is the natural lot of all men because of their human imperfection (although this does not explain the severity of Job's affliction) and merely alluding in passing to the fact that suffering may have a corrective purpose, they proceed to lay the blame in succession on his children, his own blasphemy and self-righteous attitude, and finally on a whole list of assumed sins. For Job himself the only rational solution possible is that God, though omnipotent and omniscient, is unjust or at least amoral. He is then driven to assume the necessity of a mediator who can meet the transcendence of God. The dialogue does not offer a reason for Job's suffering, since this has already been provided in the prologue. Rather it points out how erroneous the accepted religious views are, and seeks to provide a bridge between God and man.

The Elihu speeches stress the disciplinary function of suffering. Finally, the speeches of God maintain that the divine nature and wisdom are so far beyond the comprehension of frail man's finite mind that it is futile for him to attempt to fathom them. He can do naught else than respond in faith and prostrate himself before his Maker, "lost in wonder, love and praise." If there be any solution here it can only be the implication that God has a hidden purpose in man's suffering (*cf.* Rom. viii, 28). *See* BIBLE; *see* also references under "Job, Book of" in the Index.

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JOBBER (LONDON STOCK EXCHANGE): *see* STOCK EXCHANGE.

JOB EVALUATION is a widely used method of determining wages in industry and in the government. It provides a basis for comparing the human requirements of different jobs within a factory or industry, so that persons holding jobs with relatively higher requirements will be paid relatively more, in a consistent manner. Formal job evaluation plans of one type or another have been used seriously since World War I. These plans have been used primarily for hourly paid workers, whose jobs can be relatively accurately and completely described. The pressure to have orderly and systematic wage plans grew as factories grew in size and number of employees, to deal with recurring difficulties in settling wage disputes among employees and between management and union.

Techniques of Job Evaluation.—Several systems of job evaluation are used in practice; in increasing order of complexity, these are: (1) the job ranking system, (2) grade description, (3) factor comparison, (4) the point system. In job ranking, the earliest system, several raters rank a set of jobs in, what in their judgment, is the proper order, from the most important (or difficult) to the least.

Accurately written job descriptions, organization charts indicating the relative importance of each job and discussions with supervisors usually are the basis for ranking jobs. Jobs are then grouped and standard wage rates are assigned to each level. The grade description system defines broad classifications or grades of work, such as skilled, semiskilled, unskilled, clerical, etc., to which jobs are assigned. Ordinarily, then, jobs are ranked within grades and wage rates are assigned to each grade and job.

The factor comparison system, originated in 1926 at the Philadelphia Rapid Transit Co., involves ranking a small set (15 or 20) of widely diversified key jobs within each of a limited number of job factors, such as mental, physical and skill requirements, responsibility and working conditions. The wage rate currently paid each key job is then divided among the factors in a manner consistent with the original rankings, with the result that a key job earns a certain number of dollars or cents for each of the five factors. All the other jobs in the factory or industry are then compared with the key jobs (or bench marks) and a dollar amount is allotted for each factor; the final wage rate is added up over the factors for each job.

What appears to have been the first point system of job evaluation was designed by Merrill Lott about 1925; it is the most systematic or scientific of the four techniques, and the one that has come to be most commonly used. The first step in this method is the selection and definition of a group of factors which seem to be influential in the determination of wage rates. Originally, as many as 50 factors were described, but the tendency in later years has been to reduce the number to about 10.

A representative list of factors for hourly paid factory jobs is: (1) educational background, (2) job training, (3) mental effort, (4) visual effort, (5) physical effort, (6) responsibility for material or product, (7) responsibility for tools and equipment, (8) responsibility for safety of others, (9) work surroundings and (10) unavoidable hazards. (Other sets of factors are used for office jobs, for salaried factory jobs and for executive or administrative jobs.)

The next step then is to analyze each job, using concise job descriptions, in order to assign a level of each factor to the job. Handbooks on job evaluation stress that it is important when doing this work to analyze the job itself, independent of the particular person who happens to hold the job at the time, apparently because organizational science has not yet been developed to the point where it can handle the effect of a large number of individual personalities. The obtaining and recording of job information represents one of the major costs of a job evaluation program, and it is essential that this phase of the work be done effectively.

After all jobs have been analyzed in terms of levels of the factors, a number of points (or a weight) must be allotted to the levels of each factor. Each job is worth the total of these points, summed over factors, and the wage rate for the job is a simple multiple of the total points for the job. This calculation is in one sense a calculation of how important different levels of the factors are in the determination of the wage structure. The weighting of each factor should be designed to reflect the current wage structure or over-all job relationships as closely as possible.

It must be recognized that an improper weighting of factors may create actual distortions in the wage structure. If a particular wage rate prescribed by the job evaluation plan is less than employees are currently receiving for the job, it will be difficult or impossible to reduce their wages to comply with the plan, although it may be possible to reduce them relatively at the time of a general wage increase by raising them less than other rates. On the other hand, if a prescribed rate is above that currently paid, the company will have to increase the rate to have a consistent wage administration policy.

Another difficulty is that if the wages for a particular job are below the community average for that job, it may not be possible to find satisfactory employees. Methods used to compute the weights (points) to be attached to the levels of the different factors range from trial-and-error (which is tedious and may not lead to satisfactory results) to multiple regression, a mathematical method of weight determination that minimizes the sum of squared differences between rates specified by the plan and a sample of existing wages.

Industrial Psychology.—It is possible to use the job analyses and descriptions prepared for job evaluation for other purposes, such as employee selection and screening, although these studies were not intended for that use. One part of the field of industrial psychology is concerned with the determination of what physical and psychological characteristics are related to success in a particular job. The main characteristics (factors) considered include such diverse ones as education, intelligence, emotional stability, tact, health, popularity, persistence, body weight and height. These are individual characteristics of persons holding a certain kind of job, rather than characteristics of the job itself, and are designed for the particular purpose of selection and screening.

Executive Compensation.—Construction of a salary or a wage plan for executives uses some of the features of both hourly wage plans and psychological characterization. "In executive compensation plans, as distinct from the usual wage evaluations, it is important to consider both the man as well as the job. Persons occupying executive positions may contribute to an organization in a variety of ways, many of which are only indirectly associated with the job they happen to hold." (A. Charnes, W. W. Cooper and R. O. Ferguson, "Optimal Estimation of Executive Compensation by Linear Programming," *Management Science,* vol. 1, no. 2 [Jan. 1955].)

The factors these authors used to analyze executive jobs include effectiveness with others, acceptance of responsibility, initiative, experience, education, self-expression, planning ability, mental ability and ability to get things done. As criteria for the selection of weights for these factors, they require, among other things, that resulting salaries do not violate the ranked position hierarchy of the company and that they meet competitive conditions so that the company will not tend to lose executives to other companies. The mathematical method of linear programming is used to determine factor weights in this application.

See also MANAGEMENT SCIENCES; PSYCHOLOGY, APPLIED: *Industrial Psychology: Personnel Selection, Placement, and Training.*

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JOBST (Czech Jost) (1351–1411), margrave of Moravia and of Brandenburg and, for 15 weeks, German king, of the Luxembourg dynasty, was the son of the brother of the Holy Roman emperor Charles IV, John Henry, after whose death (1375) he in 1376 became margrave of Moravia. He was rich and learned, and played an influential part in the turbulent politics of Bohemia during the reign of his cousin Wenceslas, who from 1378 to 1400 was not only king of Bohemia but also German king. In 1388 his cousin Sigismund (*q.v.*) pawned the margraviate of Brandenburg to Jobst. When Rupert of the Palatinate, successor of the deposed Wenceslas as German king, died in May 1410, some of the electors at Frankfurt chose Sigismund as king (Sept. 20), but another faction chose Jobst instead (Oct. 1). He died, however, at Brno in Moravia on Jan. 18, 1411. (R. R. Bs.)

JOB'S-TEARS, the popular name for *Coix lacryma-jobi*, a species of grass of the tribe Maydeae, which also includes corn or maize (*see* Grasses). The seeds, or properly fruits, are contained singly in a stony involucre or bract, which does not open until the enclosed seed germinates. The young involucre surrounds the female flower and the stalk supporting the spike of male flowers, and when ripe has the appearance of bluish-white porcelain. From their shape and appearance these fruits bear a fanciful resemblance to tears; hence the common name. The fruits are edible and often are used for making necklaces and other ornaments. The plant is a native of the Indian subcontinent but is now widely spread throughout the tropical zone. It grows in marshy places and is cultivated in China, the fruit having a supposed medicinal value. Forms of it are used as cereal foods in parts of eastern Asia and in the Philippines where it is called adlay.

JOCASTA: *see* Oedipus.

JOCELIN de Brakelond (fl. *c.* 1170–1215), from 1173 a monk of Bury St. Edmunds, chaplain to Abbot Samson from 1182–88, was author of the well-known *Cronica* which describes the life and administration of the abbey during the 30 odd years of Samson's rule. Study of this text in the light of Samson's charters makes it almost certain that Jocelin was the cellarer appointed by Samson in 1197, dismissed in 1199 and again cellarer 1200–11. This identification explains both the growth of a tendency in the author to criticize Samson and justifies as "a sign of monastic efficiency" his "intense interest in revenues"; also it makes it more than likely that Jocelin was the author of the *Electio Hugonis*, the story of the election of Samson's successor and of the subsequent dispute (1213–15) with King John. Previously Jocelin had been identified with an almoner of the same name, whose enterprise the author of the *Electio* acknowledges.

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JOCHELSON, VLADIMIR ILICH (Waldemar) (1855–1937), a Russian-born ethnographer and linguist, was one of a group of young people in the 1880s who laid the basis for their ethnographic work while in exile in Siberia for revolutionary activities. Like his contemporaries, V. G. Bogoraz and L. Y. Sternberg (*qq.v.*), Jochelson was active in the Narodnaya Volya (People's Will) party. Exiled to Kamchatka for ten years, he turned to studying such indigenous peoples as the Yukaghir and Koryak (*qq.v.*).

He later took part in two major expeditions of the Imperial Russian Geographic society, and the Jesup North Pacific expedition under Franz Boas. During the period 1912–22 he was associate curator of the Museum of Anthropology and Ethnology in St. Petersburg (later Leningrad). In 1922 he emigrated to the U.S. where he was associated with the American Museum of Natural History and later with the Carnegie institution. Jochelson's contributions to the literature include *The Koryak* (1908), *The Yukaghir and the Yukaghirized Tungus* (1910–1926) and *Peoples of Asiatic Russia* (1928). He died on Nov. 1, 1937, in New York city at the age of 82. (L. K.)

JODELLE, ÉTIENNE (1532–1573), French dramatist and poet, born in Paris in 1532, was a member of La Pléiade (*q.v.*), and applied the principles of the reformers to dramatic composition. He aimed at creating a classical drama that should be in every respect different from the moralities and mysteries then occupying the French stage. His first play, *Cléopâtre captive*, was presented before the court at Paris in 1553; the cast included his friends Remy Belleau and Jean de la Péruse. In honour of the play's success the friends organized a fete at Arcueil, when a goat garlanded with flowers was led in procession and presented to the author—a ceremony exaggerated by the enemies of the Ronsardists into a renewal of the pagan rites of the worship of Bacchus. Jodelle wrote two other plays, *Eugène* (1552) and *Didon se sacrifiant*. He died in poverty in Paris in July 1573.

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JODHPUR, formerly capital of Jodhpur state and now headquarters of a district and division of the same name in Rajasthan, India, lies about 380 mi. S.W. of Delhi, and 590 mi. N. of Bombay by rail. Pop. (1961) 224,760, the third largest city of Rajasthan.

Jodhpur takes its name from Rao Jodha, who founded it in 1458. It is encircled by a strong and massive wall, 24,600 ft. long and 15 to 30 ft. high, built in the first half of the 18th century, and has seven gates. The fort contains the maharaja's palace and completely covers the crest of the hill overlooking the city. The principal buildings in the fort are a series of apartments forming the palace, the most noteworthy being the Moti Mahal built by Raja Sur Singh in the 17th century, and the Fateh Mahal built by Maharaja Ajit Singh in the 18th century. In the palace can be seen priceless jewels and a heterogeneous collection of arms and manuscripts. From the battlements there is a panoramic view of the city. In Jodhpur the ruins of Mandore and of Junagadh fort are evidence that the history of Marwar dates back to the 4th century. The city also contains many temples and water tanks, three hospitals, and Jodhpur university, established in 1962.

Jodhpur is an important centre of trade and industry with several engineering works and a railway workshop. Bicycles, brass and iron utensils and textiles are made and cotton cloths are dyed. The town is the divisional headquarters of the Northern railway and also has an extensive airfield used for training the Indian air force. It is the seat of the Rajasthan state high court.

Jodhpur District (area 8,772 sq.mi.; pop. [1961] 885,663) is the third largest in area in Rajasthan. It is divided into two administrative subdivisions and five *tehsils*. The district is mostly a sandy plain dotted with picturesque conical hills, in places attaining a height of 3,000 ft. The Luni river rises in the sacred lake of Pushkar in Ajmer and flows through the district in a southwesterly direction. The principal crops are bajra, mung beans, jowar, maize (corn), mustard and cotton. Salt is extracted from Didwana and Sambhar lakes. An irrigation and power project was completed in the 1950s.

History of the State.—Until it was merged with Rajasthan on March 30, 1949, Jodhpur, or Marwar, was the largest princely state in the Rajputana agency. The present district is only a part of it. The population centres contain many Jains, and by association Jain merchants and moneylenders have come to be known as Marwaris throughout northern India.

The ruling house belonged to the Rathor clan of Rajputs, claiming descent from the legendary hero Rama. After the downfall of the Rathor dynasty of Kanauj in 1194, Sivaji, the grandson of Jai Chand, the last king of Kanauj, entered Marwar on a pilgrimage to Dwarka and laid the foundation of the state, but it was not till the time of Rao Chanda, the tenth in succession from Sivaji, that Marwar was actually conquered. His grandson Jodha founded the city of Jodhpur, which he made his capital. In 1561 the country was invaded by Akbar and the chief was forced to submit. Aurang-

zeb invaded Marwar in 1679, plundered Jodhpur, sacked all the large towns, and commanded the conversion of the Rathors to Islam. This cemented all the Rajput clans into a bond of union, and a triple alliance was formed by the three states of Jodhpur, Udaipur and Jaipur to throw off the Muslim yoke. One of the conditions of this alliance was that the chiefs of Jodhpur and Jaipur should regain the privilege of marriage with the Udaipur family, which they had forfeited by contracting alliance with the Mogul emperors, on the understanding that the offspring of Udaipur princesses should succeed to the state in preference to all other children. The quarrels arising from this stipulation lasted through many generations and led to the invitation to the Marathas for help from the rival aspirants to power, and finally to the subjection of all the Rajput states to the Marathas. In 1818 Jodhpur was taken under British protection. In 1843, the chief having died without a son and without having adopted an heir, the nobles and state officials were left to select a successor from the nearest of kin. They chose Raja Takht Sinh, chief of Ahmednagar, who served the British during the 1857 mutiny; he died in 1873. After 1896 there was a succession of minorities during which Sir Pertab Singh of Idar acted as regent. (S. M. T. R.)

JODL, ALFRED (1890–1946), German army officer, Adolf Hitler's chief adviser on strategy and operations throughout World War II, was born at Würzburg, Bavaria, May 10, 1890. He was assigned to staff rather than command duties during World War I and thereafter. On Aug. 22, 1939, he became chief of the armed forces operations staff and in this capacity directed, under Hitler and Wilhelm Keitel, all the campaigns except that against Russia (which was conducted by the army general staff). In 1944 he attained the rank of colonel general, and he signed the capitulation of the German armed forces at Reims, France, on May 7, 1945. Jodl, as chief of operations staff, had countersigned many orders requiring the shooting of hostages and other acts contrary to international law. He was sentenced to death for war crimes by the International Military tribunal at Nürnberg and was hanged on Oct. 16, 1946. A faithful servant of Hitler, Jodl had little military acumen and no moral courage. (P. N. T.)

JOEL, BOOK OF (Prophecy of Joel), the second of the 12 Minor Prophets in the Hebrew Old Testament. The name means "Yahweh is God."

Contents.—The following outline refers to the three chapter divisions of the English and most other versions. Hebrew printed Bibles usually have four chapters thus: Hebrew i and ii = English i, 1–ii, 27; Hebrew iii, 1–5 = English ii, 28–32; Hebrew iv, 1–21 = English iii, 1–21.

i, 1–ii, 27:	a locust plague and a drought and their removal
i, 1:	title, claiming divine inspiration
i, 2–20:	lamentation by the people and animals of Judah
ii, 1–11:	the locust attacks as a presage of the day of the Lord
ii, 12–17:	call to national repentance
ii, 18–27:	God's promise to remove the locusts and send rain
ii, 28–iii, 21:	future blessings of Judah and judgment of the nations
ii, 28–29:	outpourings of the Spirit
ii, 30–32:	portents of the day of the Lord and deliverance of believers
iii, 1–8:	God's purpose to judge the oppressors of his people
iii, 9–11:	summons of the nations to battle with the heavenly host
iii, 12–16a:	the last judgment
iii, 16b–21:	physical and spiritual blessings of Judah

Main Themes and Relation to New Testament.—*Judgment and Blessing Through Nature.*—In the locust plague and the drought Joel sees God's judgment on Judah (i, 2–ii, 17), and conversely he regards the removal of the locusts and the restoration of fertility as indications of God's favour (ii, 18–27). The eschatological blessings of Judah are described in terms of fruitfulness (iii, 18).

Call to Repentance.—The prophet calls the people to assemble in the Temple for fasting and prayer led by the priests (i, 13–14; ii, 12–17). In addition to these outward forms, he stresses inward contrition and return to God (ii, 13).

Salvation Through Faith.—Joel promises, referring to Jerusalemites, that all who call on the Lord shall be saved (ii, 32a). Peter (Acts ii, 21) and Paul (Rom. x, 13) quote this passage referring to all peoples everywhere. Similarly God's call to salvation (Joel ii, 32b) is extended by Peter (Acts ii, 39) to include all nations.

Importance of Formal Worship.—To Joel a serious result of the locust plague and drought is the cessation of sacrifice because of the lack of materials for offerings (i, 9, 16), and the first benefit of renewed prosperity is that sacrificial worship is again possible (ii, 14).

Exclusiveness.—To Joel the Lord is the God of Israel, and he is "jealous for his land" and has "pity on his people" (ii, 18). The future blessings are for the people of Judah (iii, 16–18), and other nations are mentioned only as the objects of God's judgment (iii, 2–8). Such national particularism was perhaps necessary in Joel's time for the preservation of Israel's identity and monotheistic faith. Joel's exclusiveness is not only national but also spiritual, for he teaches that only the remnant of Israelites who call on the Lord will be saved (ii, 32).

Promise of the Spirit.—Joel promises the outpouring of the Spirit on all Israelites without distinction of sex, age or social rank (ii, 28, 29). Peter (Acts ii, 16–21) sees the pentecostal gift of the Spirit as the fulfillment of this promise and enlarges its scope to all believers in Christ. This prophecy of a spiritual relationship to God is perhaps the most significant theological contribution of the book.

The Day of the Lord.—The locust plague is a day of the Lord (i, 15; ii, 1, 11). This partial judgment in Judah is a sample and a warning of the universal day of the Lord, the time of final judgment and blessing (iii, 14, 18). Compare "the day of our Lord Jesus Christ" (I Cor. i, 8).

Final Judgment.—According to Joel's dramatic account of the last judgment, all nations will be gathered and judged according to their treatment of their fellow men (iii, 2–6), as in Matt. xxv, 31–46. Joel's imagery for the judgment is carried over into the New Testament: the battle (iii, 9–11; *cf.* Rev. xvi, 14, 16), the seated judge (iii, 12; *cf.* Matt. xxv, 31), the harvest (iii, 13a; *cf.* Matt. xiii, 39) and the vintage (iii, 13b; *cf.* Rev. xiv, 17–20).

Blessings of the Kingdom of God.—The concepts of the holy and inviolate city (iii, 17), of the fruitful land and of the stream from the house of the Lord (iii, 18) are given spiritual significance in Rev. xxi, 2–8 and xxii, 1–2. The source of every blessing is the presence of God in the midst (iii, 21; *cf.* Rev. xxi, 22).

Form and Style.—In form the prophecy consists of a liturgical lament by the people, followed by God's answering promises. The style of Joel is marked by dramatic descriptions (locust plague, final judgment), varied poetic rhythms, studied repetitions, alliterations, comparisons and sharp contrasts of judgment and blessing. At least 23 phrases of Joel are found exactly in other prophets. In some cases it seems that Joel is quoting, but in the majority of these passages he is using common prophetic terminology.

Literary History.—No definite time is mentioned in the prophecy, and widely differing dates from the 9th to the 3rd century B.C. have been proposed. The following reasons for placing the book after the exile seem decisive:

1. The people of Judah have been scattered and enslaved, the land has been divided, the Temple has been plundered (iii, 2, 3, 5), conditions which presuppose the fall of Jerusalem in 586 B.C. The northern kingdom is not mentioned, and the name Israel given to it before the exile is now a synonym for Judah (iii, 1–2). Neither king nor nobles are mentioned, and priests (i, 13; ii, 17) and elders (i, 2, 14; ii, 16) are the leaders of the people as in postexilic times. The religious life of the people of Judah centres in the Temple, and there is no reference to the local high places or to the idolatry which pre-exilic prophets condemn.

2. Since the prophets of the Assyrian and Chaldaean periods usually mention the current world power, the absence of reference to either of these empires probably indicates a date after the fall of Babylon in 539 B.C. The mention of Greece (iii, 6), but not yet as a world power, points to a time before Alexander the Great.

3. Like postexilic prophets and unlike pre-exilic prophets, Joel places high value on the proper performance of the sacrifices. His eschatology shows the influence of exilic Ezekiel.

4. Some words in Joel are characteristic of postexilic writers;

e.g., "ministers" (i, 9, 13; ii, 17), "weapons" (ii, 8), "rear" (ii, 20).

5. In ii, 32 Joel seems to be quoting Obadiah 17 (probably postexilic), and Joel ii, 11 and 31 are perhaps derived from postexilic Mal. iii, 2 and iv, 5.

All these considerations together indicate that Joel's prophecy was probably delivered *c.* 400 B.C. The text is clear and well preserved, with the possible exceptions of i, 17, 18 and iii, 21, where the ancient versions differ from the Hebrew.

The Jewish commentator Rashi (11th century A.D.) mentions a tradition identifying this prophet with the son of Samuel mentioned in I Sam. viii, 2, but, as shown above, the prophet Joel probably lived in the 5th century B.C. The lives of the prophets attributed to the Church Father Epiphanius (4th century A.D.) states that the prophet's home was in the territory of Reuben (*cf.* I Chron. v, 4), but the prophecy itself implies that Joel lived in Jerusalem. Because of his interest in the ritual, some have thought that Joel was a priest, and others have called him a "Temple prophet." Some allow to Joel only the passages dealing with the locusts and attribute all eschatological references to later authors. Other prophets, however, often combine contemporary and future elements (*e.g.*, Isa. xiii; Zeph. i). There is no compelling reason for partitioning this symmetrical prophecy.

Interpretation of the Locusts.—The Aramaic Targum, patristic commentators and some modern expositors interpret the locusts as symbols of historic human invaders of Palestine. Decisive against such interpretations is the express comparison of the locusts to human soldiers (ii, 4–5, 7); a thing is not compared with itself. According to Adalbert Merx (*Die Prophetie des Joel*, 1879), the locusts in ch. i are supernatural apocalyptic creatures and symbols of invading armies of the last days in ch. ii. The prophet, however, describes the plague as present, "before our eyes" (i, 16). The most natural way of interpreting the locusts is as present, literal insects, described with vivid poetic imagery.

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JOENSUU, a town of Finland, in the *lääni* (county) of Pohjois-Karjala, is situated in a sparsely populated wilderness at the mouth of the Pielisjoki river. Pop. (1960) 28,335. Joensuu is an important educational town and the traffic centre for the surrounding region, with connections by rail, highway and air. The town ships timber and has lumber and plywood mills. Points of interest are the Northern Karelia central hospital, the town hall designed by Eliel Saarinen, the Pielisjoki castle and the Northern Karelia museum. (E.-S. Ku.)

JOFFRE, JOSEPH JACQUES CÉSAIRE (1852–1931), commander in chief of the French armies on the western front in World War I from 1914 to 1916, "the victor of the Marne," was born at Rivesaltes in the Pyrénées-Orientales *département* on Jan. 12, 1852. Before 1914 Joffre's military career was unremarkable. He took part as a subaltern in the siege of Paris (1870–71) and later served in Indochina, west Africa and Madagascar. He became a general of division in 1905 and a member of the Conseil Supérieur de la Guerre in 1910. He was appointed chief of the general staff in July 1911 and thereby commander in chief designate in the event of war. This exalted post was given to Joffre, in preference to other more distinguished soldiers, because he was regarded as a safe republican. From 1911 he was responsible for all the French army's planning and preparation for war and must bear the major responsibility for the calamitous Plan XVII with which it began operations in 1914 (*see* WORLD WAR I). This plan, providing chiefly for a mass attack by the French across the common French-German frontier, underestimated the likelihood of an encircling movement by the Germans through Belgium.

As the German armies made their huge sweep through Belgium and northern France, the futility of Plan XVII rapidly became apparent, while its cost mounted. Joffre could not at once see how to counteract the remorseless defeat of his armies. In this moment of supreme trial his best qualities came to the fore; his imperturbability, his painstaking patience, his force of character, above all his courage, saved him from despair. Once enlightened, he quickly perceived that the decisive point was on his left wing, where stood the British expeditionary force, an Allied army to which he could not issue direct commands. His instant decision to create, on the outer flank of the British, a new French army, the 6th, under his direct authority, laid the essential foundation for the battle of the Marne. Constantly threatened with envelopment by greatly superior German forces deployed under the Schlieffen plan, the French retreated steadily until their left flank was fighting just outside Paris by Sept. 5. Joffre then issued the order which on Sept. 6 launched the Allied counterstroke, the first of the battles of the Marne (*q.v.*). The result of this confused encounter, which was nevertheless decisive, was the ruin of the German hopes for a swift victory in the west. On this success Joffre's reputation depends.

BROWN BROTHERS

MARSHAL JOFFRE

By the end of 1914 the western front had settled into the heavily entrenched lines which existed until 1918. Throughout 1915 the French armies under Joffre attempted, at ruinous cost, to burst through the German positions. Two great battles in Champagne and one in Artois all ended in failure. Joffre's prestige began to wane, but such was his fame in the country and with France's allies that it was thought impossible to remove him. However, the German attack on Verdun in 1916 and the evident lack of French preparation for this blow, for which Joffre was held to be responsible, prepared his downfall. Later, in the battles of the Somme, the large French casualties, in a secondary role, and their apparent lack of results, brought about a political crisis in France which could be resolved only by his removal. This was done in two stages. On Dec. 13, 1916, he was appointed "technical adviser" to the government, with no direct powers of command. Realizing that he had been shelved, Joffre resigned 13 days later. On the same day he was created a marshal of France. This marked the end of his active military career, though on the entry of the United States into the war in 1917 he was appointed head of the French mission to that country, where his great fame proved still to be of service to his country.

His failures in 1915 and 1916 should not obscure Joffre's achievement in 1914, and he must also receive credit for his tact in handling France's allies, particularly the British—a relationship never easy for either party. He died in Paris on Jan. 3, 1931. His *Mémoires*, two volumes, were published in 1932 (Eng. trans. also 1932).

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JOGJAKARTA (DJOKJAKARTA), capital of Jogjakarta Special Territory, Java, Indon., lies 18 mi. inland from the south Java coast and about 20 mi. S.W. of the active volcano Mt. Merapi. Pop. (1961) 312,698. From 1946 to 1949 Jogjakarta was the seat of the government of the Republic of Indonesia and the centre of the struggle for independence. From Dec. 1948 until July 1949 it was occupied by Dutch forces. In the town are the spacious 18th-century palace of the sultan of Jogjakarta, a state university (Gadjah Mada, the first to be established after independence), the Hatta Foundation library, the Sono Budoyo museum, an art academy, a private university and several colleges. The streets

are wide and a river runs through the centre of the town; there is also an interesting market place and bazaar. Transport consists largely of bicycles and *betjaks* (tricycle taxis), with little motor traffic. There are rail and road connections with the main Javanese towns and an airport. Industries include leather, tobacco, oil, soap, sugar and metalware. Long famous as a cultural and educational centre, the town is also a market for the surrounding agricultural area, and for the batik, silver and leather goods produced locally. Jogjakarta is a tourist centre, the special attractions being the ancient temples of Borobudur and of Prambanan, the beautiful country around Kaliurang and the village of Kotagede, the centre of the silverware industry.

JOGJAKARTA SPECIAL TERRITORY comprises Jogjakarta municipality and the districts of Bantul, Kulonprogo, Sleman and Gunungkidul. Pop. (1961) 2,241,477. Area 1,224 sq.mi. The area is mountainous, but low lying to the southwest with less fertile limestone hills in the southeast. An agricultural region, it grows rice, tobacco and sugar. The sugar is chiefly milled at Madukismo. Manganese is mined at Kulonprogo. The silver- and leatherwork and batik cloth of the region are exported to many parts of Indonesia.

JOGUES, SAINT ISAAC (1607–1646), French Jesuit, was born at Orléans, Jan. 10, 1607. Entering the Society of Jesus in 1624, he was ordained priest in 1636. That year his desire to Christianize American Indians was realized when he reached the Huron lands near Georgian bay, Canada. For six years he patiently instructed the Indians, bearing their abuse, helping their sick, even in the shadow of death. In 1641, exploring westward, he began the Jesuit missions to the Objibwa at Sault-Ste.-Marie. Hostile Mohawks captured him, his companion, René Goupil, and a Huron band near Montreal in 1642, and brought them to Ossernenon (Auriesville), N.Y., where Goupil and some Hurons were slain. Jogues ran the gauntlet three times and bore tortures fearlessly. A slave through 13 months, he suffered innumerable cruelties. Aided by the Dutch of nearby Fort Orange (Albany), he escaped down the Hudson river in their ship. He was the first priest to visit New Amsterdam. On Christmas, 1644, he reached France, where he had been supposed dead. Embarrassed there by a hero's welcome, he returned to Montreal. In 1645 he was the government's ambassador to Ossernenon for settling a French-Mohawk peace. Back in Montreal he obtained permission to live with the Mohawks, but arriving at Ossernenon he found them violently warlike. Accused of witchcraft, he was killed on Oct. 18, 1646. He was canonized with the other North American martyrs in 1930, and their feast is celebrated Sept. 26.

See Francis Talbot, *Saint Among Savages: the Life of Isaac Jogues* (1935). (J. V. J.)

JOHANAN BEN ZAKKAI (fl. 1st century A.D.), Palestinian Jewish sage, of primary influence particularly in the last third of the 1st century A.D., and with his leading disciples responsible not only for the survival but for the very intellectual and spiritual élan of Judaism after the destruction of the Jerusalem Temple (A.D. 70)—the principal cultic and religious institution of the Jews—and the devastations resulting from the war against Rome (66–73). By establishing in Jamnia (Jabneh) a major academy and authoritative rabbinic body (*see* YEŠHIVA), he fixed the conditions for continuity of basic traditions; and by his lively sense of the need for reinterpreting inherited concepts lest they become irrelevant in new circumstances, he laid the foundations of learning and thought on which talmudic and rabbinic Judaism built their structure.

While critical examination of the midrashic-talmudic sources reveals that Johanan was already an influential teacher before A.D. 70 and a leading representative of the Pharisees in debate with priestly and Sadducean authorities, it was the war tragedy and the crisis following it that sharpened or stimulated some of his emphases and demonstrated their fundamental realism and aptness to the circle that gathered around him. At least two of his disciples, Eliezer and Joshua, became the leading teachers in the next generation, and in turn had a profound influence on the greatest scholars of the generation after. It is thus hardly excessive to say that Johanan's teachings are to be traced not merely to the relatively few statements specifically attributed to him but to many views which become articulate during the 2nd century; for example, that acts of loving-kindness atone no less effectively than the Temple sacrificial ritual did, and are indeed at the core of the universe since its creation; that the study of Torah is a central purpose of man and a paramount form of serving God; that despite the unique sanctity of Jerusalem, basic decisions of practice and instruction must be permitted to the authorized scholars wherever circumstances compel them to sit in session. Such ideas, truly radical in origin, became normative rabbinism and permanent components of Judaism.

Johanan is the only sage not of the Hillelite and patriarchal dynasty who was referred to—very likely already in his lifetime—as rabban; the title suggests that in an interim period he may have been recognized as the head of the rabbinic court-academy until the post was filled by Gamaliel II.

Johanan opposed the policy of those who were determined on war with Rome at all costs. The story goes that when he found he could not dissuade them from their course, he had himself smuggled out of beleaguered Jerusalem in a coffin and brought before the Roman commander. To him Johanan predicted elevation to imperial power, and from him he requested permission to establish a school in Jamnia. But the fall of Jerusalem distressed him grievously. In Jamnia he was joined by a number of his favourite disciples, though after some time he seems to have moved on from there.

The study and development of the Law (*halakha*) doubtless constituted the chief preoccupation of Johanan and his students. Of course, he and they also engaged in the study of nonlegal subjects (*haggada*), especially in connection with biblical exegesis (*midrash*). In addition he was interested in esoteric themes (related to the subject of creation and the visions of the *Merkabah,* the divine throne of Ezek. 1), discourses on which were even delivered by some of his disciples. And, at least before the destruction of the Temple, if not after that too, he seems to have held occasional sessions when certain ethical-philosophical questions, typical of Hellenistic-Roman popular philosophical discussion, were raised and explored. His homiletical interpretations of Scripture often unite the symbolic with the rationalistic in a remarkable way. Although he had discouraged messianic pronouncements, a saying attributed to him in his last illness suggests that messianic speculation was not alien to him.

In the history of talmudic literature and thought, Johanan is rightly seen as continuing the Hillelite tradition (*see* HILLEL), although this should not be interpreted to mean that he inherited only Hillel's teachings. *See* also TALMUD.

BIBLIOGRAPHY.—In addition to the summary description in the general Jewish histories (for example, H. Graetz, *History of the Jews,* Eng. trans., vol. ii, pp. 321–359 [1893]), *see* G. Alon, *Studies in Jewish History* (Heb.), vol. i, pp. 219–273 (1957); W. Bacher, *Die Agada der Tannaiten,* vol. i, pp. 25–46 (1884); J. Goldin, "On the Academy of Johanan ben Zakkai" (Heb.) in *Harry A. Wolfson Jubilee Volume,* pp. 69–92 (1965); J. Neusner, *A Life of Rabban Yohanan ben Zakkai* (1962). (JU. G.)

JOHANNESBURG, the largest city and industrial centre of the Republic of South Africa, is situated at an altitude of 5,750 ft. on the southern slopes of the Witwatersrand, a rocky watershed of east-west ridges rising to 6,000 ft. and surrounded by the Transvaal high veld. Pop. (1960 census) 1,152,525, comprising 413,153 Europeans and 739,372 non-Europeans, including outside areas under the city council's jurisdiction. The climate is good; the mean annual rainfall is 30.3 in., and the mean temperatures are 10.2° C. (50.5° F.) in July and 20.2° C. (68.5° F.) in January.

Major buildings are grouped around Eloff street, which is the main shopping centre and leads south from the railway station, and Von Brandis, Joubert and Rissik streets parallel to it; Commissioner, Market, Fox and Main streets (the commercial area); and Jeppe and Bree streets. They include the stock exchange (1961), city hall (1915), with a concert hall and fine organ, the public library, with the Africana (1935) and Geological (1890) museums, the Witwatersrand Technical college (1904), law courts (1910), post office (1935), Anglican cathedral (1926) and many commercial buildings, office blocks and hotels.

BY COURTESY OF THE SOUTH AFRICAN TOURIST CORPORATION PRETORIA

JOHANNESBURG CITY HALL

To the northeast of this area lies Joubert park, in which is the art gallery (1915); to the north, the general and non-European hospitals (1909 and 1925), the Johannesburg College of Education (1916) and the civic theatre (1962); to the northwest, close to the proposed civic centre, lies Milner park, the home of the University of the Witwatersrand (1922) and the planetarium (1961) and the scene of the Witwatersrand Agricultural society's Easter show. Farther out are the Republic observatory to the northeast, housing a 26-in. refracting telescope and a branch observatory from the University of Leiden, Neth., and the Hermann Eckstein park to the north, containing the zoo (with its lake and gardens) and the South African National War museum.

Near the western boundary, George Harrison park is named for the Australian digger who first found gold-bearing quartz there in Feb. 1886. To the south lie Turffontein racecourse, stadia, sports grounds and mine dumps. In the northern suburbs the Wilds (43 ac.) are laid out as a reserve for South African flora, and the Melrose bird sanctuary (26 ac.) shelters more than 100 avian species.

Johannesburg is the meeting place of national roads from Pretoria (36 mi.), Bloemfontein (264 mi.), Cape Town (907 mi.) and Durban (406 mi.). Its modern railway station handles 160,000 passengers daily, and it is served by buses and trolley buses. The republic's terminal for international air routes is Jan Smuts airport (1947), 15 mi. N.E.

Johannesburg is the industrial centre of South Africa, as well as the centre of the Rand gold fields. In the mid-20th century about 40% of the labour force of the Witwatersrand municipal region was employed in gold mining, 27% in secondary industry and 22% in commerce and administration.

The Witwatersrand would probably have remained almost uninhabited had it not contained auriferous "banket" reefs whose discovery in 1886 led to the mushroom development of the greatest gold-mining industry in the world. The origin of the name Johannesburg is uncertain; reputedly the town was named after Johann Rissik, first clerk to the surveyor general at the time, but a more likely derivation is from Johannes Meyer, veld cornet of Ward Klipriver who was responsible for administering the new gold field until the arrival of a mining commissioner. The town grew at a remarkable rate and outstripped early forms of local government until a town council was set up by the first South African republic in 1897. The South African War (1899–1902) brought the Transvaal under British rule, and by 1903, when a new town council was elected, the population was nearly 109,500. By 1910, when the Union of South Africa was established, the city's built-up nucleus extended toward a ring of townships two to six miles away; most of the intervening areas had been filled in, and more distant townships had been proclaimed. Between 1930 and 1950 urban expansion took place in the north and northwest up to 15 mi. from the city centre. The central square mile grew upward rather than outward, and the rapidly increasing non-European population (362,542 in 1946) gravitated mainly to the west and southwest. (B. O. P.)

Bantu Townships.—Until the 1920s most of the Bantu employed in Johannesburg were migrants who left their families in the Bantu reserves and lived on their employers' premises in hostels and compounds. Gradually the men brought in their families, and in 1923 the Native (Urban Areas) act placed responsibility for Bantu housing on the local authorities. By then the Johannesburg city council had provided land at Pimville (10 mi. S.W. of the city hall), where natives could build their own houses, and had built 2,000 houses for Bantu families at Western Native township, 4 mi. W. of the city hall.

The vast complex known as Soweto (Southwestern Bantu areas), lying between 6 and 15 mi. W.S.W. of the city hall, started with 3,000 houses at Orlando in 1932; by 1942 there were 6,000 and by 1955, 11,000 houses in this one area. Most of these were let at subeconomic rents, and by 1951 the city council's annual loss on the townships exceeded £300,000. Cheaper building methods, using Bantu workers and simplified designs complying with governmental standards, made it possible to build houses that could be let at economic rentals of £2 10*s*. and £2 15*s*. monthly. By 1961 the city council had provided accommodation for 57,827 families and for 20,000 single men, or a total of about 400,000 persons. Soweto covers 26 sq.mi. and is linked with Johannesburg by road and rail. Water, sanitation and lighting are supplied, and sports fields, playgrounds, schools and community halls provided by the council. Church sites are leased to recognized churches, and all shopkeepers are Bantu. Services for welfare, recreation, rehabilitation, employment and health are administered by a municipal staff of about 400 Europeans and 3,000 Bantu.

(W. J. P. C.)

JOHANN VON TEPL (or VON SAAZ) (*c.* 1350–*c.* 1415), Bohemian author of a remarkable German dialogue, *Der Ackermann aus Böhmen*. Born probably in Tepl, Bohemia (Teplá, Czech.), he studied at a grammar school and at Prague university. Appointed, probably before 1378, a notary in Saaz (Žatec), he became headmaster of the grammar school there in 1383. In 1411 he became protonotary of Prague New Town, where he died in or before 1415.

In the *Ackermann*—which, though described in a Latin dedication as an exercise in rhetoric, probably arose from the death of the author's first wife in 1400—a plowman accuses Death of unjust dealings toward mankind. Death's counterarguments reconcile him to Death's activities, though he still champions man's nobility against Death's insistence on human corruption. God, though sympathizing with the plowman, awards Death the victory. The complex structure and elaborately artificial, but vigorous, rhythmical prose of this profound work make it—despite the uncertain state of the text—unique in medieval German literature. The older view of the *Ackermann* as the chief representative of a "Bohemian Renaissance" has come to be seriously questioned; despite Renaissance features, the work is widely regarded as essentially medieval in thought and even in technique.

BIBLIOGRAPHY.—The *Ackermann* has been edited by K. Spalding (1950) and M. O'C. Walshe (1951), with English commentaries. These editions contain extensive bibliographies, as do those by L. L. Hammerich and G. Jungbluth (1951) and W. Krogmann (1954). For problems and literature to 1954 *see* T. Bacon in *Studies in Philology*, 53 (1956). *See* also Eng. trans. by K. W. Maurer, *Death and the Ploughman* (1947). (J. R. WE.)

JOHN, SAINT, the apostle, in the Bible, was son of Zebedee, a Galilean fisherman, and Salome. He and his brother James were among the first disciples called by Jesus (*see* JAMES, SAINT, the Great). In Mark he is always mentioned after James and was no doubt the younger brother. His mother, Salome, was among those women who ministered to the circle of disciples (Mark xv, 40–41; xvi, 1). James and John were called by Jesus "sons of thunder" (Boanerges; Mark iii, 17), perhaps because of some trait in their

character such as the fiery zeal exemplified in Mark ix, 38 and Luke ix, 54. John and his brother, together with Simon Peter, formed an inner nucleus of intimate disciples (Mark v, 37; ix, 2; xiv, 33). In the Fourth Gospel the sons of Zebedee are mentioned only once as present by the lake of Tiberias when the risen Lord appeared (John xxi, 2); whether the "disciple whom Jesus loved" (who is never named) is to be identified with John (also not named) son of Zebedee is not clear from this Gospel. After the resurrection John continued to play a leading role in the Jerusalem church together with Peter and James, the "Lord's brother." His authoritative position is shown by his visit with Peter to Samaria to lay hands on the new converts there (Acts viii, 14, 25). It is to Peter, James (the Lord's brother) and John that Paul successfully submits his gospel for recognition (Gal. ii, 1–10). What position John held in the controversy concerning the admission of the gentiles to the church is not known; the evidence of Rev. ii, 2, 14, 20; xxi, 14 is insufficient for a theory that the Johannine school was anti-Paul. The authorship of the Gospel and Epistles of John and of the Book of Revelation is discussed in JOHN, GOSPEL ACCORDING TO AND EPISTLES OF SAINT and in REVELATION, BOOK OF.

John's subsequent history is obscure and passes into the uncertain mists of legend. At the end of the 2nd century Polycrates, bishop of Ephesus, claims that John's tomb is at Ephesus, identifies him with the beloved disciple and adds that he "was a priest, wearing the sacerdotal plate, both martyr and teacher." That John died in Ephesus is also stated by Irenaeus, who says John wrote his Gospel at Ephesus and Revelation, under Domitian, at Patmos. During the 3rd century two rival sites at Ephesus competed for the honour of being the apostle's grave. One eventually achieved official recognition, becoming in the 4th century a shrine. In the 6th century the healing power of dust from John's tomb was famous (it is mentioned by Gregory of Tours); at this time also the church of Ephesus claimed to possess the autograph of the Fourth Gospel.

Legend was also active in the west, being specially stimulated by Mark x, 39 with its hint of martyrdom. Tertullian reports that John was plunged into boiling oil from which he miraculously escaped unscathed. This story is not mentioned by any Greek writer. During the 7th century the scene was portrayed in the Lateran basilica and was located in Rome by the Latin gate; it is still annually commemorated on May 6. John's feast day otherwise is Dec. 27. The belief that John did not die is very early (*cf.* Mark ix, 1–2 and John xxi, 23). In the original form of the apocryphal Acts of John (second half of the 2nd century) the apostle dies; but in later traditions he is assumed to heaven like Enoch and Elijah. A popular tradition known to Augustine declared that the earth over his grave heaved as if the apostle were still breathing.

BY COURTESY OF THE STÄDELSCHES KUNSTINSTITUT, FRANKFURT

ST. JOHN ON PATMOS, WRITING THE BOOK OF REVELATION. A 14TH-CENTURY PAINTING

The legends which contributed most to medieval iconography are mainly derived from the apocryphal Acts of John. (*See* JOHN, GOSPEL ACCORDING TO AND EPISTLES OF SAINT: *Gospel: Literary History: Apocryphal Acts of John.*) These Acts are also the source of the notion that John became a disciple as a very young man (which in modern times has generated some sentimentalized interpretations of the evangelist's gospel of love). Iconographically the young beardless type is early (as in a 4th-century sarcophagus from Rome, *c.* A.D. 330–340) and this type came to be preferred (though not exclusively) in the medieval west. In the Byzantine world the evangelist is portrayed as old, with long white beard and hair, usually carrying his Gospel. His symbol as an evangelist is an eagle (from Ezek. i, 10). On account of the inspired visions of the Book of Revelation the Byzantine churches entitled him "the Theologian," and the title appears in Byzantine manuscripts of Revelation but not in manuscripts of the Gospel.

See also APOSTLE.

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JOHN, SAINT, THE BAPTIST, known from the Gospels and the Jewish historian Josephus (*Antiquities,* xviii, 2), was born before 4 B.C. and executed *c.* A.D. 28–30. Christian tradition associates his origin, preaching and function with Jesus, making him the forerunner of the Messiah. His religious antecedents lie in the Jewish sectarian movement revealed by the Qumran discoveries (Dead sea scrolls; *q.v.*), and while he was clearly important for Jesus and nascent Christianity, he was a prophetic figure in his own right and through his followers and his rite also influenced certain later Gnostic circles (the Mandaeans).

Whatever may be said about its legendary overtones, the Baptist's nativity story, combined with that of Jesus in Luke i, seems properly to suggest that he was born of a (landed?) priestly Jewish family. His parents were the priest Zechariah and Elizabeth, a kinswoman (Luke i, 36) of Mary the mother of Jesus. His early years, said to have been spent "in the wilderness" (Luke i, 80), may well have brought him under the influence of the Qumran sectaries. From them he probably acquired his disaffection from the existing religious leadership, rites and piety of his people and his messianic expectation. At some point, because of a "call" (Luke iii, 2), he undertook the separate career of prophetic preacher and baptizer. He spoke of himself as "the voice of one crying in the wilderness: Prepare the way of the Lord, make his paths straight" (Mark i, 3 and parallels; John i, 23), the allusion being to the fulfillment of the prophecy of Isaiah xl, 3–5, verses which the Qumran sectaries applied to the function of their community. The austerity of John's further life in the wilderness is characterized by his "camel's hair" garment and his food of "locusts and wild honey" (Mark i, 6), the separate meaning of which has elicited much useless speculation

John's "ministry" was conducted in the Jordan valley. "Bethany beyond the Jordan" and "Aenon near Salim" are mentioned as places where he preached and baptized (John i, 28; iii, 23; x, 40). His preaching was of imminent catastrophic divine judgment upon his people and of the coming of a "mightier one" who would baptize with the Holy Spirit or with the Holy Spirit and fire (Mark i, 7–8; Matt. iii, 7–11; Luke iii, 7–9, 16–17). He demanded immediate repentance (Matt. iii, 1–2), baptism of repentance (Mark i,

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ST. JOHN THE BAPTIST. AN EARLY 13TH-CENTURY SCULPTURE AT CHARTRES CATHEDRAL (FRANCE). ST. JOHN CARRIES THE SYMBOL OF THE HOLY LAMB

4) and ethical "fruits of repentance" (Matt. iii, 8–10; Luke iii, 8–14). His baptism, while possibly inspired by Jewish sectarian purification rites, may have dramatized also the willingness of the repentant to subject himself to the coming divine judgment.

John's preaching and baptism deeply impressed many of his Jewish contemporaries (Mark i, 5 and parallels), though there were also detractors (Matt. xi, 18; Luke vii, 33). That Jesus and several of his disciples accepted John's baptism is indubitable (Mark i, 9 and parallels). The details concerning John's recognition of Jesus, if any, are in conflict (*cf.* John i, 29–36 and Matt. xi, 2–6), but Jesus' conviction of the importance of John as "more than a prophet," "the messenger [of Mal. iii, 1]" and the returned "Elijah" is well attested (Matt. xi, 9, 10, 14; Luke vii, 26–27). He became the first item in the Christian gospel (Mark i, 1–4; Acts i, 22; x, 37; xiii, 24). John's denunciation of Herod Antipas (*q.v.*) for his relations to Herodias (Mark vi, 17–29) was not only lese majesty but politically subversive, espousing the cause of Herod's first wife, a Nabataean princess. Fear of local support of retributive action by the Nabataean king Aretas (*see* NABATAEANS) occasioned John's imprisonment at Machaerus and his execution, according to Josephus. His birth is commemorated on June 24 in the West, June 25 in the East; his death on Aug. 29.

John (Arabic Yahya) is accounted one of the prophets in Islam and is mentioned frequently in the Koran, which, however, does not refer to his role as Baptist nor recount his death. A tomb said to be his may be seen in the Great Mosque of Damascus.

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(C. H. KR.)

JOHN, SAINT, OF BEVERLEY (d. 721), bishop of York, one of the most popular medieval English saints, was consecrated bishop of Hexham in 687, and in 705 was transferred to York. John had founded a monastery at Inderawood (later called Beverley), where he spent his last years and where he died on May 7 (his feast day), 721. Henry V ascribed to him the victory of his troops over the French at Agincourt on Oct. 25, 1415, the anniversary of the translation of John's remains to York (1037), and in 1416 ordered his feast to be kept throughout England.

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(PL. GN.)

JOHN, SAINT, OF CAPISTRANO (GIOVANNI DA CAPISTRANO, JOHANNES CAPISTRANUS) (1386–1456), Italian theologian and preacher, was born at Capistrano in the Abruzzi. Trained in law at Perugia, he became magistrate and captain of his native town. As an intermediary in a civil quarrel arising from the power struggles of the great western schism, he was imprisoned, experienced an emotional conversion while in prison, and dedicated his life to healing the wounds caused by the schism. After dissolving his unconsummated marriage, he became a Franciscan in 1416 and was ordained in 1426. St. John was the most famous Franciscan preacher of the century. He tried to restore doctrinal harmony and to promote education. Alert to the Turkish danger, he helped to raise the army which lifted the siege of Belgrade in 1456, the year he died (Oct. 23, of plague) at Ilok on the Danube. He was canonized in 1724, and his feast day is March 28.

See John Hofer, *St. John Capistran* (1943).

(A. S. TR.)

JOHN, SAINT, CLIMACUS (*c.* 550–*c.* 649), abbot of Mt. Sinai and author of the *Klimax* ("Ladder of Divine Ascent"), from which he derives his name. He became a monk in the monastery of St. Catherine on Mt. Sinai (*c.* 600) and after living as a hermit was elected abbot (639). He returned to his hermitage shortly before his death. His feast day is March 30. The "Ladder" sums up the teaching of the desert fathers from renunciation of life on the first rung to faith, hope and charity on the 30th and topmost rung. Widely used in the medieval west as well as in the Byzantine world, it is still a spiritual classic.

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(A. O.)

JOHN, SAINT, OF THE CROSS (Spanish, SAN JUAN DE LA CRUZ) (1542–1591), the name in religion of JUAN DE YEPES Y ÁLVAREZ, the most profoundly lyrical of Spanish poets and one of the great mystics of all time. Born at Fontiveros (in the modern province of Ávila) in 1542, John became a Carmelite in 1563, attended the University of Salamanca and was ordained priest in 1567. St. Teresa of Ávila enlisted his help in her work of reform (from 1568) and he subsequently participated in the founding of Discalced Carmelite monasteries. For this he had to endure persecution by Carmelites hostile to the reform (he was twice kidnapped and imprisoned, 1576 and 1577–78) and to face charges before the authorities. Eventually he won high office in his order—vicar provincial of Andalusia, 1585–87. John died at Úbeda in the early morning of Dec. 14, 1591. He was beatified in 1674, canonized in 1726 and pronounced a doctor of the church in 1926.

In the work of St. John of the Cross poetry and prose are closely linked, the prose being primarily the exegesis of the mystical poetry. First, however, the short poems for which the author did not provide any prose commentary must be mentioned. This group comprises *romances* (ballads) and *glosas* (stanzas built up to a key line selected for paraphrasing or expatiation). All fall within the established Castilian tradition, but some are especially remarkable: for instance the *glosa* beginning "Tras de un amoroso lance . . ." ("On an impulse of love . . ."), a short poem of great mystical intensity; "El cantar del alma que se huelga de conocer a Dios" ("Song of the Soul Delighted by the Knowledge of God"), the verse form of which involves an unusual sort of parallelism, with the constant refrain ". . . aunque es de noche" (" . . . though it be night"); and the charming poem beginning "Un pastorcico solo está penado . . ." ("A lonely shepherd boy is grieving . . .").

It was, however, in the poems with commentaries that St. John was to express himself incomparably: *Cántico espiritual, Noche oscura* and *Llama de amor viva*. These are all in the *lira* form (stanzas of 5 lines, the first, third and fourth of 7 syllables, the others of 11, rhyming *a b a b b*), in the polished style introduced by Boscán and Garcilaso de la Vega. They provide an account of mystical experience in terms of the most intense poetry.

In *Cántico espiritual*, the kernel of which he derives from the biblical Song of Songs, St. John gives an exposition of mysticism on classical lines, in the three stages of purgation, illumination and union, as he himself explains in the foreword to the commentary, addressed to Ana de Jesús, prioress of the Discalced nuns of San José de Granada. The lyric of the *Noche oscura* consists of eight stanzas "in which the soul sings of the fortunate adventure that it had in passing through the dark night of faith . . . to union with the Beloved"; on this St. John wrote two commentaries, the *Subida del monte Carmelo* in three books and the shorter work itself entitled *Noche oscura*. The *Llama de amor viva* consists of four songs, each with a prose commentary, and provides the conclusion to John's theory of mysticism: every line is exclamatory, as pure exclamation alone can convey his meaning.

St. John reaches high peaks of lyrical poetry, but he also presents considerable difficulties to the reader, as his approach is not only poetic but also rigorously intellectual. Words being inadequate to express mystical rapture, he is often obliged to use symbolism; and as his vocabulary is rather restricted (words suggestive of something consuming, such as "flame" and "fire," are very frequent, and "dark night" is a typical symbol), the same word may recur twice within four lines of a poem with a different symbolism on each occasion. Of his exclamatory phrases and comparisons some are derived from the Bible, others are of his own invention. He also uses antithesis (*e.g.,* in the phrases *soledad sonora* ["resounding solitude"] and *música callada* ["tacit music"], which he elucidates in prose of great poetic quality). The line "El silbo de los aires amorosos" ("the whistling of the breezes full of love") is a strikingly beautiful example of his mastery of alliterative onomatopoeia. The musicality of his lines serves to enhance the expression of his feeling.

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JOHN, SAINT, OF DAMASCUS (JOHANNES DAMASCENUS) (*c.* 675–749), eminent theologian and doctor of the church, considered to be the last of the Greek Fathers, was born at Damascus, the son of a Christian father, Sergius, a comptroller for the Arab occupation troops. In Arabic his surname was Mansur ("Victorious"). John succeeded his father as comptroller for the caliph. While still a layman, he wrote (about 730) three treatises in defense of the veneration of holy images, which the emperor Leo the Isaurian was making strenuous efforts to suppress (*see* ICONOCLASTIC CONTROVERSY). Shortly after this literary debut, John entered the monastery of Mar Saba, 10 mi. S.E. of Jerusalem, where he spent most of the rest of his life studying, writing, preaching and practising a severe asceticism. He was ordained priest by the patriarch of Jerusalem. John of Damascus is a canonized saint in both the Greek and Latin churches, which hold his feast day on Dec. 4 and March 27, respectively. Leo XIII recognized him as a doctor of the church in 1890. Among the Greeks he is called the "Golden-flowing" because of the eloquence of his sermons and the beauty of both his prose and his poetry. The latter is still used in the Greek liturgy. The Greek recension of the story of Barlaam and Josaphat (*q.v.*) was formerly attributed to him.

Among the numerous works of Damascenus the most important is entitled *The Fount of Knowledge* (or *of Wisdom; Pege Gnoseos*). Sober in style and didactic in scope, this work eventually became the principal textbook of Greek Orthodox theology. It is divided into three parts. The first, entitled "Philosophical Principles," is an exposition of Aristotle's *Dialectic* and its application to theology. The second, "On Heresies," describes 103 heresies; the first 80 are literally copied from a similar work of St. Epiphanius, the balance are from an unknown source. These philosophical and historical introductions lead up to the third and main part of the work, "The Orthodox Faith," a systematic exposition of theology, based upon the Bible, the Fathers and the church councils, which summarizes the earlier theological thinking of the Eastern Church. Although not devoid of originality, "The Orthodox Faith" leans heavily on such eminent writers as Basil the Great, Cyril of Alexandria, Cyril of Jerusalem, Gregory Nazianzus, Gregory of Nyssa, Maximus the Confessor and Nemesius of Emesa. The influence of this work can be seen in the number of manuscripts still extant; some 550 Greek codices and at least 150 copies of the Latin version of Burgundio of Pisa (12th century). There are also many translations, some going back to the 10th century. Western scholasticism was influenced mainly by the version of Burgundio.

Among the other works of Damascenus, the moral and ascetic counterpart of *The Fount of Knowledge* is another treatise, the *Sacred Parallels,* a collection of biblical passages followed by illustrations drawn from other scriptural sources and from the Fathers. He also wrote a commentary on the Pauline Epistles.

Damascenus was chiefly a compiler. However, he is original in his treatment of predestination, providence, Christology, the divine maternity and the assumption, the Eucharist and the cult of saints and holy images. He is weak in his doctrine on the Holy Spirit, the church, grace, certain sacraments and his proofs for the existence of God.

BIBLIOGRAPHY.—The works of John were edited by Le Quien, 2 vol. (1712), edition reproduced in J. P. Migne, *Patrologia Graeca,* vol. xciv–xcvi. Burgundio's and Cerbanus' Latin versions of St. John's "The Orthodox Faith" were ed. by E. M. Buytaert (1955). The *Writings* exist in Eng. trans. by F. H. Chase (1958), including *The Fount of Knowledge. See* also J. Nasrallah, *Saint Jean de Damas* (1950); F. Dölger, *Der griechische Barlaam-Roman, ein Werk des hl. Johannes von Damaskos* (1953); B. Studer, *Die theologische Arbeitsweise des Johannes von Damaskus* (1956); B. Kotter, *Die Ueberlieferung der Pege gnoseos des hl. Johannes von Damaskos* (1959); K. Rozemond, *La christologie de saint Jean Damascène* (1959). (E. M. BT.)

JOHN, SAINT, OF GOD (1495–1550), founder of the Hospitaller Order of St. John of God (Fate Bene Brothers), was born at Montemor, Novo, Port., on March 8, 1495. From the life of a shepherd he turned to that of soldiering in the Austrian army, then in active conflict with the Turks. In this process he turned away from religion, but at about the age of 40 he repented. On returning to Granada, after service in north Africa, he was so deeply impressed by the sermons of Juan de Avila that he determined to devote his life to the care of the poor and the sick and so rented a house for that purpose. When he died on March 8, 1550, his companion Antonio Martino succeeded him as head of the institution. Other houses, including the large hospital at Madrid, richly endowed by Philip II, were soon opened; in 1572 Pius V raised the lay society to an order with the Augustinian rule. The order flourishes especially in Italy, Spain, France and central Europe. John was canonized in 1690 and declared the patron of hospitals and sick persons in 1886. His feast day is March 8. *See* also JOHN OF GOD, HOSPITALLER ORDER OF SAINT.

JOHN, SAINT, OF NEPOMUK OR POMUK (JOHN NEPOMUCEN) (*c.* 1345–1393), an incidental victim of the bitter conflict of church and state in Bohemia (*q.v.*) in the last decade of the 14th century, is first recorded as an ecclesiastical notary in 1374. In 1383 he went to Italy to study at Padua, where he became a doctor of canon law. After acquiring several benefices, he finally, in 1390, became vicar general for John of Jenstejn, archbishop of Prague. When in 1393 the archbishop excommunicated one of the favourites of King Wenceslas IV and thwarted the king's ambition to carve a new bishopric out of Jenstejn's province, John of Pomuk was arrested as the archbishop's chief agent. He was tortured to death by the king in person (March 20). His body was put into a goatskin sack and thrown into the Vltava river.

During the fight with the Hussites the Catholic faction made a martyr of John. The Austrian chronicler Thomas Ebendorffer (d. 1464) is the first to say that Wenceslas killed him because he refused to betray what Queen Sophia had told him in the confessional. Though he never was her confessor, the story was officially accepted by the church, which regards him as the martyr of the seal of confession. He was canonized as such in 1729, when the Bohemian Jesuits were seeking to counter the still surviving popularity of the memory of John Huss. It is possible that Ebendorffer's account confused two different persons. John's feast day is May 16.

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JOHN, the name of several popes, an antipope and a schismatic. The numbering of the popes John is extremely confused. From the end of the 12th century onward catalogues of the popes erroneously split the pontificate of John XIV into two pontificates and also included the antipope John XVI. The present-day list of the popes follows one of these errors for the period from John XVI to John XIX (*i.e.,* it counts John XVI as if he were a legitimate pope) and both errors for the period since John XXI, who actually was the 19th canonical pope of that name. There never

was a pope carrying the name of John XX. Baldassare Cossa, called John XXIII, was a schismatic; hence, following the standard enumeration, the number XXIII was correctly applied to Angelo Roncalli when he took the name John in 1958, though he was in fact the 21st canonical pope of the name. (G. B. L.)

St. John I (d. 526), a Tuscan, was pope from Aug. 13, 523, to May 18, 526. In 525 the Arian king Theodoric the Great sent him to Constantinople to effect revocation of the emperor Justin I's anti-Arian policy. Returning unsuccessful, he was cast by Theodoric into prison, where he soon died. He is honoured as a martyr and saint (feast May 27).

John II (d. 535), a Roman, was pope from Jan. 2, 533, to May 8, 535. He was the first to change his original name (Mercurius). He settled the Theopaschite controversy by approving, in March 534, the profession of faith submitted by Emperor Justinian I, explaining the orthodox sense of the controverted phrase "One of the Trinity suffered in the flesh." He also upheld the Blessed Virgin Mary's title *Theotokos* (*see* Mary).

John III (d. 574), pope from July 17, 561, to July 13, 574, was originally named, it seems, Catelinus. Little record has survived of his pontificate. (Jn. F. B.)

John IV (d. 642), pope from 640 to 642, a Dalmatian by birth and archdeacon of the Roman church, was consecrated in 640. He condemned Monothelitism as his predecessor Severinus had and defended the orthodoxy of the replies of Honorius I to Sergius. John died Oct. 12, 642.

John V (d. 686), pope from 685 to 686, was a Syrian by birth. In 680–681 he was Pope Agatho's legate to the sixth ecumenical council at Constantinople. He was consecrated July 23, 685, and died Aug. 2, 686. He is described as a man of great energy, learning and moderation.

John VI (d. 705), pope from 701 to 705, a Greek, was consecrated bishop of Rome on Oct. 30, 701. He protected the exarch Theophylact on his entry into Italy from the violence of the soldiery. When Gisulf, the Lombard duke of Benevento, invaded the Roman duchy, the pope ransomed his captives and induced him to withdraw to his own territory. John died Jan. 11, 705.

John VII (d. 707), pope from 705 to 707, also a Greek, was elected March 1, 705. He was illustrious for devotion to the Virgin Mary and for zeal in restoring Roman churches, as modern archaeology attests. John timidly returned without decision the decrees of the Trullan council (692) submitted by the emperor Justinian II. He died Oct. 18, 707.

John VIII (d. 882), pope from 872 to 882, a Roman and archdeacon of the Roman church, was elected Dec. 14, 872. He was a man of great energy and capacity in diplomatic and military as well as in ecclesiastical affairs. He helped in the conversion of the Slavs, especially in the case of St. Methodius (*see* Cyril and Methodius, Saints), and he worked hard and effectively to unite south Italy against the Saracen menace. He laboured to solve the problem created by Photius (*q.v.*) in Constantinople and maneuvered adroitly between 875 and 881 to maintain and increase the authority of the pope as the arbiter of the succession in the Carolingian claim to the imperial crown. On Dec. 16, 882, he was murdered in a domestic conspiracy.

John IX (d. 900), pope from 898 to 900, was involved in a disputed election with Sergius, destined to become pope later. John, elected in Jan. 898, rehabilitated the memory of Formosus, confirmed the imperial rights in papal elections and supported the alliance with Lambert of Spoleto. He died early in 900.

John X (d. 928/929) succeeded Lando about March 914. He was a powerful ruler and a capable soldier. With the Roman senator Theophylact and the margrave Alberic of Spoleto he defeated the Saracens on the Garigliano (Aug. 915). John crowned Berengar of Friuli as emperor, but in a civil war with Theophylact's daughter Marozia. John was thrown into prison, where he died shortly afterward, probably in 929.

John XI (d. 935/936), pope from 931 to *c.* 935, son of Marozia, was consecrated as a youth of 21 in Feb. or March 931. He was his mother's tool until his half brother Alberic (her son by Alberic of Spoleto) overthrew her in 932 or 933. John was then virtually a prisoner till his death in Dec. 935 or Jan. 936.

John XII (Octavian) (d. 964), pope from 955 to 963, the son of Alberic, was elected while still only a youth on Dec. 16, 955. He crowned Otto I (*q.v.*) emperor on Feb. 2, 962, but rebelled when he found him a master. Otto called a council which in Dec. 963 deposed him for scandalous conduct and elected Leo VIII; this gave rise to the much-discussed Ottonian privilege, which required the pope to take an oath of obedience to the emperor before consecration. John died May 14, 964.

John XIII the Good (d. 972), pope from 965 to 972, formerly bishop of Narni, was enthroned on Oct. 1, 965. His nomination was a credit to the emperor Otto I, as he was a pious and learned man. However the Romans expelled him from the city, whereupon Otto secured his return and took savage vengeance on his enemies. John gave the imperial crown to the youthful Otto II on Christmas day 967 and crowned Theophano as empress immediately before her marriage in 972. John died on Sept. 6, 972.

John XIV (Pietro Canepanova) (d. 984), pope from 983 to 984, was elected by Otto II in Nov. or Dec. 983. On Otto's death Boniface VII returned and imprisoned John, who died on Aug. 20, 984, either of starvation or poison.

John XV (d. 996), pope from 985 to 996, loyal to the Carolingian line which failed during his reign, was elected in Aug. 985. He was dominated by the Roman patrician Crescentius except when the latter was in dread of the empress-mother Theophano or of Otto III. (*See* also Crescentii.)

John XVI (Philagathus) (d. *c.* 1013), antipope from 997 to 998, was a creature of Crescentius II, who put him in the place of Gregory V. Otto III returned, hanged Crescentius and relegated John to a monastery after degrading and mutilating him.

John XVII (Giovanni Siccone), pope from June to Dec. 1003, succeeded Silvester II.

John XVIII (Fasano) (d. 1009), pope from 1004 to 1009, the successor of John XVII, was a creature of John Crescentius, consecrated in Jan. 1004. He eventually abdicated and died shortly afterward in a monastery in June or July 1009.

John XIX (Romano, count of Tusculum) (d. 1032), pope from 1024 to 1032, succeeded his brother Benedict VIII in April or May 1024. Having agreed to grant to the patriarch of Constantinople the title of ecumenical bishop he was forced by the general outcry to withdraw from the agreement. He crowned Conrad II on Easter Sunday 1027. John died late in 1032. (C. P. L.)

John XXI (Peter Juliani) (d. 1277), pope from 1276 to 1277, was born in Lisbon between 1210 and 1220 and in the history of philosophy and of science is known as Petrus Hispanus. He wrote one of the most widely used medieval textbooks on logic, *Summulae logicales;* also a psychological treatise, *De anima;* and a commentary to Pseudo-Dionysius the Areopagite's *Celestial Hierarchy*. Among his medical works the most important are the *Thesaurus pauperum* and the ophthalmological *Liber de oculo*. Peter taught at Siena and later was a master in the arts faculty of the University of Paris. He held several benefices in Portugal and in 1272 was raised to the archiepiscopal see of Braga by Gregory X, who also used him as his personal physician. He was made cardinal bishop of Tusculum in 1273 by Gregory and received episcopal consecration in 1274. When he became pope on Sept. 8, 1276 (*cf. Registres de Grégoire X et de Jean XXI,* ed. by J. Guiraud and L. Cadier, Bibliothèque des Écoles Françaises d'Athènes et de Rome, series ii, 2 vol. [1892–1906]), after the short pontificate of Adrian V, he chose as his principal adviser cardinal John Gaetan Orsini, who was to succeed him; his short pontificate was in every way an introduction to that of Nicholas (*q.v.*) III. John XXI died on May 20, 1277. (G. B. L.)

John XXII (Jacques Duèse) (d. 1334), pope from 1316 to 1334, was chosen as a compromise candidate because he was 70 years old. He was consecrated on Aug. 7, 1316. He lived 18 years more (reigning at Avignon), restored the papal treasury depleted by Clement V, centralized ecclesiastical patronage and created a new financial system. He reserved the right to appoint to all bishoprics, condemned plurality of benefices and created many new dioceses. His reign was dominated by quarrels with the German king Louis of Bavaria, whom he excommunicated. Louis entered Rome in 1328, had himself crowned Holy Roman emperor

by a captain of the Roman people, declared John deposed and called a council to elect a successor; but the new antipope Nicholas V had little support. In the long quarrel between the Spiritual and Conventual Franciscans over the nature of poverty, John condemned the position of the extreme Spirituals. He was an energetic pope whose decretals came to form a significant addition to canon law. He died Dec. 4, 1334.

JOHN XXIII (Baldassare Cossa) (d. 1419) was a schismatic pope from 1410 to 1415. As cardinal he deserted Pope Gregory XII in 1408 and joined other cardinals to convene the invalid Council of Pisa (1409). This council elected a third rival pope, Alexander V. After the latter's death in May 1410 Cossa was chosen to succeed him as John XXIII (May 25, 1410). John agreed to call the Council of Constance (1414–18) on the insistence of the emperor Sigismund, but when he discovered that he could not control the council he fled disguised as a layman. Enraged by his desertion, the council ordered his arrest and deposed him (May 29, 1415). He accepted the deposition and, when released from prison, threw himself on the mercy of Martin V, who made him cardinal bishop of Tusculum. He died a few months later, on Nov. 22, 1419. (J. A. CT.)

JOHN XXIII (Angelo Roncalli) (1881–1963), elected pope in succession to Pius XII on Oct. 25, 1958, was born in the village of Sotto il Monte in the diocese of Bergamo, northern Italy, on Nov. 25, 1881, of a peasant family. He studied at Bergamo and Rome, obtained the doctorate in theology in 1904 and was ordained priest in the same year. Roncalli became private secretary to his bishop, Giacomo Radini-Tedeschi of Bergamo, lectured on apologetics and church history in the diocesan major seminary and published several historical works. Called up for military service in 1915 during World War I, he was made a sergeant in the medical corps and, the following year, chaplain of several military hospitals with the rank of lieutenant. Summoned to Rome by Benedict XV in 1921, he was employed in administrative capacities in the Congregation for the Propagation of the Faith. In 1925 he was made titular archbishop and sent to Bulgaria as apostolic visitor. He became apostolic delegate to Bulgaria in 1931 and in 1934 was named apostolic delegate to Turkey and, simultaneously, to Greece. Pius XII appointed him apostolic nuncio to France in 1944. At Paris during the difficult postwar years he won general favour by his talent for smoothing out difficulties. From 1946 to 1953 he also acted as Vatican observer at UNESCO.

Pius XII created Archbishop Roncalli a cardinal in 1953 and made him patriarch of Venice. As patriarch, Cardinal Roncalli eschewed politics although expressing opposition to the Communists and other leftists. According to the public press he was a compromise candidate in the conclave of 1958, and some expressed the opinion that his would be a caretaker's pontificate. John XXIII quickly dispelled this notion and showed that he intended, despite his years, to give the church vigorous leadership. His choice of the name John, so long unused by the Roman pontiffs, was a first indication of his independence. Within a month of his accession he had raised the College of Cardinals to an unprecedented number and, subsequently, he still further expanded and internationalized it. Despite his age and with an informality that contrasted with previous papal practice, John XXIII frequently toured Rome and visited hospitals, the jail, etc. In 1962, in the company of the premier and the president of Italy, he undertook a train journey of more than 400 mi. to the shrines of Loreto and Assisi, the longest trip taken by a reigning pope since the civil state of Italy absorbed the papal dominions in the 19th century; it was regarded as a final gesture completing the papacy's acceptance of civil rule over its former territories.

The most important initiative of Pope John's pontificate was the summoning of a general council, the first in nearly 100 years. In 1959 he announced his intention of convoking the second council of the Vatican and urged that preparatory synods be held in each diocese, setting an example by holding one at Rome in 1960. The council opened on Oct. 11, 1962. The pope allowed the fathers of the council great, perhaps unprecedented, freedom of discussion and urged them to find new means of making the faith live in the hearts and lives of the faithful of the church.

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POPE JOHN XXIII (ANGELO RONCALLI)

(*See* VATICAN COUNCILS.) John XXIII also manifested great interest in the reunion of Christendom and made it one of the aims of the council. He received in audience the Greek patriarch, the archbishop of Canterbury and the moderator of the Scottish Kirk. The pope celebrated Mass according to the Byzantine rite, something no Roman pontiff had done for centuries. Chiefs of state who visited John included King Paul of Greece, Queen Elizabeth II of England and King Baudouin of Belgium. The Turkish government opened relations with the Vatican in 1960. Even the governments behind the "iron curtain" made gestures of good will.

The pope promulgated a revised liturgical code governing the use of the Roman missal and breviary but put off major liturgical changes till the council. One of his most important encyclical letters, *Mater et Magistra,* brought the doctrine of the church on social questions up to date. The encyclical *Pacem in terris* (dated April 11, 1963, Holy Thursday, but signed April 9), in addition to giving pastoral advice, dealt with the relations among men, their rights and duties as citizens of the state and the conduct of affairs among nations. Many of Pope John's predecessors were elderly men when they reached the papal throne. With few exceptions they showed as pontiffs surprising energy, initiative and enterprise. John XXIII continued this tradition. Indeed, it is probable that no pope ever made such an impression on world opinion as did this octogenarian pontiff. He died on June 3, 1963, from peritonitis consequent on a gastric tumour. Proceedings for his beatification were instituted in 1965 by his successor, Pope Paul VI.

(E. A. R.)

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JOHN I (JOHN TZIMISCES) (924–976), Byzantine emperor from 969 to 976, was of noble Armenian descent. In 969, already

a distinguished general and commander of the east, he gained the throne by the assassination of Nicephorus II Phocas. He conciliated the patriarch by making concessions to the church, but had to put down serious opposition, chiefly from the Phocas family, before he could concentrate on foreign policy. In his campaigns of 970 and 971 he crushed the Russians of Kiev, then threatening Constantinople, and extended the imperial frontier to the Danube, thus subduing eastern Bulgaria and paving the way for its complete subjugation under Basil II. In the west, Tzimisces welcomed the emperor Otto I's overtures, and Theophano, probably his niece, was married to Otto II. He sent an expedition to renew the war against the Arabs in 973 and himself led campaigns in 974 and in 975, recovering the middle reaches of the Euphrates and advancing through Syria into Palestine, taking Tiberias, Nazareth and Caesarea. Before he could follow up these victories he died, probably of typhoid, on Jan. 10, 976, in Constantinople. During his short reign he had given attention to all the frontiers of the empire, and he left it much strengthened.

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JOHN II (JOHN COMNENUS) (1088–1143), Byzantine emperor from 1118 to 1143, son of Alexius I and Irene Ducas, succeeded his father on Aug. 16, 1118. At home John's agrarian policy resembled that of his father: he settled prisoners of war on the land as soldier-farmers, and estates in *pronoia* were granted in return for military service, though he had mainly to rely on mercenaries. A devout emperor, he founded the splendid monastic house of the Pantocrator in Constantinople with a well-organized hospital attached to it. Abroad he built up alliances in the west and north in order to protect his flanks in his coming struggle with the Norman principality of Antioch. In the Balkans he gained a decisive victory over the nomad Pechenegs (Patzinaks) in 1122. Of the Balkan principalities Zeta recognized Byzantine overlordship, but Rascia, though defeated by John, inclined toward Hungary. Married to a Hungarian princess, John had opportunity for intervening in internal disputes in Hungary; war between the two powers broke out in 1128 and Byzantium defeated Stephen II. Venice, Hungary's rival in the Adriatic, was powerful enough to force John to renew the trading concessions granted by Alexius I. Trading privileges were also granted to Pisa (1136) and possibly to Genoa (1142). John attempted to win over the papacy and made an alliance with the German ruler, Lothair III, hoping to strengthen himself against the Norman Roger II of Sicily.

From 1130 onward he was mainly occupied in Asia Minor and Syria. He drove back the powerful Danishmends of Anatolia (1132–35). He next gained control of Lesser Armenia (Cilicia), and was then free to approach his main objective, Antioch. In 1137 he forced Raymond of Poitiers, husband of the Norman Constance of Antioch, to recognize his overlordship, but this was bitterly resented by the Latins and he withdrew in 1138. At this time he also faced fresh Danishmend attacks, as well as papal and Sicilian hostility and the death of his ally Lothair III. He renewed the German alliance with Conrad III, arranging a marriage between his son Manuel and Conrad's sister-in-law Bertha of Sulzbach (*see* IRENE). During 1139–41 he campaigned against the Danishmends. In Sept. 1142 he reached Antioch and demanded its surrender. He wintered near Mopsuestia and in April 1143 was preparing to enforce his claims when he unexpectedly died of a septic wound (April 8), having chosen as his successor his youngest son, Manuel. An able statesman, diplomat and soldier, John was equally distinguished for his humanity and morality.

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JOHN III (JOHN DUCAS VATATZES) (1192–1254), Byzantine emperor at Nicaea, was a son-in-law of Theodore I Lascaris, whom he succeeded in 1222. By skilful diplomacy and strategy he greatly enlarged his territories and paved the way for the future recovery of Constantinople from the Latins. In 1225 he forced them to relinquish most of their conquests in Asia Minor, and established his first foothold in Europe by occupying Adrianople. His subsequent success was assisted by the downfall in 1230 of Theodore Angelus, the rival Byzantine emperor at Thessalonica. In 1235 he joined forces with Theodore's conqueror, the Bulgarian tsar John Asen II, in an unsuccessful attack on Constantinople; and in 1246 he put an end to the empire of Thessalonica, which had revived under Bulgarian patronage, by incorporating it into the empire of Nicaea. The western Greeks, however, refused to acknowledge John as their emperor, and to the end of his reign he was engaged in warfare or negotiation with the despot of Epirus.

He strengthened his position with regard to his Latin enemies by securing the friendship of the German emperor Frederick II, whose daughter Constance (Anna) he married in 1244, and by exchanging embassies with Popes Gregory IX and Innocent IV, offering to submit the Greek church to Rome in return for the restoration of the Byzantine throne and patriarchate. Although his sights were set on Constantinople, he laboured to improve the administration, the economy and the agriculture of his empire in exile, to relieve it of dependence upon foreign, especially Venetian, trade, and to make Nicaea a microcosm of the Byzantine capital, fortifying it and enriching it with churches. He reorganized the eastern frontier-defense system by settling military colonies of Cumans, refugees from the Mongols; and the Seljuk Turks, who bore the brunt of the Mongol invasions of Asia Minor, were glad to conclude an alliance with him in 1243.

John Vatatzes was the greatest statesman produced by the empire of Nicaea and one of the ablest of all Byzantine emperors. He was long revered as a saint in Nymphaeum where he died, on Nov. 3, 1254, and in Magnesia where he was buried.

BIBLIOGRAPHY.—A. Meliarakes, *Ἱστορία τοῦ βασιλείου τῆς Νικαίας καὶ τοῦ δεσποτάτου τῆς Ἠπείρου* (1898); A. Gardner, *The Lascarids of Nicaea* (1912); D. M. Nicol, *The Despotate of Epiros* (1957); G. Ostrogorsky, *History of the Byzantine State* (1956). (D. M. N.)

JOHN IV (JOHN LASCARIS) (*c.* 1250–*c.* 1300), Byzantine emperor from 1258 to 1261, was about eight when his father, Theodore II, died. Michael VIII Palaeologus (*q.v.*) conspired to make himself regent and was crowned co-emperor with John probably about Jan. 1, 1259. But when Constantinople was recovered from the Latins, Michael was crowned again as sole emperor, and John, deprived of his rights, was blinded on Michael's orders (Dec. 1261) and imprisoned in a fortress in Bithynia, where he died as the last of the Lascarid dynasty.

See A. Gardner, *The Lascarids of Nicaea* (1912); G. Ostrogorsky, *History of the Byzantine State* (1956). (D. M. N.)

JOHN V (JOHN PALAEOLOGUS) (1332–1391), Byzantine emperor from 1341 to 1391, was born at Didymoteichos on April 18, 1332. He was nine years old when his father, Andronicus III, died. The regency was disputed between his mother, Anne of Savoy, and her supporters, and John Cantacuzenus (*see* JOHN VI). Civil war broke out, and Cantacuzenus was crowned emperor in Constantinople in 1347 and married his daughter Helen to John. But John soon asserted his hereditary claims and in Nov. 1354 forced Cantacuzenus to abdicate.

John V made great efforts to arrest the decline of his empire. But two civil wars had drained its resources and fatally disrupted its unity; while the Ottoman Turks, whom both sides had called to their aid, and the Serbs, who had overrun Macedonia and Thessaly, threatened the very capital with conquest. The Serbian danger passed in 1355 with the death of Stephen Dushan; but the Turks penetrated into Europe, capturing Gallipoli in 1354. John's only hope of deliverance seemed to lie in the west. In 1355 he appealed to the pope, offering to submit his church to Rome, but his clergy and people refused to support him. The Turks set up their first European capital at Adrianople (*c.* 1365), and John, in despair, went to Hungary to seek help, only to be arrested by the Bulgarians on his way home. Finally, prompted by his Italian mother and his cousin, Count Amadeo of Savoy, who had brought an army to Thrace, he went to Rome; and in Oct. 1369 he confessed the Roman faith. But the Greek and Latin churches remained in schism; no crusade for the defense of Constantinople materialized, and John himself was detained at Venice as a debtor.

In 1371 the Turks entered Macedonia, and John was obliged to acknowledge the sultan Murad I as his suzerain. The situation provoked further civil war. John's eldest son, supported by the Genoese, set himself up as the emperor Andronicus IV in Constantinople in Aug. 1376. John retrieved his throne with the help of the Venetians and the Turks in July 1379. Andronicus died in 1385, and John was supported by his second son, Manuel (*see* MANUEL II), against a rebellion of his grandson John VII (*q.v.*) in 1390. But both father and son were merely vassals of the sultan. John had to demolish the fortifications he had built in Constantinople, while Manuel lived as a hostage at the sultan's court until his father died on Feb. 16, 1391.

See O. Halecki, *Un Empereur de Byzance à Rome* (1930); G. Ostrogorsky, *History of the Byzantine State* (1956). (D. M. N.)

JOHN VI (JOHN CANTACUZENUS) (*c.* 1292–1383), Byzantine emperor from 1347 to 1354, was the friend and first minister of Andronicus III, for whom he had fought against Andronicus II, and for whose infant heir John V (*q.v.*) Palaeologus he claimed the right to act as regent in 1341. His claim was contested by John's mother, together with the patriarch and a powerful faction; and he had himself proclaimed emperor at Didymoteichos in Oct. 1341. The empire was again split by civil war, aggravated by social and religious dissensions. The landed aristocracy rallied to Cantacuzenus. His opponents fostered the discontent of the unpropertied classes; while the Hesychast doctrine (*see* HESYCHASM) formulated by Gregory Palamas, which had found favour especially with the monks, was proscribed by the patriarch, and the Hesychasts looked to Cantacuzenus as their champion. But it was only on the shoulders of the Turks, with the help of Seljuk troops and through alliance with the Ottoman sultan Orchan, to whom he gave his daughter Theodora in marriage, that Cantacuzenus was carried to final victory. In 1346 he was crowned emperor at Adrianople, and in Feb. 1347 entered Constantinople, where a second coronation was performed on May 13, followed by the marriage of his daughter Helen to John V.

The empire over which John VI now ruled was irretrievably dismembered. Thessalonica was controlled by his political opponents until 1350; the Serbs, in alliance with John V, had seized the occasion to descend into Macedonia, Epirus and Thessaly; the treasury of Constantinople was empty, its revenue negligible, and its trade at the mercy of the Genoese and Venetians. Cantacuzenus hoped to promote unity and stability by sharing his authority with his sons: Manuel was made despot of the Morea (Peloponnese), and Matthew received part of Thrace. But in 1352 John V, financed by the Venetians who were then at war with the Genoese, attacked Matthew's territory. Cantacuzenus restored order with an army of Turks, renounced John's imperial title and crowned Matthew co-emperor. But in Nov. 1354 he was forced to abdicate in favour of John V. He became a monk and spent the many remaining years of his life writing a history of his own time in the form of memoirs covering the years 1320–56. He also composed theological works in defense of Hesychasm, whose acceptance by the Orthodox Church he had helped to secure. He died at Mistra in the Morea on June 15, 1383.

BIBLIOGRAPHY.—The history is edited by L. Schopen in the Bonn corpus, 3 vol. (1828–32). *See* also V. Parisot, *Cantacuzène, homme d'état et historien* (1845); G. Ostrogorsky, *History of the Byzantine State* (1956); K. Krumbacher, *Geschichte der byzantinischen Litteratur,* 2nd ed. (1897). (D. M. N.)

JOHN VII (JOHN PALAEOLOGUS) (*c.* 1370–1408), Byzantine emperor in 1390, was the son of Andronicus IV and grandson of John V (*q.v.*), against whom he rebelled, encouraged by the sultan Bayazid I. He reigned in Constantinople from April to September 1390, when he was dethroned by his uncle Manuel (*see* MANUEL II) and allotted Selymbria as his portion of empire. During Manuel's absence in the west, however, from 1399 to 1403, John again ruled the capital; and on Manuel's return he became emperor at Thessalonica, where he died on Sept. 22, 1408.

See F. Dölger, "Johannes VII, Kaiser der Rhomäer 1390–1408," *Byzantinische Zeitschrift,* vol. xxxi, pp. 21–36 (1931); G. Ostrogorsky, *History of the Byzantine State* (1956). (D. M. N.)

JOHN VIII (JOHN PALAEOLOGUS) (1392–1448), Byzantine emperor, was the eldest of the six sons of Manuel II, who made him co-emperor in 1421 and whom he succeeded in 1425. His empire was almost restricted to the walls of Constantinople, and seemed in constant danger of extinction by the Ottoman Turks. Thessalonica fell to the Turks in 1430, and the only remaining province was the Morea (Peloponnese), where in 1432 three of John's brothers put an end to the Latin principality of Achaea, which had endured since the fourth crusade. John, who had already toured western Europe seeking help (in 1423), offered to submit the Greek church to the papacy as the only effective means of eliciting that help. In 1438 Pope Eugenius IV convened the Council of Ferrara-Florence (*q.v.*), which John himself attended together with his brother Demetrius, the patriarch Joseph, and several Orthodox prelates. After prolonged theological debates the union of the Greek and Roman churches was proclaimed at Florence on July 6, 1439. But the clergy and people of Constantinople fanatically opposed the union and Demetrius tried unsuccessfully to exploit the situation by seizing the throne. Nor did the promised help from the west prove effective. A crusade which set out in 1443 was routed by Murad II at Varna on Nov. 10, 1444. John's last years were further darkened by family intrigues for the succession, and he died on Oct. 31, 1448.

See G. Ostrogorsky, *History of the Byzantine State* (1956); J. Gill, *The Council of Florence* (1959). (D. M. N.)

JOHN, Latin emperor of Constantinople: *see* JOHN of Brienne, king of Jerusalem.

JOHN, the name of two kings of Aragon.

JOHN I (1350–95), king of Aragon from 1387 to 1395, was born at Perpignan on Dec. 27, 1350, the son of Peter IV. Devoted to poetry, music, hunting and superstition, John was content throughout his reign to rely for advice on political matters upon his energetic third wife, Yolande, daughter of the duc de Bar. Consequently he generally followed a pro-French policy, instead of the independent line pursued by Peter IV. John, however, refused to become involved in the Hundred Years' War. He enjoyed good relations with Castile, but was faced by serious revolts in Sicily and Sardinia, and lost the duchy of Athens. John died after a hunting accident on May 19, 1395, and was succeeded by his brother Martin.

JOHN II (1398–1479), king of Aragon from 1458 to 1479, was also king of Navarre from 1425 to 1479. Born at Medina del Campo in 1398, the second son of the future Ferdinand I of Aragon, he succeeded to the Navarrese throne on the death of Charles III in 1425 through his marriage (1420) with Charles's daughter Blanche of Navarre. In 1458 he succeeded his elder brother Alfonso V as ruler of Aragon, Sicily and Sardinia. John's reign was one of incredible confusion. He intervened continually in the affairs of his native Castile and of Naples, neglecting those of Aragon. He also became involved in civil war in Navarre and Catalonia because of a bitter quarrel with his eldest son, Charles, prince of Viana. In 1462 John and his Castilian second wife, Juana, were expelled from Catalonia by the *Diputació General.* The king did not succeed in returning to Barcelona until 1472. In the meantime he had lost Rousillon and Cerdagne to France. John appears to have been a man of robust determination, but he lacked political sense and his Castilian upbringing left him ill-equipped to understand Catalan problems. John died on Jan. 19, 1479; his heir was Ferdinand the Catholic. (P. E. R.)

JOHN (1296–1346), king of Bohemia from 1310, was born on Aug. 10, 1296, the son of the future German king Henry VII, of the house of Luxembourg, by his wife Margaret, daughter of John I, duke of Brabant. He became count of Luxembourg in 1310 and about the same time was offered the crown of Bohemia, which had passed to Henry, duke of Carinthia, after the death of Wenceslas III, the last Premyslid king, in 1306. His father accepted this offer for him, and John married Elizabeth (d. 1330), a sister of Wenceslas. After Henry's departure for Italy, John was crowned king of Bohemia in Prague (Feb. 1311). Henry of Carinthia was driven from the land, order was restored and Moravia was again united with Bohemia. By his coronation charter John confirmed the liberties of the lords and promised to give no offices or lands to foreigners.

On Henry VII's death (Aug. 1313) John was not elected to suc-

ceed him as German king. He then became a partisan of Louis the Bavarian, afterward the emperor Louis IV (*q.v.*), and helped him in his struggle against the rival claimant of the German kingship, Frederick of Austria, to whose defeat in the battle of Mühldorf (1322) he contributed. Louis rewarded John by giving him the Egerland (Chebsko) in pledge.

John took some action to extend his own dominions. In 1325 he made war against Casimir III of Poland, who was forced to recognize him as lawful heir to Henry duke of Wroclaw and overlord of all Silesia; between 1320 and 1329 parts of upper Lusatia were added to the Bohemian crown; and in 1330 John married his son John Henry to Margaret Maultasch, heiress of Tirol. He spent much of his time, however, both before and after he went blind in 1337, as a knight errant in the service of others, campaigning all over Europe from Toulouse to Prussia. Several times he assisted the French kings Charles IV (who was married to his sister Mary of Luxembourg in 1322) and Philip VI (whose son John married John's daughter Bona in 1332); and three times he led the knights of the Teutonic Order against the pagans in Pomerania and Lithuania (1328, 1339 and 1345). Thus he neglected his kingdom of Bohemia itself, visiting it merely to raise heavy taxes for his military enterprises, so that he and his German followers were unpopular there. Henry of Lipa and other lords plunged the country into civil strife, and John's absence provided the opportunity to create the beginnings of a parliament there. Finally, in 1333, John restored peace and good government by making his son Charles (*see* CHARLES IV, Holy Roman emperor) margrave of Moravia and regent of Bohemia.

Meanwhile, since the battle of Mühldorf, the relations between John and Louis the Bavarian had become strained, partly because of John's growing friendship with the papacy and with France, partly because of territorial disputes. During a period of reconciliation, John invaded Italy as imperial vicar and made himself ruler of much of Lombardy (1331 and 1333), but then more trouble between John and Louis arose from a quarrel over the lands left by Henry of Carinthia. After much fighting John was forced to acquiesce in the cession of Tirol and Carinthia to the Habsburgs (1336). In 1346, however, acting in concert with Pope Clement VI, he secured the formal deposition of Louis and the election of his own son Charles as German king (July 1346). He then went to help Philip VI of France against the English and fought at Crécy, where he died heroically on Aug. 26, 1346.

BIBLIOGRAPHY.—The definitive account of John's reign is by Josef Susta, in *Ceske Dejiny,* ii, parts 2 and 3 (1939, 1948). *See* also R. Cazelles, *Jean l'Aveugle* (1947). (X.; R. R. Bs.)

JOHN, the name of two kings of Castile.

JOHN I (1358–90), king of Castile from 1379 to 1390, was born at Épila (Aragon) in 1358, son of the future Henry II. Though ailing and melancholic, he was a devout, well-intentioned man who had the misfortune to encounter the full impact of the military consequences of his father's usurpation of the Castilian throne. After proclaiming Castile's allegiance to Clement VII and ratifying the Franco-Castilian alliance, John was confronted (1381) by an English invasion army concentrated against him in Portugal. Political measures averted this invasion, but John was henceforth convinced that, for Castile's security, he should annex the neighbouring kingdom. He took advantage of the death of his wife, Eleanor, daughter of Peter IV of Aragon, to marry (1383) Beatriz, heiress of the Portuguese king Ferdinand. After Ferdinand's death (Oct. 1383) John invaded Portugal and proclaimed himself king (Jan. 1384). Though many of the Portuguese magnates accepted him, urban opposition, led by John of Avís (*see* JOHN I of Portugal) was strong. After a number of defeats and setbacks the Castilian army finally met ignominious disaster at Aljubarrota (Aug. 14, 1385). The ensuing military prostration of Castile now gave John of Gaunt, duke of Lancaster (*q.v.*), the Castilian pretender, his long-awaited chance. He occupied Galicia with about 7,000 English troops in July 1386 and, with his Portuguese allies, invaded León in March 1387. The Trastamaran dynasty's survival seemed doubtful, but John recovered his confidence, adopted a scorched-earth policy and refused any major engagement with the invaders. These tactics caused the disintegration of the Anglo-Portuguese army. Lancaster agreed to negotiate and, by the settlement of Bayonne (1388), renounced the Castilian throne for a heavy indemnity and a marriage between his daughter Catherine (granddaughter of Pedro I) and John's heir, Henry (afterward Henry III). The great cost of his wars and the Lancastrian indemnity compelled John I to make substantial concessions of the royal prerogative to the *Cortes* of Castile in exchange for the subsidies he required from it. After 1389 the kingdom enjoyed peace at home and abroad for the first time since 1356. John was killed in a riding accident at Alcalá de Henares on Oct. 9, 1390—perhaps to his advisers' relief, since he was planning another attempt to secure the Portuguese crown.

JOHN II (1405–54), king of Castile from 1406 to 1454, was born at Toro in 1405, the son of Henry III. His long minority was relatively tranquil under the joint regency of his mother, Catherine of Lancaster, and his uncle Ferdinand of Antequera (*see* FERDINAND I of Aragon). His personal rule began in 1419. John liked culture and made his court a centre of literature and embryonic humanism but, as a ruler, he proved timid, indolent and easily persuaded. His reign was, therefore, characterized by endless civil wars as factions of nobles, allied with his Portuguese and Aragonese neighbours, sought to impose their will on him and on his able and courageous, if ambitious, favourite, Álvaro de Luna. In 1447 John made a second marriage. The new queen, Isabella of Portugal, determined to put an end to his reliance on his only competent counselor and conspired with his heir, Henry (afterward Henry IV), to overthrow the favourite. They persuaded the king to arrest and execute Álvaro de Luna (1453). After this betrayal John died at Valladolid on July 21, 1454—it was widely believed of remorse. (P. E. R.)

JOHN (HANS) (1455–1513), king of Denmark and Norway from 1483 to 1513 and of Sweden from 1497 to 1501, was born at Aalborg on Feb. 2, 1455, the son of King Christian I. Though he had been chosen as successor to Denmark, Sweden and Norway in 1458, his accession after his father's death in 1481 proved difficult: since 1471 Sweden had stood apart from the Scandinavian union; the Swedish regent Sten Sture was now also threatening to appropriate Norway; and the Danish *rigsraad* wished to limit the royal power. Only after putting his seal to a stringent union charter on Feb. 1, 1483, was John recognized as king of Denmark and Norway. In the duchies of Schleswig and Holstein he had been recognized in 1482 as co-ruler with his younger brother Frederick (the future Frederick I of Denmark), with whom in 1490 he divided the territory into a royal part (*Gottorp*) and a ducal part (*Segeberg*).

In spite of the charter John began to rule more and more autocratically in Denmark, with little regard for the *rigsraad*. His government favoured the bourgeois and he tried to limit the Hanseatic league's commercial power in the northern states, partly by trade agreements with England and with the Netherlands in 1490 and partly by co-operation with the South German merchants of the house of Fugger. In 1493 he allied himself with Ivan III of Russia, whose collaboration helped him to force Sten Sture at last to resign the Swedish regency (1497). He also began to build a navy to command the Baltic; but in 1500 a crushing defeat inflicted on his and Frederick's knights by the peasants of Dithmarschen led to a crisis: John held his ground against the Danish nobility, but Sweden in 1501 again declared its independence. In a war against Sweden and Lübeck in 1510–12 the new navy showed its strength, and Lübeck's domination of the Baltic trade was weakened. John died on Feb. 20, 1513. (A. E. CN.)

JOHN (1167–1216), king of England from 1199 to 1216, one of the most unpopular monarchs in English history, aroused widespread hostility and his reign ended in a baronial rebellion. Yet he was one of the most astute politicians and energetic administrators of the Plantagenet line of kings. A source and subject of controversy throughout his life, he was born at Oxford on Dec. 24, 1167, the youngest son of Henry II and Eleanor of Aquitaine. Henry's plan (1173) to assign to this favourite son (whom he had nicknamed "Lackland") extensive lands upon his marriage with the daughter of Humbert III, count of Maurienne (Savoy), was defeated by the rebellion which it provoked of John's elder broth-

ers. Various provisions were made for him in England (1174–76), including the lands of Reginald, earl of Cornwall, and the succession to the earldom of Gloucester. He was also granted the lordship of Ireland (1177), which he visited from April to late 1185, committing youthful political indiscretions from which he acquired a reputation for reckless irresponsibility. Henry's continued favour to him contributed to the rebellion of his eldest surviving son, Richard, in June 1189. For obscure reasons John deserted Henry for Richard and the French.

BY COURTESY OF THE PROVOST AND FELLOWS OF ETON COLLEGE AND THE ROYAL ACADEMY OF ARTS

THE GREAT SEAL OF JOHN, SHOWING THE KING ENTHRONED; FROM A DOCUMENT DATED 1203

Activities Under Richard I.—On Richard's accession (July 1189), John was made count of Mortain (a title which became his usual style), confirmed as lord of Ireland, was granted lands and revenues in England worth £6,000 a year, and was married (Aug. 29) to Isabella, heiress to the earldom of Gloucester. He also had to promise (March 12, 1190) not to enter England during Richard's absence on his crusade. But John's actions were now dominated by the problem of the succession in which his nephew, the three-year-old Arthur, duke of Brittany, the son of his defunct elder brother Geoffrey, was his only serious rival. When Richard recognized Arthur as his heir (October 1190) John immediately circumvented his oath and returned to England, where he led the opposition (1191) to Richard's dictatorial chancellor, William Longchamp. On receiving news (January 1193) of Richard's captivity in Germany, John allied with and did homage to King Philip II of France, and attempted unsuccessfully to seize control of England. He was forced to accept a truce (April 1193), but made further arrangements for the division of Richard's possessions with Philip (January 1194) and for rebellion in England. On Richard's return John was summoned to appear before the king's court, and on his failure to appear was banished and deprived of all his lands (March 31, 1194). He was reconciled to Richard in May, and recovered some of his estates including Mortain and Ireland in 1195, but his full rehabilitation only came after the Bretons had surrendered Arthur to Philip II (1196). This led Richard to recognize John as his heir (September 1197).

Accession and the Early Years of the Reign.—In 1199 the doctrine of representative succession, which would have given the throne to Arthur, was not yet generally accepted, and following Richard's death (April 6, 1199) John was invested as duke of Normandy (April 25, 1199) and crowned king of England on Ascension Day (May 27), thereafter dating his regnal years by this movable feast. Arthur, backed by Philip II, was recognized as Richard's successor in Anjou and Maine, and it was only in the Treaty of Le Goulet (May 1200) that John was recognized as successor in all Richard's French possessions, in return for financial and territorial concessions to Philip. Meanwhile John successfully resisted Scottish claims to the three northern counties, and conducted a vigorous overhaul of local administration in England.

The Loss of Normandy (1204) and Its Consequences.—The renewal of war in France was triggered off by John's second marriage. His first wife, Isabella of Gloucester, was never crowned, and the marriage was dissolved on grounds of consanguinity (1199), both parties being great-grandchildren of Henry I. John then intervened in the stormy politics of his county of Poitou, and, while trying to settle the differences between the rival families of Lusignan and Angoulême, himself married Isabella (August 1200), the heiress to Angoulême, who had been betrothed to Hugh IX de Lusignan. This politically conceived marriage provoked the Lusignans into rebellion (Easter 1201); angered by John's methods of repression, they appealed to Philip II (October), who summoned John to appear before his court. In the general war which followed his failure to answer this summons (April 1202) John had a temporary success at Mirebeau (Aug. 1), where Arthur of Brittany was captured, but Normandy was quickly lost, Rouen capitulating on June 24, 1204. By 1206 Anjou, Maine, and parts of Poitou had also gone over to King Philip.

These failures, foreshadowed under Henry II and Richard, were brought about by the superiority of French resources, and the increasing strain on those of England and Normandy. Nevertheless they were a damaging blow to John's prestige and, equally important, they meant that John was now almost permanently resident in England. This factor, coinciding with the death (1205) of the chancellor and archbishop of Canterbury, Hubert Walter, gave his government a much more personal stamp, which was accentuated by the promotion of members of his household to important office. His determination to reverse the continental failure bore fruit in ruthlessly efficient financial administration, marked by taxation on revenues (1207), investigations into the royal forests (1207–09), taxation of the Jews (1210), a great inquiry into feudal tenures (1212), and the increasingly severe exploitation of his feudal prerogatives. These measures provided the material basis for the charges of tyranny later brought against him.

Relations with the Church.—John's attention was diverted and his prestige disastrously affected by relations with the papacy. In the disputed election to the see of Canterbury which followed the death of Hubert Walter, Pope Innocent III quashed the election of John's nominee in procuring the election of Stephen Langton (December 1206). John, taking his ground on the traditional rights of the English crown in episcopal elections, refused to accept Langton. Innocent laid an interdict on England (March 1208) and excommunicated John (November 1209), but the quarrel continued until 1213, by which time John had amassed more than £100,000 from the revenues of vacant or appropriated sees and abbeys. But such a quarrel was a dangerous hindrance to John's intention to recover his continental lands. He agreed to accept Langton and the pope's terms in November 1212. Apparently at his own behest, he surrendered his kingdom to the papal nuncio at Ewell, near Dover, on May 15, 1213, receiving it back as a vassal rendering a tribute of 1,000 marks (£666 13*s*.4*d*.) a year. He was absolved from excommunication by Langton on July 20, 1213, and the interdict was finally relaxed on July 2, 1214. John thus succeeded in his aim to secure the papacy as a firm ally in the fight with Philip and in the struggle already pending with his own baronage. But his treatment of the church during the interdict, although arousing little if any opposition among the laity at the time, angered monastic chroniclers who henceforth loaded him with charges of tyranny, cruelty, and, with less reason, of sacrilege and irreligion.

NATIONAL MONUMENTS RECORD

JOHN, HIS TOMB EFFIGY IN WORCESTER CATHEDRAL

Baronial Rebellion and Magna Carta.—In August 1212 recurrent baronial discontent had come to a head in an unsuccessful plot to murder or desert John during a campaign planned against the Welsh. Pope Innocent's terms had included the restoration of two of those involved, Eustace de Vesci and Robert FitzWalter, and although the barons soon lost papal support they retained the protection of Stephen Langton. John, skilfully isolating the malcontents, was able to launch his long-planned campaign against the French, landing at La Rochelle in February 1214. He achieved nothing decisive, withdrawing from La Roche-aux-Moines (July 2); his Flemish allies suffered a decisive defeat at Bouvines (July 27), and he was forced to accept a truce lasting

until 1220. Returning to England in October 1214 he now had to face much more widespread discontent, centred mainly on the northern, East Anglian, and home counties. After lengthy negotiations in which both sides appealed to the pope, civil war broke out in May 1215. John was compelled to negotiate once more when London went over to the rebels (May 17), and on June 19 at Runnymede he accepted the baronial terms embodied in Magna Carta (*q.v.*). This settlement was soon rendered unworkable by the more intransigent barons and John's almost immediate appeal to Pope Innocent against it. Innocent annulled the charter on August 24; his commissioners in England excommunicated the baronial leaders and suspended Langton (September). In the civil war which resulted John captured Rochester Castle (Nov. 30) and laid waste the northern counties and the Scottish border (January 1216). But his cause was weakened by the arrival of Prince Louis (later Louis VIII) of France, who invaded England at the barons' request and received their homage (May). John continued to wage war vigorously, but died at Newark on Oct. 18–19, 1216, leaving the issues undecided. His death made possible a compromise peace including the restoration of the rebels, the succession of his son, Henry III, and the withdrawal of Louis.

John's Character and Achievements.—John's reputation, bad at his death, was further depressed by writers of the next generation. Of all centuries prior to the present, only the 16th, mindful of his quarrel with Rome, recognized some of his quality. He was suspicious, vengeful, and treacherous; Arthur of Brittany was probably murdered in capitivity; and Matilda de Braose, the wife of a recalcitrant marcher baron, was starved to death with her son in a royal prison. But John was cultured and literate. Conventional in his religion rather than devout, he was remembered for his benefactions to the church of Coventry, to Reading Abbey, and to Worcester, where he was buried and where his effigy still survives. He was extraordinarily active, with a great love of hunting, and a readiness to travel which gave him a knowledge of England matched by few other monarchs. He took a personal interest in judicial and financial administration, and his reign saw important advances at the exchequer, in the administration of justice, in the importance of the privy seal and the royal household, in methods of taxation and military organization, and in the grant of chartered privileges to towns. If his character was unreliable, his political judgment was acute. In 1215 many barons, including some of the most distinguished, fought on his side. *See* ENGLISH HISTORY: *Early Plantagenets (1154–1216); see* also references under "John, king of England" in the Index.

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JOHN I (b. and d. 1316), king of France and Navarre, was the posthumous son of Louis X of France by his second consort, Clemence of Hungary. Born in the night of Nov. 13–14, 1316, John died on Nov. 19, five days later. His uncle, who succeeded him as Philip V (*q.v.*) of France, has been accused of having caused his death, or of having substituted a dead child in his place; but nothing was ever proved. In 1358 a man called Giannino, in Florence, persuaded Clemence's nephew, Louis I of Hungary, that he was John I; but otherwise he met with little success and died in jail in Naples (1363).

See P. Lehugeur, *Histoire de Philippe le Long, roi de France* (1897); V. Gonzi, *Re Giannino* (1938).

JOHN II THE GOOD (1319–1364), king of France from 1350 to 1364, was born on April 26, 1319, the eldest son of Philip VI and Joan of Burgundy. He was married first, in 1332, to Bona of Luxembourg (d. 1349), daughter of King John of Bohemia; and secondly, in 1350 to Jeanne, daughter of Guilhem (William) XIII, count of Auvergne. His father made him duke of Normandy in 1333. John campaigned against the English in Hainaut (1340), in Brittany (1341–42) and in Guienne (1346).

John II succeeded his father as king of France on Aug. 22, 1350, and was consecrated king at Reims on Sept. 26. He faced external dangers (*see* HUNDRED YEARS' WAR) and domestic discords which would have taxed a far abler ruler; and his political ineptitude brought disaster for himself and his country. Showing quixotic chivalry to those who were his equals, he could yet act with base injustice toward subjects; suspicious and resentful, he was guilty of gross acts of vengeance. On his accession he executed without trial the constable Raoul de Brienne, comte d'Eu. His gift to the new constable, Charles of La Cerda, of lands claimed by Charles II the Bad (*q.v.*), king of Navarre, caused the assassination of La Cerda (1354). Obliged to make peace since Charles was plotting with the English, John nevertheless awaited his revenge and in April 1356 arrested Charles at Rouen, summarily executing some of Charles's followers.

ARCHIVES PHOTOGRAPHIQUES

JOHN THE GOOD. PORTRAIT BY AN UNKNOWN ARTIST. IN THE LOUVRE

Peace negotiations with the English had broken down in 1354, fighting was resumed, and at the battle of Poitiers (Sept. 19, 1356) John was taken prisoner. He was taken to Bordeaux and was moved in April 1357 to London, where he lodged in the Savoy palace. He concluded the first and second treaties of London (Jan. 1358 and March 1359), making in the latter concessions so extensive that they were repudiated in France. Finally the treaty of Brétigny (*q.v.*; May 1360) and the subsequent treaties of Calais fixed John's ransom at 3,000,000 gold *écus* and provided for his release. He returned to Paris in Dec. 1360. His son, the future Charles V (*q.v.*), had been lieutenant of the kingdom during his absence.

Although an adept of chivalry and the founder of the Order of the Star (1351), John failed to placate the nobility, who criticized his lowborn ministers, such as Robert de Lorris and Nicholas Braque. Because of the king's inertia and his preoccupation with projects for a crusade, nothing was done to rid France of the pernicious private armies which ravaged the country. Moreover, in less than six years the currency was devalued by 70%. When one of the hostages for the payment of his ransom escaped from Calais, John returned to London (Jan. 1364) to erase this blot on his good faith. He soon fell ill and died at the Savoy on April 8, 1364. His body was taken to France and buried at St. Denis.

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JOHN (JÁNOS ZÁPOLYA or SZÁPOLYAI) (1487–1540), king of Hungary from 1526 to 1540, was born at Szepesváralja (Spisske Podhradie in Slovakia), the son of the palatine of Hungary István Zápolya and the princess Hedwig of Teschen. He began his public career at the diet of Rákos in 1505, when on his motion the assembly decided that after the death of the reigning king, Ulászló II (who was also king of Bohemia as Vladislav II), no foreign prince should be elected king of Hungary. Henceforth he became the national candidate for the throne, which his family had long coveted. In 1511 he was appointed voivode of Transylvania. He stamped out the peasant rising under György Dózsa (*q.v.*) in 1514 with ruthless brutality. This increased his popularity with the gentry, and on the death of Ulászló in 1516 the second diet of Rákos appointed him the governor of the infant king Louis II. He now aimed at the dignity of palatine, but the council of state and the court party combined against him and appointed István (Stephen) Báthory in 1519. The dissensions between Zápolya and Báthory helped the Turks to conquer Belgrade in 1521. The revolutionary Hatvan diet drove out all the members of the council

of state in 1523 and made István Werbőczy, a friend of Zápolya, palatine. In the midst of this hopeless anarchy, the Ottoman sultan Suleiman I the Magnificent invaded Hungary and the young king perished with his army at Mohács (Aug. 29, 1526), Zápolya arriving too late to save the day. The court party accused him, but probably without justification, of deliberate treachery. The diets of Tokaj (Oct. 14) and Székesfehérvár (Nov. 10) then elected Zápolya king of Hungary, and he was crowned on Nov. 11, 1526.

A struggle ensued with the rival German candidate, Ferdinand of Austria (*see* FERDINAND I, Holy Roman emperor), in which Zápolya received support from the Turks. By the compact of Nagyvárad, in 1538, Ferdinand recognized John as king of Hungary, but secured the right of succession on his death. Nevertheless John bequeathed the kingdom, under Turkish protection, to his infant son John Sigismund. He died at Szászsebes (Sebes in Transylvania) on July 22, 1540. *See* also HUNGARY: *History*.

(GE. GR.)

JOHN OF BRIENNE (*c.* 1144?–1237), titular king of Jerusalem and subsequently Latin emperor of Constantinople, was a younger son of a noble family of Champagne. His elder brother Walter (d. 1205) had claimed Sicily as son-in-law of King Tancred; but John's own martial exploits had won him only esteem when, in his 60s, he was designated in 1208 by Philip II Augustus of France to marry the young Mary of Montferrat, titular queen of Jerusalem (*see* CRUSADES). Having raised loans from Philip and from Pope Innocent III, John arrived at Acre, the capital of Mary's diminished kingdom, on Sept. 13, 1210, married Mary the next day and was crowned at Tyre on Oct. 3. A five-year truce with Malik al-Adil, sultan of Egypt and Syria, was arranged with effect from July 1212.

Mary of Montferrat bore John a daughter, Isabella (or Yolande) of Brienne, but died in 1212, whereupon John became regent for his daughter. In 1214 he married Stephanie, daughter of Leo II of Armenia. On the expiry of the truce with the sultan, the fifth crusade was launched against Egypt. During the siege of Damietta (1218–19), Malik al-Kamil, successor of al-Adil in Egypt, offered to restore Jerusalem and all Palestine west of the Jordan to the crusaders, but the cardinal legate Pelagius of Sta. Lucia, who was moreover disputing the command with John, insisted on rejecting this offer. Having left Egypt in Feb. 1220 in the hope of securing rights in Armenia for his wife and their infant son (which lapsed when both wife and son died), John returned in July 1221 just before the crusaders' advance southward, which ended in disastrous defeat followed by an eight-year truce (Sept. 1221).

In 1222 John embarked on a tour of western Europe, soliciting help for his daughter's kingdom. The betrothal of Isabella-Yolande to the Holy Roman emperor Frederick II (*q.v.*) in March 1223 was made conditional on John's remaining regent for his lifetime, but immediately after the marriage (Nov. 1225) Frederick began to contest John's rights. John meanwhile, on a visit to Spain, had married Berengaria, daughter of Ferdinand III of Castile. By her he had another daughter, Mary. While Frederick, on the sixth crusade (1228–29), was reconquering Jerusalem, John led papal troops against his possessions in southern Italy.

The accession of the young Baldwin II to the precarious empire of Constantinople in 1228 led to John's being invited to become regent and co-emperor by the faction unwilling to receive the Bulgarian tsar Ivan Asen II. John accepted (treaty of Perugia, 1229), and it was agreed that Baldwin should marry Mary of Brienne. John reached Constantinople in 1231 and was crowned; but in 1235 Ivan Asen, in alliance with the Nicaean emperor John III Vatatzes, began a mighty attack on the city. While Baldwin was appealing for help in western Europe, John died in March 1237.

JOHN I, king of Poland: *see* JOHN ALBERT.

JOHN II, king of Poland: *see* JOHN CASIMIR.

JOHN III (JAN SOBIESKI) (1629–1696), king of Poland from 1674, was born at Olesko, near Lvov, on Aug. 17, 1629, the eldest son of Jakob Sobieski, castellan of Cracow, and Teofila Daniłlowicz, granddaughter of the hetman Stanislaw Zolkiewski. Educated in Cracow, he made a two-year grand tour of Europe (France, England and the Netherlands) with his brother Marek

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JAN SOBIESKI, ENGRAVING BY CAREL ALLARDT, AMSTERDAM

and returned to Poland in 1648. He served against Bohdan Chmielnicki and the Cossacks and took part in the battle of Beresteczko (1651); but when the Swedes invaded Poland in 1655 and King John Casimir left the country, Sobieski passed to the Swedish camp with a great part of the army. Next year, however, he again changed sides and helped Stephan Czarniecki expel the Swedes from the central Polish provinces. For his subsequent services to John Casimir, especially in the Ukraine against the Tatars and Cossacks, he received the grand baton of the crown, becoming commander in chief (Feb. 5, 1668). He had already (1665) acquired the offices of grand marshal and field commander of the Polish army. His military capacities were extraordinary.

At the election diet of 1669 Sobieski accepted bribes from Louis XIV of France to support one of the French candidates, and after the election of Michael Wisniowiecki (June 19, 1669) he conspired in the French interest against the king. The plot that he had formed with the primate Mikolaj Prazmowski and others was discovered in 1670 and disavowed by Louis; but two years later Sobieski and Prazmowski renewed their plot, trying to obtain the abdication of the king, whom Sobieski despised for his weakness of character. The king, supported by the country squires, opposed Sobieski's plan of increasing the regular army. Meanwhile, a strong Turkish force invaded Poland. When Sobieski, with all available regiments, was marching against the Turks, the king's envoys signed the disgraceful peace of Buczacz (Oct. 18, 1672), ceding the entire Ukraine, with Podolia and Kamieniec, to Turkey.

Sobieski partially retrieved the situation by winning four victories in ten days. The peace of Buczacz was repudiated, and Sobieski defeated the Turks brilliantly at Chocim (Hotin) on Nov. 11, 1673. On Nov. 10, however, the king had died, and therefore Sobieski, abandoning the frontier to its fate, hastened to Warsaw to secure the throne for himself. Appearing at the elective diet of 1674 at the head of 6,000 veterans, he overawed every other competitor and, despite the persistent opposition of the Lithuanian deputies, was elected king, as John III, on May 21.

John then returned at once to the Ukraine. His plan was to negotiate with the sultan and the khan of Crimea; to entrust the whole guardianship of the Ukraine to the Cossacks; and himself to concentrate the regulars and militia in Lwow. The Polish gen-

try, however, failed to support him, and he faced the Turks with only a few devoted lieutenants. After going to Cracow to be crowned (Feb. 2, 1676), he renewed the campaign and at last recovered two-thirds of the Ukraine, but without Kamieniec, by the treaty of Zorawno (Oct. 17, 1676).

The king hoped, with Louis XIV's help, to regain Ducal Prussia from the Hohenzollerns and to weaken the envious opposition of the Polish magnates. When those plans failed, relations between France and Poland gradually grew more strained; and finally, on March 31, 1683, John signed the treaty of Warsaw with the Holy Roman emperor Leopold I against the Turks. This was the prelude to the most glorious episode of his life, the relief of Vienna from the Turkish siege and the liberation of Hungary. The epoch-making victory of Sept. 12, 1683, was ultimately decided by the charge of the Polish cavalry led by the king in person. Poland profited little by this triumph, being left to fight on in the Ukraine with whatever assistance it could get from the Muscovites.

The last 12 years of John's reign were unfortunate; he had to deal with a treasonable senate, a mutinous diet and ungrateful allies. His last campaign (1691) was an utter failure, and the last years of his life were embittered by the violence and the intrigues of his dotingly beloved wife, Marie Casimire de La Grange d'Arquien, whom he married on July 6, 1665, and by whom he had three sons, Jakob, Aleksander and Konstanty. He died at Wilanow, on June 17, 1696, disillusioned and brokenhearted.

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(ST. HE.)

JOHN I (1357–1433), king of Portugal from 1385 to 1433, was the illegitimate son of Pedro I and Teresa Lourenço. When he was seven years old his father made him master of the Order of Avís, but little is known of his youth and he only became involved in politics during the dynastic crisis after the death (Oct. 22, 1383) of his half brother King Ferdinand. John then put himself at the head of those who were opposed to the succession of Ferdinand's daughter Beatriz, wife of John I of Castile, and launched a national revolution by his stabbing (Dec. 1383) of João Fernandes Andeiro (*q.v.*), the queen dowager's lover. Assured of popular support and of that of a faction of the nobility led by Nuno Álvares Pereira, John immediately took defensive measures against Castile and sent a mission to England to seek military aid. John I of Castile invaded Portugal in Jan. 1384, invoking his wife's right to the throne, and laid siege to Lisbon. But Pereira's victory at Atoleiros (April 1384) checked the Castilian advance and then an epidemic of plague among the Castilian army obliged it to return home. The master of Avís was proclaimed ruler and defender of the realm on Oct. 2, 1384, and was elected and acclaimed king of Portugal by the *Cortes* of Coimbra on April 6, 1385. Alliance with England (the treaty of Windsor, May 1386) and John's marriage (Feb. 2, 1387) with Philippa, daughter of John of Gaunt, duke of Lancaster, helped to make the new dynasty secure. Moreover, the Portuguese inflicted successive defeats on the Castilians during 1385 at Trancoso, Aljubarrota and Valverde. War with Castile was ended by the provisional peace treaty of 1411 and John was then able to turn to plans for the expedition which was successfully launched against Ceuta in 1415. John died in Lisbon on Aug. 14, 1433, and was succeeded by his son Edward (Duarte). His third son was Henry (*q.v.*) the Navigator. *See* also PORTUGAL: *History*. (V. R. R.)

BY COURTESY OF THE TRUSTEES OF THE BRITISH MUSEUM

JOHN I OF PORTUGAL ENTERTAINING JOHN OF GAUNT: MINIATURE FROM A MANUSCRIPT OF THE "CHRONIQUE D'ANGLETERRE" BY JEAN DE WAVRIN, LATE 15TH CENTURY. IN THE BRITISH MUSEUM

JOHN II THE PERFECT (1455–1495), king of Portugal from 1481 to 1495, was born in Lisbon on May 3, 1455, the son of Afonso V. John's reign was marked by his firm control of internal affairs, shrewdness in foreign policy and the continued promotion of Portuguese overseas expansion. His policy of increasing royal authority by centralizing the government and curtailing the power of the aristocracy produced two conspiracies, which resulted in the execution of the duke of Braganza in 1483 and the assassination (by the king's own hand) of his brother-in-law the duke of Viseu in 1484. Peace with Castile was arranged during 1479–80, when claims to Castile made by Afonso V were dropped in return for the abandonment of Castilian pretensions in connection with Portuguese overseas expeditions. The rival colonial claims of the two countries were eventually settled by the celebrated treaty of Tordesillas (*q.v.*; 1494). John II gave enthusiastic support to Portuguese voyages of discovery and his reign was marked by the rounding of the Cape of Good Hope by Bartolomeu Dias (1488). John had married in 1471 Leonor, daughter of the duke of Viseu. He died at Alvôr on Oct. 25, 1495, and, his only legitimate son, Afonso (1475–91), having predeceased him, was succeeded by his cousin and brother-in-law, the duke of Beja, as Manuel I. (DA. A. P.)

JOHN III (1502–1557), king of Portugal from 1521 to 1557, was born in Lisbon on June 6, 1502, the son of Manuel I and of Maria, daughter of the Catholic sovereigns Ferdinand and Isabella. In 1525 he married Catherine, sister of the emperor Charles V, who shortly afterward married John's sister Isabella. John showed considerable favour to the church, notably in permitting the establishment of the Inquisition (1536) and of the Society of Jesus (1540). His reign saw new advances in Portuguese overseas expansion, including possession of the Moluccas and the foundation of Macao. He died on June 11, 1557, and was succeeded by Sebastian (1554–78), the posthumous child of his son John (d. 1554). John III's daughter Maria (d. 1545) married in 1543 her cousin, the future Philip II of Spain. *See* also PORTUGAL: *History*. (DA. A. P.)

JOHN IV (1604–1656), "the Fortunate," king of Portugal from 1640 to 1656 and founder of the Braganza dynasty. He was born at Vila Viçosa on March 18, 1604, the son of Teodosio, duke of Braganza, whom he succeeded in 1630. He married in 1633 Luisa de Guzmán, daughter of the duque de Medina Sidonia. John ascended the throne as a result of the national revolution of Dec. 1, 1640, which ended the dual hispano-lusitanian monarchy (*see* PORTUGAL: *History*); he was crowned on Dec. 15, 1640, and was recognized as king by the *Cortes* in Jan. 1641. (For the basis of John's claims, *see* BRAGANZA.) His reign was marked by a quest for European alliances and the continuation of the war with Spain. Portuguese successes included the victory of Montijo in 1644, but Spain did not recognize Portugal's independence until 1668. In Brazil and Angola there was a prolonged struggle with the Dutch. John died on Nov. 6, 1656, and was succeeded by his eldest surviving son Afonso VI. John's daughter Catherine (*q.v.*) of Braganza married Charles II of England in 1662. (DA. A. P.)

JOHN V (1689–1750), king of Portugal from 1706 to 1750, was born in Lisbon on Oct. 22, 1689, the son of Pedro II, whom he succeeded in Dec. 1706. He supported the candidature of the archduke Charles in the War of the Spanish Succession and married in 1708 the archduchess Mariana. John's reign was characterized by increasing monarchical absolutism. The great wealth derived from overseas freed the king from financial dependence on the *Cortes* and enabled him to spend liberally in emulating

the magnificence of other European courts. John, who was particularly fond of music, gave encouragement to the arts and to learning: the royal library and the libraries at Coimbra and Mafra were enlarged, the Academia da Historia and museums of natural history and architecture were founded, and many splendid buildings were erected, including the monastery at Mafra (*q.v.*). John V was fervently religious, though in serious dispute with the Holy See from 1720 to 1748, and the title "his most faithful majesty" was bestowed upon him by Benedict XIV in 1749. In external affairs he was concerned mainly with adherence to the English alliance and defense of Portuguese overseas possessions. John died on July 31, 1750, and was succeeded by his son Joseph.

(DA. A. P.)

JOHN VI (1767–1826), king of Portugal from 1816 to 1826, was the son of Maria I and her king-consort Pedro III. He was born in Lisbon on May 13, 1767, and married Carlota Joaquina, infanta of Spain, in 1785. In 1792 Maria had an attack of insanity and John became ruler in her name. He was regent from 1799, when his mother's illness was declared incurable, until her death in 1816. In 1807 the regent sided with England against Napoleon, too late to stop an invading French army; in November John and the whole court, to escape capture, sailed for Brazil, whither the government was transferred (*see* BRAZIL: *History*). The 1820 revolt in Portugal, which proclaimed a constitutional monarchy, obliged John to return home. His last years were characterized by the struggle between liberals and absolutists, the latter headed by the king's second surviving son, Dom Miguel. John recognized Brazil's independence in 1825. He died in Lisbon on March 10, 1826, and was succeeded by his eldest surviving son Pedro IV (*see* PEDRO I, emperor of Brazil). *See* also PORTUGAL: *History*.

(M. CA.)

JOHN (1801–1873), king of Saxony from 1854, was born in Dresden on Dec. 12, 1801, the third son of the future king Frederick Augustus I's brother Maximilian (1759–1838) by his wife Caroline of Parma. Passionately interested in law and a patron of the arts, John also wrote poems (published in 1902) and, inspired by a visit to Italy (1821–22), became a student of Dante. Under the name Philalethes he published a translation of the *Divine Comedy* with critical and historical notes, three volumes (1839–49).

John's interest in government was both intellectual and conscientious and he played an active part on the commission which drew up the constitution of 1831. On the death of his brother King Frederick Augustus II (Aug. 9, 1854), he became king.

John's preferred solution to the burning question of German unity would have been a confederation of German states independent of Prussia and Austria alike (*see* GERMANY: *History*), but his minister F. F. von Beust persuaded him to support Austria against Prussia both at the diet of princes in 1863 and in the Seven Weeks' War of 1866. After the war he dismissed Beust and supported the North German confederation. In the Franco-German War, Saxony was on Prussia's side.

John worked for good administration and economic progress in Saxony, but his reserved manner won him respect rather than love. By his marriage (1822) with Amalia Augusta of Bavaria (1801–77), he became the brother-in-law of Frederick William IV of Prussia, with whom he had a deep and lasting friendship. John died at Pillnitz on Oct. 29, 1873. His sons Albert (1828–1901) and George (1832–1904) were successively kings of Saxony after him. George's son John George (1869–1938), duke of Saxony, edited his grandfather's correspondence with Frederick William IV and William I of Prussia (1911) and with the U.S. scholar George Ticknor (1920). *See* SAXONY.

JOHN III (1537–1592), king of Sweden from 1568, was born at Stegeborg castle on Dec. 21, 1537, the elder son of Gustavus I Vasa by his marriage with Margareta Leijonhufvud. In 1556 his father made him duke of Finland, and as such he soon showed signs of conducting a foreign policy divergent from that of the Swedish crown. The accession of his half brother Eric XIV in 1560, however, was followed by the abridgment of John's ducal rights, his condemnation to death by the diet of 1563 and his imprisonment in Gripsholm. Liberated in 1567, he joined his younger brother, the future Charles IX, in a rebellion (1568) which deposed Eric and put John himself on the throne. His position was for years made insecure by conspiracies on Eric's behalf, and it seems virtually certain that John ordered the murder of Eric (probably by poison) in 1577. Meanwhile he had had to extricate Sweden from Eric's wars: the peace of Szczecin with Denmark (1570) left him free to deal with the Russian threat to Estonia.

BY COURTESY OF THE SVENSKA PORTRÄTTARKIVET, STOCKHOLM

JOHN III. DETAIL OF A PORTRAIT BY AN UNKNOWN ARTIST, 1570

By the end of the reign Estonia was relatively secure—a result to which John's own efforts only meagrely contributed. John gave more attention to dynastic matters: in 1562 he had married Catherine, sister of Sigismund II of Poland; and after Sigismund's death (1572) he spent much time and money in trying to secure her share of the Jagiello inheritance and twice attempted to get himself elected king of Poland. In pursuit of these objects he drew closer to the Habsburgs, and this development accorded well with his religious policy.

John was an expert theologian and liturgiologist, deeply versed in the Fathers and anxious to return to the customs of the primitive church. He had been impressed, on a visit to England, by the Anglican compromise; he desired to restore some of the ceremonies and liturgical usages abolished since the Reformation; and he believed that reunion with Rome was possible without sacrificing the Reformation's essential gains. He forced upon Sweden in 1577 a liturgy of his own devising (the "Red Book") and sharply persecuted those clergy who declined to conform to it. By 1580, however, he saw that hopes of compromise with Rome were vain; but his son Sigismund was brought up a Catholic, and this assisted his election to the Polish throne as Sigismund III in 1587. John soon regretted this dynastic triumph and at Reval in 1589 almost persuaded Sigismund to renounce the Polish crown. His efforts were defeated by the Swedish council, who saw in the link with Poland a guarantee of aid against Russia and the prospect of a free hand for the aristocracy at home. Common hatred of aristocratic pretensions provided the basis for a reconciliation between John and his brother Charles, who had opposed his religious policy.

John died at Stockholm on Nov. 17, 1592, disillusioned and embittered: by that time he had almost abandoned the attempt to impose his religious solution on the country. Scholarly, sensitive, cultured, a lavish and discriminating patron of the arts, John had been a poor administrator and a worse financier; and his indecision was not compensated by the violence of his temper. *See* also SWEDEN: *History*.

(MI. R.)

JOHN (HANS) (1513–1571), margrave of Brandenburg-Küstrin from 1535, was born at Tangermünde on Aug. 3, 1513, the younger son of Joachim I, elector of Brandenburg. In spite of the *Dispositio Achillea* of 1473, which decreed the indivisibility of the electorate (*see* BRANDENBURG), John inherited the New Mark, the eastern part of the Hohenzollern dynasty's territory, on his father's death in July 1535. He had been brought up as a strict Roman Catholic, but as an adult became a firm Protestant. John was very much interested in finance and liked to increase his funds by the activities of a *condottiere*. His successful speculations made him leave a capital of more than 500,000 guilders, whereas his brother Joachim II died with debts of nearly 3,000,000. John joined the League of Schmalkalden, but when the Schmalkaldic War broke out he hired his troops to the Holy Roman emperor Charles V (*see* GERMANY: *History*). The "Interim" of 1548 drove him into active resistance; but in 1552 he again enlisted mercenaries and himself led them to help Charles in the siege of Metz. In return, he was appointed an imperial counselor and re-

ceived a salary from Charles, which the emperors Ferdinand I and Maximilian II as well as Philip II of Spain continued to pay.

John's remaining years were mainly spent in the New Mark, which he ruled carefully and economically. He purchased Beeskow and Storkow and fortified the towns of Küstrin and Peitz. He died at Küstrin on Jan. 13, 1571. As he left no sons, the New Mark passed to his nephew John George, elector of Brandenburg.

See G. Berg, *Beiträge zur Geschichte des Markgrafen Johann von Küstrin* (1903). (H. Lz.)

JOHN IV (JEAN DE MONTFORT) (1339 or 1340–1399), duke of Brittany from 1365 to 1399, was the son of the John de Montfort (d. 1345) against whom Charles of Blois had contested the Breton succession (*see* also BRITTANY). Educated at the court of Edward III of England, who took charge of him when his mother, Joan of Flanders, became insane, he chose his first two wives—Mary (1361), Edward's daughter, and Joan (1366), daughter of Thomas, earl of Kent—from that king's country. After Charles of Blois had been defeated and killed at Auray (1364), the French king Charles V recognized John as duke of Brittany under the treaty of Guérande (*q.v.*) in 1365; but John remained determined to preserve his English connections. He made an alliance with Edward III (1372), was granted the earldom of Richmond and, in return, allowed the English to garrison his fortresses: 4,000 English knights landed at St. Malo in March 1373. This angered not only the French but also the Bretons themselves, who detested the English. The French invaded Brittany, John fled to England (April 1373), and the English were driven from all the Breton strongholds except Brest, Derval, Auray and Bécherel. Finally Charles V declared the duchy forfeit in 1378. This provoked a reaction of Breton patriotism in John's favour, which, however, was counteracted by John's allying himself with Richard II of England (1380). Receiving little further help from Richard, John eventually made peace with the regents for the young Charles VI of France by the second treaty of Guérande (1381).

As well as his reliance on English aid, John's harsh taxation had made him unpopular in Brittany. The nobles resented his restrictions of their rights and the erection of new ducal castles at places such as St. Malo, St. Brieuc and Quimper; and his institution (1381) of the Order of the Ermine failed to engage their support. A long personal feud with Olivier de Clisson (*q.v.*), who gave his daughter Marguerite in marriage to John of Blois-Penthièvre, son of John IV's old rival Charles, led to an attempt on Clisson's life at John IV's instigation (1392) and was only ended in 1395. John IV, who had married his third wife, Joan, daughter of Charles II the Bad of Navarre, in 1386, died at Nantes, on Nov. 1, 1399. His position in Brittany had been uneasy.

See E. Durtelle de Saint Sauveur, *Histoire de Bretagne,* vol. i (1935); A. Rébillon, *Histoire de Bretagne* (1957). (MI. M.)

JOHN V THE VALIANT (JEAN DE MONTFORT) (1389–1442), duke of Brittany from 1399 to 1442, was born on Dec. 24, 1389, the son of John IV of Brittany and Joan of Navarre. Since he was a minor at his father's death (1399), Philip the Bold, duke of Burgundy, for some years acted as his guardian in the name of the French king Charles VI, but John was crowned duke at Rennes on March 23, 1402. Once in control of affairs, John V showed himself an adroit trimmer in diplomacy, treating alternately with either side in the successive struggles (1) between Burgundians and Armagnacs; (2) between French and English; and (3) between Charles VII of France and his enemies. Though he had been on good terms with Philip the Bold (d. 1404), John favoured the Armagnac faction against Philip's son John (*q.v.*) the Fearless after the murder of Louis d'Orléans (1407), but even so failed to take up arms against the Burgundians in 1414. Likewise, though he allowed his subjects to fight the English corsairs, he signed a truce (1407) with Henry IV of England; and in 1415 the Breton contingent arrived too late to support the French at Agincourt. Later still, his alliance of 1421 with the dauphin Charles (the future Charles VII) did not deter him from adhering in 1422 to the treaty of Troyes (1420) by which Charles was disinherited in favour of Henry V of England; and even after allowing his brother Arthur III to be made constable of France by Charles (1425) he renewed his adhesion to the same treaty of Troyes in 1427. When Charles had come to terms with the Burgundians (1435), John moved toward a reconciliation with him, but yet joined the revolt of the Praguerie (1440) and the League of Nevers (1442) against him. Even his imprisonment (Feb.–July 1420) by the rival claimants to the duchy of Brittany (representatives of the house of Blois-Penthièvre) had turned to John's advantage: his wife Jeanne, daughter of King Charles VI, roused the Bretons on his behalf, and the Blois-Penthièvre claim received no further support.

Under John V the Breton *parlement* and the exchequer became differentiated from the ducal council; military institutions were reorganized, the merchant marine developed and agriculture and industry increased. When John died on Aug. 28, 1442, he was eulogized as an architect of Breton prosperity.

For bibliography *see* JOHN IV (Jean de Montfort). (MI. M.)

JOHN THE FEARLESS (1371–1419), duke of Burgundy from 1404, was born at Dijon on May 28, 1371, the eldest son of Philip the Bold and Margaret of Flanders. His father arranged his marriage (1385) with Margaret, daughter of Duke Albert of Bavaria, the regent in Hainaut. Count of Nevers from 1385, John led the crusade of 1396 against the Turks in the Balkans, won his spurs as a knight in the assault on Vidin but was defeated and taken prisoner in an attack on Sultan Bayazid I's army at Nicopolis (Nikopol; Sept. 1396). He was ransomed for 200,000 gold ducats. From this adventure he gained his nickname "the Fearless."

BY COURTESY OF THE MUSÉE ROYAL DES BEAUX-ARTS, ANTWERP; PHOTO, A.C.L.

JOHN THE FEARLESS, PORTRAIT BY AN UNKNOWN MASTER OF THE SOUTHERN NETHERLANDS, *c.* 1415

John succeeded his father as duke of Burgundy in 1404, but did not arrange a division of territory with his brothers until after his mother's death (1405), when he left Brabant and Limburg to Antony and the counties of Nevers and Rethel, with some land in Champagne, to Philip. In the Low Countries he supported Antony's claims to Luxembourg; and at Othée (Sept. 23, 1408) he defeated the people of Liège who were rebelling against their bishop, his brother-in-law, John of Bavaria. For his sister Catherine, widow of Leopold IV of Habsburg, duke of Austria, he secured possession of the county of Ferrette, which had been her dowry. Because one of his vassals, Louis de Chalon, had carried off one of the duchess Margaret's ladies in waiting, John attacked him (1412–19) and occupied his county of Tonnerre.

John's quarrel with his first cousin, Louis, duc d'Orléans (*q.v.*), brother of the French king Charles VI, began in 1404. Orléans wanted to join Luxembourg, Valois and Vermandois to his domain, thus dividing Burgundy and Flanders. He had also attained the dominant position in the French royal council, hitherto occupied by Philip the Bold. John, thus deprived of the numerous financial advantages enjoyed by his father, began demanding a reform of the royal finances and objecting to the taxes suggested by Louis. In this he was supported by the University of Paris, by the *bourgeoisie* of Paris and by the butchers' guild under its leader Simon Caboche (*q.v.*). John's daughter Margaret was married in Aug. 1404 to the dauphin Louis, duc de Guienne (d. 1415), whom John was thus able to employ as an instrument for his policy.

After a serious conflict in 1405, the quarrel between Orléans and Burgundy broke out afresh in 1407. A reconciliation was forced on the disputants, but three days later Louis was assassinated (Nov. 23, 1407). John admitted responsibility for this murder and had to leave Paris (Nov. 27), but he returned in Feb. 1408, engaging the Franciscan Jean Petit to justify the murder on the grounds that it was allowable tyrannicide. In any case, John was now assured of the preponderant role in the king's council and could force the other French princes and the so-called Armagnac

faction—representing his victim's heirs—to agree to a series of reconciliation treaties made at Chartres (1409), at Bicêtre (1410) and, after his unsuccessful campaign against the Armagnacs in Bourges, at Auxerre in 1412.

From 1409 onward, John inaugurated certain fiscal reforms and penalized various financiers; this repressive policy led to riots (1412–13) directed against the dauphin Louis and against his mother Isabella of Bavaria, who was acting as regent for the deranged Charles VI. John tried to appease the rebels by issuing the reforms known as the "Ordonnance Cabochienne" but soon had to abandon Paris to the Armagnacs (Aug. 1413).

John was then treated as a rebel, and an expedition was sent against him in the king's name. This forced him to come to terms at Arras (Feb. 1415), but he took no part in the French campaign which ended in the French disaster at Agincourt later that year. Moreover, his son-in-law the dauphin Louis died in Dec. 1415, the next dauphin (Jean, duc de Touraine) died in April 1417, and Charles (afterward Charles VII of France), who then became dauphin, was John's enemy. John had already treated with Henry V of England in Oct. 1416; and in Nov. 1417 he joined up with the queen, whom the dauphin Charles had driven from court, and with her organized a shadow government at Troyes, rivaling the government in Paris. Civil war broke out again, and after a rising in Paris against the Armagnacs (May 1418) John retook the city. By now, however, the English campaign in Normandy, begun in 1417, was menacing Paris, so that John, who could not meet the threat alone, had to come to terms with the dauphin. After preliminary interviews at Pouilly and at Corbeil (July 1419), the two princes met again on the bridge at Montereau on Sept. 10, 1419. There a dispute started, perhaps deliberately provoked by the Armagnacs, and John was killed.

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(J. B. R.)

JOHN THE STEADFAST (1468–1532), elector of Saxony from 1525, was born at Meissen on June 30, 1468, the fourth son of the elector Ernest, founder of the Ernestine branch of the house of Wettin. On his father's death (1486) he began to rule jointly with his eldest brother Frederick III the Wise over all the Ernestine lands apart from the electoral territory. He was a fervent supporter of Martin Luther. Succeeding his brother as elector in May 1525, he formed the League of Gotha or of Torgau with Philip (*q.v.*) of Hesse in Feb. 1526, for the protection of the Reformers. Other princes joined this league, and the Reformers were able to obtain a favourable recess from the diet of Speyer in the following summer. Thereupon John proceeded to reform the church in Saxony, where a plan for divine service was drawn up by Luther. When the Catholic majority at the next diet of Speyer (1529) repealed the recess of 1526, John signed the minority's protest, thus becoming one of the original Protestants. He accepted the Augsburg Confession of 1530; and in view of the Holy Roman emperor Charles V's threat to coerce the Lutherans he played a leading part in forming the League of Schmalkalden in the winter of 1530–31. The religious peace of Nürnberg (July 23, 1532) between Charles and the league had temporarily averted hostilities when John died at Schweinitz on Aug. 16, 1532.

JOHN, DON, OF AUSTRIA (1547–1578), the victor of the naval battle of Lepanto, was born at Ratisbon on Feb. 24, 1547, the illegitimate son of the emperor Charles V and Barbara Blomberg, a burgher's daughter. He was brought up in concealment in Spain under the name of Gerónimo. After the emperor's death, Philip II recognized Gerónimo as his half brother and gave him the name of Don Juan de Austria (1559). Don John had all the princely qualities of dedication to arms, personal charm and loyalty which Philip's son, Don Carlos, lacked so conspicuously. In March 1569 Philip II appointed Don John commander in chief against the rebellious Moriscos of Granada. After the successful conclusion of this campaign, he appointed him (1571) commander in chief of the naval forces of the Holy League of Spain, Venice and the pope. By the prestige of his royal name and by his enthusiasm Don John was able to impose a temporary unity of purpose on the quarreling admirals of the league and to inspire the soldiers and sailors with his own courage. In the battle of Lepanto (Oct. 7, 1571) the allies virtually annihilated the Turkish fleet. The victory fired Don John's ambition for further campaigns against the Turks; but Philip would only allow him to conquer Tunis (1573) and he vetoed a plan, put forward by Spanish court circles and by Pope Gregory XIII, to proclaim Don John king of Tunis. The city was lost again in 1574, and Don John continued to chafe under the restraints which his cautious and suspicious brother imposed on his ambitions.

MANSELL—ANDERSON

DON JOHN OF AUSTRIA. DETAIL FROM A PORTRAIT BY AN UNKNOWN ARTIST. IN THE MUSEO DEL PRADO, MADRID

In 1576 Philip appointed Don John governor general of the Netherlands, then in open revolt against the king's authority. Don John accepted the post only on condition that he would be allowed to invade England in order to liberate and marry Mary Stuart. In the Netherlands he signed the Perpetual Edict with the states-general (Feb. 1577). The Spanish troops were to be sent away but the Catholic religion was to be restored. The provinces of Holland and Zeeland did not accept this latter condition and refused to recognize Don John's authority. Soon he realized that neither the Netherlanders nor Philip would support his plans against England. After months of exasperating negotiations, Don John reverted to the more congenial role of soldier and resumed the war by capturing Namur. He routed the states-general's army at Gembloux (Jan. 1578), but had not enough forces to follow up his success. Philip had grown increasingly suspicious of his brother and had even approved the murder of his secretary, Juan de Escobedo; yet he refused Don John's repeated requests to be recalled. Don John died at Bouges, near Namur, on Oct. 1, 1578.

One of the most attractive, if quixotic, personalities in Spanish history, Don John had won his victories and reputation as the champion of Christendom against Islam. In the political and religious conflicts of western Europe, and in the intrigues of the Spanish court, he found himself out of his depth. His early death came as a deliverance from an increasingly intolerable position.

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JOHN, DON, OF AUSTRIA (1629–1679), the younger, the most famous of the illegitimate children of Philip IV of Spain, was born in Madrid in April 1629, his mother being the celebrated actress María Calderón. He received a princely education at Ocaña and was amply endowed with commanderies in the military orders and other forms of income. He received his first military command in 1647 when he was sent to Naples to support the viceroy against a popular rising. He was recalled to Spain in 1651 and given the command of the forces besieging Barcelona. He negotiated the terms under which the city surrendered in Oct. 1652. In Catalonia Don John carried out a policy favourable to the interests of the *bourgeoisie,* who were later to support him in his bids for power at court. In 1656 he was sent to Flanders as governor and achieved a brilliant personal success at Valenciennes. Two years later, however, he was defeated at the battle of the Dunes by the marshal de Turenne. Don John was recalled to Spain to command the army in Portugal. He held this post from 1661 to 1664, enjoying initial successes but eventually being soundly beaten. On the death (Sept. 17, 1665) of Philip IV he was out of favour.

Don John played an active part in the political intrigues which marked the minority of the new king, his half brother Charles II. He was strongly hostile to the queen mother and in 1669 headed a military rising in Aragon and Catalonia (the first of the *pronun-*

ciamientos which were later to become such a recurrent feature of Spanish history) which obliged her to dismiss her confessor and favourite, Johann Eberhard Nithard. For the time being, Don John was forced to content himself with the viceroyalty of Aragon, but in 1677 he was able to drive the queen mother from court and establish himself as first minister. Highly popular, and widely regarded as the saviour of Spain, Don John was in office for only a short time and his administration proved disappointing. His death, which occurred in Madrid, on Sept. 17, 1679, saved him from certain downfall.

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JOHN OF ASIA (506/507–*c.* 586), bishop of Ephesus, was a leader of the Monophysite Syriac-speaking church and author of one of the earliest and most important of Syriac histories. Born at Amida (modern Diyarbakir, Turk.), he was there ordained deacon in 529, when already a monk. He visited Antioch, Egypt and Constantinople before being compelled to move from his monastery with the other monks because of persecution of the Monophysites after the Council of Constantinople in 536. Four years later he settled in Constantinople, where he won the favour of Justinian I, who in 542 sent him to the province of Asia to evangelize. John was supposed to preach the orthodox faith as defined at the Council of Chalcedon (451), but was finally consecrated as bishop of Ephesus, the capital of Asia, by a Monophysite bishop (*c.* 558). After the death of Theodosius of Alexandria in 566 John was in Constantinople as leader of the Monophysites there, but was unable to prevent a schism within the Monophysite ranks. In 571 he was expelled from his monastery in Constantinople after the accession of Justin II, and suffered various imprisonments. He died *c.* 586, after a year of exile in Chalcedon. His only extant works are a collection of lives of the Eastern saints and the last part of an ecclesiastical history of the period from Julius Caesar to his own time. The part which survives covers the years 571 to 585. It gives a reliable account of events in which John took part, referring to himself in the third person.

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JOHN THE FASTER (JOHN IV) (d. 595), patriarch of Constantinople from 582 to 595, who claimed to the title of ecumenical patriarch, was in his youth a sculptor. Showing early asceticism, he became the protégé of the patriarch John III Scholasticus, was ordained deacon by him and made almoner of Hagia Sophia. At the death of John III's successor, Eutychius, he was elected to the patriarchal throne (582). He apparently first claimed the title ecumenical in 588. This title had previously been used in the time of Justinian I, but the importance of John's act lies in his insistence on its use and its continuance down to the present day (*see* CONSTANTINOPLE, ECUMENICAL PATRIARCHATE OF). It doubtless represented the dignity of the throne of Constantinople among the other eastern patriarchates as the result of the 28th canon of the Council of Chalcedon (451), which gave the bishop of the imperial capital the second place after that of Rome. Protests were made by both the popes Pelagius II and St. Gregory the Great, but John was not trying to usurp the claims of Rome. The title is one of honorary precedence, the patriarch himself being the mouthpiece of his synod, and has reference to the inhabited (*oikoumene*) or civilized world. John's asceticism brought him the name of "the Faster." That he left no personal possessions when he died on Sept. 2, 595, added much to his reputation. Various works on penitence are extant under his name, but they seem to belong to the 7th or 8th century. One on repentance, self-control and virginity is largely based on St. John Chrysostom.

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JOHN OF GAUNT: *see* LANCASTER, JOHN OF GAUNT, duke of.

JOHN OF KRONSTADT (IVAN ILYICH SERGEEV) (1829–1909), "the great shepherd of Russia," united in his person traditional asceticism, evangelizing ability and awareness of the social duties of Christianity. He was born on Oct. 31, 1829, in Sura near Archangel, the son of a family with more than 350 years' tradition of priesthood. After attending an ecclesiastical school and a seminary he went in 1851 to the theological academy in St. Petersburg.

Although John originally wanted to become a monk, he recognized his call to lay priesthood, married Yelizaveta Konstantinovna Nesvitskaya (or Vetvenitskaya) and, after taking priest's orders on Sept. 24, 1855, went to the Church of St. Andrew in the port of Kronstadt (Kronshtadt), a very poor and crime-infested parish. By diligently visiting the houses of his parishioners he won the confidence of the totally unchurched population. He founded in 1874 a brotherhood for social welfare work. A *dom trudolubia,* the first of its kind in Russia, was set up to include workshops, training in professional skills and courses in general education and religion, as well as charitable activities. Its own printing works published John's spiritual writings.

John was well known as a spiritual adviser throughout Russia among all classes of society, even at court. Many sick people owed their recovery to his intercession. He was one of the few important preachers of his time and an upholder of frequent communion. In order to facilitate this for the crowds of people who flocked to hear him he introduced general confession of sins which was then unprecedented in the Orthodox Church. John died on Jan. 2, 1909.

Many Orthodox Christians revere John of Kronstadt as a saint, but he was never canonized. The reasons are probably twofold: first, he was an uncompromising supporter of the alliance between the tsarist state and Orthodox Church and the opponent of all political reform and revolution; and second, toward the end of his life there developed a fanatical sectarian veneration of his person in the form of the so-called "Joannity."

See John's *My Life in Christ,* Eng. trans. by E. E. Goulaeff (1897). *See* also G. P. Fedotov (ed.), *A Treasury of Russian Spirituality* (1948). (F. v. L.)

JOHN OF SALISBURY (1115 or 1120–1180), the best Latinist of his age, was the secretary of two important archbishops of Canterbury, Theobald and Thomas Becket, and finally became bishop of Chartres, France. He was born in Old Salisbury, Wiltshire, and after 1135 studied at cathedral schools in France for 12 years, interposing three years at Chartres between two periods in Paris. He became a clerk in Theobald's household in 1148 and during the next five years was mainly employed on missions to the Roman curia, where he gained a thorough knowledge of chancery practice and of the personalities of the papal court. His *Historia pontificalis,* written about 1163, with its brilliant character sketches is virtually a memorandum from this viewpoint of the great events of those years. From 1153 John's contribution can be traced in the archbishop's council. His main duty was to draft the correspondence with the papal curia, especially in connection with appeals. In the late summer of 1156 this activity brought him into disfavour with King Henry II who regarded him as a champion of ecclesiastical independence. The crisis blew over, but to some extent it influenced two books that John wrote in 1159, the *Policraticus* and the *Metalogicon.* The former work was dedicated to Thomas Becket, still archdeacon of Canterbury and the king's chancellor; its influence may possibly have contributed to Becket's change, when he became archbishop in 1162, into an austere protagonist of ecclesiastical rights. It seems that Henry saw John's relation with the archbishop in this light, for John had to go into exile in France in the autumn of 1163, in advance of his master. From his refuge in the monastery of St. Remi at Reims he wrote many letters, assessing the prospects of the Canterbury case in the light of European events and policies and appearing as an acute and almost detached observer. After the reconciliation between Henry and Becket, he returned to England in Nov. 1170, a month before the archbishop, and was in Canterbury cathedral when Becket was assassinated (Dec. 29, 1170). After that event John was occupied in collecting Becket's correspondence and pre-

paring a biographical introduction. He became bishop of Chartres in 1176, took an active part in the third Lateran council (March 1179) and died on Oct. 25, 1180, probably at Chartres, where he was buried.

The "Metalogicon" and the "Policraticus."—In these two books John set out the conclusions he had drawn from the learning of his student days. His general intention was to show his contemporaries that both in their intellectual pursuits and in their actions they were defecting from the true task of humanity. His work represents a protest against the professional specialization slowly developing in royal and papal administration as well as in academic teaching. In the *Metalogicon* he attempted to show that logical studies ought not to be isolated from literary education; in it he provided the first western analysis of the whole corpus of Aristotle's logical writings, thereby proving his acquaintance with the latest developments in scholastic thought. In the *Policraticus* he unfavourably contrasted the way of life followed by contemporary courtiers and administrators with an ideal practice imagined from examples gathered from Latin poets and from classic and patristic prose writers. As a political theorist John's views were those of the pamphleteers who argued the Gregorian thesis of ecclesiastical supremacy. This doctrine seemed to him fully in harmony with the emphasis on natural law that he had derived from the philosophical tradition of antiquity. His attitude is expressed by the literary device—the doctrine that the church represents the soul of the body politic—which forms the political core of the *Policraticus*.

John's place among contemporary philosophers was to some extent ambiguous. He was obviously acquainted with current problems, but his attitude showed a marked divergence from the approach of the Chartres school. Whereas these thinkers indulged in cosmological speculation developed through their interpretation of the Latin version of Plato's *Timaeus*, John merely reported philosophical doctrine, avoiding metaphysical statements, and he liked to quote Cicero as an authority for this kind of skepticism. This attitude was much more akin to that which had developed among the teachers of theology in Paris during his last years there, partly under the impact of Cistercian opposition to rational investigations. But the composition of all his works shows that he had in any case a strong personal disinclination to systematic construction.

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JOHN, AUGUSTUS EDWIN (1878–1961), British portrait and mural painter, etcher and lithographer, was born at Tenby, Wales, on Jan. 4, 1878. He studied art at the Slade school, London (1894–98), winning a scholarship in 1896. He first visited Paris in 1900, traveling later to the Netherlands, Belgium and Provence. His drawings show great precocity and he was chiefly influenced by Rembrandt, El Greco and the Postimpressionists. He was a regular exhibitor at the New English Art club from 1900, and taught painting at Liverpool university until 1902. A colourful personality, he roamed over Wales, Ireland and Dorset, painting gypsy life and, after working with J. D. Innes and Derwent Lees (1911–14), developed a bold style of sharply defined areas of bright colour.

His first important oil, "The Smiling Woman" (*c.* 1908, Tate gallery, London), was a portrait of his second wife Dorelia. His service in World War I as an official war artist in the Canadian corps inspired the large decorative cartoon "Canadians Opposite Lens" (1919), and he painted many leading personalities of the peace conference. Later portraits include those of the cellist Mme Suggia (1923, Tate gallery), the poet Dylan Thomas (*c.* 1936–40, National museum, Wales) and the artist Matthew Smith (*c.* 1946, Tate gallery). His landscapes of the 1920s are in a Cézannesque style. Augustus John is well represented in the Tate gallery.

Although elected a royal academician in 1928, he resigned in 1938. He was re-elected in 1940 and in 1942 was awarded the Order of Merit. A retrospective exhibition of his work was held at the Royal Academy in 1954. John died at Fordingbridge, Hampshire, on Oct. 31, 1961.

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JOHN, GRIFFITH (1831–1912), Welsh minister and the first Christian missionary to penetrate central China, was born at Swansea on Dec. 14, 1831, and was brought up a Congregationalist. His work in China as a missionary covered a period of 55 years. In 1861 he went from Shanghai through the provinces of central China, and he claimed that with his colleagues he had established more than 100 stations of the London Missionary society in Hupeh and Hunan. He acquired an intimate knowledge of Chinese language and literature, and translated the New Testament and a great part of the Old into more than one Chinese dialect. In the Yangtze valley he founded a theological college for native preachers which bore his name. He died at Hampstead, London, on July 25, 1912.

JOHN, GOSPEL ACCORDING TO AND EPISTLES OF SAINT, books of the New Testament. The Gospel of John is the Fourth Gospel, a position it holds in all printed editions and in the majority of manuscripts. The three Epistles of John are classified among the catholic (*i.e.*, universal) Epistles, though II and III John are addressed to specific persons, II John to "the elect lady and her children" (referring to a church), III John to "the beloved Gaius." The Gospel's place in the New Testament canon, at first contested by some, was established by *c.* 200. There is no record of dispute about I John. But II and III John ranked as disputed books until the 4th century, when the seven-letter canon of catholic Epistles superseded the three-letter canon that included only James, I Peter and I John.

THE GOSPEL

Structure

Contents.—The solemn prologue culminates in the incarnation of the Word (Gr. *Logos*) and the antithesis between Judaism and Christianity: the Law was given by Moses, grace and truth by Jesus Christ (i, 1–18). The next sections underline the finality of the incarnation in contrast to all that has gone before. John the Baptist yields to Jesus as Son of God (i, 19–52). Jesus' first miracle at Cana marks the transformation of the water of Judaism into the wine of the gospel (ii, 1–12). He purifies the Temple, bringing the old cultus to an end (ii, 13–22). He teaches Rabbi Nicodemus about the new birth as something radically supernatural (ii, 23–iii, 21). John the Baptist reiterates his preparatory status as a forerunner (iii, 22–36). Jesus' dialogue with the symbolic figure of the woman of Samaria (iv, 1–42) teaches that true worship transcends both Judaism and the Samaritan cultus, and culminates in the self-revelation of Jesus as Messiah—significantly made to a non-Jew outside Jewish territory (*cf.* the half-heathen Galileans of iv, 43–45). The Samaritans accept the revelation without miracles as guarantees. So also the nobleman of iv, 46–54 (probably a gentile since the story is a modification of the centurion's servant in Matt. viii, 5–13 and Luke vii, 1–10) is a type of faith in Jesus' word independent of signs and wonders.

From v, 1 the scene moves to Jerusalem. The theme is the manifestation of the incarnate Word in Judaea in face of the Jews' disbelief and hardness of heart. The mounting crisis is underlined by the healing of the man at the pool of Bethesda on the Sabbath

day (v, 1–47), by the feeding of the multitude and the discourse on the bread of life (vi, 1–71; since this chapter is located in Galilee, probably it ought to be placed before ch. v), and by the Jews' attempts to kill Jesus and the controversy at the Feast of Tabernacles (vii–viii).

The tension is heightened by the incident of the woman taken in adultery (vii, 53–viii, 11); but the manuscript evidence makes it unlikely that this belongs to the original text of the Gospel (which has no implications for the question of historical authenticity). Though supported by the Byzantine text and Codex Bezae, it is omitted by many manuscripts and by others is placed after vii, 36 or xxi, 24 or Luke xxi, 38, which suggests that it was a floating tradition which, in face of all the 2nd-century tendencies to turn the Christian ethic into a morality of rules and precepts, asserted its claim to a place in the canon. Further disputes are occasioned by the healing of the man born blind (ix), the discourse concerning the good shepherd (x), and decisively by the raising of Lazarus from the dead which precipitates Caiaphas' judgment that Jesus' death is expedient (xi).

Nevertheless, Jesus goes up for the Passover to stay at Bethany with Mary, Martha and Lazarus (the anointing, xii, 1–8), and to make his triumphal entry into Jerusalem (xii, 12–19). At the point when "some Greeks" ask to see him, Jesus declares that the hour has now come for the Son of Man to be glorified in the passion, which is throughout a divine victory over the powers of evil (xii, 20–36), and in face of continued Jewish blindness declares himself the light of the world, to reject which is to decide destiny at the last judgment (xii, 37–50).

Hitherto there has been intermittent contact with the synoptic tradition. But the washing of the disciples' feet (xiii, 1–15), the farewell discourses after the Last Supper (xiii, 16–xvi) and the intercession for the disciples or "high priestly prayer" (xvii) are unparalleled in the Synoptic Gospels; and from xiii, 1 the Gospel of St. John moves into a new key, with a sense of profound inwardness and intensity, as Jesus gives his last teaching to the inner circle of intimate disciples. The language reflects the deepest experience of the church. There is no account of the actual Last Supper and nothing is said of the institution of the Eucharist (a silence paralleled by the omission of Jesus' baptism); but just as baptism and Eucharist are presupposed in iii and vi respectively, so also xiii, 1–15 is full of baptismal allusions and the "abiding in the vine" of xv has strong eucharistic overtones.

The theme of the farewell discourses as a whole is the organic union between Christ and his disciples. He is the authentic vine (in contrast to the old Israel), and the disciples are the branches who are to bear fruit. The mutual love of the Father and the Son, and of the Son and his disciples, contrasts with the hatred of the world—true disciples share the hatred which Jesus endures in the passion and which is an expression of the world's alienation from God. The departure of Jesus from his disciples is expedient since it is the condition of the coming of the Holy Spirit, the "Paraclete" (*i.e.*, "helper," "advocate," "counselor"; xiv, 16–17, 26; xv, 26; xvi, 7–15; the word is twice used of Jesus: in I John ii, 1 and indirectly in John xiv, 16). Just as John the Baptist is forerunner for Jesus, so Jesus himself is forerunner for the Spirit whom he himself sends. The Spirit's revelation to the post-resurrection church is in all respects continuous with the witness of Jesus; no functions are ascribed to the Paraclete which are not also ascribed to Jesus: both are sent by the Father, both are discerned only by believers, both teach the disciples truth and both convict the world of sin. So the evangelist denies that the Spirit is the source of new revelations out of line with the norm of primitive apostolic teaching, and at the same time affirms the identity of the Jesus of history with the Christ of faith.

The passion narrative (xviii–xix) resumes closer contact with the synoptic tradition but is dramatically told as a manifestation of divine triumph and majesty. The resurrection story (xx) underlines the point that historical proximity to the earthly Jesus is not faith, which is rather a relation to the risen Lord, who is nevertheless one with the historical Jesus. Therefore "blessed are those who have not seen and yet believe" (xx, 29). The epilogue (xxi) describes the meeting of the risen Christ with a group of disciples by the Lake of Tiberias, and a dialogue with Peter concerning his commission, which includes an explicit denial of a popular rumour that the "beloved" disciple would not die before the Lord's return.

Relation to the Synoptic Gospels.—St. John's use of his sources is subtle and his relation to the synoptic tradition is problematic. The most superficial reader is struck by the contrast: the paucity of parables, the insistence on miracles as a manifestation of divine glory rather than incidental acts of compassion and the drastic heightening of the supernatural (*e.g.*, ii, 1–10; v, 5; ix, 1; xi, 39), the long discourses of self-revelation and the hieratic style, the monotones of which produce a strange effect of timelessness. The actions and words of Jesus seem more symbolic than spontaneous. The apocalyptic element has been transmuted (characteristically the eschatological title "Son of Man" in St. John means the humanity of Christ). Judgment and salvation belong not to the future but to the immediate presence of Jesus, pre-existent, eternal, unchanging and undergoing no surrender of divine glory by becoming flesh. In St. John's Gospel, Jesus is not tempted and never asks a question to which he does not already know the answer. At death he utters a cry not of dereliction but of triumph.

At the same time St. John is more emphatic than the synoptists in stressing the reality of Jesus' humanity.

Despite the obvious differences there is much contact with the synoptists in detail. St. John corresponds to St. Mark in including John the Baptist, the feeding of the multitude, the walking on the lake, Peter's confession, the anointing and triumphal entry, the supper, Judas' betrayal, the arrest, Peter's denial, and several details of the passion and resurrection narrative. Likewise there is contact with Luke in the mention of Lazarus, a disciple named Judas other than Judas Iscariot, and Annas the high priest; also in minor details such as John xiii, 38 (*cf.* Luke xxii, 34), xviii, 10 (*cf.* Luke xxii, 38), xx, 12 (*cf.* Luke xxiv, 4). The nearest contact with St. Matthew is in the form and placing of the saying, John xiii, 16; xv, 20 (*cf.* Matt. x, 24–25). (*See* also GOSPELS.)

LITERARY HISTORY

The style of the Fourth Gospel is throughout so homogeneous that no theory of composition which breaks it up into distinguishable sources can be rendered plausible. On the other hand, the order of the text as it stands (according to the unanimous consensus of the manuscripts) causes acute difficulties which have provoked many attempts at restoring what is believed to be the original order. The geographical data demand that ch. vi precede ch. v; vii, 15–24 belongs with v; x, 22 ff. looks like the beginning of the discourse on the shepherd, and x, 19–21, with its reference to healing the blind, seems to be in the wrong place; xii, 44–50 is unconnected with what precedes and follows; xiv, 31 leads naturally into xviii. If the text is indeed in disorder, then it is not the original document as it left its author's hand and a theory of editorial revision is unavoidable. That such revision occurred is likely anyway in view of ch. xxi, where the author of the Gospel is identified with the elusive "disciple whom Jesus loved" (xxi, 20–24, *cf.* xiii, 23; xix, 26–27, 35; xx, 2–10; xxi, 7. That he is also intended in xviii, 15–16 is possible but not necessary; concerning i, 40 no decision can be reached).

The identity of the beloved disciple is never disclosed; not a word in the Gospel itself indicates that John the son of Zebedee is intended (*see* JOHN, SAINT, the apostle), and this mysterious reticence has led to speculation either that for the original evangelist he is an ideal and symbolic figure and that this was not understood by the first editors or that he is Lazarus (*cf.* xi, 3 and 36). It is perhaps more probable that the title is throughout attributable not to the evangelist but to his editors, who carefully give the lie to the popular rumour that the beloved disciple would live until the Lord's return (xxi, 20–23) and manifestly regard him as a concrete historical person, a member of the group mentioned in xxi, 2, present at the Last Supper, an eyewitness of the crucifixion, there honoured by being entrusted with Jesus' mother. It is probable (not certain) that the editors thought the beloved disciple was John son of Zebedee.

The deliberate reticence may seem odd to the modern reader, who may find it hard to envisage a book lacking clear indications of author or publisher. In fact the Gospels and Acts were published anonymously; their present titles come from the 2nd century (the Bodmer Papyrus ii, of *c.* 200, has the inscription "Gospel according to John"). According to the earliest Christian conviction the author of an inspired work was the Holy Spirit and the human writer was only an instrument. Letters and apocalypses were different, in that they had to bear the name of their author as a vindication of their authority and authenticity. The fact that the editors of the Fourth Gospel provided the work with a hint concerning the identity of the author suggests that they were anxious for the acceptance of the authenticity and veracity of the narrative. It is noteworthy that none of the Synoptic Gospels carries any internal indication, direct or indirect, concerning the identity of the author.

The date of the Gospel is very uncertain. A 2nd-century dating is put out of court by the evidence of papyrus fragments. According to Christian writers of the end of the 2nd century the Fourth Gospel was the last to be written and was intended as a supplement to the synoptists. If it is independent of the synoptists, its lateness cannot be taken for granted. But the work is marked by a deep sense of maturity and meditative reflection and by an allusiveness and subtlety which make it hard to regard as a young man's work. Its composition was probably a long process. Moreover, it reflects the richness of experience of the Christian community. While, therefore, a date before 90–100 is not impossible, especially if it is independent of the synoptists, it is not probable.

The so-called anti-Marcionite prologue to John (to which various dates from the 2nd to the 5th century have been assigned) attributes to Papias the statement that "John gave his gospel to the churches while he was still in the body" (*adhuc in corpore constituto*). Probably this is a distant echo of lost controversy on the question whether the Gospel was a posthumous publication or not (*cf.* xxi, 23–24).

Ecclesiastical Tradition.—The ecclesiastical tradition from the last decade of the 2nd century unanimously affirms that John son of Zebedee, one of the 12 apostles, wrote the Gospel and the first catholic Epistle that bears his name. As both Gospel and Epistle are strictly anonymous productions (like much other early Christian literature), this 2nd-century evidence must be scrutinized. That the son of Zebedee also wrote the Johannine Apocalypse (*see* REVELATION, BOOK OF) and the two Epistles known as II and III John, ancient testimony is not unanimous, though these writings are not anonymous—II and III John are written by one entitling himself "the presbyter."

Origen, who regards Gospel, Apocalypse and First Epistle as the work of the apostle, records uncertainty about II and III John; Eusebius of Caesarea (4th century) reckons them among the disputed books. Dionysius of Alexandria (3rd century), while rejecting an extreme view that the Apocalypse had no place whatever in the New Testament canon, argued on stylistic grounds that Gospel and Apocalypse cannot be by the same author and suggested that the latter was by another John, finding support for this hypothesis in the existence of two rival tombs at Ephesus, each claimed as the apostle's. The affirmation that the apostle lived to an old age and died at Ephesus is common to several writers at the end of the 2nd century: Irenaeus of Lyons, Polycrates of Ephesus, Clement of Alexandria and Tertullian of Carthage. Polycrates, when the apostolic tradition of Asia Minor was challenged by Victor of Rome, declared that Philip the apostle was buried at Hierapolis and that John, "who leant on the Lord's breast, who was a priest, wearing the sacerdotal plate, both martyr and teacher, fell asleep at Ephesus." His reference to John's martyrdom is noteworthy; he probably means the exile to Patmos, thereby implying the identification of apocalyptist and evangelist. It is disturbing that he seems to merge Philip the apostle and Philip the evangelist, which suggests an inclination to overcall the hand.

Irenaeus, whose origins lie in Asia Minor, does not doubt that the apostle John, having written the Apocalypse under Domitian, wrote the Gospel and died in Asia Minor under Trajan; *i.e.,* after 98. Irenaeus claims that as a small boy he saw Polycarp of Smyrna who had known John, and frequently appeals to the authority of "elders" (whom he does not claim to have either seen or heard but whom he must have read, or read about) who also knew John in Asia Minor. These links between Irenaeus and John are not invulnerable, and the points for which Irenaeus invokes the authority of "elders" are unimpressive; *e.g.,* that Jesus lived to an old age (*cf.* John viii, 57). Moreover, all his statements are made in a polemical context, defending both Gospel and Apocalypse from attack. Since the criterion of admission to the New Testament canon was apostolic authorship, to claim any less was *ipso facto* to admit defeat. In short, Irenaeus' evidence is not cast-iron; but it is at least certain that for him the attribution of both Gospel and Apocalypse to John is traditional; *i.e.,* he is more important as a witness to the tradition's existence than as a guarantee of its truth.

The Apocalypse is ascribed by Justin Martyr (*c.* 155) to John "one of the apostles"; to whom he ascribed the Fourth Gospel if he knew it (which is probable but not certain) there is no evidence. Although the external testimonies to unity of authorship are strong, and although there are remarkable points of contact between Gospel and Apocalypse ("the word of God," "the water of life," "the lamb of God"), the differences, especially in language and style, are so vast as to make it very improbable, if not impossible, that they come from the same author; apart from the testimony of church tradition, no one would ever have imagined it. If, therefore, the tradition is mistaken, some hypothesis to account for the error is required.

Apocryphal Acts of John.—It is possible that there is a key in the apocryphal Acts of John. These Acts were written in the name of a supposed disciple of the apostle John named Leucius, probably in Asia Minor and, being probably known to Clement of Alexandria, may be dated before 180 (how much before 180 is uncertain). Like other apocryphal Acts (*see* APOCRYPHA, NEW TESTAMENT: *Acts*) the work was a loose amalgam of stories; it tended to break up in transmission, but can be partially restored by piecing together separate episodes from different Greek manuscripts. An early Latin version current by 250 has not survived; only a doctored late Latin text, purged of heresy, occurs in "Abdias" (*Historia apostolica,* 5). Occasional Greek fragments occur in quotation or on papyrus. Unhappily, the beginning is lost, and the first extant section opens with John landing at Miletus and forthwith going on, in obedience to a vision, to evangelize Ephesus. Ephesus, it is repeatedly emphasized, is John's prime care; but eventually he yields to a pressing invitation to visit Smyrna. After a lacuna the story brings John from Laodicea back to Ephesus, where, after resurrecting a dead woman and expounding esoteric and highly unorthodox doctrines, he arranges the digging of his grave, lies down in it and dies. Only the Ephesian portions of the narrative survive. But probably the lost beginning told of John's exile to Patmos.

A tantalizing fragment of the Acts in a 4th-century papyrus from Oxyrhynchus contains John's arrest by a proconsul with letters from the emperor; the papyrus does not name the emperor and breaks off immediately. It is likely, however, that Clement of Alexandria, whose probable knowledge of these Acts is otherwise attested, drew on them for his "legend which is no legend but a true story" concerning John and the robber; it happened (Clement says) "when, after the tyrant's death, John removed from the island of Patmos to Ephesus and used to go off by request to neighbouring places." Origen explains that Mark x, 39 was fulfilled when Herod killed James and when "the Roman emperor (as tradition tells us) condemned John, witnessing for the word of truth, to the island of Patmos." Neither Clement nor Origen names the emperor. (Irenaeus identifies him with Domitian.)

The evidence points toward the conclusion which, until more of the Acts of John turn up cannot be more than probable conjecture, that the exile to Patmos featured in the Acts. It is noteworthy that the order of the cities in the missionary itinerary corresponds to that of Rev. i–iii; perhaps Pergamum, Thyateira and Sardis fell in the lacuna. Since one passage in the Acts speaks of John

as leaning on Jesus' breast, it seems clear that the Acts use the Fourth Gospel and identify John with the beloved disciple. Therefore, it is likely that the notion of identifying the apocalyptist and the evangelist is due to this author's fertile imagination. The Acts are also the earliest witness to the tradition connecting the apostle with Ephesus; that the author is the creator of this tradition is possible but not probable.

Possible Martyrdom of John the Son of Zebedee.—The strength of the Ephesian tradition associating the Fourth Gospel with the son of Zebedee must be balanced by consideration of the evidence that John suffered martyrdom, like his brother James, at the hands of the Jews. The prime authority for this is a fragment of the second book of the exposition of the Lord's oracles by Papias (*c.* 130), preserved in two Byzantine sources: a 10th- or 11th-century manuscript of the 9th-century chronicle of George the Monk (the citation is not in other manuscripts of the chronicle and is an early interpolation, but the point is immaterial here), and a series of excerpts from a carelessly made epitome of church history, contained in a 14th-century manuscript in the Bodleian library, Oxford, which, since it mentions Phocas and is used by Theophanes, must fall between 600 and 800. It looks as if both George and the excerptor drew on the same source, and it is more probable than not that this source is the lost work of Philip of Side (*c.* 430). Philip was a poor historian, but his fragment of Papias may be genuine. According to George's interpolater it runs: "Papias . . . in the second book of the Lord's oracles says John was killed by the Jews, and so clearly fulfilled, with his brother, Christ's prophecy concerning them (Mark x, 38–39). For it is impossible for God to lie." The interpolater proceeds to compare Papias' exegesis with that of Origen mentioned above.

Subsidiary evidence supporting Papias' account has been strangely sought in early church calendars which commemorate John and James on the same day; but it would be so natural to associate the two sons of Zebedee that nothing can be built on so flimsy a foundation. In any event, Acts xii does not say that John died with James; and Gal. ii, 9 proves that John was alive two or three years later. The crucial question is whether Papias is independent of Mark x, 39. Conservative scholars, anxious to uphold the Ephesian tradition, have often stressed the tenuous transmission of the Papias fragment so as to cast doubt on its authenticity. More cogently, they have argued that the fragment cannot contain an authentic statement of Papias since the full text of his work lay before Irenaeus and Eusebius, neither of whom mentions anything of the kind. All these arguments about Papias' testimony to John's martyrdom assume that, if he said it, he is independent of Mark. But Papias was avowedly expounding the Lord's oracles; like Origen, he could not think any prediction unfulfilled. Accordingly, the final issue concerning the early martyrdom of John turns on this text alone. The commentator must decide whether, if the text contains *ipsissima verba* of Jesus, it means that both sons of Zebedee were expected to die as martyrs or if "baptism" could mean something less than actual death, or whether the saying is more probably prophecy after the event and reflects the fact of the death of both James and John. Papias cannot be invoked to enforce the latter exegesis. The question remains open. It can only be said that if the Papias fragment is genuine it may have some negative value inasmuch as, if he did so expound Mark x, 39, and if he thought both brothers were martyred at the same time (which is far from clear), then he ignored the tradition that John died peacefully in old age at Ephesus. Papias did not live far from Ephesus and wrote before the Acts of John. On the other hand, as Eusebius of Caesarea remarks, he was very stupid.

John the Elder.—Papias further adds to confusion by what he says about a certain "John the Elder." He explains that, being anxious to find out all he could about the conversation of the apostolic generation and valuing oral tradition more highly than books, he used to question any Christian arriving at Hierapolis who had heard words spoken by Andrew, Peter, Philip, Thomas, James, John or Matthew. He also treasured the words of Aristion and "John the Elder" (of these two he speaks in the present tense). According to the natural reading of the words Papias here distinguishes between John the disciple and John the Elder. But there is nothing to indicate whether John the Elder lived at Ephesus or not; and, unfortunately, while Papias knew both the Fourth Gospel and the First Epistle, and while his millenarian beliefs suggest the strong influence of the Apocalypse, there is no particle of evidence for his opinions about their authorship.

Conclusion.—To sum up, the external testimony ascribing the Fourth Gospel to the son of Zebedee, though less than compelling, remains strong; but the question can be decided only on the basis of the Gospel itself. Internal evidence suggests that the work as it stands comes from editorial hands which were responsible for attributing the work to the beloved disciple, probably understood to be John. The fundamental difficulty about accepting the tradition without more ado lies in the inherent content of the work—that is, in its radical divergence from the historical tradition of the synoptists, in its exalted theology (notably the "I am . . ." sayings) and in the presence of certain strongly Hellenic elements (*see* below).

Influences on the Gospel

The prologue to the Fourth Gospel puts in the forefront the concept of the Word (Gr. *Logos*). The term Logos was used, for example, by Stoic writers to describe the universal reason apparent in the order and rationality of the cosmos on the one hand and in the mind of man on the other. The concept also plays some part in late Platonism. But John's introduction of the term Logos does not take one as far afield as Greek philosophy and it is important not to read too much into his use of the word. It is equally important to be on guard against putting the Gospel in line with later Christian theology based in part upon it. Christian writers of the 2nd and 3rd centuries, in expounding their faith to a critical Greek audience, use the Logos idea to explain their doctrine of a unique revelation of God in Christ and at the same time to affirm the continuity of this revelation with all truth wherever it may be found. The Johannine prologue is very near to this. The Logos is the light lightening every man coming into the world; yet he is also the Word who is made flesh. The particularity of the incarnation is the way by which the universality of God's creative providence is known and understood.

Nevertheless, this kinship with the themes of later Christian writers addressing a gentile world must not be allowed to prejudge the question of the purpose of the Fourth Gospel. It cannot be taken for granted that the book is primarily an apologia for Christianity to the gentile world.

Hellenistic Judaism.—A background for the term Logos more immediate than that of Stoicism is found in Hellenistic Judaism. Philo (*q.v.*) of Alexandria, whose voluminous works expounding the Pentateuch are the chief literary monument of the Greek synagogues, stands at the meeting point of Hebraic and Hellenic thought and strives after a synthesis of Platonic and Stoic philosophy with a biblical doctrine of God and the world. Where the older Jewish Wisdom literature (*e.g.*, Prov. viii) spoke of the personified divine Wisdom as the ordering agent of God in creation and as the inspirer of the Mosaic Law, Philo speaks rather of the Logos of God as the medium of creation and so as mediating between the transcendent God and the earthly order and exercising immanent providential care. He also thinks of the image of God in man as a fragment or reflection of the Logos, interpreting Gen. ii, 4 as referring to the making of earthly man and Gen. i, 26–27 as referring to the heavenly archetypal man formed after God's image. Many Old Testament symbols are interpreted by Philo as referring to the divine Logos. He is the manna from Heaven, the shepherd, the light and life of the world, the sole mediator of the knowledge of God, our leader on the way to God, our high priest, intercessor and "Paraclete."

Hermetic Doctrine.—The cosmogony of Genesis provoked speculation on both sides of the vague frontier between hellenized Jews and Greeks in contact with Judaism. The Greek aspect is seen in the *Corpus Hermeticum*, a collection of dialogues in which Hermes Trismegistos (*q.v.*) imparts revelations to an initiate, some concerning astrology and alchemy, others concerning philosophical and religious matters, the latter being marked by mystical feeling

sometimes passing into fantasy and theosophical speculation but normally tempered by restraint and reasonableness. The demonstrable presence of Jewish elements in some of these tracts suggests that Judaism may have acted as a catalyst upon the minds of the writers.

According to the Hermetic doctrine the way of salvation for man lies in the "knowledge" (*gnosis*) of "the divine"; man, disregarding his right to immortality, has given himself over to death, but can recover himself by repentance, by learning the cosmic mysteries expounded by Hermes and by an intuitive, ecstatic awareness described as "entering into the divine life and light," or, in the 13th tract, as being "born again." The concept of the cosmic Logos occurs in a few (not very prominent) passages referring to a mediating power between the supreme mind (*nous*) and the material world. Here again, it is possible that this is due to the influence of Jewish speculations about the creation and the Old Testament theme that "by the word of the Lord the heavens were made" (Ps. xxxiii, 6).

Gnosticism.—The existence of certain significant parallels should not obscure the distinctiveness and individuality of the writers concerned. It is unlikely either that John had read Philo or that the Hermetic writers had read John, and literary dependence is not in question. Kinship does not mean borrowing, and even the 13th Hermetic tract, where the case for direct Christian influence is at maximum, may well be independent. The parallels, however, at least illuminate the background of Johannine language and the way in which the Gospel would be understood by some readers. The Hermetic tracts, in particular, were popular among the Gnostic sects of the 2nd and later centuries A.D. and it is congruous that the Fourth Gospel also found a receptive public in the same circles, especially in the school of Valentinus (*q.v.*). Valentinus' pupil Ptolemy wrote a commentary on the Johannine prologue; another, Heracleon, wrote an exposition of the Gospel as a whole, 40 fragments of which are preserved by Origen, freely exploiting the evangelist's symbolism so that the work becomes an esoteric allegory. The influence of the Fourth Gospel can likewise be discerned in the "Gospel of Truth" discovered at Nag-Hammadi in Egypt, perhaps also in the Odes of Solomon and in Ignatius. The speculative elements in the background of the Fourth Gospel, its apparent attempts to ward off Gnosticism by concession as well as by correction and its warm reception among the Gnostic sects of the 2nd century have led some to speak of Gnosticism as the clue to the Gospel. (*See* GNOSTICISM.)

The most important common element between John and, for example, the Valentinians is a way of thinking which in certain respects is akin to Kierkegaard and to 20th-century existentialism. It is antihistorical, stressing the contemporaneity of the gospel and its timelessness as opposed to its particularity in the historical process. The Fourth Gospel is profoundly concerned with the problem of the historical element in the revelation. It is of the very essence of Christianity that the Word was made flesh. At the same time John does not think of Jesus as a past figure of history but as contemporary, known to the believer in the preaching of the Word and in the sacramental life of the church. John's stress on the timelessness of existential faith is not to be understood from the background of Platonic idealism, which is only remotely influential, but from the quest for contemporaneity among believers removed from the scene of the incarnation in both time and space (*cf.* John xx, 29).

Mandaean Doctrine.—How far it is right to use later Gnostic and even Mandaean texts to illuminate the thought of the fourth evangelist is controversial and obscure. The Mandaean documents are for the most part late and not free of Christian influence; it is hazardous to use them to illuminate earlier Christian texts. On the other hand, the Mandaeans (*q.v.*) seem to have some connection with an early group which greatly reverenced John the Baptist; and it is therefore relevant that the fourth evangelist seems to go out of his way to stress the superiority of the incarnate Lord to one who was merely a forerunner. The existence of a sect of followers of John the Baptist at Ephesus is adequately attested by Acts xix, 1–7; *cf.* Mark ii, 18; Luke vii, 29; xi, 1. There seem to be unmistakable marks of polemic in John (i, 8, 15 ff.; iii, 22 ff.), and there was probably some measure of rivalry.

Qumran Community.—There are also some important contacts with the Dead sea scrolls (*q.v.*), notably the dualism of light and darkness and certain phrases like "walking in darkness" (viii, 12; xii, 35; I John i, 6; *cf.* Manual of Discipline iii, 21), "doing the truth" (iii, 21; I John i, 6; *cf.* Man. Disc. i, 5), "sons of light" (xii, 36; *cf.* Man. Disc. i, 9; iii, 24 ff.), "the works of God" (vi, 28 ff.; *cf.* Man. Disc. iv, 4). Moreover, beside John's strongly Aramaizing Greek, there is close contact with Palestinian soil in the detailed knowledge of topography disclosed by such remarks as iii, 23 (much water at Aenon near Salim), v, 2 (the pool of Bethesda and its five porches) and xix, 13 (the pavement called Gabbatha), in all of which cases archaeology has tended to uphold John's accuracy. It seems hopelessly artificial to think of some Hellenistic Christian author getting his topography right with the aid of a 1st-century guidebook, and the simplest explanation of the phenomena is that the author was a Palestinian Jew who knew the country. That the author had any actual contact with the Qumran community is unverifiable speculation.

QUALITIES OF THE GOSPEL

Aims.—It will be seen that certain elements in Johannine thought and vocabulary point to an author whose mother tongue was Aramaic and whose native soil was Palestine, whereas other elements point to the Greek world and especially to Greek Judaism. The evidence would be covered by the hypothesis of a Palestinian writer who had emigrated to a Greek-speaking community and acquired much familiarity with the language and religious categories of the surrounding society. Consideration of the penumbra of Hellenistic Judaism and Judaizing Hellenism helps to pose the right questions about the evangelist's objectives. The prologue can be misleading if it is taken to suggest that John is anticipating Clement of Alexandria and seeking to convince gentile readers that the Logos of the philosophers has become incarnate. After the prologue the term Logos plays no further part in the Gospel and is replaced by "the Son"; the chief theme becomes the Son's unity with the Father and his unique revelation of the Father to the world, continued in the work of the Spirit in the church. The most probable view is that the Gospel is primarily addressed not so much to the Hellenic world as to Greek-speaking Judaism in the synagogues of the diaspora, scattered not only throughout Syria and Asia Minor but in the entire Mediterranean world from the Crimea to Cádiz. John xx, 30–31 declares explicitly that "now did Jesus many other signs in the presence of the disciples which are not written in this book; but these are written that you may believe that Jesus is the Christ, the Son of God, and that believing you may have life in his name." In the Fourth Gospel "Christ" is not a proper name; the word is a title carrying its full force of "Messiah" or "anointed one." The messiahship of Jesus is a central theme. Of him spoke both the Law and the Prophets (i, 45; v, 39), and it is his messianic destiny to "gather into one the children of God who are scattered abroad" (xi, 52; *cf.* x, 16). Moreover, it is important for the evangelist and his readers not only that the inscription on the cross describes Jesus as "king of the Jews" but also that this dignity was recognized by the Roman procurator (xix, 19 ff.). Jesus is authenticated as God's anointed and only begotten Son by the fulfillment of prophecy and by his miracles, entitled "signs" (iii, 2; vii, 31; xi, 47; xii, 18, etc.). The signs are not so much quasi-Platonic symbols of an unseen reality (though this is an overtone in the background) as guarantees which vindicate Jesus' authority as Messiah. Because he is Messiah he has turned the purifying water of Jewish ceremonial observances into the wine of the messianic feast.

Use of Symbolism.—It is characteristic of the evangelist that he takes a plain story of a wonder at a wedding (ii, 1–10) to symbolize the transcending of outward religion by the worship of God in spirit and in truth. Almost every detail of a story, as John tells it, is the vehicle of symbolism. The night into which Judas makes his departure (xiii, 30) is more than natural darkness; it is the darkness which does not comprehend the light (i, 5). The foot washing is an enacted parable of the entire mystery of the

incarnation (xiii, 1 ff.) as well as a lesson in sacramental theology with clear allusions to baptism and penitence. The healing of the man born blind is the peg on which the evangelist hangs the discourse on the light of the world (ix, 1 ff.). The miracle illustrates the discourse. The symbolist writing does not mean that John has not found the story in the tradition. In the passion narrative, in particular, a few features occur which are not given a symbolical meaning (*e.g.*, Peter's denial in xviii, 15 ff.; and contrast the treatment of Gabbatha, xix, 13, with that of Siloam, ix, 7). But these are exceptional, and the most striking literary feature of the Gospel (and one of the reasons for its perennial fascination and intense power) is the artless form veiling a content of extraordinary subtlety. John loves words with many levels of meaning (*cf.* for example, "lifted up," iii, 14; xii, 32).

The symbolism is specially attached to Jewish liturgical feasts. Each discourse, with its illustrative miracle, is linked to a feast (*e.g.*, v, 1; vi, 4; vii, 2; x, 22; xi, 55, etc.), and the liturgical associations of the festival are reflected in the discourses. The themes attaching to the Feast of Tabernacles (vii, 2) are the water drawing and the illuminations (*cf.* vii, 37 ff.; viii, 12 ff.). The synagogue lections at the Feast of Dedication concern God as shepherd of his sheep (*cf.* x, 22 ff.). That the feeding of vi, 1 ff. symbolizes the Last Supper is obvious enough. Accordingly it has also been argued (by A. E. Guilding) that the unnamed feast of v, 1 must be the New Year, on the ground that the lections for this feast concern judgment, which is the main theme of ch. v.

Historicity.—It follows that the relation, in John's mind, of historical events and theological truth is profoundly complex. It is as good as certain that in many details the Gospel contains excellent historical tradition; *e.g.*, it is widely held that John is right, against the synoptists, in dating the Last Supper on the evening before the Passover (xix, 14). That the essential narrative matter came to John in the tradition is highly probable, and (whatever view is taken of ii, 1–10 or xi, 1–44) there is no good ground for thinking that the narrative of any incident was invented by the evangelist—though its placing in the chronology of the ministry will be subservient to John's theological plan. Whether or not John knew the synoptists is disputed. The strong case for asserting complete ignorance (P. Gardner-Smith) has to account for phrases suggesting direct knowledge at least of Mark and Luke; but in any event it is *a priori* improbable that, even if John knew and used the synoptists, he had no other source of good information. He may have shared the view of Papias that oral tradition was better than books.

The notion that the synoptists preserve unadorned history and that John gives theology scarcely anchored in fact will not bear critical examination. There is symbolist writing in all three synoptists; a particular link binds John to Mark in that both are deeply concerned with unbelief in face of divine revelation. No doubt the synoptists stand much nearer to the thought world of the historic ministry of Jesus, and the discourses of the Fourth Gospel must in the main reflect the evangelist's inspired meditations upon the meaning of the gospel events. He is declaring what the Spirit saith unto the churches, convinced of the complete continuity between Jesus in the days of his flesh and the risen Lord. But Matt. xi, 27 = Luke x, 22 stands as a lasting warning against hastily supposing that the self-consciousness of a unique relation to the Father is in itself a sign that the discourses are wholly the product of the evangelist's untrammeled imagination.

Influence.—Although the Fourth Gospel is a puzzle to which the historian often feels that he lacks the essential clues, its theological power and intensity of insight make it one of the greatest creative works of early Christian literature. During the 2nd century its theology and divergence from the historical tradition of the synoptists caused a dispute about its authority. Once it had been vindicated, mainly by the advocacy of Irenaeus, it dominated the theological scene; the early controversies concerning the Trinity and the Person of Christ frequently turned upon the exegesis of Johannine texts; its theology of the incarnation and the Eucharist were particularly congenial to the Alexandrians and the Gospel received one of its most perceptive expositions from Cyril of Alexandria. The book became a problem to the 19th-century historians who assumed that the Gospels were (or ought to be) biographies and provided material that the historian could use to make the "Jesus of history" comprehensible against his environment in time and space. But the Fourth Gospel has none of the presuppositions of a modern biography, and is not interested in, for example, tracing the development of Jesus' character or asking what it was his nature to do and to be. It is concerned with the revelation of the Word made flesh, urgently demanding man's moral decision of faith, lifting him up from the nothingness and mortality of this-worldly existence to participate in the very life of God.

THE THREE EPISTLES

I John is an anonymous manifesto addressed probably to a group of churches where grave heresy taught by "false prophets" has led to a secession (ii, 19) so substantial that the orthodox remnant is sadly depleted. The heretical teachers, who are denounced as Antichrist (ii, 18), deny that Jesus Christ came in the flesh (iv, 1–6). The orthodox remnant are disconcerted to find that the heretical version of Christianity is more successful with the pagan world than their own teaching, and appear to have been given a sense of inferiority by the sectarian claims to profounder mystical experience. The Epistle gives the impression of using ideas and terms drawn from the opposition in an orthodox and disinfected sense (the tension between the concessions and the correctives has led to theories denying the Epistle's literary unity and supposing it to be an orthodox revision of a document originally more radical and Gnostic). If so, the heretics claimed to possess perfection, and that they are "in the light," "born of God" and without sin. In fact their false spirituality goes with moral licence. The Epistle recalls the orthodox brethren to "that which was from the beginning" (i, 1) as opposed to heretical innovation, to the tangible fact of the incarnate Lord (i, 1; ii, 7), to the atonement (ii, 1–2), and to the authentically Christian moral life which is keeping Jesus' commandments and, above all, the commandment of love—a virtue little regarded by the seceding Gnostics. The exalted claims of the sectarians are met by equally high affirmations of every Christian inheritance (ii, 20–21; v, 13–15); believers possess the forgiveness of sins and have already overcome the transitory and evil world (ii, 12 ff.). But this does not mean perfectionism and rigorism since a brother may fall into a minor sin which is not "mortal" without passing beyond the pale; he may be restored by fraternal intercession (v, 16–17).

Latent throughout the Epistle is the basic question whether or not there is such a thing as authentic Christianity and, if so, how it is to be identified. The Epistle finds its verification in the moral life and love of the brethren (iii, 10 ff.; iv, 12–21); its ground is the love of God manifest in incarnation and atonement (iv, 9–10), and the true operation of the Spirit is wholly one with the continuous sacramental life of the church in baptism and Eucharist (v, 8).

The relation of I John to the Fourth Gospel is obviously intimate, but whether or not both are by the same author is keenly debated. Certain differences suggest that the author of the Epistle may be a pupil of the fourth evangelist (perhaps one of the Gospel's editors). The text of i, 1 does not imply that the author is himself an eye-witness; the "we" refers to the Christian community which looks back to its founding events.

The famous *comma Johanneum* (I John v, 7) mentioning the three heavenly witnesses (Father, Word and Spirit) appears in no Greek manuscript before the 14th century and no early Greek writer; first quoted by the Spanish heretic Priscillian (d. 385), the spurious words gradually made their way from Spain into manuscripts of the Latin Vulgate generally.

II and III John are unmistakably real letters from one calling himself "the presbyter" and are closely akin to I John in language and ideas. II John exhorts a church, fancifully called "the elect lady and her children," to boycott the heretics who deny the reality of the incarnation. III John is a confidential letter to one Gaius, explaining that, though the presbyter has written to the church, Diotrephes who loves pre-eminence refuses to recognize his authority. The presbyter asks Gaius to continue his support for some

itinerant missionaries who have his confidence. The two letters vividly illustrate the sharp divisiveness introduced by Gnostic teaching.

The situation of III John has been imaginatively interpreted, some taking Diotrephes' ambition as the beginnings of the monarchical episcopate; or perhaps (as E. Käsemann maintains) he was a rigidly conservative leader resisting Johannine teaching as making too many concessions to Gnosticism.

The earliest evidence for the existence of the three Epistles comes from Polycarp and Papias (I John) and Irenaeus (I and II John); III John is first attested in Clement of Alexandria. Probably they come from Asia Minor *c.* 100.

See also BIBLE; GOSPELS; and references under "John, Gospel According to and Epistles of Saint" in the Index.

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JOHN ALBERT (1459–1501), king of Poland from 1492 to 1501, was the third son of King Casimir IV Jagiello and Elizabeth of Austria. As crown prince he distinguished himself by his brilliant victory over the Tatars at Kopystrzyn in 1487. He succeeded his father on Aug. 27, 1492, and, gifted but imprudent, made plans to recapture the harbours of Kilia at the mouth of the Danube and of Belgorod in the delta of the Dniester. Polish expansion conflicted here with Hungary's aspirations and with the interests of Moldavia, then under the rule of the hospodar Stephen the Great. John Albert's attempts to reach an agreement with his brother Wladyslaw (Ulászló II), king of Hungary and Bohemia, at the conference of Levoca (Slovakia), in 1494, were unsuccessful.

In 1497 John Albert collected 80,000 men and began the campaign. The war became one between Poland and Moldavia, in which John Albert, weakened by the insubordination of the gentry, had the worst of matters. He was, however, more successful in the north, compelling the recalcitrant grand master of the Teutonic Order, Frederick of Saxony, to do homage, but a further campaign was frustrated by his sudden death on June 17, 1501.

See Fryderyk Papée, *Jan Olbracht* (1936). (ST. HE.)

JOHN BULL, a conventional personification in literature and caricature of England, the English character and the "typical" Englishman, first found in this context in *Law Is a Bottomless Pit* (1712), one of five related satires by John Arbuthnot (*q.v.*), dealing in the Tory interest with European events preceding the treaty of Utrecht (April 1713; *see* ENGLISH HISTORY). They were reissued in 1727 as "The History of John Bull," in Swift's and Pope's *Miscellanies in Prose and Verse,* vol. ii. Bull appears as an honest clothier, bringing an action with his linen-draper friend Nicolas Frog (Holland), against Lewis Baboon (Louis XIV) for interfering with trade. The wide circulation of these satires fixed Bull, Frog and the others as national personifications at that time, and they reappear, though less influentially, in other 18th-century political satires.

Arbuthnot's John Bull is honest, bluff, good-natured, easily deceived, but sensible and self-reliant when aroused: a plain, simple, not unsuccessful tradesman. This conception is confirmed in

(RIGHT) BY COURTESY OF HENRY FEARON; PHOTO, R. B. FLEMING & CO., LTD.

THREE CHARACTERIZATIONS OF JOHN BULL: (LEFT) AS A COUNTRYMAN IN AN 1829 CARTOON; (CENTRE) THE PORTLY CITIZEN IN AN 1848 CARTOON BY "HB" (JOHN DOYLE); (RIGHT) WEARING A UNION JACK WAISTCOAT IN A 1911 CARTOON BY POY FOR THE "LONDON DAILY DISPATCH"

John Bull, or the Englishman's Fireside (acted 1803), a comedy by George Colman the Younger, in which however, no character called John Bull appears; Thomas Dibdin's prologue explains:

> JOHN BULL is—*British Character* at large; . . .
> Plain, blunt, his heart with feeling, justice full,
> That is a Briton, that's (thank heaven!) JOHN BULL.

There is also no direct representation of Bull in the first use of the character in a print, "The Auction" (1756) in which "all the valuable effects of John Bull" are to be sold; but among those present is Nicolas Frog, soliloquizing that he will be the next bankrupt. Here Bull is "England," but by 1762 he has become the typical Englishman and in 1773 Boswell can refer to Johnson as "much of a *John Bull;* much of a blunt, true-born Englishman" (*The Journal of a Tour to the Hebrides,* 1785). Also in 1762 comes the first representation in which the figure has a bull's head, a bull's body or both.

The French Revolutionary and Napoleonic Wars brought John Bull's first great period in caricature, notably in the hands of James Gillray, who with Thomas Rowlandson conventionalized a gross, rather stupid figure, weighed down with debt, or taxation or oppression, according to the several artists' political allegiance; but less than 50 years later "HB" (John Doyle) raised John Bull in the social scale and he became the portly, prosperous citizen, a little like Dickens' Pickwick, and a little like Surtees' John Jorrocks. These were native representations; hostile foreign caricature identified him with "perfidious Albion," but from the early 19th century it was internationally recognized that John Bull equaled England. The figure also appeared in other countries. *The Diverting History of John Bull and Brother Jonathan* (1812) by the American satirist James K. Paulding (*q.v.*) coupled Jonathan (or Uncle Sam) with Bull, and thereafter the two characters were often shown together.

John Bull's widest recognition came in the mid- and late 19th century, especially through the influential cartoons of *Punch,* in which he appeared in many guises, often that of a seaman in the Royal Navy. But the most familiar and frequent representation was that developed (with some debt to Gillray and "HB") by John Leech and Sir John Tenniel, of the jovial and honest farmer-figure, solid and foursquare, sometimes in Union Jack waistcoat and with bulldog at heel, which was long the John Bull of a convention by now so universally understood that the name frequently appeared in book, play and periodical titles, and pictorially as a brand name or trade-mark for manufactured goods. But by the mid-20th century political satire and caricature made less use of abstractions and tended rather to depict living persons, for the illustrated press, the cinema and television had made national leaders internationally known by sight. Thus Hitler,

Mussolini, Roosevelt and Churchill often stood for their countries in political caricature; but, although in some pictorial eclipse, John Bull was by then too firmly established to pass out of literary currency.

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(K. Ho.)

JOHN CASIMIR (1609–1672), king of Poland from 1648 to 1668 and pretender to the Swedish throne, was born on March 22, 1609, the younger son of King Sigismund III Vasa. He was in Austrian service from 1635 and took part in the war against France. He was intended to become viceroy of Portugal and Spanish admiral, but was imprisoned for two years in France. Discouraged with politics, he became in 1640 a Jesuit novice and, in 1646, a cardinal without orders. He was elected king on Nov. 17, 1648, after the death of his brother, Wladyslaw IV, whose widow, Marie Louise de Gonzague-Nevers, he married. Although he was in favour of an agreement with Bohdan Chmielnicki and his insurgents, John Casimir, under pressure from wealthy Polish magnates interested in exploiting the Ukraine, waged a long and bitter war against him. He showed his military skill by winning the battle of Beresteczko against the Cossacks and Tatars on June 28–30, 1651.

When the Cossacks submitted to the Russian tsar in 1654 the war took an unfavourable turn, and Sweden, backing the Polish magnates' opposition, attacked the country in 1655. With the downfall of the Polish state, the gentry accepted the protection of Charles X Gustavus of Sweden. John Casimir fled abroad, but a peasant uprising and the disillusionment of the gentry with the Swedes enabled him to return in 1656. A long war against the Swedes and their allies, Frederick William of Brandenburg and György Rákoczy II of Transylvania, ended with the peace of Oliwa on May 3, 1660. The war with Russia ended with the truce signed at Andruszow on Jan. 31 (N.S.), 1667, at a period of great economic exhaustion for the country. The political system was weakened, moreover, by a mutiny of the gentry, opposed to the absolutist ideas of the court. The discouraged king abdicated on Sept. 16, 1668, and went to France, where he died, at Nevers, on Dec. 16, 1672. *See* also POLAND: *History*.

(ST. HE.)

JOHN DORY (DORY), the name for several species of odd-looking spiny-rayed marine fishes of the mid-depths. Belonging to the family Zeidae, the typical species, the European dory (*Zeus faber*), is found from the British Isles southward into the Mediterranean and along the west coast of Africa. The body is much compressed and nearly oval and the mouth large and capable of great distention; the anterior dorsal fin is armed with long spines. Dories may reach three feet in length.

DOUGLAS P. WILSON

JOHN DORY (ZEUS FABER)

This fish shares with the haddock a quaint reputation in folklore: On either side of the golden body is a dark smudge, legend has it the thumb and finger print of St. Peter; the story, derived from Scripture (Matt. xvii, 27), is that Peter took a coin from the mouth of this fish to pay the temple tax required by custom.

Related dories include *Zeus japonicus* of the Indo-Pacific region and *Zenopsis ocellata* of the Atlantic coast of North America. All are voracious, feeding on mollusks, shrimp and the young of other fishes.

They are common market fishes locally, but there is disagreement as to their food value and palatability.

JOHN FREDERICK I DER GROSSMÜTIGE OR THE MAGNANIMOUS (1503–1554), elector of Saxony from 1532 to 1547, the last elector of the Ernestine branch of the house of Wettin, was born at Torgau on June 30, 1503, the elder son of John (*q.v.*) the Steadfast. He succeeded John as elector in Aug. 1532, to rule over the western part of Saxony and over Thuringia. Coburg however was detached in 1541 to provide an appanage for his half brother John Ernest (d. 1553). A Lutheran like his father, John Frederick hesitated to oppose the Holy Roman emperor Charles V, in whose pacific intentions he believed; and he was often at variance with the impetuous Philip of Hesse, his colleague in the League of Schmalkalden for the defense of the Reformers. In 1542, however, he forcibly had Nikolaus von Amsdorf consecrated as bishop of Naumburg, though the cathedral chapter had elected a Catholic, Julius von Pflug; and he also laid hands on Wurzen, the property of a collegiate chapter dependent on the bishopric of Meissen, which was under the joint protection of electoral and ducal Saxony. Thereupon his second cousin Maurice, duke of Saxony from 1541, of the Albertine line of the Wettins, took up arms against him; but Philip of Hesse and Martin Luther mediated an uneasy peace between them. John Frederick then helped Philip of Hesse to expel the Catholic Henry II of Brunswick-Wolfenbüttel from his duchy (1542).

Though John Frederick personally came to terms with Charles V (on the basis of dynastic arrangements to their mutual advantage) at the time of the diet of Speyer in 1544, Charles remained determined to overthrow the League of Schmalkalden. War broke out in July 1546, and Maurice, to whom the electoral dignity had been promised, invaded the Ernestine lands at the end of October. John Frederick counterattacked, drove Maurice out, captured his ally Albert Alcibiades of Brandenburg-Kulmbach at Rochlitz and invaded ducal Saxony; but at the battle of Mühlberg (April 24, 1547) he was wounded and taken prisoner by Charles V's victorious army. A sentence of death, passed on him in order to induce Wittenberg to surrender, was not executed; but by the capitulation of Wittenberg (May 10, 1547) he renounced the electoral lands and certain disputed territories to Maurice and other districts to Charles V's brother Ferdinand. He refused, however, to compromise on religious questions, rejected the Augsburg Interim (1548) and advised his sons, who had been allowed to retain the Ernestine lands in Thuringia, to make no peace with Maurice. Consequently he remained a prisoner till May 1552, when the emperor, then at war with Maurice, set him free. Regarded as a martyr of Lutheranism, John Frederick was welcomed back to the remaining Ernestine lands. Claiming again to be elector himself, he could not come to terms with Maurice, who was killed in July 1553; but finally, under the treaty of Naumburg (Feb. 1554) he recognized Maurice's successor Augustus I as elector in return for the restoration of Altenburg, Neustadt and some lesser territories to the Ernestines. A few days later he died, at Weimar, on March 3, 1554. A great hunter, a hard drinker and a heroic figure in adversity, he had also been the founder of the University of Jena (after Wittenberg had been lost to the Albertines) and a patron of that of Leipzig.

See G. Mentz, *Johann Friedrich der Grossmütige*, 3 vol. (1903–08).

JOHN FREDERICK II DER MITTLERE OR THE MIDDLE ONE (1529–1595), duke of Saxony, was born at Torgau on Jan. 8, 1529, the eldest son of the elector John Frederick I (*q.v.*), on whose imprisonment in 1547 he undertook the government of the remaining Ernestine lands together with his brothers John William (1530–73) and John Frederick III the Younger (1538–65). After his father's death (1554) he ruled Ernestine Saxony jointly with his brothers till 1557; then he became sole ruler till 1565, when he ceded Coburg as a separate duchy to John William but kept Weimar and Gotha for himself. A strong, even a fanatic, Lutheran, he upheld Matthias Flacius (*q.v.*) and the University of Jena against the milder doctrines sponsored by the University of Wittenberg under the protection of the new elector of Saxony, Augustus I. His desire to regain the electoral dignity, however, made him lend a willing ear to Wilhelm von Grumbach (*q.v.*). Outlawed in Nov. 1566 for his persistent support of Grumbach, he was attacked by Augustus and by John William. Captured in Gotha in April 1567, he was held prisoner in various places till his death at Steyer on May 9, 1595. His wife, Elizabeth of the Palatinate (d. 1594), had shared his captivity with him. Their sons John Casimir (1564–1633) and John Ernest (1566–1638) ceded Weimar in exchange for Coburg to the uncle John William by the treaty of Erfurt (1572).

JOHN GEORGE I (1585–1656), elector of Saxony from 1611, was born in Dresden on March 5, 1585, the younger son of the elector Christian I (d. 1591). His brother, Christian II (d. 1611), appointed him administrator of the Protestant bishopric of Merseburg (1591) and had him educated in his own image: a bigoted Lutheran, a faithful adherent of the imperial house of Habsburg, easygoing and indolent, a confirmed drunkard. He was quite unable to grasp the opportunities which were open to Saxony, the richest and most powerful of the German states. His main wish "to drink his beer in peace and quiet" lost him the leadership of the German Protestants, first to Frederick V of the Palatinate, then to Gustavus II Adolphus of Sweden and lastly to Frederick William of Brandenburg. His irresolute policy during the Thirty Years' War brought him the acquisition of the Bohemian fief of Lusatia (1635), but neither the Bohemian crown nor the permanent gain of the archbishopric of Magdeburg, to both of which he had halfheartedly aspired. The peace of Westphalia was a turning-point in that henceforth Saxony was to be outstripped by Brandenburg. After the early death of his first wife, Sibylla Elizabeth of Württemberg, John George in 1607 married Magdalena Sibylla of Brandenburg (d. 1659), by whom he had 9 children and lived to see growing up 51 grandchildren and 19 great-grandchildren. He died at Dresden on Oct. 8, 1656. (S. H. S.)

JOHN HENRY, the hero of a widely sung American Negro ballad, is generally known as the Negro Paul Bunyan. In the ballad which describes his contest with a steam drill, John Henry crushed more rock than the machine but died "with his hammer in his hand." Writers and artists see in John Henry a symbol of man's foredoomed struggle against the machine, and of the Negro's tragic battle with the white man.

Some factual basis exists for the ballad of John Henry. When the Chesapeake and Ohio railroad drove the Big Bend tunnel through the Allegheny mountains in West Virginia, from 1870 to 1873, "steel drivers" hammered steel drills, held by their partners, into the rock to plant explosives. Since the modern steam drill was introduced into the south in 1870, the comparative efficiency of the two methods could have been tested at Big Bend.

Although southern Negroes sing about John Henry, they tell few stories of him and, like Paul Bunyan, he is not truly a folk hero. The imaginative treatment by Roark Bradford in *John Henry* (1931) made the name known to many Americans.

See Guy B. Johnson, *John Henry: Tracking Down a Negro Legend* (1929); Louis W. Chappell, *John Henry, a Folk-Lore Study* (1933). (R. M. Dn.)

JOHN MAURICE OF NASSAU (called THE BRAZILIAN) (1604–1679), colonial governor and military commander in the Dutch service, was born at Dillenburg on June 17, 1604. He was the younger son of John, count of Nassau-Siegen-Dillenburg, whose father was William the Silent's brother John, chief author of the union of Utrecht. John Maurice fought in the campaigns of his cousin the stadholder Frederick Henry and was by him recommended to the directors of the Dutch West India company in 1636 to be governor general of the new dominion in Brazil, recently conquered by the company. He landed at Recife, the port of Pernambuco and the chief stronghold of the Dutch, in Jan. 1637. By successful expeditions he extended the Dutch possessions from Sergipe on the south to S. Luis do Maranhão in the north. He likewise conquered the Portuguese possessions of St. George del Mina and St. Thomas on the west coast of Africa. With the assistance of the architect Pieter Post of Haarlem he transformed Recife by building a new town called after his name Mauritsstad.

A capable general and first-rate administrator, John Maurice was exceptionally tolerant and humane for his age, and his work for the interests of the whole population under his government had some temporary success in reconciling them to Dutch rule. His own humanist interests led him to patronize scholars and scientists such as Caspar Barlaeus, Georg Marcgraf and Willem Piso, who published invaluable work on the botany, zoology and tropical diseases of Brazil, while Frans Post painted landscapes. John Maurice's large programs and lavish expenditure, however, alarmed the directors of the company, and he left Brazil in May 1644.

John Maurice refused later proposals that he should return to Brazil, but in 1647 he accepted from Frederick William, elector of Brandenburg, the position of stadholder of Cleves, Mark and Ravensberg. In 1665 he became commander in chief of the Dutch army against England's ally, Bernhard von Galen, bishop of Münster; and in the third of the Dutch Wars (*q.v.*) he was appointed by William III of Orange to command the forces in Friesland and Groningen in 1673. Though 70 years of age, he distinguished himself at the battle of Seneffe in 1674. He retired in 1675 and died at Cleves on Dec. 20, 1679. Most of his extensive collections were dispersed, but the house in The Hague designed for him by Pieter Post is still known as the Mauritshuis and contains the well-known collection of Dutch paintings. *See* also NETHERLANDS, THE: *History.*

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JOHN OF GOD, HOSPITALLER ORDER OF SAINT (Ordo Hospitalarius S. Joannis de Deo; Fate Bene Fratelli; O.H. [F.B.F.]), is a Roman Catholic mendicant religious order of nursing brothers founded in 1537 by St. John (*q.v.*) of God. The motherhouse is on Calybit Island in the Tiber river, Rome. More than 2,500 brothers operate 225 hospitals, containing 50,000 beds, throughout the world, including general hospitals, institutions for mentally retarded children and hospitals for incurably sick men of all ages and creeds. The brothers also staff the Vatican pharmacy. (O. McG.)

JOHN O'GROATS, a place on the north coast of Caithness, Scot., 17 mi. N. of Wick by road. It is the site of the house, now only a mound, connected with a story first recorded in *The Statistical Account of Scotland* (1793). This tells how three Dutch brothers, Malcolm, Gavin and John de Groat, arrived in Caithness with a letter of protection from King James IV. They prospered till eight families of the name held land in the parish. Annually they celebrated their arrival with a feast until disputes on precedence arose. These were settled by John de Groat who built a house with an octagonal room and table so that all were "head of the table." Mention of "Johnny Groat's house" is found early in the 17th century and the family held lands in Canisbay from 1500 onward. With two hotels and shops, John o'Groats is now a popular resort. "From Maidenkirk to John o'Groats" (280 mi.) is a colloquial expression meaning from end to end of Scotland, displacing John Barbour's phrase in *The Brus* (or *The Bruce*),

Fra Weik anent Orknay
To Myller's Neuk in Galloway.

"From Land's End to John o'Groats" (873 mi.) means from end to end of Great Britain. (In fact, the northernmost point in mainland Britain is Dunnet Head [*q.v.*]; the most northerly point in the British Isles is the Muckle Flugga lighthouse on a rock off the island of Unst in Zetland [Shetland].) (F. W. Rn.)

JOHN SCHOLASTICUS (John III) (d. 577), patriarch of Constantinople and canonist, whom some scholars identify with the chronicler John Malalas (*q.v.*). He was born at Seramis near Antioch where he later became a well-known lawyer, gaining the title of Scholasticus ("orator"; Syriac *malal*). Ordained late in life, he was appointed *apocrisarius* ("permanent legate") from the patriarchate of Antioch to that of Constantinople (550). He was elected patriarch in 565 and died on Aug. 31, 577. While in Antioch he compiled a collection (Gr. *synagoge*) of canon laws in 50 titles which was a revision of a similar collection made earlier in the century. It included the main Novels of Justinian I and the canons of Basil of Caesarea. Later, in Constantinople, he made a further collection of 87 chapters of excerpts from the Novels and a supplement in 22 chapters. Photius mentions his authorship of a catechetical oration on the Trinity, and the 7th-century historian John of Nikiu refers to his *Mystagogia* (probably an interpretation of the liturgy).

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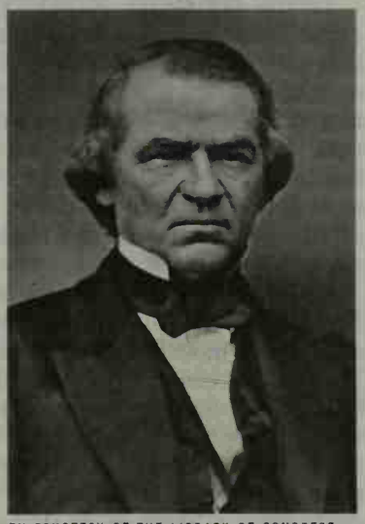
118–120 (1957); H. G. Beck, *Kirche und theologische Literatur im Byzantinischen Reich* (1959). (A. O.)

JOHNS HOPKINS UNIVERSITY, a nonsectarian U.S. institution of higher education at Baltimore, Md., was founded by Johns Hopkins, a Quaker merchant and banker of Baltimore who also founded the Johns Hopkins hospital, a separate corporation. Both institutions were incorporated in 1867; instruction in the university was begun in 1876 and the hospital was opened in 1889. The university's famed medical school was opened in 1893.

While the primary purpose of the university, in line with the German approach to higher education, was to sustain graduate education and research, and to train men for scholarly careers, it also provided undergraduate instruction for men in the arts and sciences. *See* BALTIMORE; *see* also MEDICAL EDUCATION; MEDICAL RESEARCH.

JOHNSON, ANDREW (1808–1875), 17th president of the United States, was born at Raleigh, N.C., Dec. 29, 1808. No one reached the White House from humbler origins. Because his father, a poor sexton and porter, died while Johnson was very young, he was apprenticed to a tailor at the age of ten. Without a day of formal schooling, he learned to read in the small intervals of time he could spare from his work. In 1826, with his mother and stepfather, he moved to Tennessee and finally settled at Greeneville in the eastern part of the state, and there he opened his own tailor shop. On May 17, 1827, he married Eliza McCardle (1810–76), who was relatively well educated for the time and who taught him writing and arithmetic.



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ANDREW JOHNSON

Johnson soon turned to politics and rose to prominence. Before he was 21 he organized a workingman's party which first elected him alderman and then mayor of Greeneville. Between 1835 and 1843 he served two terms in the Tennessee house of representatives and one in the state senate. During this period he rejected the more aristocratic Whig party and joined the Democrats. Trained in the hard school of border state politics, he emerged as the raucous spokesman for the eastern Tennessee mountaineers and small farmers. In 1843 he began a ten-year tenure as U.S. congressman from his eastern Tennessee district which the Whigs, in despair of ever defeating him, ended by gerrymandering him out of the district in 1853. Johnson countered by announcing his candidacy for governor. He won by a fair majority and, as a champion of public education, was reelected in 1855.

As a U.S. senator in 1857, Johnson agreed with the dominant proslavery element of his party in the senate on such issues as the lowering of tariffs and putting an end to antislavery agitation. In addition, he stood solidly behind his poor white constituents in their fear of the abolitionists' demand for freedom of the Negro slaves. However, in favouring a homestead act, he parted company with most of his fellow southerners.

Upon Lincoln's election as president in 1860, Johnson vehemently denied that the South had valid reasons for secession. When Tennessee passed an ordinance of secession in June 1861, Johnson, alone among the senators from the seceded states, remained at his post and refused to join the Confederacy. Although he was denounced by a majority of Tennesseans, he never faltered in his loyalty to the Union. In March 1862, in recognition of Johnson's unwavering support of the Union, Lincoln appointed him military governor of Tennessee, which by this time had been largely overrun by the advancing Northern armies. During a turbulent period of more than two years Johnson served as military governor of the state. Shortly before he relinquished this position he created the machinery for a restoration of civilian rule in Tennessee.

In 1864 the Republican party, deciding to broaden its support by forming a Union party of Republicans and "War" Democrats, nominated Abraham Lincoln as president and Andrew Johnson as vice-president. Johnson appeared ill and weak at his inauguration as vice-president on March 4, 1865. Accepting an offer of a drink of whisky to steady him during the prolonged ceremonies, he became intoxicated. This indiscretion permitted his political enemies during the remainder of his career to depict him unfairly as a drunkard.

Lincoln's assassination in 1865 thrust Johnson into the presidency; he took the oath of office on April 15. Reconstruction was the most vexing of many unsolved problems that he inherited and, immediately upon his accession, he reiterated his view that the South should be reconstructed with fire and rope. Radical Republicans who wished to recast Southern society believed that Johnson would co-operate with them more fully than had Lincoln. Johnson, however, infuriated the radicals by changing his position. As a lifelong spokesman for the small farmers, he did not want to see the South dominated by the free Negroes. Therefore, on May 29, 1865, he issued two proclamations that foreshadowed his reconstruction policy. They included a mixture of Lincoln's ideas and an earlier radical proposal, the Wade-Davis bill, along with some of Johnson's own prejudices.

In accordance with this policy Johnson quickly reconstructed the former Confederate states. When congress met in Dec. 1865, however, Republican leaders looked upon Johnson's actions as premature and rejected his handiwork. While Republican moderates still vainly sought a basis of compromise with Johnson, the radicals in congress demanded that the Negroes immediately be given the right to vote and that a sufficient number of ex-Confederates be disfranchised to assure Republican majorities in most of the southern states, assuming that the Negroes would vote Republican out of gratitude to the party that had effected their freedom. The times demanded a president who was tolerant, broad of view and politically adept. By temperament and experience Johnson lacked these qualities, and the breach between him and the Republican congress widened. As president Johnson had been placed in an almost impossible situation, for he had no large personal following in either the North or the South; he was president by accident and was the titular head of a party whose policies and leaders he distrusted. Standing almost alone, he faced the complexities of reconstruction which had taxed Lincoln's greater capacities.

During the congressional elections of 1866 Johnson made a "swing 'round the circle"—a tour of the important cities of the east and middle west—using his forceful stump-speaking technique to explain his reconstruction policy to the people and to help elect a congress with which he could work. His efforts were a failure. Indeed, under the goad of vicious heckling, Johnson lost his temper and hurt rather than helped his cause. As a result, he had to face a congress in which his opponents commanded a firm two-thirds majority.

On March 2, 1867, the radicals in congress passed over his veto the first of a series of acts setting up what has become known as "radical reconstruction" based upon Negro suffrage. Johnson administered the law faithfully but interpreted it so narrowly that it had to be clarified by additional legislation. By vetoes and a narrow interpretation of congressional acts he delayed the radical program so seriously that he contributed materially to its ultimate failure.

Although an earlier attempt to impeach Johnson in the house of representatives had collapsed because none of his official acts could be construed as criminal, he played into the radicals' hands by the imbroglio over the Tenure of Office act, an effort to protect radical sympathizers in the executive branch of the government. Johnson had long suspected that his secretary of war, Edwin M. Stanton, was working secretly with the radicals. Usually credited with great boldness, Johnson occasionally vacillated over obvious but unpleasant decisions and so he did not remove Stanton until after the Tenure of Office Act had been pressed through congress over his veto. This act forbade the president to remove certain federal officeholders without the concurrence of the senate. Johnson intended by his removal of Stanton to rid himself of an untrust-

worthy adviser and to provide a court test of the constitutionality of the act. Instead, this action provided the radicals in the house of representatives with the opportunity to vote articles of impeachment based mainly upon his violation of the act. In the trial before the senate the charges against Johnson proved so obviously weak that 7 Republicans joined 12 Johnson men in voting to acquit him. More Republican votes could have been obtained if they had been needed. The votes taken on May 16 and May 26, 1868, resulted in 35–to–19 decisions, one vote short of the two-thirds necessary for conviction.

Almost unnoticed during all the political furor, Johnson's secretary of the treasury, Hugh McCulloch, quietly carried out financial policies approved by the dominant wing of the eastern radical Republicans and generally contradictory to Johnson's own policies. After his term as president ended in March 1869, Johnson, deeply resentful, sought to vindicate himself. After several unsuccessful political attempts in Tennessee, he won a senatorial election in 1875. He attended only one short session of the senate before his sudden death from a paralytic stroke on July 31, 1875.

Despite his intellectual force, integrity and unquestioned courage, Johnson was too tactless and undignified to fit the popular conception of the presidency. It was ironic that Johnson should have been impeached for violation of a law, for much of his political difficulty in the reconstruction period stemmed from his strict interpretation of the constitution.

See also references under "Johnson, Andrew" in the Index.

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JOHNSON, HIRAM WARREN (1866–1945), governor of California and U.S. senator, was born in Sacramento, Calif., Sept. 2, 1866. In his junior year he left the University of California, entered his father's law firm, was admitted to the bar in 1888 and in 1902 opened a law office in San Francisco with his elder brother. He became a brilliant trial lawyer and acquired a reputation as a civic reformer. As city attorney in Sacramento he campaigned against a corrupt political machine presided over by his father, Grove Johnson. In 1906 he acquired a reputation as a crusading prosecuting attorney, moving against the corrupt alliance of the Union Labor party and the great public service corporations that had dominated the San Francisco city government. As the nominee of a state-wide reform movement in 1910 he won the governorship of California and was re-elected in 1914.

Under his leadership the state legislature passed a comprehensive program of reform that curtailed the political hold on California of the Southern Pacific railroad and placed the state in the forefront of the progressive action then sweeping the nation. Meanwhile in 1912 Johnson helped in the formation of the National Progressive party, which nominated Theodore Roosevelt for president and Johnson for vice-president. In 1917 Johnson resigned as governor and entered the U.S. senate, to which he was regularly re-elected until his death. As senator he opposed the dominant conservative tendency of the Republican party.

Johnson was best known in his later years as an implacable isolationist. He opposed U.S. adherence to the treaty of Versailles, the League of Nations and the World court. He sponsored the neutrality acts of the 1930s and was adamantly opposed to involving the nation in what he considered to be strictly European quarrels. In 1940 and 1941 he opposed the lend-lease act, conscription and other preparedness measures. At the very end of his life he argued that the United States should not join the United Nations. Johnson died on Aug. 6, 1945, at Bethesda, Md. (G. E. Mo.)

JOHNSON, LYNDON BAINES (1908–), 36th president of the United States, succeeded to the office on Nov. 22, 1963, upon the assassination of Pres. John F. Kennedy. He became the first Southerner to hold the office of president since Andrew Johnson of Tennessee succeeded Abraham Lincoln in 1865.

Johnson was born Aug. 27, 1908, on a farm near Stonewall, a small town in Gillespie County, Tex. He was the eldest son of Samuel Ealy Johnson and Rebekah Baines Johnson, descendants of Texas pioneer families. The other children, in order of birth, were Rebekah (Mrs. O. P. Bobbitt), Josefa (Mrs. Jim Moss, died 1961), Sam Houston Johnson, and Lucia (Mrs. Birge D. Alexander). The father of the family was a rancher, real estate agent, and member of the state legislature. When Lyndon was five years of age the family moved to Johnson City, a Texas town founded by the boy's grandfather, who had also been a member of the Texas legislature. There he attended the public schools and graduated from high school in 1924. Though he had done well as a student he did not plan to go on to college; instead he journeyed to California with several friends and worked at odd jobs. When he returned home after a few months he took a job as a laborer on a road-construction project. In 1927, finally deciding to heed his mother's advice about going to college, he borrowed money to get started and enrolled at Southwest Texas State Teachers College at San Marcos. He earned his way by working after hours, took one year off to earn more money by teaching in an elementary school, and graduated in 1930. He then became a teacher in the Sam Houston High School in Houston, Tex. With experience as a debater in both high school and college behind him, he taught debating and public speaking. In 1931 he took part in Richard M. Kleberg's successful campaign for Congress and was asked by Representative Kleberg to become his congressional secretary. While in Washington, D.C., Johnson took night courses at Georgetown University Law School for a few months. On Nov. 17, 1934, he married Claudia Alta Taylor (known as Lady Bird, the name given her in infancy by her nurse), a recent graduate of the University of Texas and the daughter of a wealthy family in Karnack, Tex. Their first child, Lynda Bird, was born in 1944 and the second, Lucy (or Luci) Baines, in 1947.

KARSH OTTAWA

LYNDON B. JOHNSON

Representative.—In 1935 Johnson was appointed Texas director of the National Youth Administration, a New Deal agency for aiding needy young people. Two years later he decided to run for Congress when a special election was held in the 10th congressional district of Texas to fill the vacancy caused by the death of Rep. James P. Buchanan. His victory in the election on April 10, 1937, brought him to the attention of Pres. Franklin D. Roosevelt, who was fishing off the Texas coast at the time. The president invited the young congressman to accompany him back to Washington on the presidential train, thus beginning a long period of friendly relations between the two men.

Johnson was reelected for a full two-year term the next year and continued to represent the 10th district in the House of Representatives until 1948. During this period he ran for the Senate in a special election held on June 28, 1941, but was defeated by W. Lee ("Pappy") O'Daniel in a close race. He interrupted his congressional service a few days after the Pearl Harbor attack (Dec. 7, 1941) to enter the U.S. Navy as a lieutenant commander. After a few months of service in Australia and New Zealand, during which he was awarded the Silver Star for participation as an observer during a bombing raid on Japanese positions in New Guinea, he returned to Washington when President Roosevelt objected to further service by congressmen in the armed forces. During the remaining years of World War II Johnson was a member of the House Naval Affairs Committee, and in 1947 moved to the Armed Services Committee; he also served on the Select Committee on Postwar Military Policy in 1944–45 and in 1948 on the Joint Atomic Energy Committee. Throughout his wartime service in the House of Representatives he was a consistent supporter of President Roosevelt's policies and was closely associated with the influential speaker of the House of Representatives Sam Rayburn, a family friend and fellow Texan.

Senator.—In 1948 Johnson again ran for the Senate. In the Democratic primary, which was tantamount to election in Texas,

former Gov. Coke Stevenson won the most votes, with Johnson second, but as Stevenson did not have a majority of the total votes cast, a runoff election was necessary. This time Johnson won the Democratic nomination by a margin of 87 votes out of a total of nearly 1,000,000. The result was unsuccessfully challenged in the courts and Johnson, after the general election, took his seat in the Senate (Jan. 3, 1949), where he became a member of the Senate Armed Services Committee and the Committee on Interstate and Foreign Commerce. In 1950 he headed a subcommittee that investigated and sharply criticized the disposal of surplus property by the armed services. From 1951 to 1953 Johnson served as Senate majority whip (assistant to the majority leader) and in 1953, with the Republicans in control of the Senate, he was elected minority leader by the Democrats; two years later, when the Democrats regained control, he became majority leader, a position he held until the end of 1960.

As majority leader Johnson soon became recognized as a master of persuasion and compromise. Because he believed that his job was to get legislation passed, not to create political issues, he was often criticized by the more liberal members of his party who felt that his approach resulted in a watering down of liberal legislation. It was Johnson's leadership that was largely responsible for winning enactment of the 1957 and 1960 civil rights bills, the first such bills passed by the U.S. Congress in the 20th century. It was during this period of Senate leadership—in July 1955—that Johnson suffered a heart attack. After a period of hospitalization he returned to the Senate and resumed his arduous duties as majority leader.

On major issues before the Senate, Johnson took a stand that reflected his earlier support of the New Deal, but his views were moderate rather than extreme. He favoured raising the minimum wage to $1.25, enlarging the social security program, and relieving depressed areas by means of federal-state cooperative efforts; in 1958 he set forth a ten-point antirecession plan that included a greatly expanded public works program. An area in which Johnson consistently voted along pro-Texas lines was the regulation of the oil and gas industries. As a member of the Senate Committee on Interstate and Foreign Commerce in 1949 he voted for a bill exempting independent natural-gas producers from the jurisdiction of the Federal Power Commission. During the debate on tidelands oil in 1952 he maintained that Texas had owned its offshore lands as a sovereign nation before it had joined the Union and had never transferred its rights to those lands to the federal government.

Vice-President.—In 1960 Johnson sought his party's nomination for president. The Texas legislature in 1959 had revised the state election laws to enable a candidate to seek two offices at once, thus making it possible for Johnson to run for president (as it turned out, for vice-president) at the same time that he ran for a third term in the Senate. Johnson delayed formal announcement of his candidacy until July 5, 1960, six days before the Democratic national convention opened in Los Angeles, Calif. Running on a platform of "proven leadership," Johnson tried hard to win the nomination but his regional identification and John F. Kennedy's head start were too much to overcome. Kennedy won the nomination for president and then announced that he favoured Johnson as the candidate for vice-president. Johnson was nominated by voice vote on July 14.

Most political observers agreed that without Johnson on the ticket Kennedy would probably have lost the election in November, for Johnson helped carry some of the Southern states. Johnson's presence on the ticket helped to offset the anti-Catholic feelings that Kennedy's candidacy engendered, for Johnson was a member of the Christian Church. In Washington he often attended the Episcopal Church because his wife and daughters were Episcopalians. As it was, the Democratic ticket won by the slimmest popular-vote margin in the 20th century. On the same day that he was elected vice-president Johnson was reelected to the Senate but he resigned his Senate seat on Jan. 3, 1961.

As vice-president, besides presiding frequently over the Senate, Johnson conferred regularly with President Kennedy and served on the National Security Council as well as on its executive committee, which had been created during the 1962 Cuban missile crisis. He was chairman of the president's Committee on Equal Employment Opportunity and in that post was credited with effective public and behind-the-scenes efforts to improve Negro employment opportunities. He was chairman of the National Aeronautics and Space Council and was thus able to pursue his interest in space exploration and missile development. He attended weekly White House conferences with legislative leaders, briefing sessions held with the president before press conferences, and meetings of the secretaries of state and defense on security problems. He also traveled extensively to represent the United States abroad; his journey to Berlin in 1961 was to reassure the citizens of West Berlin of continued U.S. support.

President.—Johnson was sworn in as president on Nov. 22, 1963, after the announcement of President Kennedy's death. The oath of office was administered by a federal district judge, Sarah T. Hughes, aboard the presidential plane on the ground at Love Field, Dallas, Tex. President Johnson immediately returned to Washington, and on Nov. 27 delivered a message to Congress in which he urged all Americans to "put an end to the teaching and the preaching of hate and evil and violence." His most forceful request of Congress was for the earliest possible passage of the civil rights bill then pending in the House Rules Committee. In addition, he urged continued action on all aspects of the program proposed by his predecessor, stressing enactment of the tax-reduction bill, foreign aid legislation, education bills, and the youth employment opportunities bill. He pledged Congress that his administration would be one of the utmost thrift and frugality without neglecting "unfilled needs or . . . commitments."

Immediately after the assassination Johnson had asked all the members of the Kennedy Cabinet to remain at their posts. The only important innovation during his first year in office was a call for a "war on poverty." He appointed R. Sargent Shriver, director of the Peace Corps, to head the Office of Economic Opportunity, which was created to administer the antipoverty program. Johnson's success in promoting the legislative objectives of the Kennedy administration in Congress was remarkable. The tax-reduction bill, for example, was enacted in February 1964, much sooner than had been predicted. In June the Senate invoked cloture to stop a filibuster and within a few weeks, under strong pressure from President Johnson, passed the most comprehensive civil rights bill to be enacted since the Reconstruction period. The methods by which Johnson stimulated this congressional activity were demonstrated soon after he took office as president. He kept in touch by telephone with leading members of both the House and Senate and invited every member of Congress to the White House at least twice during his first year in office. The most notable function of this type was the "Salute to the 88th Congress," a reception held on the White House lawn on Aug. 19. It was generally agreed that his relations with Congress were the best of any president in modern times.

Johnson soon showed himself to be a vigorous president bent on pursuing a liberal legislative program and at the same time holding the middle ground of American politics. While advocating Democratic programs that were regarded by Republicans as too expensive, Johnson submitted a budget that was lower than anticipated and asserted that, "I will insist that the Government get a dollar's value for a dollar spent." His emphasis on government economy, even to the point of turning out unneeded lights in the White House, created a favourable impression in the business community. While he pushed strongly for passage of the civil rights bill, his forceful and repeated condemnation of violence and rioting in racial demonstrations had a reassuring effect in the South and other areas that were concerned about racial integration.

Despite strong opposition to many aspects of his domestic program, the president received substantial congressional response to his call to create a "Great Society." In addition to approving the civil rights and tax-reduction bills, Congress in 1964 adopted the president's antipoverty program and approved such long-sought measures as the Wilderness Bill, a food-stamp program, extension of the Hill-Burton Hospital Construction Act, a pay increase for federal employees, and an urban transportation pro-

gram. Outside the legislative field the president's principal domestic triumph came in April with the settlement of the long-standing labour dispute in the railroad industry.

In foreign affairs the president showed equal vigour in reassuring representatives of foreign governments who were shaken by the assassination of President Kennedy and concerned over the future course of U.S. policy. Although the president declined to leave the country during his first year (except for a brief trip to Canada in September 1964) because of the absence of a vice-president, he frequently entertained representatives of foreign governments. He repeatedly reaffirmed U.S. support for the United Nations and the various alliances to which the U.S. was a party.

The one major personnel change that Johnson made at the top level of the Department of State was the appointment of a long-time associate, Thomas C. Mann, as assistant secretary of state for Latin American affairs and coordinator of the Alliance for Progress program. This was taken as an indication that Johnson would pursue a vigorous policy of aid and reform in Latin America.

The first foreign policy crisis the new president had to deal with occurred early in January 1964 when Panama severed diplomatic relations with the United States following anti-American rioting. The president soon made a conciliatory statement at a press conference, saying that the United States was willing to engage "without limitation or delay in a full and frank review" of the Panama situation. The crisis ended on April 3 when Panama and the United States signed a joint declaration providing for immediate resumption of diplomatic relations and adoption of procedures for eliminating the causes of the dispute.

The situation in Vietnam required the constant attention of the administration in 1964. On June 23 the president appointed Gen. Maxwell D. Taylor, at that time chairman of the Joint Chiefs of Staff, as the new U.S. ambassador to South Vietnam to replace Henry Cabot Lodge, who had resigned. This appointment was considered a measure of the administration's deep concern with the military situation in Southeast Asia. The Vietnam crisis reached a peak Aug. 2 and 4, when North Vietnam torpedo boats attacked U.S. destroyers in the Gulf of Tonkin. After conferring with his advisers, President Johnson ordered a retaliatory air strike against the torpedo boat bases and other targets in North Vietnam. The president emphasized the limited nature of the attacks but said "repeated acts of violence against the armed forces of the United States must be met not only with alert defense but with positive reply." At the president's request, Congress quickly approved a resolution supporting his action.

Political criticism of Johnson during the year centred on two main factors: the Baker case and the Johnson family fortune. The former involved the financial affairs of Robert G. Baker, who was forced to resign as secretary to the Senate majority in October 1963 when an investigation revealed the full extent of the many business interests he had built up while in that position. Baker had been a Johnson protégé and attempts were made to associate the two. The investigation of the Baker case by a Senate committee provided ammunition for the presidential election campaign. Criticism of the Johnson family's ownership of radio and television companies stressed the fact that these concerns were subject to regulation by the Federal Communications Commission and greatly increased in value while Johnson was a senator and majority leader of the Senate. President and Mrs. Johnson on Nov. 29, 1963, placed the family holdings in irrevocable trust during the period that Johnson should hold federal elective office or until his death.

As expected, the Democratic national convention, meeting in Atlantic City, Aug. 24–27, selected Johnson by acclamation as the party candidate for a full four-year term as president. (Under the 22nd Amendment to the U.S. Constitution, Johnson would still be eligible for another term in 1968.) There was no opposition to Johnson's nomination. Johnson entered the convention hall on Aug. 26, immediately after his nomination, and announced to the delegates that his choice for the vice-presidential nomination was Sen. Hubert H. Humphrey of Minnesota.

In his acceptance speech the president emphasized his belief in a strong national defense, world peace, and "fair play for all of our people" at home. These themes were to play important roles in the campaign, during which both Johnson and Humphrey spoke throughout the country. On Nov. 3 Johnson was elected with the largest popular vote and by the widest popular margin in U.S. history. In the electoral college he lost Arizona, his opponent's home state, and five states of the normally Democratic Deep South. He carried with him substantial majorities in both the House and Senate. He was inaugurated on Jan. 20, 1965.

Johnson's first year as president in his own right was marked by the same energy he had shown when he took office. In his state of the union message, delivered Jan. 4 before a joint session of Congress, he outlined his "Great Society" program based on expanded federal assistance in the fields of health, education, and welfare. This was followed by a series of special messages on a variety of subjects, including federal aid to education, medical care for the aged under social security, housing and urban development, conservation, immigration, intensification of the "war on poverty," medical research, excise-tax reduction, and a constitutional amendment providing for presidential disability.

An area of particular delicacy and concern for a Southern president was that of civil rights. On March 15, with national attention focused on racial violence and massive demonstrations taking place in connection with a voter registration drive in Selma, Ala., Johnson made a dramatic speech before Congress urging passage of a law ensuring voting rights for Negroes.

Johnson followed up his speeches and messages with considerable pressure on congressional leaders and individual senators and congressmen. By mid-October, Congress had approved almost every important item on the president's lengthy legislative agenda. The only major administration defeat of the session, the failure of Congress to repeal the "right-to-work" provisions of the Taft-Hartley labour law, occurred after the president had entered the Naval Hospital at Bethesda, Md., to undergo surgery for removal of his gall bladder and a kidney stone.

In foreign affairs, Johnson was less successful in maintaining the broad national "consensus" that he desired. His dispatching of U.S. troops to the Dominican Republic when revolution broke out there in April 1965 was widely criticized as undue interference in the internal affairs of another country. In Europe the North Atlantic Treaty Organization was threatened by Pres. Charles de Gaulle's announced intention of ending French participation. At the same time, the U.S.-Soviet *détente* that had marked the last months of the Kennedy administration showed signs of deterioration, chiefly because of the U.S. involvement in Vietnam.

It was the Vietnamese war, however, that overshadowed other foreign and domestic matters from early 1965 onward and caused the greatest dissension, including criticism from within Johnson's own party. Beginning in February 1965, when the president ordered retaliatory air strikes against selected military targets in North Vietnam, the U.S. commitment in Vietnam grew steadily, with sharp increases in the number of U.S. troops engaged in combat.

Johnson attempted to maintain a middle ground between those who desired U.S. withdrawal from Southeast Asia and those who wished to intensify the war effort in an attempt to gain immediate victory. While reaffirming the U.S. policy of helping the South Vietnamese people resist Communist aggression, he repeatedly offered to negotiate with North Vietnam. To this end, bombing of North Vietnam was suspended for a short time in April 1965 and again in late 1965 and early 1966, when an intensive but ultimately unsuccessful diplomatic effort was made toward bringing about an end to hostilities. Johnson also placed considerable emphasis on socioeconomic reform in South Vietnam. This was one of the principal topics discussed at a meeting between Johnson and his chief advisers and South Vietnamese government leaders held in Honolulu in February 1966.

In his state of the union message to Congress in January 1966 Johnson announced his determination not to let the war in Vietnam divert resources and attention from his "Great Society" objectives. Nevertheless, many congressional leaders expressed an overriding concern with the war and with signs that the war effort was leading to inflationary pressures within the economy.

During the year, as fear of inflation heightened, the administration and Congress suspended temporarily the 7% investment tax credit and certain methods of accelerated depreciation for corporations' machinery and equipment. In addition, the president called for reductions in federal spending and delay in some grants-in-aid. But by the beginning of 1967 there were signs that the rate of growth of the economy was slowing somewhat, and calls for measures against inflation diminished. In his state of the union message of Jan. 10, 1967, President Johnson disclosed his intention of asking for a 6% surcharge on tax bills, a much smaller tax increase proposal than had been expected. Even then, there was some doubt whether the 90th Congress would grant the request.

The Vietnam war and its increasing costs dominated the presidency in 1966. While Johnson repeatedly announced his readiness for "unconditional negotiations," there was little he could offer in his state of the union message beyond "more cost, more loss, more agony." In other foreign developments, the president stressed the importance of moving toward a *détente* with the Soviet Union and Eastern Europe, a move that was inhibited by the Vietnam conflict. The president asked Congress for action on his 1966 proposal for East–West trade and on the U.S.–Soviet consular treaty. A significant step was taken on Jan. 27, 1967, when the United States, the Soviet Union, and other members of the United Nations signed a treaty on the peaceful use of space. Also, active talks were underway during 1966 and 1967 on a proposed treaty to stop the spread of nuclear weapons beyond those nations already possessing them.

In the background of U.S. foreign policy developments lurked the massive mystery of China (*q.v.*), where the turbulent events surrounding an apparent power struggle presented an alarming and puzzling sight for the rest of the world.

In April 1966 Johnson paid a brief visit to Mexico, his first trip outside the country since the 1964 election. The visit was interpreted as an indication of his desire to promote good will among the nations of the Western Hemisphere and to strengthen the Alliance for Progress. A 17-day trip beginning Oct. 17 took the president to Honolulu, American Samoa, New Zealand, Australia, Manila, Thailand, Vietnam (for a 2½-hour visit with U.S. troops), Malaysia, and Korea; the principal purpose of the Asian trip was to attend a conference of seven Asian and Pacific nations "to consider the conflict in South Vietnam and to review their wider purposes in Asia and the Pacific." Johnson's visit to Vietnam was the first by an incumbent president to a foreign battle zone since Franklin D. Roosevelt reviewed U.S. troops in Casablanca in 1943.

On Nov. 16 the president underwent abdominal and throat surgery. The necessary rest preceding the operations precluded his campaigning at the last minute before the Nov. 8 elections. The results of these were disappointing to him and his party, giving the Republicans eight new governorships, three new Senate seats, and 47 additional seats in the House of Representatives. For current developments, see *Britannica Book of the Year*. (T. N. S.)

JOHNSON, REVERDY (1796–1876), U.S. lawyer, senator and diplomat, was born at Annapolis, Md., on May 21, 1796. Admitted to the bar in 1816, he appeared in a number of famous cases before the U.S. Supreme Court, including *Brown* v. *Maryland* (1827), Wheeling Bridge (1852 and 1856), Dred Scott (1857), *Virginia* v. *West Virginia* (1871), and *Railroad Co.* v. *Maryland* (1875). Johnson also served in the U.S. Senate, both as a Whig (1845–49) and a Democrat (1863–68). Dubbed "the trimmer," he could argue on either side of an issue with equal force. After voting for a wartime test oath, for example, he later was instrumental in having test oaths declared unconstitutional. He opposed extreme measures during the Civil War and sought a moderate policy of reconstruction. As minister to Great Britain (1868–69), he helped settle issues that arose between that country and the U.S. during the war. He also appeared for the defendant in cases under the Enforcement Act of 1870. In *United States* v. *Cruikshank* (1875) the Supreme Court held that law to be unconstitutional. Johnson died on Feb. 10, 1876. (C. Fn.; X.)

JOHNSON, RICHARD MENTOR (1780–1850), ninth vice-president of the United States, was born near the present site of Louisville, Ky., in 1780. He was admitted to the bar in 1802 and soon became prominent as a lawyer and Democratic politician. He served in the U.S. house of representatives and in the senate for many years. During the War of 1812 he commanded a Kentucky regiment of mounted riflemen at the Battle of the Thames (1813). From 1837 to 1841 he was vice-president of the United States while Martin Van Buren was president. He was elected to this position by the senate when none of the four vice-presidential candidates had received a majority of the electoral votes, the first such instance in U.S. history. The opposition to Johnson within the party greatly increased during his term, and the Democratic national convention of 1840 adopted the unprecedented course of refusing to nominate anyone for the vice-presidency. In the ensuing election Johnson received most of the Democratic electoral votes, but was defeated by the Whig candidate, John Tyler. He died on Nov. 19, 1850.

BY COURTESY OF THE LIBRARY OF CONGRESS

RICHARD M. JOHNSON, LITHOGRAPH PORTRAIT, 1840

JOHNSON, SAMUEL (1709–1784), English poet, critic, essayist, lexicographer and the greatest clubman of 18th-century London, was born at Lichfield, Staffordshire, on Sept. 18, 1709. His father, Michael Johnson, was a prominent citizen of Lichfield, being sheriff of the city at the time of Samuel's birth. As a bookseller, he conducted a substantial but not very profitable business.

Samuel was not a healthy child. His eyes were weak and he was the victim of a tubercular infection in the glands of the neck, commonly known then as "the King's evil." In the hope that the cure for this disease lay in the royal touch, Mrs. Johnson traveled to London in March 1712 and Samuel was duly touched by Queen Anne. His memories of the ceremony were naturally slight, but he retained "a sort of solemn recollection of a lady in diamonds and a long black hood." It is not recorded that he derived any physical benefit from the royal touch, but the gold amulet which the queen hung round his neck remained there until his death.

Michael Johnson was a high churchman with Jacobite sympathies. His wife, Sarah (daughter of Cornelius Ford, a Warwickshire yeoman), was a devout woman with leanings toward Calvinism. It was she who taught her son to learn the collect for the day by heart and expounded to him the contrast between heaven and hell. In 1717 Johnson entered Lichfield grammar school and began the study of Latin under Humphrey Hawkins. One of his schoolfellows, Edmund Hector, recalling in later years Johnson's "uncommon abilities for learning," wrote: "His ambition to excel was great, though his application to books . . . was very trifling . . . his dislike to business was so great that he would procrastinate his exercises to the last hour." It was a disposition that remained with Johnson throughout his long literary career.

BY COURTESY OF THE NATIONAL PORTRAIT GALLERY, LONDON

DR. JOHNSON, DETAIL OF A PORTRAIT BY SIR JOSHUA REYNOLDS

When he was promoted to the upper school, Johnson came under the discipline of the headmaster, John Hunter, a scholar but a tyrant who beat his boys indiscriminately—"to save them from the gallows." As Johnson later said, "My master whipt me very well. Without that, Sir, I should have done nothing. . . ." After a brief period at the grammar school at Stourbridge, where he worked under the Rev. John Wentworth and took some part in the teaching of the younger

boys, Johnson helped his father in the bookshop. Rambling along his father's shelves, he read widely and with the instinct of an incipient scholar—"not voyages and travels, but all literature, Sir, all ancient writers, all manly." Thus, by the time that he entered Pembroke college, Oxford, in 1728, he was familiar with many works unknown at the universities; and when he was first introduced to the tutor of the college his own contribution to the conversation was a quotation from Macrobius. The tutor was William Jorden. Johnson thought little of his scholarship, but praised his goodness of heart. William Adams, fellow and later master of Pembroke, meant more to Johnson and remained his friend through many years. He had some good friends, too, among the undergraduates of his own generation. He was near to his old schoolfellow, John Taylor of Ashbourne, at Christ Church, and among Pembroke men he had the reputation of being gay and frolicsome. But it was a forced gaiety. Frustrated and embittered by poverty, he defied authority and "thought to fight his way on his literature and his wit." One example of his scholastic facility survives from his undergraduate days—a Latin translation of Pope's *Messiah,* which was included in a *Miscellany* edited by John Husbands and published at Oxford in 1731.

How the impecunious Michael Johnson was enabled to send his son to college is not wholly clear. Possibly a small legacy received at the time by Mrs. Johnson may have helped. But, in any event, Johnson was compelled to leave Oxford in Dec. 1729 after a residence of four terms. His prospects were poor. He had no degree or other qualification; his father's business was declining; an application for an ushership at Stourbridge was unsuccessful. His father died at the end of 1731 and in the following year Samuel accepted a post as undermaster in the grammar school at Market Bosworth. The work brought him neither health nor happiness and he resented the arrogance with which he was treated by Sir Wolstan Dixie, in whose house he lived. Through the influence of his old friend Edward Hector, who had become a surgeon in Birmingham, Johnson secured the task of translating into English the French version of *A Voyage to Abyssinia, With a Continuation of the History of Abyssinia,* by Father Jerome Lobo. Johnson's preface gives an early indication of his instinctive sympathy with the natives of an invaded country. The invaders of Abyssinia were missionaries, but they preached the gospel with swords in their hands. The preface also gives an authentic foretaste of Johnson's prose style: "The Reader . . . will discover, what will always be discover'd by a diligent and impartial Enquirer, that wherever Human Nature is to be found, there is a mixture of Vice & Virtue, a contest of Passion and Reason, and that the Creator doth not appear Partial in his Distributions, but has balanced in most Countries their particular Inconveniences by particular Favours."

Johnson's sojourn in Birmingham brought him something more than a fee of five guineas for his first book—it brought him a wife in the person of Elizabeth, widow of Harry Porter, a mercer. She was 20 years older than Johnson and it is not easy to determine the grounds of mutual attachment. Johnson, in later years, used to speak of his wife's beautiful blonde hair and whatever the lady thought of Johnson's looks ("lean and lank . . . the scars of the scrofula deeply visible") or of his "convulsive starts and odd gesticulations," she at least appreciated the vigour and good sense of his conversation. The marriage took place at Derby in 1735 and one solid fact was that the bride brought with her a dowry of about £700. On the strength of this and with the encouragement of his friend Gilbert Walmesley (registrar of the ecclesiastical court of Lichfield) Johnson decided to set up at Edial, near Lichfield, a school of his own at which young gentlemen could be boarded and taught the Latin and Greek languages. He prepared an elaborate curriculum, but only a few young gentlemen, among whom was David Garrick (*q.v.*), came as pupils, and at the end of two years Johnson had to admit failure.

But in spite of ill-health, of melancholia, of his lack of a degree and of the collapse of his school, the desire to be known as a scholar and a writer remained clear in his mind. While still a schoolboy he had written of

> . . . the young Authour, panting after fame,
> And the long honours of a lasting name

and in the year before his marriage he had written to Edward Cave (*q.v.*), who in 1731 had successfully founded the *Gentleman's Magazine,* offering to fill a column, on reasonable terms, with poetry, dissertations, critical remarks on ancient and modern authors and other material. Furthermore, with plenty of time on his hands at Edial, he embarked, again with the encouragement of Gilbert Walmesley, upon the writing of a tragedy. It was based on the story of Sultan Mahomet II and the beautiful Greek maiden Irene, as told by Richard Knolles in his *General History of the Turks.* But the work was not finished and Johnson, facing the fact that he must write something for which an editor or a bookseller would pay, decided to seek his fortune in London. So, in company with David Garrick, he rode to London in March 1737. "Two such candidates for fame," wrote Arthur Murphy (in *An Essay on the Life and Genius of Samuel Johnson,* 1792), "perhaps never before that time, entered the metropolis together. They brought with them genius, and powers of mind, peculiarly formed by nature for the different vocations to which each of them felt himself inclined . . . . In three or four years afterwards Garrick came forth with talents that astonished the publick . . . . Johnson was left to toil in the humble walks of literature."

Early Work.—The *Gentleman's Magazine* offered him the first opportunity of humble toil. Cave quickly recognized his journalistic ability and Johnson contributed a number of pieces in prose and verse—odes, epigrams, reviews, as well as a series of concise biographies. In the later part of 1737 he returned to Lichfield, finished his tragedy *Irene,* and brought his wife to London. Meanwhile, his ambition to be a writer of something more than ephemeral pieces for periodicals remained and in 1738 his first substantial poem, *London,* was published. It was written in imitation of Juvenal's third *Satire* and in it Johnson embodied his protest against political corruption:

> Here let those reign, whom pensions can incite
> To vote a patriot black, a courtier white;

against the dangers of the London streets:

> Their ambush here relentless ruffians lay,
> And here the fell attorney prowls for prey;
> Here falling houses thunder on your head,
> And here a female atheist talks you dead.

and, with more acutely personal feeling, against the miseries of the unknown and impecunious author:

> This mournful truth is ev'ry where confess'd
> SLOW RISES WORTH, BY POVERTY DEPRESS'D.

London, published anonymously, had an immediate success. It went quickly into three editions and won high praise from Pope. But Johnson's fee was but ten guineas and again he thought of schoolmastering as an alternative to being "starved to death in translating for booksellers." The headmastership of Appleby school in Leicestershire was offered to him, subject to his obtaining the degree of M.A., but negotiations for its conferment broke down both at Oxford and at Dublin; similarly, his lack of a degree in law frustrated his application for permission to practise as an advocate. To this period of embittered disappointment belong his two most violent and satirical strictures upon the Walpole ministry: the first was *Marmor Norfolciense* (1739), an essay upon a Latin rhyme supposed to have been discovered in Walpole's county, Norfolk, and the second *A Complete Vindication of the Licensers of the Stage* (1739), an ironical defense of the suppression of Henry Brooke's play *Gustavus Vasa.* Both satires are the protests of an angry young man rebelling against authority and striving, as he had striven at Oxford, to fight his way out by his wit. Johnson was no sentimental Jacobite, but his scorn of the Hanoverian government was never more bitterly explicit than in *Marmor Norfolciense:*

> Then o'er the World shall Discord stretch her wings;
> Kings change their Laws, and Kingdoms change their Kings.

The story that a warrant was issued for Johnson's arrest has never been verified; but, meanwhile, as a member of Cave's staff, he was required to treat contemporary politics in more sober style. Reports of parliamentary debates had been a feature of the *Gentleman's Magazine* since 1732, but shortly after Johnson's arrival in London the house of commons forbade publication of their pro-

ceedings. Cave, however, contrived to continue the publication of "Debates in the Senate of Magna Lilliputia" and in the first instance Johnson was employed to assist William Guthrie in editing and expanding the reports; but from 1740 to 1743 the "Debates" were entirely Johnson's own work. He was not a reporter in the modern sense and was only once inside the house of commons. Sometimes he had a few notes supplied by other reporters; sometimes nothing more than the subject of debate and the names of the speakers; sometimes, he confessed, the "Debates" were the mere coinage of his own imagination, and in later years he had some prickings of conscience about his freedom of invention. As a journalistic feat, they were a remarkable *tour de force.* He would shut himself up in a room at Cave's headquarters in St. John's gate and deliver three columns for the *Magazine* in an hour. His famous remark that he took care that the Whig dogs should not have the best of it has perhaps been given undue importance. His reports have been well described as leading articles on both sides of the question rather than records of the cut-and-thrust of debate and the short speech put into the mouth of Walpole at the end of the debate on the motion for his removal from office is a remarkably objective record of a minister speaking with dignity and restraint in his own defense.

One of Johnson's closest companions in his early years in London was Richard Savage (*q.v.*). Savage had in his time been actor, playwright and poet. He claimed to have been nobly born and had had many friends among the great whose hospitality he persistently abused. Two qualities at least he shared with Johnson—poverty and patriotic indignation against the Walpole administration. When their fortunes were at their lowest, they would spend whole nights in "a perambulation round the squares of Westminster . . . when all the money they could both raise was less than sufficient to purchase for them the shelter and sordid comforts of a night cellar." When Savage died, Johnson lost no time in commemorating his friend. Written *con amore* and at a white heat, the *Account of the Life of Mr. Richard Savage,* anonymously published in 1744, was the first of Johnson's prose works to captivate the public. Fielding called it the best treatise in the language on the excellencies and defects of human nature; Sir Joshua Reynolds could not put the book down until he had finished it.

The Theatre.—In addition to a great variety of hack work, Johnson was now turning his attention to Shakespeare. In 1745 he published his *Miscellaneous Observations on the Tragedy of Macbeth,* coupled with preliminary proposals for his own edition of the plays, but from further Shakespearean work he was deflected by the suggestion that he should compile a dictionary of the English language. That a syndicate of booksellers should have chosen Johnson for so gigantic a task is a tribute to the position he had made for himself during his ten years in London. In those same years David Garrick had made more rapid and more brilliant progress. Deserting the law for the theatre, he had made his mark as an actor in 1741 and by 1747 had become the patentee of Drury Lane theatre. For the first performances under Garrick's management Johnson wrote a prologue and, although he commonly spoke with contempt of actors and their profession, he was willing, for friendship's sake, to plead their cause:

> Ah! let not Censure term our Fate our Choice,
> The Stage but echoes back the publick Voice,
> The Drama's Laws the Drama's Patrons give,
> For we that live to please, must please to live.

At this time, moreover, Johnson had a personal interest in dramatic production. His tragedy *Irene*, completed shortly after he had come to London, had long lacked a publisher or a producer. Garrick, when he came into power, agreed to do his best for his old master and *Irene* was produced "with a display of Eastern magnificence" in 1749. It ran for nine nights. It was essentially a moralist's play and although it was said to be "universally admired in the closet," it has never been revived.

More permanent was Johnson's second didactic poem, *The Vanity of Human Wishes* (1749), in which the careers of Galileo, Wolsey, Charles XII of Sweden and others are shown to illustrate the hazards of political ambition, the futility of military conquest and the miseries of authorship:

> There mark what ills the scholar's life assail,
> Toil, envy, want, the patron, and the jail.
> See nations slowly wise, and meanly just,
> To buried merit raise the tardy bust.
> If dreams yet flatter, once again attend,
> Hear Lydiat's life, and Galileo's end.

At the time of its publication, *The Vanity of Human Wishes* had a much less rapid sale than *London.* But it is Johnson's greatest poem. Its manner is that of its period. But Johnson's panorama of the rise and fall of scholars and philosophers, of statesmen and kings, in the modern as well as the ancient world, is inspired by that "high seriousness" which endows the poem with universality. But the record of disillusionment is not the end.

> Must helpless man, in ignorance sedate,
> Roll darkling down the torrent of his fate?

No, says Johnson, he must pray for the love and patience and faith of the Christian.

The "Rambler."—The contract for the *Dictionary of the English Language* had been signed in 1746 and Johnson published his *Plan of an English Dictionary* in the following year. He made no complaint of what the booksellers offered him, but it was not enough to keep the wolf from the door. So, in 1750, he embarked upon the *Rambler,* a twopenny sheet published twice a week and containing a single anonymous essay. The *Rambler* is of fundamental importance in any estimate of Johnson's approach to literature. Before he embarked on the work, he prayed that he might promote the glory of God and the salvation of himself and others. The Rambler, in short, was not an entertainer but an instructor, and 19th-century critics tended to dismiss his essays as lay sermons. Johnson had recently founded his first club (the Ivy Lane club) and from his tavern chair would take a prominent part in contributing to what he called "colloquial entertainment." But a printed essay demanded "more accurate thought and more laboured beauties." Talking for victory was legitimate; with the printed word came the moralist's responsibility and, in Johnson's literary creed, the basic article of belief was that it was always a writer's duty to make the world better. This sense of responsibility determined the style of the essays. "To trifle agreeably," as he wrote "is a secret which schools cannot impart" and the Rambler was for the most part a detached and generalizing commentator. He created no character comparable to that of Addison's and Steele's Sir Roger de Coverley in the *Spectator* and the essays bear little relation to current events or current literature. On the other hand, they frequently reflect the social and literary conditions of the time: there is scorn for the virtuoso and the overdomesticated hostess; an objective picture of the prostitute's life; a vigorous protest against the death sentence for robbery; and, inevitably, a grimly humorous presentation of the journalist's lot.

The *Rambler* appeared twice a week for two years (1750–52). A few days after the issue of the last number, Johnson's constitutional melancholy was deepened by the death of his wife. The full story of his married life must necessarily be conjectural. None of Johnson's friends in his early London period appears to have met Mrs. Johnson and there are but few contemporary references to her. That the marriage was based on mutual admiration and affection is reasonably clear. From the beginning Mrs. Johnson had relished the quality of her husband's conversation and she had a special admiration for the *Rambler;* Johnson, on his part, appreciated her intelligent reading of comedy. But, domestically, they were not well suited. Johnson was as insistent about the quality of his food as he was careless and untidy about the house. What was more serious was that in her later years Mrs. Johnson became addicted to strong liquor and to drugs and was unable to satisfy her husband's physical desires. Something of this may be read between the lines of Johnson's prayers and meditations about her death. Nevertheless, Johnson's affection, tinged with some remorse, remained sincere and its sincerity is not impaired by the discovery that on April 22, 1753, he purposed "to try . . . to seek a new wife without any derogation from dear Tetty's memory." The precise direction of his search is not known, but it is interesting that he contemplated an adventure which he was later to describe as the triumph of hope over experience. "Formosa, culta, ingeniosa, pia" ("a woman of beauty, elegance, ingenuity, and

piety")—so Johnson described his Tetty on the gravestone which he placed in Bromley parish church more than 30 years later. In lapidary inscriptions, as he said, a man is not upon oath.

In 1752 Johnson was a lonely man, but he had made some good friends. At the Ivy Lane club he was delighted "to pass those hours in a free and unrestricted interchange of sentiments, which otherwise had been spent at home in painful reflection." There were ten members, including Sir John Hawkins (*q.v.*), who lived to be Johnson's executor and biographer; John Hawkesworth (*q.v.*), editor of the *Adventurer,* to which Johnson himself contributed a number of essays; John Ryland, one of the few of Johnson's early friends who lived to attend his funeral; John Payne, publisher of the *Rambler;* and Richard Bathurst, the physician whom Johnson loved better than any other creature. It was at the Ivy Lane club that Johnson celebrated the publication of Mrs. Charlotte Lennox's first book by "a whole night spent in festivity." Hawkins was worried by reflecting how nearly the party had re sembled a debauch. It is not surprising that it was for Hawkins that Johnson coined the word "unclubable."

The Dictionary.—Johnson had published his *Plan* for the *Dictionary* in 1747. At Dodsley's suggestion, it was dedicated to Lord Chesterfield, who at first showed some interest and made some suggestions for revision. But Chesterfield paid no further attention to the work and Johnson resolved to part company with him—but Johnson did not forget. In April 1753 he was beginning work upon the second volume of the *Dictionary* and he had still to write the Preface, the Grammar and the History. Two years later the work was finished. It had occupied Johnson and his amanuenses for eight and one-half years and its accomplishment was described by Sir James Murray, editor in chief of the *Oxford English Dictionary,* as a marvelous one. It surpassed earlier dictionaries not in bulk, but in precision of definition and in literary illustration (*see* DICTIONARY). Its 40,000 words were, in fact, rather less than those in the work of his predecessor, Nathaniel Bailey; but what distinguished Johnson's work was the range of reading by which he exemplified the different shades of the meaning of a particular word. "I applied myself," he wrote in his preface, "to the perusal of our writers . . . noting whatever might be of use to ascertain or illustrate any word or phrase." Certain books (Bacon's *Essays,* South's *Sermons* and others) have survived with Johnson's underlinings and indications of the passages chosen for quotation. His assistants copied the quotations on separate slips and these were pasted below Johnson's own definitions. At the beginning Johnson had looked forward to hours which he would revel away in feasts of literature and ransack the obscure recesses of northern learning. But he soon realized that these were "the dreams of a poet doomed at last to wake a lexicographer." To the weariness of copying was added the vexation of expunging, and Johnson, having set practical limits to his work, was acutely conscious of its imperfections. His orthography was admittedly controvertible and his etymology uncertain; and, even while the dictionary was hastening to publication, some words, as he said, were budding and some were falling away. Nevertheless, the claim made in the final paragraph of his preface—one of the finest examples of his prose style—was abundantly justified:

> In this work, when it shall be found that much is omitted, let it not be forgotten that much likewise is performed; and though no book was ever spared out of tenderness to the author, and the world is little solicitous to know whence proceeded the faults of that which it condemns; yet it may gratify curiosity to inform it, that the *English Dictionary* was written with little assistance of the learned, and without any patronage of the great; not in the soft obscurities of retirement, or under the shelter of academick bowers, but amidst inconvenience and distraction, in sickness and in sorrow.

Today the ordinary reader may tend to remember the "wild blunders," the "risible absurdities," the frankly personal prejudices shown in the definitions of "oats" ("A grain, which in England is generally given to horses, but in Scotland supports the people"), "excise," "pension" and other well-known examples. But Johnson's enrichment of the wordbooks of his predecessors by judicious definition and by linguistic illustration from the whole range of English literature was an enduring monument in the history of lexicography.

On the title page of the *Dictionary,* Johnson had the satisfaction of describing himself as a master of arts of the University of Oxford and it is significant that the award was made in consideration of the religious and moral value of his essays. The degree, in short, was conferred upon the Rambler.

The *Dictionary* was well received and opposition came only from "the Criticks of the coffeehouse whose outcries are soon dispersed in the air and are thought on no more." But there was one outcry of enthusiastic praise which Johnson did not allow to be dispersed. In two papers in the *World,* Lord Chesterfield, seeking to make amends for his previous neglect, hailed Johnson as the supreme dictator of the English language and so provoked the most famous of all Johnson's letters:

> The notice which you have been pleased to take of my labours, had it been early, had been kind; but it has been delayed till I am indifferent, and cannot enjoy it; till I am solitary, and cannot impart it; till I am known and do not want it . . .

Journalism—"The Idler."—Johnson was soon at work upon an abridged edition of the *Dictionary,* but fame as a lexicographer had not relieved him of pecuniary distress. In March 1756 he was under arrest for the sum of £5 18*s.* Normally he would have appealed to one of the printers for whom he worked—William Strahan or Andrew Millar—but they were not available, and it was the printer-novelist Samuel Richardson who sent him six guineas. So, of necessity, his activity as a journalist continued. He edited Sir Thomas Browne's *Christian Morals* (1756), wrote prefaces to William Payne's *Introduction to the Game of Draughts* (1756) and Richard Rolt's *Dictionary of Trade and Commerce* (1761) and contributed many articles to journals. In the *Literary Magazine* Jonas Hanway's "Essay on Tea" provoked Johnson's description of himself as a "hardened and shameless tea-drinker" who had drunk of it for 20 years without hurt and therefore believed it not to be poison. A more important review was that of Soame Jenyns' *Free Enquiry Into the Nature and Origin of Evil* (1757), in which, with massive irony, he demolished the conjecture of a superior race of beings deceiving and tormenting men for their own pleasure: "The only end of writing is to enable the readers better to enjoy life or better to endure it: and how will either of those be put more in our power by him who tells us that we are puppets, of which some creature not much wiser than ourselves manages the wires?" Nor could Johnson swallow the bland assertion that poverty was generally compensated by better health and a more exquisite relish of the smallest enjoyments. "Life," he retorted, "must be seen before it can be known." These were topics on which he wrote with peculiar depth of feeling and, as always when he felt deeply, his style became more simple.

Neither Johnson's interests nor his writings were confined to the problems of literature and ethics. To the *Literary Magazine* of 1756 he contributed two articles on the political situation—"An Introduction to the Political State of Great Britain" and "Observations on the Present State of Affairs." In both he writes with scorn of the power politics inherent in both English and French colonialism. The dispute between the two countries in America was "the quarrel of two robbers for the spoil of a passenger," and even those who had settled in the new world on the fairest terms had no other merit than that of "a scrivener who ruins in silence over a plunderer that seizes by force." Nor was he afraid of asserting that the French sent out better governors and that they treated the natives better than did the English. It was ridiculous, he wrote, to imagine that the friendship of nations, whether civil or barbarous, could be gained or kept but by kind treatment, and it was this basic mistrust of the motives and methods of colonizers that provoked his later and better-known outburst against colonial claims. Meanwhile, he had projects of his own in hand or in view. He issued his proposals for his edition of Shakespeare in 1756, emphasizing, not for the first time, that his motive was not desire of fame but want of money. In April 1757 he wrote to his old friend Edmund Hector, in Birmingham, that the subscriptions, if slightly disappointing, were satisfactory: but early in 1758 he was obliged to borrow £40 from Jacob Tonson, the bookseller.

About the same time he undertook to contribute a weekly essay,

to be entitled "The Idler," to the *Universal Chronicle*. Of these essays it may be said that the reader who has been nurtured in the tradition that, while Johnson's talk is magnificent, his writings (other than the *Lives of the English Poets*) are unreadable, would be well advised to turn his attention to "The Idler." Though the moralist and the social reformer (especially on such topics as debtors' prisons and vivisection) are still evident, he is willing to turn aside to the human comedy: for instance, to the female bargain hunter ("whatever she thinks cheap, she holds it the duty of an economist to buy"); or to the publisher ("Some never dealt with authors; others had their hands full; some had never known such a dead time; others had lost by all that they had published for the last twelvemonth."). There are also some character sketches, of which the most memorable is that of "Mr. Sober":

> Mr. Sober's chief pleasure is conversation; there is no end of his talk or his attention; to speak or to hear is equally pleasing; for he still fancies that he is teaching or learning something, and is free for the time from his own reproaches. But there is one time at night when he must go home, that his friends may sleep; and another time in the morning when all the world agrees to shut out interruption. These are the moments of which poor Sober trembles at the thought.

It is a rare, and convincing, piece of self-portraiture. Every week for two years, with a few exceptions when he secured another contributor, Johnson delivered his "Idler" essay to the printer.

Rasselas.—In the midst of his work and worry came news of his mother's illness. On Jan. 13, 1759, he contrived to send her 12 guineas. But he knew that he would need more and on the same day (Jan. 20) that he wrote his last tender tribute to his mother he implored Strahan, the printer, to let him have £30 on account of "a thing he was preparing for the press." The thing was to be entitled "The choice of Life, or The History of —— Prince of Abissinia," better known as *Rasselas*. Written in the evenings of a week with the impending expenses of his mother's funeral in mind, it explores and exposes the vanity of the human search for happiness. The setting was no doubt prompted by Johnson's recollection of Jerome Lobo's *Voyage to Abyssinia* and the work is addressed to those who "listen with credulity to the whispers of fancy and pursue with eagerness the phantoms of hope." Impelled by such eagerness, Rasselas, with his sister, leaves his happy valley because its pleasure has ceased to please and because he is fired with a desire to do something. He meets with men of varied occupations and interests and earnestly explores their manner of life—scholars, astronomers, shepherds, hermits, poets. With Imlac, the poet, he ranges over many of the basic problems of art and life, but gains little satisfaction from the answers he receives. Imlac's catalogue of the necessary qualities of the poet is so overwhelming that Rasselas concludes that no human being can ever be a poet; a comparison between European and Eastern happiness leads to the conclusion that, although the advantage may rest with the Europeans, "human life is everywhere a state in which much is to be endured, and little to be enjoyed." At his first entry into city life, Rasselas meets everywhere with gaiety and happiness, but closer association reveals a picture of levity and intemperance. From the extravagance of youth, he turns to an inspiring lecture on morality, only to find that the lecturer's philosophy collapses at the first stroke of personal misfortune. When he passes hopefully to scenes of pastoral simplicity, he finds the shepherds cankered with discontent since they are condemned to labour for the luxury of the rich; when he seeks advice from a hermit, he is disappointed to be told that "the life of a solitary man will be certainly miserable, but not certainly devout." So the journey of disillusionment continues, until Imlac protests: "While you are making the choice of life, you neglect to live"—which is, perhaps, the most important moral to be drawn from the tale.

Of all Johnson's writings, none is more intensely characteristic than *Rasselas*. It is a remarkable example of his fluent productivity when he had a definite object and a definite date before him, but speed did not debase either the solemnity of his subject or the dignity of its treatment. Johnson allowed his imagination to wander into Abyssinia and Egypt, but fundamentally *Rasselas* is a spiritual autobiography. Furthermore, it was the one prose work of Johnson's which obtained an immediate and wide popularity in his lifetime. It satisfied the taste of the 18th-century reader for "impressive truth in splendid fiction drest"—and not only of the English reader. In a variety of translations, its fame spread over Europe and beyond.

Johnson's Circle.—In spite of his struggles and sorrows, Johnson was, by this time, no longer a lonely hack writer. His writings, though they did not make his fortune, had brought him many friends. Sir Joshua Reynolds, who had been enthralled by Johnson's *Life of Savage*, was no less enthusiastic about his conversation and his counsel; Charles Burney warmly commended the *Dictionary* and encouraged the edition of Shakespeare; Bennet Langton came to London at an early age for the express purpose of meeting the author of the *Rambler*. Johnson also cherished his Oxford friendships. He spent some time there in 1754 and again in 1755 and 1759 and, after the conferment of his degree, took a keen pleasure in wearing his gown. Among his friends at Oxford were Robert Chambers of Lincoln college and Thomas Warton of Trinity. It was at Trinity in 1759 that Bennet Langton introduced him to Topham Beauclerk.

Even so, Johnson was still at the beck and call of authors and editors and friends for the writing of introductions, reviews and, especially, dedications. Of James Bennet's edition of Roger Ascham's works he was virtually the editor and contributed a life of Ascham; he wrote the loyal address presented to George III on his accession by the painters, sculptors and architects; he revised John Gwynn's pamphlet on the proper route for the coronation procession; he reviewed a work on Mary, Queen of Scots, and wrote a dedication for Giuseppe Baretti's *Italian Dictionary*. Meanwhile his edition of Shakespeare tarried. In 1762 the unexpected happened. He was informed of the gracious intention of his majesty the king to confer on him a pension of £300 a year. Could he in decency take it, after defining "pension" in his *Dictionary* as "pay given to a state hireling for treason to his country"? At least, he felt, he must consult his friends. But Reynolds reassured him and Lord Bute told him that the award was made not for anything he might do but for what he had already done. So, from a full heart, Johnson thanked his lordship for sparing him "the shame of solicitation and the anxiety of suspense."

Meeting With James Boswell.—The following year was to provide yet another landmark in Johnson's life, for on May 16, 1763, his accidental meeting with James Boswell (*q.v.*) in the back parlour of Thomas Davies' bookshop in Covent Garden inaugurated one of the most famous companionships in history. Boswell, the eldest son of Lord Auchinleck, a Scottish judge, had studied law at Edinburgh and Glasgow and had a passionate desire to taste the felicities of London life. His mind was dominated by two ambitions—to meet famous men and to be a famous author himself. Staying in a country house in the previous year, he had read aloud, with enthusiastic comment, some of the *Rambler* essays and, in the list of celebrities whom he wished to meet, the author of the *Rambler* stood high. A little daunted by Johnson's brusque rejoinders at their first meeting, Boswell was nevertheless encouraged by Davies to persevere and a week later he waited, with some apologies, upon Johnson. Johnson cut him short. "I am obliged," he said, "to any man who visits me." So Boswell stayed and listened in rapture. "His conversation," he wrote in his diary "is as great as his writing." He could give no higher praise. To Johnson new friendships were always welcome, and especially with young people, for such friendships lasted longest. To the charm of Boswell's enthusiasm he quickly succumbed. Together they enjoyed suppers at the Mitre tavern and excursions on the Thames, but the signal mark of Johnson's favour was his offer to accompany Boswell in the coach to Harwich, whence Boswell was to embark on his continental tour. Johnson gave him much sound advice. In particular, he urged him to keep a diary and it is to Boswell's diary that the world owes its intimate knowledge of Johnson. Many others left valuable records of his life and character, but it was Boswell who johnsonized the land.

In 1764 Johnson was happy to concur with Sir Joshua's suggestion for the foundation of what is still the most famous of London dining clubs—The Club. Among the original members, besides

Reynolds and Johnson, were Edmund Burke, Topham Beauclerk, Bennet Langton and Oliver Goldsmith, and nine years later it was one of the proudest moments of Boswell's life when he was admitted to membership. Johnson was characteristically frank in describing the circumstances of the election. If they had refused Boswell, he would have kept every other candidate out.

Edition of Shakespeare.—Meanwhile, he had been working upon his edition of Shakespeare. Adumbrated in 1745 and formally announced in 1756, it had occupied him for much more than the two years in which he had hoped to complete it and the long delay had provoked some satire by the scurrilous Charles Churchill:

> He for subscribers baits his hook
> And takes your cash; but where's the book?

The book, in eight volumes, appeared at length in 1765. Johnson had been a student of Shakespeare all his life. He was no idolater and his basic criticism is that of the moralist: "He is so much more careful to please than to instruct, that he seems to write without any moral purpose. . . . He carries his persons indifferently through right and wrong, and at the close dismisses them without further care, and leaves their examples to operate by chance. This fault the barbarity of his age cannot extenuate; for it is always a writer's duty to make the world better."

As an editor, Johnson set out, first, to correct textual corruptions; second, to elucidate obscurities of language; and, last, in treating of Shakespeare's sources, to examine the very books which Shakespeare consulted. Of the critics' complaint of Shakespeare's neglect of the unities of time and place he made short work. The demand for these unities arose from "the supposed necessity of making the drama credible," but in Johnson's view no drama was either credible or credited. "The truth is that the spectators are always in their senses, and know, from the first act to the last, that the stage is only a stage, and that the players are only players." Johnson recognized that Shakespeare wrote his plays not for the reader at his desk, but for an audience in the theatre. But Johnson himself could never appreciate the contribution made by the actor to dramatic interpretation. For him the actor was a reciter who said his piece "with just gesture and elegant modulation" and it was not in the theatre but in his study that he was most deeply moved by "the perpetual tumult of indignation, pity and hope." "He that peruses Shakespeare," he wrote about *Macbeth,* "looks round alarmed and starts to find himself alone" and he was so deeply shocked by his first reading of Cordelia's death that he could not bear to read it again until he revised the play as an editor. By the romantic critics of the 19th century Johnson's work on Shakespeare was depreciated; but Walter Raleigh's prophecy that he would receive more respect in the 20th century has been abundantly fulfilled by modern editors. It was in the year of the publication of his Shakespeare that Johnson received the degree of LL.D. from Trinity college, Dublin; his own university did him a similar honour ten years later.

Johnson's Household.—In whatever literary work Johnson was engaged, his greatest terror was solitude, and the composition of his household reflects his efforts to avoid it. He had many habitations in London of which the most famous is the house in Gough square, just north of Fleet street, in which he lived from 1749 to 1759. When Boswell first called upon him in 1763 he was at No. 1 Inner Temple lane. From there he moved back to Johnson's court (No. 7 Fleet street) in 1765 and in 1776 to Bolt court, which was his home until his death. The house in Gough square, thanks to the foresight and generosity of Cecil (later Lord) Harmsworth, has been well preserved. There the *Dictionary* was compiled; there the *Rambler,* the *Idler, Rasselas* and much else was written; there his wife died in 1752. Even before her death and long before the grant of his pension, he had begun to make his house a refuge for the poor and the unfortunate.

Anna Williams, daughter of Zachariah Williams, whom Johnson helped to write his *Longitude at Sea* in 1755, had come to London in the hope of being cured of a cataract, but later became totally blind. She was a constant visitor in Mrs. Johnson's lifetime, and, after her death, came to live in the house. For the rest of her life she had either a room in Johnson's house or lodgings near at hand. Blindness made her peevish in manner, but Johnson's regard and affection for her remained constant. When she died in 1783, he mourned a companion to whom he had had recourse for domestic amusement for 30 years. Shortly after Mrs. Johnson's death, Johnson's beloved friend Richard Bathurst presented to him Francis Barber, a Negro slave who had been freed by Bathurst's father. Johnson made Francis his friend as well as his servant, sent him to school at Bishop's Stortford and provided for him handsomely in his will. Another humble friend was Robert Levett, "an obscure practiser in physick amongst the lower people," who was given a room at the top of the house in Johnson's court. Johnson insisted that Levett was indebted to him for nothing more than house-room, a share of a penny loaf at breakfast and an occasional Sunday dinner. His death provoked one of Johnson's most moving poems:

> Well try'd through many a varying year
> See Levett to the grave descend;
> Officious, innocent, sincere,
> Of every friendless name the friend.

Yet another beneficiary was Mrs. Desmoulins, daughter of Dr. Swynfen, Johnson's godfather, who joined the household in the early London years. After Mrs. Johnson's death she appears to have been in charge of the cooking. But she quarreled constantly with Anna Williams and in the kitchen anarchy reigned.

The Thrales.—It was from this domestic background that in 1765 Johnson was introduced to a family that was to provide one of the most comforting friendships of his life. Henry Thrale, owner of a Southwark brewery, had been married to Hester Lynch Salusbury (*see* PIOZZI, HESTER LYNCH) in 1763. Two years later he was elected member of parliament for Southwark and his wife became a famous hostess and, in particular, "the provider and conductress of Dr. Johnson." For the first time in his life Johnson, who was invited not only to dine but to spend weeks, or even months, at Streatham, was free to enjoy the luxury of solid comfort. No man, as he said, is a hypocrite in his pleasures and at Streatham he could enjoy them all—a good library, intelligent conversation, pretty women, late hours, tasteful cookery. Furthermore, he became the confidant and counselor of both parents and children; a room was set apart for him at the Southwark house as well as at Streatham; he was one of the family.

Political Pamphlets.—Already his pension had made two important differences in his way of life: he was no longer obliged to write for a living and he could afford the time and money for holidays. Not that he was entirely idle as a writer. Shakespeare and the *Dictionary* called for revision; friends called for dedications and prologues (he wrote one for Goldsmith's *The Good-Natur'd Man*); and he was also moved to write a series of political pamphlets. Of these tracts, or at least of three of them, the general view was, for long, that they exhibited the sad spectacle of a great man giving vent, unworthily, to the abusive expression of Tory prejudice against the rights of the people. Today, more trouble is taken to understand, though not necessarily to approve, Johnson's point of view.

The False Alarm (1770) was written not so much to defend the right of the house of commons to refuse re-admittance to a member already expelled, as to protest against the absurdity of raising the controversy to the level of a constitutional crisis comparable to that of the 17th century. What the country was arguing about, he said, was whether Middlesex should be represented, or not, by a criminal from jail. To raise the cry that liberty was in danger was to raise a false alarm.

The Patriot (1774), a short piece written just before the election of that year, defines the qualities of the true patriot and contrasts them with the behaviour of those who had unjustifiably arrogated the title to themselves. The man, for instance, who sought to deprive the nation of its authority over its own colonies was no true patriot. As for the supposed defenders of liberty of conscience, had they not opposed the act of parliament which gave the Catholics of Quebec the right to practise their own religion?

Taxation No Tyranny (1775) is a more elaborate development of the case against the Americans, and here it is important to remember that Johnson was unsympathetic toward colonies and

colonists *ab initio*. Colonists to him were discontented sectaries or mercenary adventurers who, of their own volition, had left the country. They had settled on the other side of the Atlantic under English protection and with the authority of English charters. That they had no representation at Westminster was their own fault. They had the protection of English arms. Why should they not pay for it? And, if there were 3,000,000 Whigs in America "fierce for liberty," why were the loudest yelps for liberty heard among the drivers of Negroes?

Thoughts on the Late Transactions Respecting Falkland's Islands (1771) is in rather a different category. Writing in reply to Junius (*q.v.*), Johnson reviews the history of the islands and defends the government's policy in agreeing that British possession should not preclude later discussion of Spain's theoretical rights. This leads him to an apt and realistic description, in splendid prose, of the actualities of war—the sufferings of the common soldier and the profits of contractors. Unlike the other tracts, *Thoughts on Falkland's Islands* has more than an ephemeral value.

For Johnson, these tracts were an opportunity of expounding his essentially pragmatic philosophy of politics. He ascribed divine right neither to kings nor to people. Talk about liberty in the abstract or about "natural" rights he dismissed as cant. What was essential for a civilized community was a stable government and respect for its laws. But he clearly recognized that there was an ultimate safeguard. If government abused its power, mankind would not bear it; against a tyrant the people would rise and cut off his head.

The politics of the 1770s did not deter Johnson from the enjoyment of his new-found liberties. With the Thrales he spent weeks at Brighton as well as at Streatham and his "annual midland ramble" included long visits to Oxford, to Lichfield and to his old friend John Taylor at Ashbourne.

Journey to the Western Islands.—In 1773 he was persuaded by Boswell to accompany him on a more exciting expedition. He had wanted to visit the western islands of Scotland for longer than he could remember and now felt that Boswell's "gaiety of conversation and civility of manners were sufficient to counteract the inconveniences of travel." The travelers left Edinburgh on Aug. 18 and followed the coast road. At St. Andrews Johnson's sadness at the sight of archiepiscopal ruins was mitigated by the kindness of the professors; at Aberdeen he was made a freeman of the city and gave Scotland credit for the absence of a petty officer bowing for a fee; dining with the governor of Ft. George, he talked learnedly about gunpowder. After Inverness, horses were substituted for the post-chaise, and by the shore of Loch Ness Johnson encountered an old woman, who could speak very little English, boiling goat's flesh in a kettle. They crossed to Skye from Glenelg. There they had rain for the first time and were warned that a succession of three dry days was not to be expected for many months. In the island of Raasay they found "nothing but civility, elegance and plenty" and Johnson was delighted with the patriarchal life which he had come to see. Similarly, at Dunvegan he "tasted lotus." On the voyage to Mull, they were driven by a stormy sea into Coll, where, to Boswell's delight, Johnson strutted about one night with a broadsword and target. But they were weather-bound for a week and Johnson began to long for the mainland—"to go on with existence." It was Boswell, not Johnson, who insisted on visiting Iona, but Johnson's comment is one of the most famous paragraphs in all his writings: "That man is little to be envied, whose patriotism would not gain force upon the plain of Marathon, or whose piety would not grow warmer among the ruins of Iona." On the way back to Edinburgh, a visit was paid to Boswell's father at Auchinleck, where, to Boswell's distress, Johnson did not succeed in avoiding controversial topics. After a fortnight's stay in Edinburgh, Johnson returned to London and declared that his tour was the most pleasant journey he had ever made.

From many points of view the tour was a triumph. Johnson had his 64th birthday at Dunvegan and his endurance of the physical strain of riding his pony down the rough tracks of Mam Rattigan, of sleeping in Highland huts and of being tossed in small boats on stormy seas was in itself remarkable. Socially, with rare exceptions, the tour was a complete success, both from Johnson's point of view and from that of his hosts. For Boswell, of course, it was a glorious opportunity for him to write what was, in effect, the first instalment of his *Life* of Johnson. Johnson himself was moved, for once, to write a book for its own sake. It was at Anoch in Glenmoriston on Aug. 31, 1773, that the travelers "entered a narrow valley not very flowery, but sufficiently verdant." While the horses grazed, Johnson sat down on a bank "such as a writer of Romance might have delighted to feign" and conceived the thought not of a romance but of an account of his journey. Of course, he did not attempt to compete with Boswell whose diary he read, and approved, at intervals. For an intimate personal record of the "minute particulars" of Johnson's behaviour and conversation, the reader naturally turns to Boswell's *The Journal of a Tour to the Hebrides*, published after Johnson's death. Johnson, in his own *Journey to the Western Islands* (1775) was concerned to describe the customs, religion, education, trade and agriculture of a society that was new to him. His narrative is far from being impersonal, but it contains no gossip. It was in his many letters to Mrs. Thrale that he wrote more freely. In one letter he offered her a definition of travel highly characteristic of his general approach to life: "The use of travelling is to regulate imagination by reality, and instead of thinking how things may be, to see them as they are."

Not long after his return, Johnson was saddened by the death of Oliver Goldsmith. They had first met in 1761 and Johnson had been one of the first to recognize the quality of Goldsmith's writings. He had contributed a famous couplet to *The Traveller*, and *She Stoops to Conquer* had been dedicated to him. He frequently crushed Goldsmith in argument at The Club and elsewhere, but his final judgment was sincere: "Let not his frailties be remembered," he wrote to Bennet Langton, "he was a very great man."

Johnson's intimacy with the Thrales at this time is clearly illustrated by his joining them in two long tours—to north Wales in 1774 and to France in the following year. On the way to Wales, he was able to introduce them to his Lichfield friends and some time was spent in the Vale of Clwyd, where Mrs. Thrale's ancestors had lived. On the return journey Johnson was interested to see Matthew Boulton's "enginery" at Birmingham and at Oxford the party was entertained in the hall of University college. In France, he was interested more in people than in places. He admired some of the cathedrals, but his most significant comments were on social conditions and particularly on the gulf between rich and poor. There was no provision for the maintenance of the poor and there was no comfortable middle class.

The "Lives of the English Poets."—In 1777, three booksellers waited upon Johnson and asked him to write a series of *Lives* for an "elegant and accurate" edition of the English poets which they and others had in preparation. Johnson agreed. The choice of the poets had already been made and he strongly objected to the volume being described as "Johnson's Poets." Only five names (and some of them rather odd names) were added at his suggestion. Though he said that he wrote his pieces "dilatorily and hastily, unwilling to work and working with vigour and haste," it was in this work that he came nearest to actual enjoyment of writing.

The *Lives* are not a series, but a miscellany. They follow no plan; they have no uniformity of design. On certain major poets (Milton, Dryden, Pope and others) Johnson wrote long essays which remain as part of the stock-in-trade of English criticism. He was led on, he said, by "the honest desire of giving useful pleasure." Thus, in writing of Cowley, he seized the opportunity of a lengthy examination of the characteristics of the metaphysical poets, those poets who were "more desirous of being admired than understood." On the other hand, in a laconic piece of 300 words on Richard Duke, he concluded that his poems "were not below mediocrity." When he came to James Thomson (one of his own additions) he praised his *Seasons* highly, but of the poem *Liberty* he wrote: "When it first appeared, I tried to read and soon desisted. I have never tried again. . . ." The biographical part of literature was what Johnson loved best and he made no attempt to separate the poetry from the man who had written it. If he disapproved of the man, he found it difficult to be a detached

critic of his work. The *Lives* of Milton and Gray are the two most notorious instances of this. In *Paradise Lost* Johnson found all the qualities required of an epic poet—knowledge, morality, piety, sublimity; and, in spite of his prejudice against blank verse, he wished for no other form of the poem. It was against *Lycidas* that he allowed his prejudices to have full play; and the primary source of his indignation may be sought in the biographical portion of the essay. There Milton's religion and politics are scornfully exposed—he was not a member of any church and, politically, he was an acrimonious and surly Republican. Furthermore, *Lycidas* was a pastoral—a form of poetry which Johnson regarded as appropriate only to descriptions of country life. Personal dislike is also evident in the *Life* of Gray. To the *Elegy* Johnson paid a famous tribute of genuine admiration, but he approached his other poems with "the neutrality of a stranger and the coldness of a critick." In fact, he was far from neutral in his harsh and niggling criticisms of Gray's linguistic inversions and antiquarian epithets. It was Gray's attitude to life and literature that irritated Johnson. One who had spent 30 years in Grub street could have little patience with a fastidious scholar who asked for leisure to be good and wrote only when he was in the humour.

Last Years.—Publication of the *Lives* was completed in 1781 and a storm of criticism broke out. But Johnson was too old a campaigner to be disturbed by criticism and, in fact, the *Lives* remain the best-loved, or the least neglected, of Johnson's works. What distressed him far more than unfavourable reviews was the death of Henry Thrale. No loss, since that of his wife, had so much oppressed him; he felt like a man beginning a new course of life. To some extent he was saved from brooding over his loss by his attention to his duties as executor. Always interested in trade and commerce, he had enjoyed discussing brewery policy with Thrale in his lifetime and now, in the words of the famous story, he was dealing not with parcels of boilers and vats, but with "the potentiality of growing rich beyond the dream of avarice." To his disappointment, but to Mrs. Thrale's delight, the brewery was sold to "a knot of rich Quakers" for £135,000. For a time Johnson continued to regard Streatham as his home, but in Aug. 1782 Mrs. Thrale told him of her decision to sell the house. On his last visit in October he humbly thanked God for the comforts he had enjoyed there. A room was allotted to him in the house which Mrs. Thrale took in Argyll street, but the intimacy of the Streatham days was weakening. For long a victim of asthma and dropsy, Johnson had a paralytic stroke in June 1783, from which he did not properly recover until the spring of the following year. Mrs. Thrale wrote to him with "the attention and tenderness of ancient time," but she dared not tell him that she had for long been trying to decide whether or not to marry Gabriele Piozzi, an Italian musician. When, at the end of June 1784, Johnson heard of her decision to marry, he wrote a letter of angry condemnation; but a week later he recognized that Mrs. Thrale's marriage (which was, in fact, a happy one) was her own affair and thanked her for the kindness which had soothed 20 years of a life radically wretched.

Johnson was now bereft of many old friends and he was a sick man, but to the end he fought untiringly against his worst enemy—solitude and the melancholy which it induced. In Dec. 1783 he had formed yet another club in Essex street, which was conveniently near his house in Bolt court, and in the following July he set out upon his last Midland ramble. At Lichfield everyone was pleased to see him; he stayed for two months at Ashbourne, where he was comfortable, but "hungry for conversation," for Taylor went to bed at nine; at Birmingham he talked over old times with Hector; at Oxford he was welcomed to his old college by the master. On Nov. 16 he returned to London. Though his mind remained alert, his bodily state grew worse and he died on Dec. 13, 1784. A week later he was buried in Westminster abbey. One journalist noted that there was only one man of hereditary title among the mourners; but he added, rightly, that he who was followed by Reynolds and Burke did not go unhonoured to the grave.

Reputation and Character.—The history of Johnson's fame is curious. In his own day he was acknowledged as a literary dictator; his death left a chasm that could not be filled. Today his fame persists. After Shakespeare, he is perhaps the best-known figure and the most frequently quoted writer in the whole range of English literature. Yet it is not his published works that are quoted. Johnson is familiar to, and loved by, the English-speaking peoples not for his writings but for the unique record of his life, his personality and his conversation, preserved in the pages of Boswell's *Life*. The more that is discovered about Boswell's literary workmanship, the more remarkable his accuracy, his skill and his judgment in compiling his diaries are seen to be. His most fascinating pages are those which reproduce the personalities and the atmosphere of a tête-à-tête at the Mitre or an evening at The Club or a dinner party at Mr. Dilly's. Here, the reader feels that he has got at the very heart of Johnson's temperament and opinions. But Boswell would have been the first to agree that this is not the whole Johnson. Arguing and refuting argument in congenial company after a good dinner, Johnson was at his happiest. It was not necessarily a talker's duty to make the world better; in the rough and tumble of disputation many kinds of exaggeration and inconsistency were permissible; one might even take the wrong side.

But Johnson was a moralist by temperament and a writer by profession and it is in his writings that a properly balanced picture of his approach to literature and politics and religion must be sought. *The Vanity of Human Wishes* and *Rasselas* may not be easy bedside reading, but they are essential for the comprehension of the depth of Johnson's thought and feeling; and it is to be remembered that when Boswell and others were listening to Johnson, they had no thought in their minds of a contrast between the talker and the writer. They were listening to the author of the *Rambler*. Johnson's oracular pronouncements on political questions (on Whigs and Liberty and Patriots and Americans) are quoted with appreciative relish by modern readers, but they are seldom corrected or supplemented by reference to his written work. Johnson was frequently roused to political passion, but it was not a passion for the Tory or any other party. It was a passion for order in church and state, not an order decreed by God or by nature, but a rational constitution safeguarded on the one hand against tyranny and on the other against mob rule. Of the poor and the oppressed he was the consistent champion and he denounced slavery at a time when it was generally regarded as part of the order of nature.

Johnson was not only a moralist, but a Christian moralist. The sinfulness of man and his need of redemption by the passion of Jesus Christ were the basis of his personal faith. His constitutional melancholy deprived him of a feeling of joy in his religion and the sin of which he was most deeply conscious was idleness. In his *Prayers and Meditations* (1785), published after his death, his repentance and his good resolutions, constantly repeated but seldom kept, show the sincerity of his heart-searching and his humility. But his faith prevailed and in his last days he refused to take opiates because he had prayed that he might render his soul to God unclouded.

Born in a bookshop, Johnson had the qualities, and the conscience, of a scholar. By the writing of books he strove to earn his daily bread; by the reading of books he sought to enlarge the range of his ideas and of his scholarship. And what, he asked in later years, should books teach but the art of living? Few men have left finer examples of the art of living than Samuel Johnson.

See also references under "Johnson, Samuel" in the Index.

BIBLIOGRAPHY.—The standard bibliography is that by W. P. Courtney and D. Nichol Smith (1915), re-issued in 1925 and supplemented by R. W. Chapman and A. T. Hazen in the *Proceedings of the Oxford Bibliographical Society* (1939); *The Catalogue of the R. B. Adam Library Relating to Dr. Johnson and His Era,* 4 vol. (1929–30), contains facsimiles of many manuscripts and letters. The Johnsonian items in this collection now form part of the library of Donald and Mary Hyde at Somerville, New Jersey. J. L. Clifford, *Johnsonian Studies 1887–1950* (1951), a handlist of books, pamphlets and articles, gives striking evidence of the growth of interest in the subject in the 20th century.

Collected Editions: The Oxford ed., 9 vol. (1825), with two supplementary volumes of *Debates* is the best; the Yale ed. of the early collections was inaugurated by Johnson's *Diaries, Prayers and Annals* (1958), ed. by E. L. McAdam with Donald and Mary Hyde and containing a diary of 1765–84 not previously published; vol. II (1963) contains the

Idler and *Adventurer,* ed. by W. J. Bate, J. M. Bullitt and L. F. Powell. Of the collected *Poems* the standard ed. is that of D. Nichol Smith and E. L. McAdam (1941) which includes *Irene* and the Latin poems; of the *Letters,* that of R. W. Chapman, 3 vol. (1952).

Selections: There have been many popular books of selections, beginning with the *Beauties of Johnson* (1781). Among later selections are: *Select Essays,* ed. by G. Birkbeck Hill, 2 vol. (1889); *Selections from Johnson,* ed. by C. G. Osgood (1909); *Samuel Johnson,* ed. by A. Meynell and G. K. Chesterton (1911); *Johnson, Prose and Poetry,* ed. by R. W. Chapman (1922); *Samuel Johnson, Writer,* ed. by S. C. Roberts (1926). The best and most comprehensive anthology is *Johnson, Prose and Poetry,* ed. by Mona Wilson (1950), which, however, takes no account of Johnson's letters. More specialized selections are J. E. Brown, *The Critical Opinions of Samuel Johnson* (1926), and A. T. Hazen, *Samuel Johnson's Prefaces and Dedications* (1937).

Individual Works: Lobo's Voyage to Abyssinia, ed. by Henry Morley (1887); *The Vanity of Human Wishes,* ed. by E. J. Payne (1876); *London* and *The Vanity of Human Wishes,* reprinted with an introduction by T. S. Eliot (1930); *Rasselas,* ed. by G. Birkbeck Hill (1887) and by R. W. Chapman (1927), who also edited *A Journey to the Western Islands,* together with Boswell's *Tour to the Hebrides* (1924). The standard edition of the *Lives of the English Poets* is that of G. Birkbeck Hill, 3 vol. (1905); they have also been included in the World's Classics, ed. by A. Waugh, 3 vol. (1896), and in Everyman's Library, ed. by L. Archer-Hind (1925). Many *Lives* have been separately published and the "Six Chief Lives" (Milton, Dryden, Swift, Addison, Pope, Gray) was ed. by Matthew Arnold (1878); a later selection is that of S. C. Roberts (1963). The *Prayers and Meditations* were first ed. by G. Strahan in 1785; later editions are those of H. Higgins (1904) and H. E. Savage (1927). Johnson's *Account* (or *Annals*) of his early life, ed. by R. Wright (1805); *Diary of a Journey into North Wales,* ed. by R. Duppa (1816) and reprinted in A. M. Broadley's *Dr. Johnson and Mrs. Thrale* (1910); *The French Journals of Mrs. Thrale and Dr. Johnson,* ed. by M. Tyson and H. Guppy (1932).

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Biography and Criticism: The number of biographical and critical studies of Johnson is enormous. Apart from Boswell's *The Journal of a Tour to the Hebrides* (1785) and *The Life of Samuel Johnson* (1791), there are a number of contemporary authorities including the *Life* (1787) by Sir John Hawkins, abridged ed. by B. H. Davis (1961); H. L. Piozzi, *Anecdotes* (1786), ed. by S. C. Roberts (1925); T. Campbell, *Diary of a Visit to England in 1775,* ed. by S. Raymond (1854) and by J. L. Clifford from the newly discovered manuscript (1947); *Lives* by Arthur Murphy (1792) and Robert Anderson (1795); portions of these and many other anecdotes are included in *Johnsonian Miscellanies,* ed. by G. Birkbeck Hill (1897); C. B. Tinker, *Dr. Johnson and Fanny Burney* (1912), assembles the relevant portions of the diary and letters of Miss Burney. Two of the most famous essays on Johnson were those of Lord Macaulay; one a review of J. W. Croker's edition of Boswell (*Edinburgh Review,* 1831) in which the depreciation of Johnson as a writer set the fashion for many years; the other, a better balanced account, in the *Encyclopædia Britannica,* 8th ed. (1856). Among the shorter studies of Johnson are *Lives* by Leslie Stephen (1878) and F. Grant (1887); T. Seccombe, *The Age of Johnson* (1900); J. Bailey, *Dr. Johnson and His Circle* (1913); C. Hollis, *Doctor Johnson* (1929); R. Lynd, *Dr. Johnson and Company* (1928); S. C. Roberts, *Doctor Johnson* (1935); M. J. C. Hodgart, *Samuel Johnson and His Time* (1962); J. W. Krutch, *Samuel Johnson* (1944), is a more substantial work. J. L. Clifford, *Young Sam Johnson* (1955), throws new light on Johnson's early career and D. J. Greene, *The Politics of Samuel Johnson* (1960), is an interesting re-appraisement. A. L. Reade, *Johnsonian Gleanings,* 10 vol. (1909–52), is an encyclopaedia of remarkable detail about Johnson's family and early life, and P. H. Houston, *Dr. Johnson: a Study in Eighteenth-Century Humanism* (1923), examines Johnson from the scholastic point of view. Walter Raleigh, *Six Essays on Johnson* (1910), is an important re-statement, correcting Macaulay's view. Other volumes of essays are B. H. Bronson, "Johnson Agonistes," in *Johnson and Boswell: Three Essays* (1944), containing an illuminating analysis of Johnson's temperament; R. W. Chapman, *Johnsonian and Other Essays* (1953); S. C. Roberts, *Doctor Johnson and Others* (1958); *New Light on Dr. Johnson,* ed. by F. W. Hilles (1959). (S. C. R.)

JOHNSON, WALTER PERRY (1887–1946), one of baseball's greatest pitchers, was born at Humboldt, Kan., on Nov. 6, 1887. He was one of the first of five baseball immortals voted into the Baseball Hall of Fame at Cooperstown, N.Y., in 1936. He was a right-handed thrower and batter for the Washington Senators, of the American league, from 1907 to 1927. During this period he won more games (414), struck out more batters (3,497), pitched more innings (5,923) and compiled more shutouts (113) than any major-league pitcher of the 20th century. He was considered by players, managers and umpires to have the fastest ball of all time. His blinding speed earned him the nickname of the "Big Train." High lights of his career included: an unparalleled feat of pitching three shutouts in four days, in 1908; 16 straight victories, in 1912; 56 consecutive scoreless innings (an all-time record), in 1913; and a no-hit, no-run game (*v.* Boston), in 1920. He won 32 games in 1912; 36 games in 1913. He was nonplaying manager for Washington (1929–32) and the Cleveland Indians (1933–35). He died in Washington, D.C., on Dec. 10, 1946. (D. Sr.)

JOHNSON, SIR WILLIAM (1715–1774), Indian superintendent and frontiersman of colonial New York, was born at Smithtown, County Meath, Ire., and emigrated to America about 1737. He settled on the estate of his uncle, Peter Warren, on the southern bank of the Mohawk river. In 1739 he purchased a tract on the northern side of the Mohawk, the beginning of acquisitions that eventually made him one of the largest landholders in British America. His estate, Mount Johnson, became a centre of Indian trade and a shelter for the Mohawk Indians. Deerskins and beaver and raccoon pelts were acquired in exchange for blankets, ruffled shirts, ammunition and other items, and were held in Johnson's storehouse.

About 1739 Johnson apparently married a German girl, Catharine Weisenberg. After her death a Mohawk Indian woman, Caroline, bore him three children. Caroline was followed by Molly Brant, another Mohawk woman, the sister of Joseph Brant, leader of the Iroquois during the American Revolution.

Johnson's friendship with the Indians helped him acquire furs and tribal lands, and there is much evidence to show that Warraghiyagey, as he was called by the Indians, was a sincere friend of the neighbouring Iroquois in the whole era of the French and Indian War. As Old Hendrick, the Mohawk sachem, said, Johnson ". . . has Large Eyes and sees a great way, and conceals nothing from us." Because of Johnson's skill as an Indian diplomat, Gov. George Clinton of New York in 1746 made him colonel of the Six Nations (the Indian confederacy of Iroquois tribes). This office gave him authority in the management of Indian affairs. He also took responsibility for provisioning Ft. Oswego, and afterward assumed command of a New York militia.

After a dispute with the New York assembly, Johnson resigned as Indian manager and devoted himself to fur trading and agriculture. In 1754 he attended the famous Albany conference to report on Indian affairs. One year later Gen. Edward Braddock appointed Johnson superintendent of the Six Nations Iroquois and their allies. Commissioned as a major general, Johnson defeated French forces under Baron Dieskau at Lake George on Sept. 8, 1755. Largely as a result of this victory, he was made a baronet and in 1756 reappointed northern Indian superintendent, a post he held until his death on July 11, 1774. In 1759 he commanded a force that captured Ft. Niagara and then in 1760 joined Sir Jeffrey Amherst's victorious assault on Montreal. He was also active during the Indian uprising of 1763–64 and negotiated the terms of the Indian boundary settlement at the treaty of Ft. Stanwix in 1768.

Johnson was constantly called upon to mediate in disputes between whites and Indians and gained a reputation for honesty and fairness. Though remembered as a distinguished pioneer of the Mohawk valley, his chief service was in keeping the Six Nations Iroquois neutral and even friendly during the long period of conflict with the French. Favouring educational and missionary work among the tribes, he was a man of versatile interests, as indicated by references to science, literature and agriculture in his correspondence.

See Wilbur R. Jacobs, *Diplomacy and Indian Gifts* (1950); James Thomas Flexner, *Mohawk Baronet, Sir William Johnson of New York* (1959). (W. R. J.)

JOHNSON, WILLIAM (1771–1834), U.S. jurist, associate justice of the United States supreme court, to whom, more perhaps than to any other, goes credit for establishing in the court the principle of dissent and the enduring practice for the rendering of opinions, was born in Charleston, S.C., on Dec. 27, 1771. He was graduated in 1790 from Princeton, read law with the

Charleston Federalist Charles Cotesworth Pinckney and was admitted to the bar in 1793. Aligning himself with the new Jeffersonian Republican party, he was elected in 1794, 1796 and 1798 to the South Carolina legislature. In his third term he served as speaker, and in Dec. 1799 was elected to the state's highest court, to remain there until 1804.

During his 30 years on the supreme court of the United States, Johnson affected lastingly both the practices and the decisions of that body. On the eve of Thomas Jefferson's inauguration as president in 1801, the defeated Federalist leaders had secured the appointment of Secretary of State John Marshall as chief justice. There ensued a protracted tug-of-war between the solidly Federalist court under Marshall and the Jefferson administration, which regarded the court, now asserting the power of judicial review, as a threat to its program. When at last a vacancy occurred on the court, Jefferson, in March 1804, appointed Johnson, who appeared to be firm in his Republican convictions. Johnson was 32 when he shouldered the burden of counteracting Federalist decisions.

For a century after Marshall's death in 1835, the great chief justice was widely regarded as having totally dominated his court. In trying to make the court the acknowledged spokesman of the law and the constitution, Marshall not only wrote the opinions in most major cases but sought, often with success, unanimous court support for them. After 1811 only two Federalists remained on a bench of seven, yet in such epochal decisions as *McCulloch* v. *Maryland* (1819) Marshall spoke for the whole court. Jefferson himself probably contributed to the prevailing conception of Marshall's dominance, for he deplored the manner in which opinions were "huddled up in conclave" and "delivered as if unanimous, and with the silent acquiescence of lazy or timid associates, by a crafty chief judge. . . ."

Later researches disclosed, however, the occasional existence of a court minority, with Johnson as its principal spokesman. In 1822 Jefferson wrote Johnson, insisting that the justices were duty bound to record their opinions and votes on decisions and recommending resort to seriatim, or separate, opinions. In reply Johnson expressed partial agreement and related the difficulties he had encountered when he had first appeared on the court and attempted to file his own opinions. "I persevered," he wrote, "until I got them [the justices] to adopt the course they now pursue which is to appoint someone to deliver the opinion of the majority, and leave it to the discretion of the rest to record their opinions or not *ad libitum*." Johnson's own separate opinions were for that time numerous; while Marshall was writing nearly half the majority opinions, Johnson, in delivering 21 concurring and 34 dissenting opinions, wrote half the individual utterances. He spoke out alone most frequently and effectively during his last decade, after his correspondence with Jefferson.

Johnson, and indeed all the judges of the Marshall court, were generally agreed on the scope of power attributable to the national government. With rare exceptions, they all extended broad construction to the powers of congress over commerce and other matters and to the authority of the federal government to effectuate its policies through its own instrumentalities, free from state control. Here Johnson sided consistently with Marshall, yet the unique priority he assigned congress under the constitution had Jeffersonian overtones. Thus, in *Anderson* v. *Dunn* (1821), which upheld power in congress to punish for contempt, he based the implied powers of congress on a government's need of broad discretion in properly serving the people, and on elections as a check on arbitrary action.

By contrast, in seeking to narrow the range of the court's jurisdiction and likewise to widen the sphere of powers reserved to the states, Johnson differed from the majority. Said he, "State rights or United States rights are nothing, except as they contribute to the safety and happiness of the people." In concurring in *Gibbons* v. *Ogden* (1824), he defended broad regulative powers in congress; similarly, in *Ogden* v. *Saunders* (1827), over a rare dissent by Marshall, he supported power in the states to relieve distress. His emphasis on governmental power to regulate economic affairs, and on the advantages of co-operation between federal and state governments, anticipated developments of the 20th century.

Johnson exhibited his judicial independence most clearly while holding circuit court in his native Charleston. There, despite opposition, he declared illegal a ship clearance order of the Jefferson administration (1808), a state law severely regulating Negro seamen (1823) and an attempt by sponsors of state nullification of federal laws to refer the constitutionality of a protective tariff to a jury (1832). Learned and often prophetic, he was deeply concerned with legal justice for individuals and with the strengthening of the federal union; yet his restlessness, sensitiveness and impetuous manner of advocacy often enmeshed him in public controversy. Besides pamphlets and many articles in the press, he published *Sketches of the Life and Correspondence of Nathanael Greene* (2 vol., 1822). He died following surgery, in Brooklyn, N.Y., on Aug. 4, 1834.

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JOHNSON CITY, a city of Broome county, south-central New York, U.S., on the Susquehanna river, near the Pennsylvania border. It is situated between Binghamton (*q.v.*) and Endicott, the three comprising an industrial area known as the Triple cities. Johnson City is a leading centre for footwear and is significant also for felt goods, textile and wire spools, photoreproduction equipment and confectioneries. Surrounding agricultural lands are important chiefly for dairy products.

Formerly part of the Boston Ten townships, the site remained rural until the 1880s, when a shoe company constructed a new factory where Johnson City is located. The city was incorporated in 1892. For comparative population figures *see* table in NEW YORK: *Population*. (R. C. HE.)

JOHNSON CITY, a city of Washington county, Tenn., U.S., is located in the ridge and valley province of the northeastern part of the state, 21 mi. S.E. of Kingsport (*q.v.*) and 24 mi. S.W. of Bristol (*q.v.*). Early settlers moved into the area in the 1760s; soon thereafter farmers cultivated the land along the riverbanks, and ironmongers built forges and furnaces. The Washington county settlers' interest in politics and government was manifested by their participation in the formation of the Watauga association (1772) and the state of Franklin (1784–88) (*see* TENNESSEE: *History*). Johnson City started as a town in 1856 when a settler, Henry Johnson, for whom the city is named, built a warehouse at the junction of a stage road and a railroad. It was chartered as a city in 1869; this was revoked in 1879, and in 1885 a new charter was granted. The city has a council-manager form of government, in effect from 1939.

A number of industries, including hardwood flooring, textiles, hardware, chemicals, plastics, foundries, bedding and brick tile, have been developed. The county has small, diversified farms which also provide a supply of labour for industry.

Educational facilities include East Tennessee State college, established in 1909. A large Veterans administration unit (Mountain home) serves a five-state area. Nearby mountains and Tennessee Valley authority (TVA) lakes provide recreational facilities. For comparative population figures *see* table in TENNESSEE: *Population*. (F. B. W.)

JOHNSTON, ALBERT SIDNEY (1803–1862), Confederate general of the American Civil War, was born in Washington, Ky., on Feb. 2, 1803. He attended Transylvania university before entering West Point in 1822. After eight years of service, including action in the Black Hawk War, Johnston resigned his commission because of his wife's illness and engaged in farming. In 1836 he emigrated to Texas. Upon the outbreak of the Texas revolution against Mexico, Johnston enlisted as a private in the Texas army and finally rose to the rank of commander in chief. He became secretary of war of the Republic of Texas in 1838, a position he held until he retired again to his farm in 1840. During

the Mexican War (1846–48) Johnston served as inspector general of a Texas division of volunteers fighting under Gen. Zachary Taylor's command in the Monterrey campaign.

In 1849 he returned to the U.S. army as a paymaster with the rank of major and six years later assumed command of the 2nd (later 5th) U.S. cavalry in which his lieutenant colonel was Robert E. Lee. Command of an expedition against the Mormons followed in 1857, and Johnston became a brevet brigadier general for his successful suppression of Mormon opposition without bloodshed. Although placed in command of the Pacific department, he resigned his commission when Texas seceded from the Union in 1861.

After a harrowing summer march across the desert Johnston reached Texas and eventually arrived in Richmond, Va. He was appointed second-ranking general in the Confederate army by Jefferson Davis, whom he had known at West Point. He assumed command of the Western department on Sept. 10, 1861, and succeeded in raising and organizing an army to guard a long and weak line from the Mississippi river to the Allegheny mountains. His forces were no match for the superior numbers of the North, which caused the retreat from forts Henry and Donelson and from Bowling Green and led to the fall of Nashville on Feb. 25, 1862. Bitter criticism of Johnston did not affect Davis' confidence in him. Johnston concentrated his army at Corinth, Miss., determined to attack Grant at Pittsburg Landing. His strategy was almost successful in the surprise assault upon the Federals at Shiloh on April 6 and 7, 1862, but Johnston was mortally wounded in the first afternoon's battle.

Jefferson Davis repeated many times, "When Sidney Johnston fell, it was the turning-point of our fate; for we had no other hand to take up his work in the West." Subsequent events in this area proved the difficulty of finding a replacement who had the confidence of civilian and military leaders of the Confederacy, although it is doubtful whether even the skill of Johnston, who has been overrated, would have been sufficient to crush the overwhelming economic and military resources of the Northern invaders. *See* also AMERICAN CIVIL WAR.

See William Preston Johnston's biography of his father, *Life of General Albert Sidney Johnston* (1878); Avery C. Moore, *Destiny's Soldier* (1958). (J. R. Co.)

JOHNSTON, ARTHUR (1587?–1641), Scottish writer of Latin verse, was the chief rival of George Buchanan (*q.v.*) in this art. He was born at Caskieben, Aberdeenshire; studied and practised medicine in Germany, Italy and France; and after his return to Scotland was made royal physician. He died at Oxford in 1641. Johnston's Latin verse has a strong regional and Scottish flavour, and ranges from tragic to satirical and farcical themes.

See A. Johnston (ed.), *Delitiae poetarum Scotorum* (1637); W. Benson (ed.), *Psalmi Davidici* (1741); Sir W. D. Geddes (ed.), *Musa Latina Aberdonensis*, vol. i and ii (1892–95). (E. G. M.)

JOHNSTON, SIR HARRY HAMILTON (1858–1927), British administrator and explorer who was the first commissioner of Nyasaland, was unconventionally educated and gained his early African experience as a painter, natural history collector and freelance journalist. He was in Tunis in 1879–80, on the eve of the French occupation. In 1882–83 he traveled in Angola and up the Congo river, where H. M. Stanley was then laying the foundations of the Congo Free State. In 1884 he undertook a botanical expedition to Mt. Kilimanjaro, whence he advocated schemes for colonization and brought back a small land concession which proved of great importance in the delimitation of east Africa into British and German spheres.

In 1885 Johnston joined the consular service and spent three years in eastern Nigeria as a pioneer administrator in the Oil Rivers protectorate. Returning to London in 1888 he attracted the attention of Lord Salisbury, the British prime minister and foreign secretary, through whom he exercised much influence on British policy in Africa during the crucial years 1888–91. In particular, he became temporarily a close friend of Cecil Rhodes, and the intermediary between Rhodes and Salisbury in the extension of British rule over central Africa.

In 1889–90 Johnston made a remarkable journey to obtain the treaties on which British claims to Nyasaland and Northern Rhodesia were based. In 1891 he returned to Nyasaland as the first commissioner of the new protectorate, and in six years performed a brilliant feat of administration with few assistants and small funds. He was knighted in 1896, at the age of 38, and a great career was predicted for him. It never materialized. After two years as consul general in Tunis he was appointed special commissioner in Uganda (1899–1901), where he ruled with great distinction. Yet he was never again given a public post and spent his last 25 years in busy retirement as a scholar and writer. He was perhaps too brilliant and versatile in intellect, too sprightly and unconventional in manners to make a high official.

During his active career he had written several descriptive works, of which *British Central Africa* (1897) and *The Uganda Protectorate* (1902) are still well known. In retirement he added books and articles on history, politics, zoology, biography, autobiography, even novels. The greatest work of his later years was his *Comparative Study of the Bantu and Semi-Bantu Languages* (1919–22), an achievement of collection and classification which has earned him an enduring name among philologists. (R. A. OL.)

JOHNSTON, JOSEPH EGGLESTON (1807–1891), Confederate general of the American Civil War, was born near Farmville, Va., on Feb. 3, 1807. He entered West Point in 1825 and graduated in the same class with Robert E. Lee. After being commissioned in the artillery he held minor assignments along the east coast and participated in the Seminole War. Johnston resigned from the army in May 1837 but the outbreak of Indian war again in 1838 led him to return to the service as a topographical engineer. During the Mexican War (1846–48) he fought in the Veracruz expedition, gaining the rank of brevet colonel for meritorious conduct. Assignments with the engineers followed, and in June 1860 Johnston became quartermaster general of the U.S. army.

At the outbreak of the Civil War, Johnston resigned his commission and offered his services to Virginia. He became a brigadier general in the Confederate army in May 1861 when he took command of the Confederate army of the Shenandoah. As ranking Confederate officer at the first battle of Bull Run (Manassas), Johnston was credited with this first important Confederate victory (July 21, 1861). He was then promoted to the rank of general but was dissatisfied that he ranked fourth in seniority.

When the Peninsula campaign began in April 1862, Johnston withdrew south to defend Richmond. Although objecting to the strategy prescribed by Pres. Jefferson Davis, Johnston fought well against the northern forces. He was severely wounded at Fair Oaks (Seven Pines), May 31, 1862, and was replaced by Robert E. Lee.

In May 1863 Johnston assumed personal control of forces in Mississippi threatened by Grant's advance upon Vicksburg. He warned Gen. J. C. Pemberton to evacuate the city immediately to avoid Grant's trap, but President Davis ordered Pemberton to hold it at all cost. Lacking sufficient troops, Johnston could not relieve Pemberton, and Vicksburg fell on July 4, 1863 (*see* VICKSBURG). Bitterly criticized, particularly by President Davis, Johnston nonetheless took active command of the army of Tennessee in Dec. 1863, as the combined armies of the North advanced toward Atlanta.

For the main outlines of the famous campaign between Sherman and Johnston, *see* AMERICAN CIVIL WAR. Although subsequent events demonstrated the soundness of Johnston's strategy, new criticism caused his replacement on July 17, 1864, by Gen. J. B. Hood.

He remained inactive until restored to duty by Lee on Feb. 23, 1865. Taking command of his old army, now in North Carolina, Johnston succeeded in delaying Sherman's advance at Bentonville (March 19–21, 1865). Lack of men and supplies caused continued withdrawal, however, and Johnston signed an armistice on April 18 and then surrendered to Sherman at Durham Station, N.C., on April 26.

After the war Johnston engaged in business ventures, wrote his war memoirs, served in congress (1879–81) and was appointed U.S. commissioner of railroads by Pres. Grover Cleveland. He

died on March 21, 1891, in Washington, D.C.

Johnston was a superior organizer, well liked by his men, but a long-standing feud with Jefferson Davis caused him professional difficulty. His strategy was generally sound and more advanced in design than that of most Confederate generals. His inability to convince others of the wisdom of his position lessened his military effectiveness and was perhaps his chief defect.

See also references under "Johnston, Joseph Eggleston" in the Index.

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JOHNSTON, RICHARD MALCOLM (1822–1898), U.S. educator and author of local-colour fiction, was born near Powelton, Ga., on March 8, 1822, the son of a plantation owner. He graduated from Mercer university at Penfield (later at Macon), Ga., in 1841, read law in Augusta, Ga., and was admitted to the bar in 1844. Professor of rhetoric and belles-lettres at the University of Georgia at Athens, 1857–61, Johnston established a boys' school near Sparta, Ga., in 1862. It became known particularly for its disciplinary system, which incorporated features of the honour system. After the Civil War he moved his school to Chestnut Hill, near Baltimore, Md., where he conducted it under the name Pen Lucy school for a number of years.

From 1896 a clerk in the bureau of education, Washington, D.C., he prepared a study on early education in middle Georgia.

In his humorous stories Johnston vividly portrayed the people and country of his native state of Georgia, but at times he virtually ignored action and plot. *Dukesborough Tales*, four of which had been previously published as *Georgia Sketches* in 1864, was first published in 1871 and revised in a number of later editions. Other works included *Old Mark Langston, a Tale of Duke's Creek* (1884), a novel; *Mr. Billy Downs and His Likes* (1892), six stories; and *Autobiography of Col. Richard Malcolm Johnston* (1900) (he had received the courtesy title of colonel during the Civil War). Johnston died on Sept. 23, 1898.

JOHNSTONE, a small burgh of Renfrewshire, Scot., 9 mi. W. of Glasgow. Pop. (1961) 18,369. The town, though well planned on land at Easter Cochran, by the Black Cart river, in about 1781 by George Houstoun, the local laird, soon became a product of the Industrial Revolution as the cotton industry, suited to the moist air, made raids into the scenery. It became a burgh in 1857 and after World War I was much improved. Industries include engineering and the making of textiles, paper, nylon fishing lines, bootlaces and vermin traps. The village of Elderslie (1 mi. E.) is the reputed birthplace of Sir William Wallace, the Scottish patriot.

JOHNSTOWN, a city of Pennsylvania, U.S., 70 mi. E. of Pittsburgh, at the headwaters of the Conemaugh river. The business-industrial district lies within the narrow river valley, but much of the residential section is located several hundred feet above the central city. Located in a steelmaking and coal-mining area, Johnstown is the centre of a standard metropolitan statistical area comprising Cambria and Somerset counties. Pop. (1960) city 53,949; metropolitan area 280,733. The population of the city decreased slightly between 1920 and 1940 and at an accelerated rate thereafter, largely as a result of the mechanization of coal mining and the reduced market for coal; for comparative population figures *see* table in PENNSYLVANIA: *Population*. Approximately 6% of the population is foreign-born and slightly more than 3% is Negro. Although Johnstown was founded in 1800, it first became important as the western terminus of the Portage railroad, a series of inclined planes whereby canal barges on the state-owned Pennsylvania canal were transported piggyback on railway cars for 36 mi. over the summit of the Allegheny mountains. In 1861 the modern steel industry was born at Johnstown with the use of the Kelly converter (*see* CONVERTER STEEL) Other steel firsts developed at Johnstown include the first blooming mill for the breaking down of steel ingots and the first steel rails to be produced commercially. By 1873 Johnstown was the leading steelmaking centre in America. The city suffered a crushing blow on May 31, 1889, when a major upstream reservoir burst and sent a great wall of water crashing down the narrow river valley. Over 2,300 persons were drowned; 777 unidentified victims are buried in a single plot in Grandview cemetery. Flood property damage exceeded $10,000,000. Following another disastrous flood in 1936, the Conemaugh river was tamed by a multimillion dollar flood-control program.

Johnstown is no longer pre-eminent in steel production, but within this industrial complex coal is mined, coke is produced, open-hearth and blast furnaces operate and such finished products as steel plate, wheels, axles, freight cars and wire are fabricated. Inside the Johnstown market area a significant portion of the U.S. production of soft coal is mined yearly.

Johnstown college, a junior college branch of the University of Pittsburgh, was opened in 1927. A municipal stadium seats 17,000, while the Cambria County War Memorial building has a seating capacity of 5,500.

The Johnstown area has several parks. Many visitors join citizens in riding the inclined-plane passenger car that rises 500 ft. at a 71% grade from the business to the residential district. (R. L. LE.)

JOHN WILLIAM FRISO (1687–1711), prince of Nassau-Dietz and of Orange, born at Dessau, in Anhalt, on Aug. 14 (new style; 4, old style), 1687, the son of the stadholder and captain general of the Dutch provinces of Friesland and Groningen, Henry Casimir II. At his father's death in 1696 the young boy succeeded to his functions under the guardianship of his mother, Henriette Amalia of Anhalt-Dessau. He grew up in Leeuwarden and later studied at the universities of Franeker and Utrecht. His first cousin once removed, the childless William III of Orange (also king of England), in his testament of 1695, named John William as his successor in all his hereditary possessions on the European continent. After William III's death (1702) the provinces of the Netherlands, of which he had been hereditary stadholder, refused to appoint John William to that function, and Frederick I of Prussia (William III's first cousin) disputed the succession to the personal inheritance and to the title prince of Orange. In 1707 John William was declared of age. He distinguished himself as a general in the War of the Spanish Succession but failed completely to acquire political influence outside his own provinces. He was accidentally drowned on July 14, 1711, when crossing the Hollands Diep on his way to The Hague. In September his wife gave birth to a son, William IV of Orange, afterward stadholder general of the United Provinces. (E. H. K.)

JOHORE, a state of the Malaysia federation and a constitutional sultanate. The southernmost of the states of Malaya, it is the third largest of these in area (7,330 sq.mi.) and in population (estimated at 1,064,800 in 1961). The capital is Johore Bahru. The terrain is two-thirds forested and includes large areas of swamp which historically hindered links with the rest of Malaya and prevented rapid development. Hence Johore's economy is the least typically Malay in the federation. Less than 1,000 persons farm rice. The state has more than 1,000,000 ac. of rubber, half in small holdings, and its rural population is 79% Chinese, a larger proportion than any other sultanate, though in the state as a whole the Chinese constitute only 42%. Johore Malays (48%) were fishermen until early in the 20th century; many were Malays of Sumatran stock who had entered in the previous 60 years. Chinese immigration giving rise to a western-style economy began in the mid-19th century as a penetration from the coast along the rivers by pepper farmers, and became a great flow when the railway from the tin and rubber belt was extended through Johore in 1919 to reach Singapore. Commodity movements are now mainly by road, including a west coast route to Malacca, an inland route to Kuala Lumpur and an east coast route to Mersing, all radiating from the causeway to Singapore. The state's economy has depended on Singapore's trading facilities, its own shallow coasts being without good harbourage. Mersing, Bandar Penggaram (Batu Pahat) and Bandar Maharani (Muar) are fishing towns and ferry points for road traffic. Along both railways and roads are strung Chinese-populated market towns, the largest being Kluang

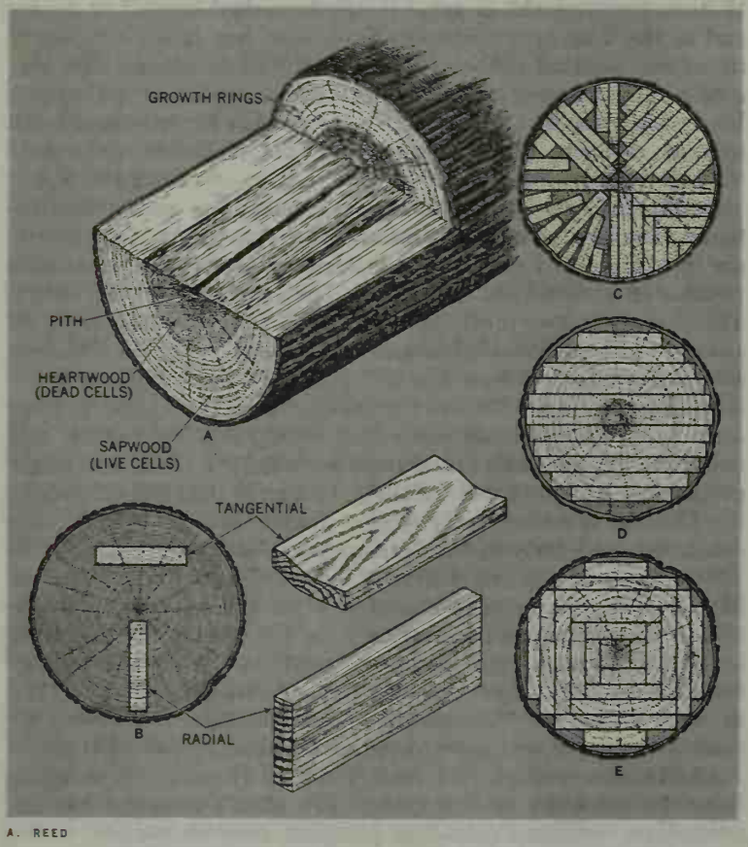
(51,000) and Segamat (18,000), both central to rubber-growing regions and retaining a pioneer atmosphere. During the guerrilla warfare in the Johore jungles from 1948 to 1952, Chinese smallholders were resettled into dozens of new villages constructed along the roads, thereby increasing Chinese political significance.

Tin is unimportant but most of the Malayan bauxite produced is from Telok Ramunia in southwest Johore and iron mining goes on behind Batu and Endau. Large plantations of oil palm are near Labis and Kulai in central Johore and most Malayan commercial pineapple production is from small holdings behind Pontian. Johore is mostly part of Singapore's hinterland, its economic relations with Pahang to the north being negligible. Production in the vicinity of Segamat was increasingly drawn to Port Swettenham, with which there is good road connection. Several rocky islands lie offshore in the South China sea, unused except by Malay fishermen. Off Pontian to the west the swampy island of Pulau Pisang has a population of Chinese fishermen trading with Singapore. A substantial amount of fish, pigs, eggs and fruit moves from Johore into the Singapore markets. *See* also JOHORE BAHRU; MALAYSIA. (E. H. G. D.)

JOHORE BAHRU, the capital of Johore state in the Malaysia federation, stands on low hills beside the strait which separates Malaya and Singapore Island. At this point all Malayan transport crosses a stone causeway, the sole route across the strait which there narrows to ½ mi. and is mangrove-free. Pop. (1957) 74,909 (49% Chinese).

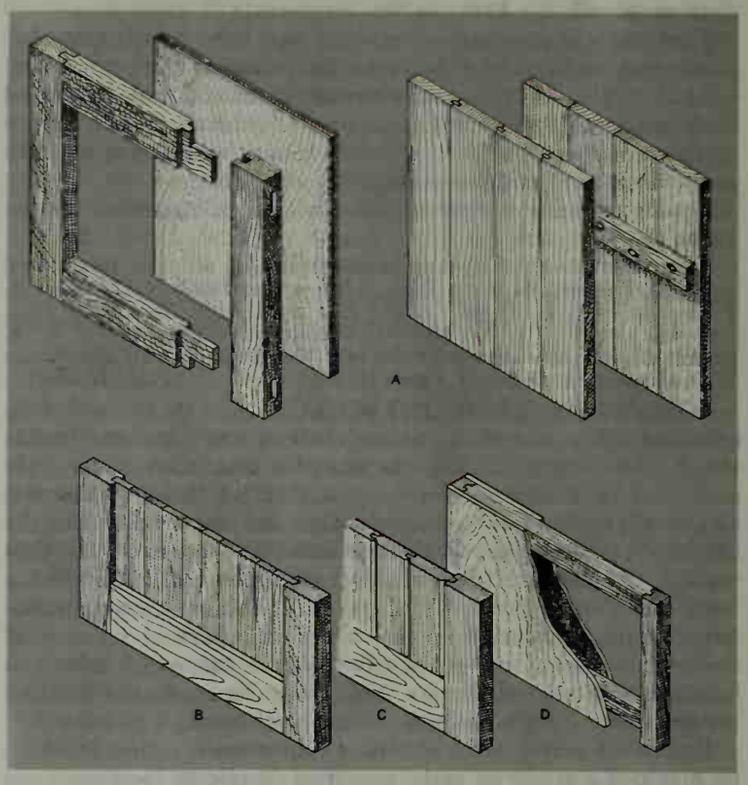
Johore Bahru has long been a trade outlet from the mainland to Singapore. The town has a semirural atmosphere, its people using the amenities of Singapore city, of which it is almost a satellite. There is a boulevard along the strait. Johore Bahru, barely a century old, has replaced Johore Lama (Old Johore), now a village (pop. 3,400), about 18 mi. E. (E. H. G. D.)

JOINERY, a term defining all the exposed woodwork in a building and including all wrought timber items which are primarily fittings and not part of the essential structure of the building (*see* CARPENTRY); joinery also includes, however, a number of essential structural items in a building such as doors, windows and staircases, as well as fittings such as paneling. Most joinery items are made in a workshop and taken to the building site, where only adjustment and final fixing are required. Although much joinery is made by hand, the greater part is produced by machinery. But it is the material rather than the special techniques required for machine or hand manufacture which plays the greatest part in the production of joinery work.



A. REED

FIG. 1.—CONVERSION OF TIMBER: (A) PARTS OF GROWING TREE; (B) CROSS SECTION OF TREE BOLE SHOWING HOW TANGENTIAL SAWING RESULTS IN GREATER WARPING THAN RADIAL CUT; (C) RADIAL OR QUARTERSAWING METHOD OF CONVERTING TIMBER; (D) THROUGH AND THROUGH METHOD; (E) TANGENTIAL METHOD



A. REED

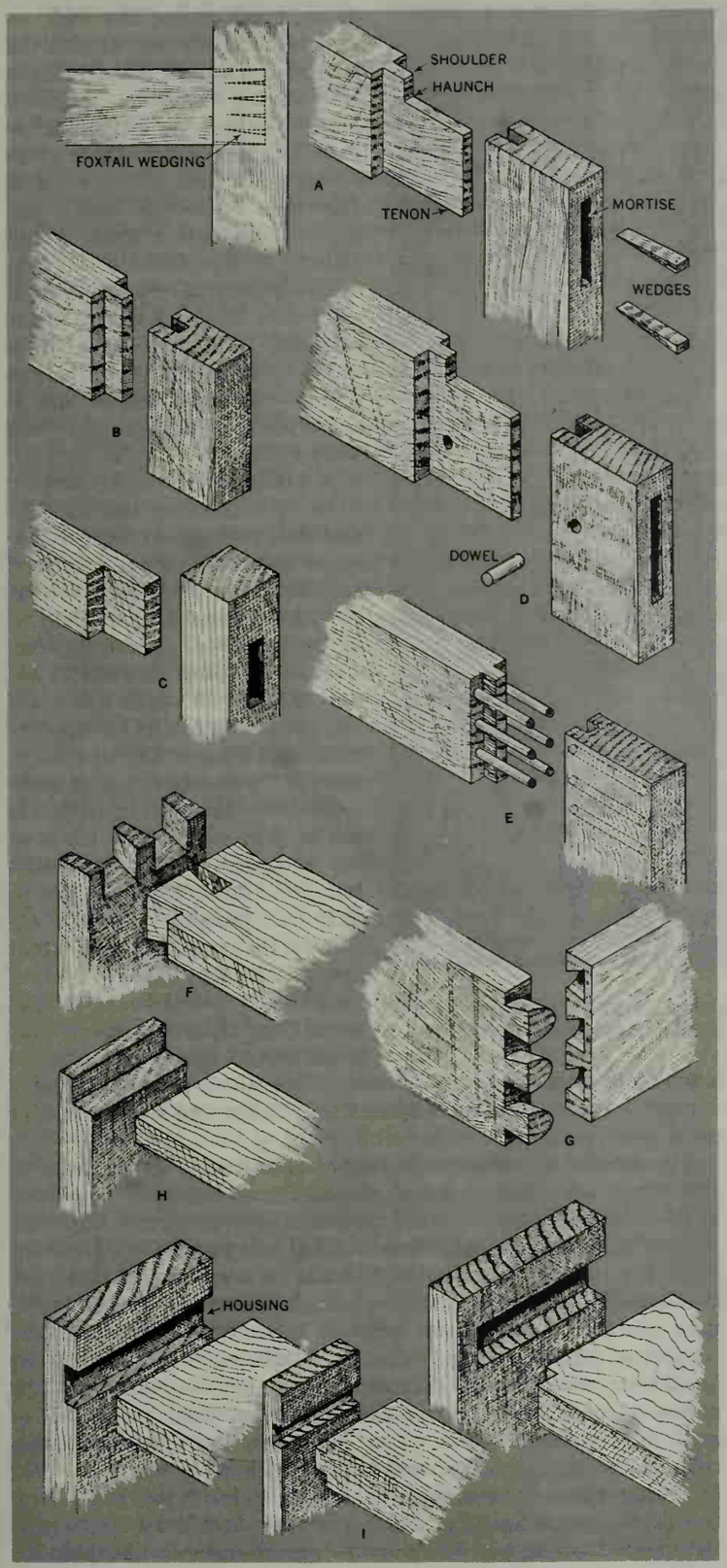
FIG. 2.—ELEMENTS OF JOINERY CONSTRUCTION: (A) METHOD OF BUILDING UP LARGE FLAT AREA ON BASIC MORTISE-AND-TENON FRAME USING SINGLE BOARD, JOINTED BOARDS AND BOARDS WITH SLOT-SCREWED JOINTS; (B) PANEL WITH ELEMENTS FREE TO MOVE IN REBATED FRAME; (C) PANEL WITH FREE BATTENS; (D) PANEL WITH PLYWOOD SKIN ON FRAME

Wood, being a natural material, is not uniform in quality. The moisture content, present in the tree as an element of growth, is uneven in the cut wood. Most building materials are subject to moisture and thermal movement; this is often quite small and can frequently be accurately predicted. Absorption and loss of moisture subject timber to considerable and variable movement, to which the joining and framing of joinery members must be closely related. Because wood is widely distributed and locally available it has always been popular as a building material and its working has reached a high standard of finish and design. The first signs of improvement in domestic comfort are associated with the increased use of timber for paneling, seats and flooring. Man's experience has helped him produce the most suitable joints and framings for the joiner's standard tasks and many of these, together with the tools used, have hardly changed in centuries. But in a useful material such as wood, experience and study have shown better or more efficient ways of working, and the 20th century has seen extensive developments in joinery associated particularly with machine production and the use of plywood, veneers and new types of glue.

Joinery Tools.—In his work the joiner uses a great variety of hand tools that have been modified only by slight improvement from time to time and by the advantage that modern steel can give to cutting edges. The principal groups are:

Planes.—Used for removing rough surfaces and for reducing to size, planes are made of wood or iron in a wide variety of sizes. Special plow or grooving planes are used for forming channels and grooves and a wide variety of planes has been traditionally used for running special moldings.

Saws.—Hand saws are used for cutting either with or across the grain, while tenon and dovetail saws are used for fine accurate work. The bow saw, keyhole saw and pad saw are used for spe-



A. REED

FIG. 3.—BASIC TIMBER JOINTS: (A) HAUNCHED MORTISE AND TENON, WITH CROSS SECTION SHOWING ALTERNATIVE FOXTAIL WEDGING; (B) STUB TENON; (C) BAREFACED TENON; (D) DOWELED TENON; (E) DOWELED JOINT; (F) HAND-CUT COMMON DOVETAIL; (G) LAPPED MACHINE-CUT DOVETAIL; (H) REBATED JOINT; (I) THREE VARIETIES OF HOUSED JOINTS

cial tasks involving cutting curved surfaces or forming holes.

Chisels are used for cutting away wood not required in the formation of joints. There is a wide variety of sizes according to the work to be done. The gouge is a special form of chisel for circular cutting.

Hammer, mallet, screwdriver, bradawl, gimlet, pincers and *pliers* are small tools used for making holes, fixing screws and driving nails.

There is also an extensive group of tools used to help to set the work out and keep it true. This group includes:

Try square, for testing the right angle between surfaces and for squaring lines across material.

Bevel, for testing angles other than right angles and for marking lines inclined to the surfaces of the material.

Gauges, for marking lines parallel to the surfaces of the material.

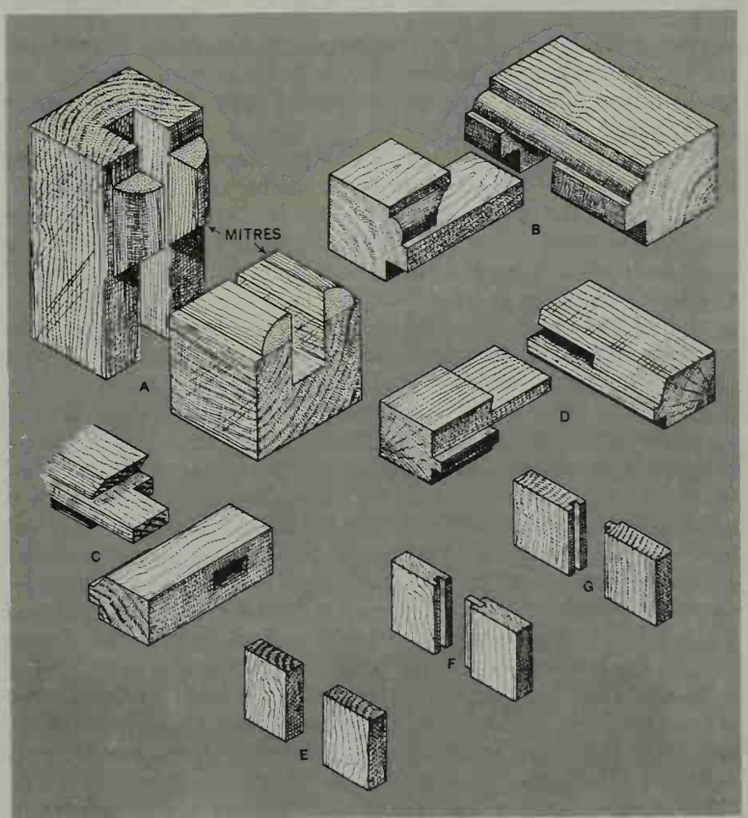
Powered hand tools, a wide range of tools used by hand but powered electrically. These enable specialized work to be carried out quickly where it would not be easy or economical to use a large woodworking machine. They are also useful on building sites for repetition cutting where hand labour would take too much time.

Woodworking machines, a wide range of shop machines for planing, thicknessing, drilling, etc., and for carrying out grooving operations, usually called routing, formerly done by hand.

Selection of Timber for Joinery.—The particular characteristics of different timbers should be understood, for they vary enormously both in appearance and in the ease with which they can be worked. Correct selection is necessary both in regard to use and economy. For example, some timbers come in certain standard size limits and designing in these must always take into account the amount of waste which any particular section will produce. Some timbers have long traditional associations: the native English oak was used almost without exception for both framing and joinery work in the middle ages and has come to be regarded as a suitable material for church work, etc.; before World War I, Honduras mahogany was widely used for high-quality finishing in public and commercial buildings.

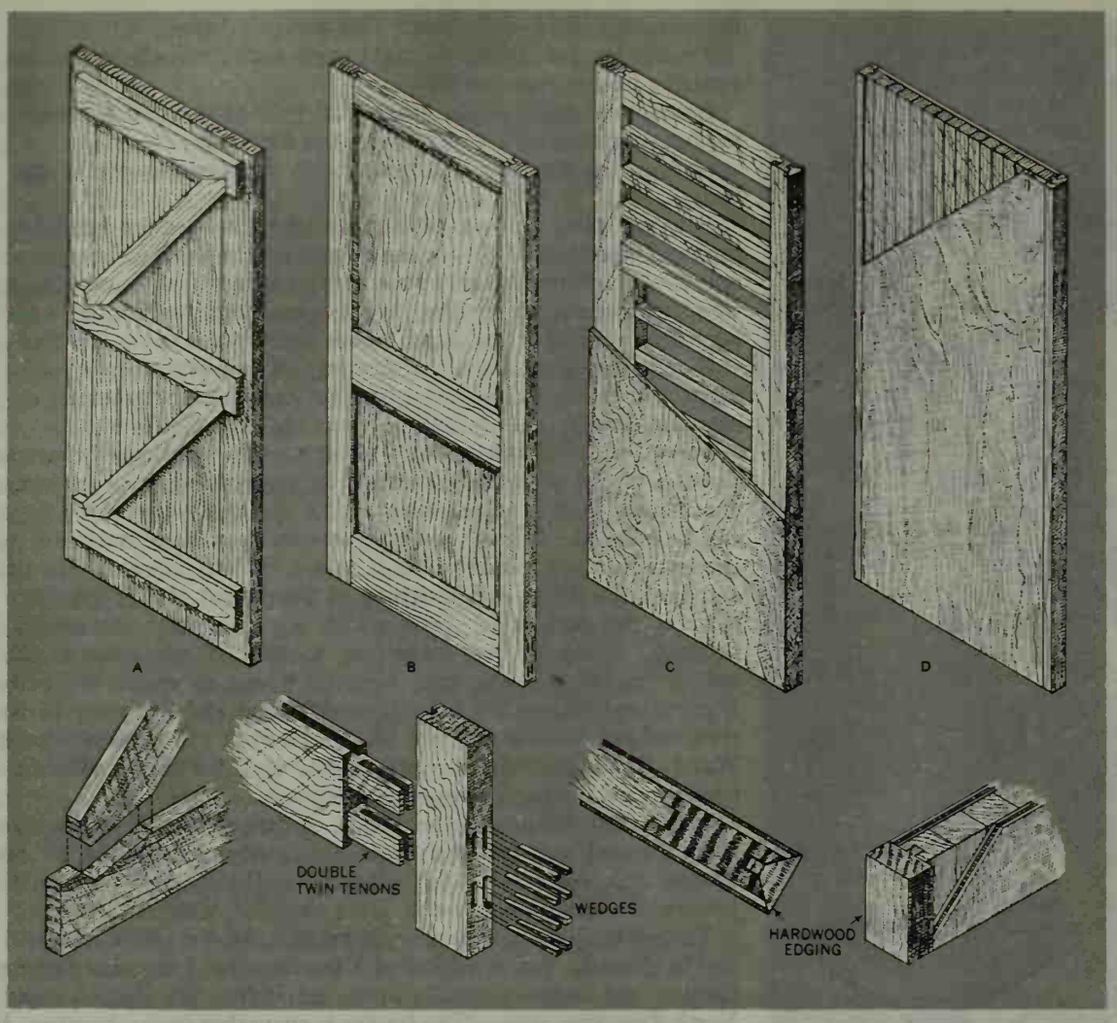
In the 20th century better means of transport and conversion have allowed well-forested areas previously unexploited to be opened up. Notable in this category is the extensive range of joinery timbers now exported from east and west Africa.

Timber for joinery is usually classified under the terms softwood and hardwood. Softwood includes the timbers of the pine and fir families and comes generally from the Baltic, Scandinavian and North American areas. The timber is converted in the country of origin and exported in scantling; *i.e.,* lengths of rectangular section



A. REED

FIG. 4.—BASIC CORNER AND BUTT JOINTS: (A) HAUNCHED TENON WITH MOLDING MITRED; (B) MORTISE AND TENON WITH MOLDING SCRIBED; (C) HAUNCHED TENON WITH SPLAY SCRIBED; (D) COMBED JOINT WITH SPLAY SCRIBED; (E) COMMON BUTT JOINT; (F) BUTT JOINT WITH LOOSE TENON; (G) TONGUE-AND-GROOVE JOINT



A. REED

FIG. 5.—COMMON DOOR TYPES WITH DETAILS OF CONSTRUCTION: (A) LEDGED AND BRACED DOOR; (B) FRAMED AND PANELED DOOR; (C) FLUSH PLYWOOD ON HOLLOW CORE; (D) PLYWOOD ON SOLID LAMINATED CORE

usually graded for quality. Softwood of this type is used for framing and for much joinery that is to be painted, although selected timber of this sort can be treated with clear varnishes or polishes and left exposed.

The trade in hardwood is much more complicated as there are innumerable varieties grown in many countries. Hardwood timber tends to have specialized uses and it is therefore exported and marketed in many forms. Often it is held by the merchant in log form or sawed into special sizes associated with the uses to which it will be put. The timber may, on the other hand, be exported as strip for flooring or in veneer form. Hardwood timbers tend to vary much more than softwoods both in physical quality and colour, and selection is often an important element in any job.

Movement in Timber.—As already mentioned, the problem of movement in timber is of the greatest importance, and knowledge of the way in which it takes place is essential in the proper design of joints and members. A tree is an elaborate and complicated structure of cells which extract food from the soil in water solution. At the moment a living tree is felled for timber it contains a large amount of water. The subsequent extraction of this water, a process known as "seasoning," causes the cells to shrink. Seasoning should continue until the amount of moisture in the timber has been reduced to a point at which the subsequent shrinkage is so small as not materially to affect the dimension of the timber after it has been worked and incorporated into a piece of joinery. Shrinkage is not, however, a simple process. Trees are built up in circular form and, most timber sections being rectangular, the fibres of the wood are found at greatly varying positions even in the same piece of wood. The process of "conversion" or reduction of the tree to plank or scantling is therefore complicated, since the same timber will shrink in different ways according to the manner in which it is cut from the log.

A tree (*see* fig. 1) grows by the process of building up a layer of sapwood under the bark in each growing season, forming the well-known annual rings. As the tree grows, the inner rings no longer convey the sap or moisture, and the cells in these rings become inactive. This wood is known as heartwood and is the part of the timber used by the joiner. The part which still contains sap-bearing cells is known as sapwood. Since it contains softer material and more food, it is liable to early attack by fungus and wood-boring beetles and is therefore not used in the best work.

A log is converted by sawing it in various ways; the simplest and most economical, since it produces the least waste, is termed "through and through" or flat sawing. The other main method is by radial or quartersawing. The method of sawing affects not only the way in which the board will shrink but also its appearance; this is especially true in the case of hardwoods having elaborate fibre (grain) formation. It can be seen (fig. 1) that the sawing of boards causes the distribution of the fibres (grain) to vary considerably. At the extremes, the board is sawed either tangentially or radially. Since a tangentially sawed board shrinks more than a radially sawed one, a flat-sawed board will tend to warp more than a quartered board. Thus although quartersawing is more wasteful it produces more stable timber and is preferred for good work.

The amount of moisture in timber is expressed as the ratio of the weight of water to wood, the moisture content. In a tree at the time of felling this is likely to be 30% or more. Exposure to drying in the air (natural seasoning) will reduce this to about 18%, the state at which an equilibrium is reached with the relative humidity of the atmosphere. Modern centrally heated buildings, however, have a lower relative humidity and the moisture content of joinery timbers to be used under such conditions must be further reduced artificially in kilns to about 8% or 9%. The moisture content of timber then can be controlled by natural or artificial means with some ease. However, if the moisture-laden cells of timber can be induced to part with water, they are only too ready, when circumstances change, to reabsorb it. In addition to this, the condition of a building into which joinery is placed is not in itself stable, and there is a continual and ever-changing adjustment between the timber and its surroundings as to the amount of moisture the timber contains and therefore the amount of movement which is likely to take place in any particular member of a joinery framing. In the selection of timber, a balance must be achieved between the type of the timber, a reasonable degree of control over its moisture content and the design of joints and members to reduce the movement in the wood.

It is common practice to cut the members of a joinery unit, form all the joints, etc., and then leave them for several weeks to allow further air seasoning to take place before the joints are finally completed. Timber will always give up moisture after machining and will therefore be liable to shrinkage because more cells are exposed to the air; nor is time in itself entirely a cure for this. English oak will shrink and distort if reworked or repaired even though it might be several hundred years old.

Principles of Construction.—Long experience in the characteristics of wood and in the behaviour of joinery units has produced accepted methods for making the most commonly used joinery items. If no special instructions are given, most joiners will make a casement window and frame or a door of traditional design in the same way. Joinery members, to be satisfactory from a structural point of view, should have the necessary strength and therefore must be put together with the most suitable joints so that the inherent disadvantages of timber itself are reduced to a minimum. This situation is further complicated by the fact that in order to reduce movement in members, most joinery units are composed of a number of small members and consequently the number of joints required is increased. A balance of these factors in design is required, together with skill in making and assembling the parts. There are two basic elements: the construction of frames for doors, windows, panel surrounds, etc.; and the construction of flat areas such as the panels of doors, wall paneling and the tops of cabinets. In the frame, the objective is to join four pieces of wood so that the frame remains square and there is as little shrinkage as possible. Shelves are examples of flat areas and are often small enough to be obtained from single pieces of wood. Where larger flat areas are desired, two or more pieces must be joined. This may be done in such a way that each individual piece may move on its own, or the large area will move as one piece (*see* fig. 2). In the latter type of framing, battens are formed with screwed joints in slots to permit one member to move relative to the other. Many of the disadvantages of large flat areas formed in this way may be eliminated by the use of plywood skins on frames or laminated boards.

Basic Timber Joints.—The object of the joint is to fix two members together so that the joint has the greatest possible mechanical strength and is as unobtrusive as possible. There are many joints in use although they fall into only a few basic groups, many being variations and elaborations on fundamentally simple ideas (*see* fig. 3). Practically all are based on hand work and with few exceptions most machine-made joints follow the traditional patterns; most joints rely to a considerable extent on a combination of mechanical fit and the use of glue for their strength. Some are only dependent on wedging or pinning and a few only on gluing. Almost the only joint which is of machine origin and which relies on glue for its ultimate strength is the "combed" joint (*see* fig. 4). The actual joint must be made in the wider dimension of the member. If it relies on the use of glue, the areas available for gluing should be as extensive as possible and if used externally must be designed to resist dampness. Junctions should be as nearly invisible as possible so that if there should be shrinkage due to moisture movement, the gap will not be apparent. Allowance must be made for movement and for the insertion of wedges to tighten up the joint. From the point of view of economy, joints should be designed that do not waste wood or require a large number of operations in making or assembly.

Animal (or Scotch) glue is still widely used; it must be used hot but its chief disadvantage is that it is not waterproof. For this reason the development of modern glues has been in the direction of greater strength and weather resistance, as seen notably in casein glues and synthetic resin glues. (*See* also ADHESIVES.)

Mortise and tenon joint, to join a horizontal member with the vertical member of a frame, is one of the most widely used joints. The tenon, usually a third of the total thickness of the member, passes into the slot or mortise so that there is enough timber at the top and bottom to enable wedges to be driven in to tighten the joint. A pin or dowel may also be used to secure the joint. Where the vertical member (stile) does not continue past the horizontal member (rail) as in the top and bottom members of a door (*see* fig. 3), the tenon must be "haunched" in order to leave enough timber at the top of the stile for wedging. In cabinetmaking and highly finished joinery, foxtail wedging may be used. There the wedging is "secret" or hidden; it is expensive and requires considerable skill in assembly as, once the joint is made, it cannot be taken apart. In thick sections, as in heavy doors and frames, tenons are often doubled; in wide members, twin tenons may also be used (*see* fig. 5). The principle is the same as for a single tenon but the reduction in the size of the tenons offers more opportunity for wedging and less danger of twisting.

Doweled joint, an alternative form of mortise and tenon, is commonly used in factory-made joinery and mass-produced fittings.

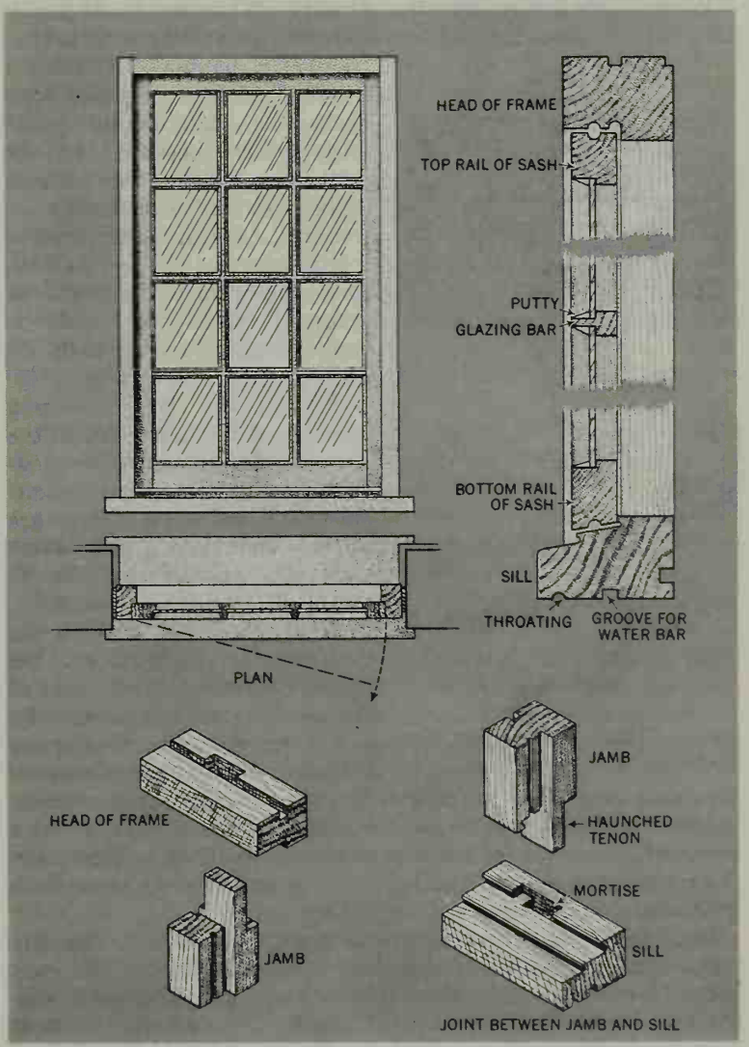
Combed joint, as mentioned above, is especially adapted to machine production.

Dovetail joint, used for joining two flat members together at right angles, as in drawer construction or at the corners of a bookcase, may be cut by hand or machine.

Rebated joint is easily made but not very strong; it is suitable for light construction such as boxlike members and for receiving the backings to fitments; it is also used in small drawers.

Housed joint is widely used in furniture and fitment construction; for example, to take the shelves in a bookcase. It is not mechanically strong but conceals the end grain of the housed member and provides support for light loads. For joining flat boards to form table tops or similar large areas, *edge-to-edge* or *butt joints* (*see* fig. 4) are often used. They rely only on the adhesion of the glue; to make the joint stronger, tongued (loose) or tongued and grooved boards are used.

Doors.—One of the commonest joinery items, doors may be made in several ways (*see* fig. 5) but the essential requirement is that the frame should remain square and not sag away from the hinge. The ledged and braced door is the simplest form, the covering usually being tongued, with grooved boarding nailed to horizontal ledges. Braces keep the shape and prevent sagging. The framed and paneled door is the simplest form employing a framed construction. It has twin tenons and may be elaborated in various ways by the addition of extra rails and panels; the latter may be either filled with wood or similar solid flat members, or glazed. The flush door is very popular because of its freedom from ledges and other dust traps. It is ideally suited to mass factory produc-



A. REED

FIG. 6.—CONSTRUCTION DETAILS OF CASEMENT SASH WINDOW

tion and large numbers are produced in standard sizes. Two main types are made: those having a light frame covered with a plywood skin, and those with a solid core built up of narrow strips of softwood with a plywood covering. Glazed areas may be provided, as well as fixings for locks, etc. The edges of flush doors of either type are usually lipped with a hardwood strip.

Windows.—For the joiner the most difficult task in window construction (*see* fig. 6) is to ensure good weather resistance and air tightness. Careful adjustment is necessary to ensure that the window is close-fitting but at the same time will not stick because of the swelling of the wood from exposure to rain. Windows are particularly vulnerable to changes in weather conditions since they are usually exposed to considerable variation in temperature and moisture condition on each face. Weather checks must be incorporated in the bottom rails and underneath sills.

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JOINT CHIEFS OF STAFF, the principal military advisers to the president of the United States, the secretary of defense and the national security council. The joint chiefs of staff (JCS) was created in 1942 to assist the president in directing the U.S. forces in World War II. After the war the JCS was given statutory recognition and a full-time staff. The JCS consisted of four members —the army chief of staff, air force chief of staff, chief of naval operations and a chairman. The commandant of the marine corps was authorized to sit as a member of the JCS when matters of direct concern to his corps were discussed. *See* STAFF, MILITARY.

JOINT FIR (JOINT PINE): *see* EPHEDRA.

JOINTS, in engineering, are places or parts which join stationary or moving parts. They may function to prevent leakage, transmit force or both.

Wood joints are nearly all stationary. They are made partly fluid-tight by grooving and tenoning and by caulking with oakum or similar material. The wood swells when it is saturated with water, the edges of the joints press closer together and the joints become tighter. Where timber is used structurally to transmit loads, compression joints can be simply formed. The contact surfaces should be accurately fitted and should be normal or nearly normal to the direction of the force transmitted. Owing to the weak shearing strength of wood parallel to the grain, tension joints will be satisfactory only if made using suitable metal connectors. These are of the following types: shear plate (fig. 1), split-ring (fig. 2) and bulldog (fig. 3). The bolts, where used, do not bear on the timber but serve only to hold the joint assembled. In the case of the shear-plate connection the load is transmitted in shear by the bolt, but the bolt bears only on the metal shear plate to transmit this force. If the timber pieces, in tension, which are to be jointed are simply bolted together with steel bolts, the stresses become extremely localized in the immediate neighbourhood of the bolts. This will tend to cause both bearing and shear failures in the timber.

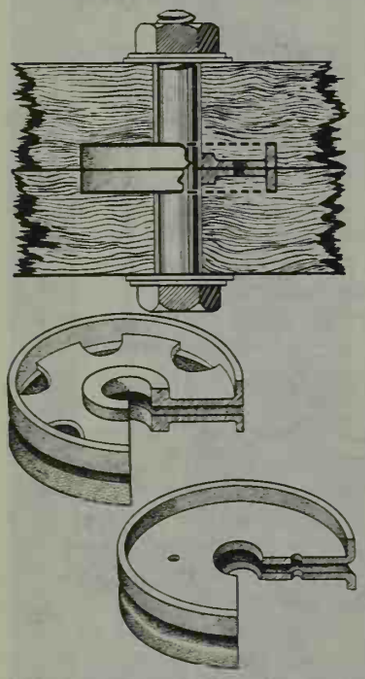


FIG. 1.—STEEL SHEAR-PLATE CONNECTORS

Steel and the other commonly used metals possess in variously high degrees the qualities desirable in jointing materials. The joint ends of metal pieces can be fashioned to any desired form or size. Metallic surfaces can be machined evenly to ensure the closest fit over their whole areas of contact. This is of the highest importance, especially in joints designed to transmit a force or an electric current. Mild steel is especially suitable for joints when there is not continuous rapid motion. Where such motion occurs, a bushing or layer of brass, bronze, or either of these metals coated with a low-friction alloy, such as white metal, is inserted (fig. 4). The joint then possesses the good frictional qualities of the bush surface. Leakage past moving metal joints can be prevented by cutting the surfaces accurately to fit each other. Steam-engine slide valves and their seats, and piston packing rings and the cylinders in which they work may be cited as examples. A subsidiary compressible packing is sometimes employed in stuffing boxes, which prevent the escape of fluids through joints. Fixed metal joints are made fluid-tight by: (1) caulking a riveted joint, *i.e.*, by hammering in the edge of the metal with a square-edged chisel; (2) the insertion between the surfaces of a layer of various jointing compounds; (3) the insertion of a layer of soft solid substance called packing, insertion or gasket. Metal parts may also be joined by soldering, brazing or welding. Soldered joints are used mainly for electrical connections and are made by heating the parts to be joined and adding molten solder, which, on cooling, solidifies and adheres to both metal surfaces, thus jointing them together. The metal faces to be joined must be first cleaned and smeared with a suitable flux. The solder is an alloy of tin and lead. Most metals can be joined by soldering; aluminum and its alloys, however, require special solders. The brazing process is similar to the soldering process, but brass or bronze is used as the added molten material instead of solder. Welding may also be carried out in a similar manner, but the added metal in this case will be identical with that of the parts joined, usually steel. Lead in plumbing can be satisfactorily welded in the same way (lead-burning). The necessary heat is provided by a torch supplied with oxygen and acetylene, hydrogen or other inflammable gases under pressure (gas welding), and the added metal

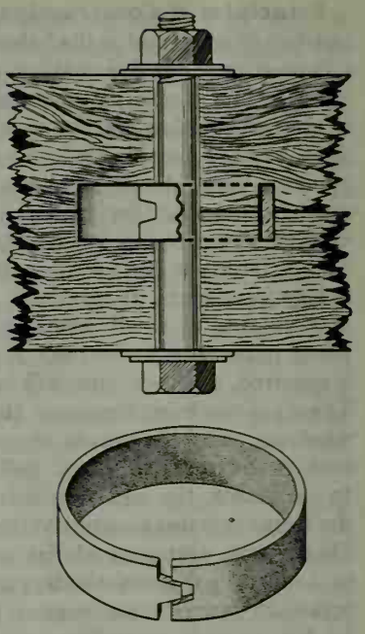


FIG. 2.—SPLIT-RING CONNECTOR

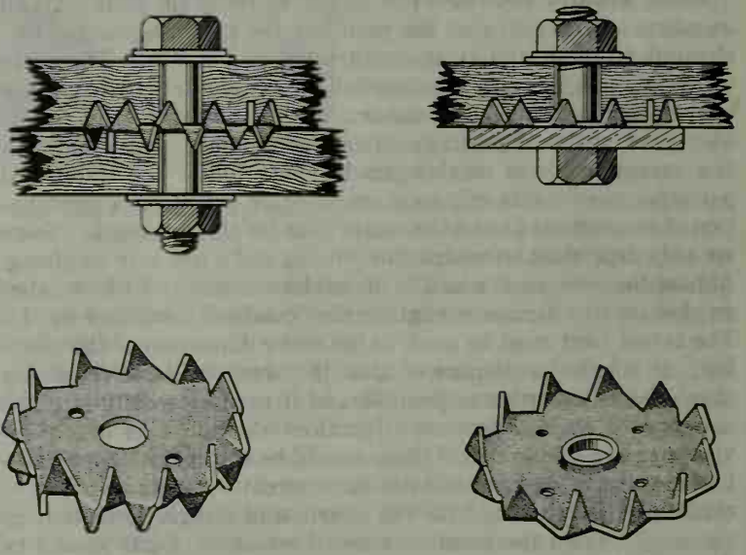


FIG. 3.—DOUBLE-SIDED AND SINGLE-SIDED BULLDOG CONNECTORS

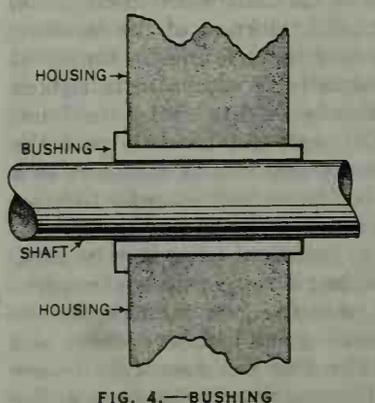


FIG. 4.—BUSHING

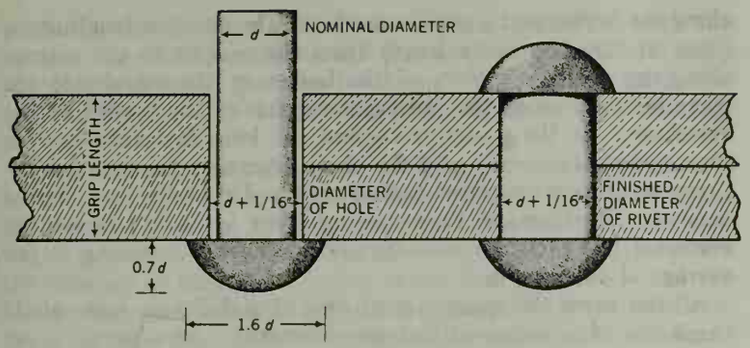


FIG. 5.—SNAPHEADED RIVET

melted from a filler rod or wire. Alternatively the heat may be supplied by an electric arc. The arc may be struck between the work piece on one hand and either the filler wire or a separate electrode (usually of tungsten) on the other. The arc and the pool of molten metal must be protected from the atmosphere. This is achieved either by means of a flux coating of the filler rod when this is used as an electrode or by means of an envelope of inert gas, such as argon, helium or carbon dioxide, when a separate electrode is used. A third type of weld is termed a pressure weld, in which no metal is added. The parts to be joined, which must be of similar metal, are heated by flame or electric current to a welding (almost melting) temperature and pressed together. Local spot welds are made using round pointed copper electrodes and continuous seam welding by using copper wheels as electrodes. Pressure welds may be made in aluminum at room temperature.

Apart from the above joints and glued or cemented joints, most joints are formed by cutting one or more holes in the ends of the pieces to be joined and inserting pins in these holes. The word "pin" is technically restricted to mean a cylindrical pin in a movable joint. The word "bolt" is used when the cylindrical pin is screwed up tight with a nut so as to be immovable. The word "stud" is used when the pin is screwed into or welded to one part, and a second part is held by a nut screwed on to the other end of the pin. When the pin is not screwed, but is fastened by being beaten down on either end, it is called a rivet (fig. 5). The pin is sometimes rectangular in section and tapered or parallel lengthwise (*e.g.*, gibs and cotters). Bolts are also used in friction grip joints, *e.g.*, in the connection of the two members of a structural steel frame. In this case the shanks of the bolts do not act as pins but as tension members providing the compressive force across the friction surfaces. The degree to which the nuts are tightened in this type of bolted joint is of direct importance to the strength of the joint. For this reason various methods are used to bring on the nuts to the desired tightness. These methods fall into three groups: (1) the use of a torque wrench to tighten the nut; (2) the use of a groove in the bolt forming an extension of the bolt beyond the nut, by means of which the bolt may be tightened into the nut until the extension shears off at the groove (fig. 6). This shearing will occur at a predetermined torque; (3) the use of a small area of material in compression inserted between the nut and the joint; this material will yield at the predetermined tension in the bolt. The inserted material can take the form of raised areas on the underside of the nut. (A. Rd.)

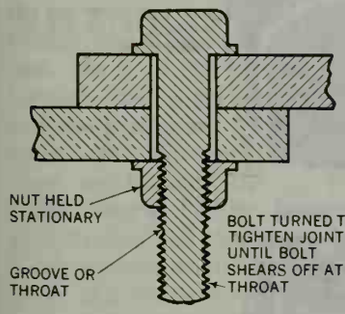


FIG. 6.—TORQUE-CONTROLLED BOLTED JOINT

JOINTS, in geology, are the dividing planes by which nearly all rocks are traversed more or less completely and which extend in various directions and at various inclinations, generally at a high angle, to the horizontal. Unlike faults, joints are fissures where little or no movement between the blocks has taken place, though the presence of slickensides—striae on the smooth faces—show that in some cases there has been some rubbing movement. Jointing cannot extend to a very great depth: for toward the base of the zone of fracture, estimated by the U.S. geologist, C. R. Van Hise (1857–1918) at about 12 km. in rigid rocks, joints and faults cannot form since the rocks tend to flow in relief of strain.

In unweathered rocks, joints, though present, are inconspicuous, but on weathering become marked, especially in a soluble rock, such as limestone. Sedimentary rocks usually show two sets of joints perpendicular to the bedding and to one another, one set in the direction of dip, the other of strike. The more prominent set, if well developed and running for long distances, forms a set of *master joints.* Individual fissures cannot be traced very far, since joints run into one another, though their approximate general parallelism is evident. The distance between joints varies from an inch or so to several yards: in alternating strata the degree of jointing may vary from bed to bed. In igneous rocks jointing is generally quite irregular, but in granite two vertical sets at right angles to one another, with another set of cross joints approximately horizontal, are frequently found. These cross joints are of a different origin: they are the effect of weathering since they conform to the surface of the ground and die out with depth. Intrusive sills and dikes in many places show a columnar structure perpendicular to the cooling surfaces, where jointing has been so symmetrical that the sheets weather out into polygonal prismatic columns. In the Giant's Causeway (*q.v.*) the columns are hexagonal, implying three equally developed sets of joints.

Near the surface, joints are more or less open, especially in limestones. Solution by percolating water controlled by joints has led to the formation of large caves and underground rivers several miles in length. Highly jointed rocks are objectionable as a source of potable water, since such water is likely to be contaminated by surface impurities. Quarrying operations are much helped by the presence of a well-developed joint system combined with the bedding planes of weakness. Large monoliths are obtainable from granite where the vertical jointing, widely spaced, is not interrupted by cross jointing.

Origin of Joints.—The principal cause of jointing in both stratified and igneous rocks is crustal movement. Certainly stratified rocks subjected to compression, tension and torsion must crack and fissure in the upper parts of the earth's crust. Thus strike and dip joints would originate along the axes of folds. The passage of earthquake waves would account for jointing in undisturbed horizontal strata, which is otherwise hardly explicable if folding is absent. Contraction on drying or crystallization also contributes to minor irregular jointing, as do also expansion and contraction due to epigene agents or the intrusion of heated igneous rocks. The columnar structure of basalt is due to the cooling effect of the walls between which it has been intruded and to which the structure is always at right angles. (C. B. B.)

JOINTS AND LIGAMENTS. A joint, or articulation, is the junction of two or more parts of the skeleton that are so fixed together as to allow more or less motion between these parts against each other in one or more directions. Ligaments are tough, fibrous strands that secure the relationships of the bones of the joints; ligaments also support the internal organs.

Most of the joints of the body are freely movable; these are called diarthroses. But there are other joints that are capable of only a little motion. Among these is the type called syndesmosis, in which the bones are joined by fibrous tissue. Another is that called synchondrosis, in which two bones are fitted together by cartilage; an example is the symphysis between the pubic bones. Only a slight degree of springy motion (which varies with age) is possible in a synchondrosis. This article is confined largely to a discussion of the diarthroses—the movable joints—and to the ligamentous structures that join and support them.

JOINTS

Anatomy.—The opposing surfaces of the bones constituting a joint are molded to each other and are covered by a cartilage layer that in the adult becomes the remainder of the preformed cartilaginous bone end. The molding of the bone occurs in various degrees, some fitting closely, as in the elbow joint (ulna and humerus), and some fitting loosely, as in the shoulder joint (hu-

merus and scapula), depending upon the range and the freedom of motion of the particular joint.

The space between bones in the joint is the joint space, or the joint cavity, and it is enclosed by the capsular sac, a tough fibrous tissue fastened to the ends of the bones that form the joint. This membrane is lined with a very sensitive and vascular lining, the synovial membrane, which is fastened to the bones, usually at the margin of their cartilaginous covering. The synovial lining secretes a fluid, the synovia, a lubricating substance which also furnishes the nourishment for the joint cartilage. Sometimes these joint cavities extend into pouches or recesses or communicating bursae, and the shape of the joint sac changes much with motion, as in the knee joint. The capsular sac is heavily strengthened by capsular ligaments woven into it.

Function.—The prime function of the joint is to provide free movement. Joints moving in one direction or plane only are called ginglymus; examples of these are the interphalangeal joints between the links of the fingers. A joint that combines motion in one plane (flexion and extension) with rotation about the length axis is called a trochoginglymus. An enarthrosis, also called a ball-and-socket joint, is a joint that is capable of moving in all directions, such as the shoulder and hip joints.

Rotation along a longitudinal axis alone is carried out in a pivot joint, or trochoides. In order to control strictly this motion, the arrangement is in the form of a double joint, which has a common axis around which the motion occurs. This is seen, for instance, in the radio-ulnar articulation, which is a double joint, one at the upper and one at the lower end of the forearm. It permits a rotatory movement of the forearm and hand (pronation and supination). The ribs are likewise fastened to the spinal column by double joints (the costovertebral and the costotransverse articulations), which permit the upward and downward motion of the rib cage during respiration.

A saddle joint is a joint in which one of the bones is fitted to the other by a sort of saddle-shaped concavity. This also permits motion in all directions, but the movements are less free than they are in the enarthrosis or ball-and-socket joint. An example of this is the joint that unites the thumb with the wrist.

Embryologic Development.—The joints develop during the mesenchymatous period of the embryo's life. This is the stage of preformation of the skeleton and is represented by a condensation of young connective tissue, the so-called mesenchyme. This mesenchyme forms the axial or vertebral skeleton as well as that of the extremities.

In this primordial formation there takes place what is called a chondrification, which means the substitution of this tissue by cartilage cells which again are the forerunners of the later ossification. Only the site of the joint remains as a mesenchymatous plate, and this plate later becomes absorbed and thereby leaves a cavity, the joint. The menisci or intra-articular cartilages represent an incomplete chondrification of the intermediate mesenchymatous plate so that really a double joint is formed, more or less incompletely separated by the cartilages. The ligaments likewise develop from condensed mesenchymatous strands, but they remain as connective tissue whereas the central rods which represent the bone undergo chondrification and later ossification.

Joints of the Body.—*Vertebral Column.*—The bodies of the 24 vertebrae resting upon the sacrum are joined by intervertebral discs. The intervertebral disc is a joint of peculiar construction, inasmuch as it consists of a tough fibrous ring containing in its centre a round-cellular, gelatinous, semielastic body, the nucleus pulposus. Because of its ability to change its shape and its position within the fibrous ring, tilting movements are possible between vertebrae in all directions, the discs functioning as a sort of universal joint.

The arches of the vertebrae carry the articular processes which, with the adjacent ones of the vertebrae above and below, form the intervertebral articulation. The anterior column (*i.e.*, that of the bodies) carries the weight. The articular facets of the arches glide over each other, while the movement occurs about or in the neighbourhood of the discs as centres.

The ligaments are fitted into the spine under tension, running along the bodies and along the arches. The anterior longitudinal ligament runs the entire length from the occiput to the sacrum along the anterior surface of the bodies of the vertebrae; the posterior runs along the posterior surface of the bodies of the vertebrae. At the posterior column the long ligaments are the supraspinous ligaments, and the short ligaments are spanned between arches and processes, and all are fitted in under considerable tension. The discs, on the other hand, are fitted in between the vertebral bodies under considerable pressure, amounting to an average of about 66 lb.

All this gives the spine a great deal of stability in spite of its consisting of so many articulating segments. As a result it requires only a comparatively small amount of muscle force to hold the spine in erect position.

The ribs are articulated with the spinal column by means of the costovertebral articulations between the heads of the ribs and the side of the vertebral body, and the costotransverse articulations between the ribs and transverse processes. This double articulation restrains the rib movement to one about the common axis of both articulations. This permits the ribs to flare outward and upward during respiration.

At the junction of the cervical spine to the skull there are great modifications in the usual vertebral pattern. The axis of the second cervical vertebra represents really the body of the first cervical fused with that of the second. It articulates with the first cervical vertebra, the atlas, in the atlantoaxial joint, which is secured by ligaments between the atlas, the odontoid and the

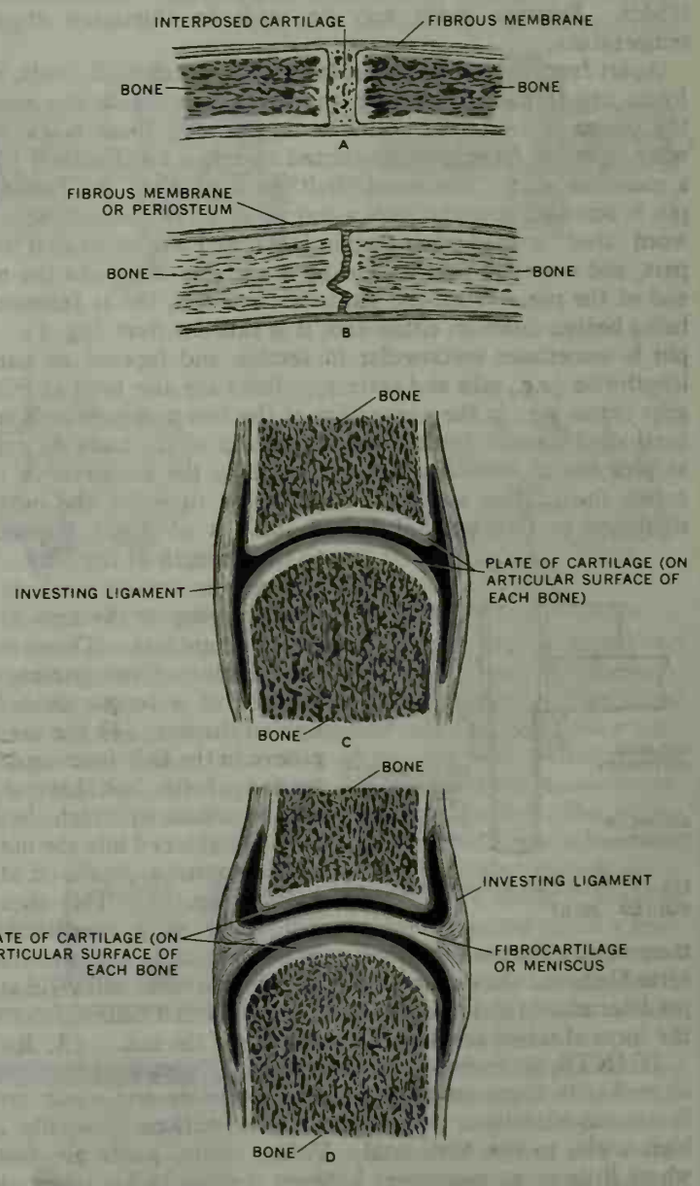


FIG. 1.—VERTICAL SECTIONS THROUGH (A) SYNCHONDROSIS; (B) CRANIAL SUTURE; (C) DIARTHRODIAL JOINT; (D) DIARTHRODIAL JOINT WITH INTERPOSED FIBROCARTILAGE OR MENISCUS

occiput. The first cervical vertebra (atlas) articulates with the occiput, the bone occupying the posterior portion of the skull. Nodding and shaking of the head are carried out in these two articulations, but the side bending of the head occurs in the rest of the cervical spine.

Shoulder.—The shoulder girdle complex is composed of the collarbone or clavicle, the shoulder blade or scapula and the upper arm bone or humerus. This complex has three articulations:

1. The sternoclavicular articulation between the collarbone and the sternum or breastbone is one of the four articulations of the human body endowed with an intra-articular cartilage or meniscus. It permits the clavicle to move up and down, forward and backward as well as to rotate about a length axis.

2. The acromioclavicular joint is between the outer end of the collarbone and the acromion or shoulder-height process of the shoulder blade. This joint also permits the clavicle to move in the same manner as does the sternoclavicular articulation, upward and downward, backward and forward. The centre of motion for both articulations lies between them at the costoclavicular ligament, which is much nearer to the inner end of the clavicle than to the outer. Consequently both ends of the clavicle move simultaneously but in opposite directions like the arms of a scale.

3. The third joint of the shoulder girdle complex is the shoulder joint, which is the joint between the shoulder blade or scapula and the upper arm bone or humerus. This is a ball-and-socket joint that can move in all directions. Its range of motion is augmented by the two other articulations already mentioned.

All joints are reinforced by ligaments. Special ligaments are the costoclavicular ligament between clavicle and first rib which serves as fulcrum for the movement of the clavicle; the coracoclavicular ligament between the clavicle and the coracoid or duckbill process of the scapula, which restrains the upward movement of the outer end of the clavicle; and the coracoacromial ligament between the coracoid process and the acromial process of the shoulder blade, which acts as an overhanging roof to the shoulder joint and protects the humerus from upward displacement.

The tendon of the long head of the biceps muscle is covered by synovial lining as it passes through the joint from the upper edge of the articulating area of the scapula, the so-called glenoid cavity, leaving the joint to lie between the two tubercles or excrescences of the humerus. The development of the clavicle is closely connected with the prehensile function of the upper extremity. Among the mammals the bone is present only in the primates.

Elbow.—This is a hinge joint in which the forearm moves against the upper arm or vice versa. The part of the humerus articulating with the ulna, the trochlea, fits snugly into the semilunar notch or greater sigmoid cavity of the upper end of the ulna. On the outer side of the joint, however, the head of the radius plays loosely about the corresponding end of the humerus, the capitellum. It is in this latter joint that the length rotation of the forearm, that is the pronation (thumb turned to the inner side) and the supination (thumb turned out to the outer side), takes place. This movement is further safeguarded by the two radioulnar articulations, the one situated at the upper and the other at the lower end of the forearm bone. In the upper of these two articulations the disc-shaped head of the radius rotates in the lesser sigmoid cavity of the ulna; in the lower, the disc-shaped lower end of the ulna fits into a slightly concave sigmoid cavity of the radius.

The forearm and upper arm do not form a complete straight line when the joint is in full extension, but the forearm is deflected outward about 10° to 15° in men and 20° to 25° in women. This is called the carrying angle. When the forearm is fully flexed, however, the hand points strictly to the shoulder joint and not to the chest; for the axis of the elbow joint exactly bisects this angle between the axis of the humerus and the forearm.

Between the radius and the ulna the interosseous ligament is spanned, its fibres ascending from the ulna to the radius so as to protect the latter from being pushed upward. At the lower end of this ligament there is the so-called chorda obliqua, a portion of the ligament, but with fibres which run in the opposite direction; these protect the radius from being pulled downward.

Wrist.—The wrist joint is between the radius and the first row of bones of the carpus or wrist, namely the scaphoid, the semilunar, the triquetrum or triangular bone and the pisiform bone. There is an oblong articulation between the radius and the first three of these bones which is called the proximal carpal joint. This joint permits motion in the direction of backward and forward flexion of the hand as well as side motion. Its upper articular surface is completed by a triangular cartilage that extends between the edge of the radius and the very end of the ulna.

The midcarpal joint is the joint between the proximal row of the carpal bones, mentioned above, and the distal or peripheral row, which consists also of four bones, namely the greater and lesser multangulum, the capitate bone and the uncinate or hooked bone. This is an S-shaped, gliding articulation that augments the motions of the radiocarpal joint.

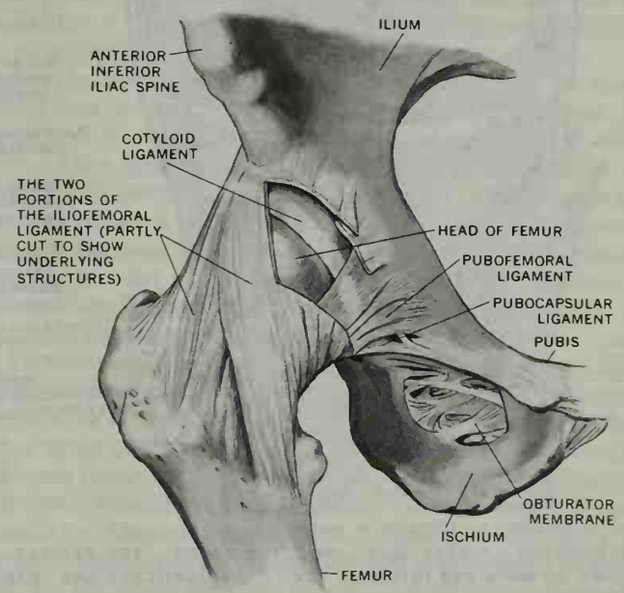
The joints between the bases of the fingers and the metacarpal bones of the palm permit flexion and extension of the fingers on the palm, side motion of the fingers, and a slight degree of length rotation. When the fingers are extended, they spread apart; when they are flexed, they crowd together. In this movement they rotate about their length axis in such a fashion that the hollow of the hand becomes cupped, for which purpose a certain length rotation is necessary, although it is insignificant in degree.

The joints between the fingers are the interphalangeal joints, uniting the different finger links or phalanges. These are purely hinge joints and move only in one plane.

All joints of wrist and fingers are heavily reinforced and secured by capsular and interosseous ligaments.

Sacroiliac.—The sacroiliac articulation is placed between the sacrum and the iliac bone or ilium, the uppermost of the three bones composing the pelvis. This joint is a combination of a diarthrosis with a syndesmosis, since the remaining large space between the sacrum and the ilium is filled out by strong and tough connective tissue. Very little motion is possible in this articulation; it is only during pregnancy or menstruation that some slight relaxation occurs. This massive connective tissue formation is called the sacroiliac ligamentous mass. The fifth lumbar vertebra is further secured to the ilium by the iliolumbar ligaments, which run from the transverse process of the fourth and fifth lumbar vertebrae to the posterior rim of the ilium, preventing the fifth lumbar vertebra from sliding forward.

Other auxiliary ligaments of the pelvis are the ligamentum sacrospinosum and the sacrotuberosum which run from the sacrum to the spine and the tuber of the ischium, or seat bone. The role of this ligament is to prevent the sacrum from tipping backward under the weight of the body.



FROM HEPBURN IN CUNNINGHAM, "TEXT-BOOK OF ANATOMY"

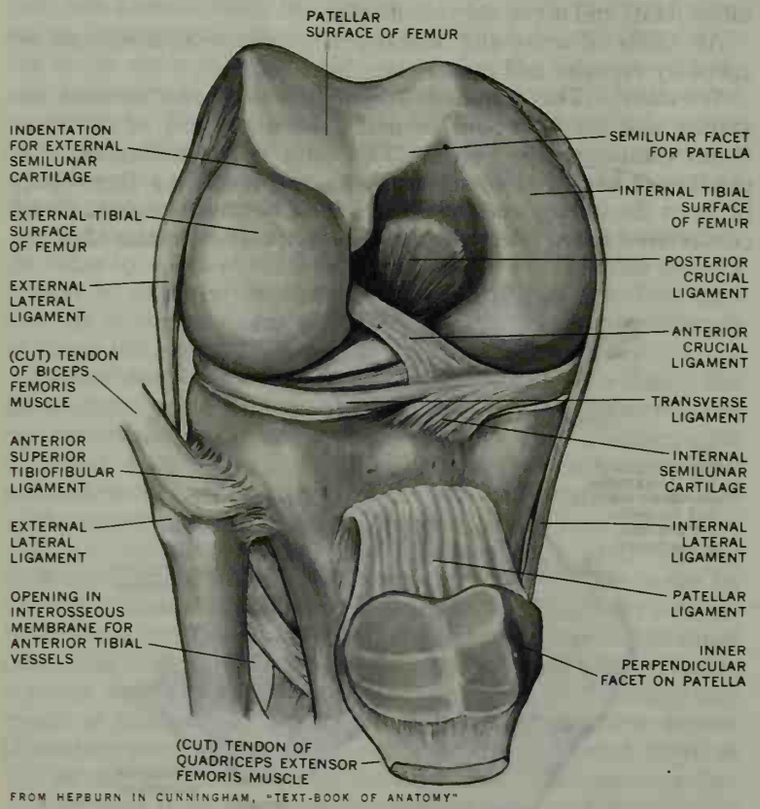
FIG. 2.—DISSECTION OF HIP JOINT. ANTERIOR VIEW SHOWING ATTACHMENT OF LIGAMENTS TO FEMUR, ILIUM, ISCHIUM AND PUBIS

Hip.—The hip joint is the articulation of the upper end of the thighbone with the socket or acetabulum at the junction of the three bones (ilium, pubis and ischium) forming the pelvis. This joint is a ball-and-socket joint and therefore permits motion in all directions. The capsular apparatus of this joint is likewise heavily enforced by strong ligaments, of which the most powerful and strongest is the iliofemoral ligament, which reinforces the capsular apparatus in its anterior aspect.

This joint has wide excursion ranges which differ, however, in the different planes. The range of flexion and extension is about 140°, while that of abduction and adduction—that is, drawing the limb away from and then back toward the midline—amounts to about 80°. The circling of length rotatory movement in both inward and outward rotation has a range from 60° to 90°, according to the position of flexion in which the limb is held.

Knee.—This is the largest joint of the body, and it also has to sustain the greatest stresses since it is located between the hip joint and the ankle joint, supporting the entire weight of the body above the knee. Consequently, the articular ends are very massive. At the same time great freedom of motion of the joint is necessary for the mechanics of the gait.

The massive condyles (rounded ends) of the lower end of the femur (thighbone) articulate with the corresponding condyles of the tibia (legbone) by means of the already mentioned intra-articular cartilages. The whole joint is enveloped in a



FROM HEPBURN IN CUNNINGHAM, "TEXT-BOOK OF ANATOMY"

FIG. 3.—DISSECTION OF KNEE JOINT FROM THE FRONT. THE PATELLA IS THROWN DOWN TO SHOW THE INTERNAL SEMILUNAR CARTILAGE AND TRANSVERSE LIGAMENT

rather redundant capsular apparatus that contains the patella, or kneecap. The recess in the capsular apparatus is wide enough to follow the movement of the joint, and it allows the kneecap to sweep freely up and down at the anterior surface of the femur.

In the interior of the joint there are the crucial ligaments, which run crosswise from the inner and outer condyles of the femur respectively to the space between the condyles of the tibia. The principal function of this joint is flexion and extension, but a certain amount of length rotatory motion is necessary for the gait. For this purpose the reinforcing ligaments of the knee joint—that is, the collateral ligaments—relax when the knee is in flexion to permit a certain amount of length rotation in the joint.

Foot and Ankle.—The ankle joint proper is the joint between the lower end of tibia and fibula (calfbone), the so-called malleolus, which forms a mortise into which fits the body of the astragalus or anklebone. In this joint only backward and forward or extension and flexion movement is possible. Another joint is situated between the anklebone and the underlying os calcis, or heelbone. In this articulation the movement is a side tipping whereby the inner border of the foot can be lowered or raised, the so-called pronation and supination of the foot.

The third articulation of the foot is situated between the anterior end of the heelbone and that of the anklebone respectively on one side and the cuboid, which is the outermost of the distal row of the tarsal bones, and the scaphoid or boat-shaped bone. The cuboid articulates with the anterior end of the heelbone, and the scaphoid or boat-shaped bone articulates with the anterior end or head of the anklebone. In this articulation there are really three types of motion possible: the forefoot can be bent up against the back part of the foot, turned inward and outward or tilted upward or downward. All the joints of the foot are heavily reinforced by ligaments, of which the most important are the internal and external deltoid ligaments.

The so-called inner arch of the foot is formed by the heelbone supporting the anklebone upon which again rests the weight of the body. It continues forward through the boat-shaped bone and the three wedge-shaped bones or cuneiforms which articulate with the metatarsals of the three inner toes.

The outer arch of the foot is formed by the heelbone, the cuboid and the metatarsals of the two outer toes. The weight of the body rests upon the inner arch, and the latter is borne by the outer arch by means of a prolongation of the heelbone, the so-called sustentaculum.

Jawbone.—The temporomaxillary articulation of the mandible or the joint of the jawbone is situated between the sigmoid cavity of the temporal bone and the so-called condyle of the mandible or jawbone. It is also endowed with an intra-articular cartilage or meniscus by which the range of motion in this joint is greatly increased. This articulation is heavily reinforced by capsular ligaments.

The motion in this joint is a combination mechanism. On opening the mouth the motion starts with a hinge movement and then goes into a gliding, taking the meniscus with it. This joint between the temporal bone and the mandible is found only in mammals. It is a perfect hinge joint in the Carnivora. In some, the anteroposterior gliding movement is favoured, as in the rodent, and in others the lateral movements predominate, as in the ruminants.

LIGAMENTS

Ligaments are structures consisting of tough fibrous strands, the direction of which is so arranged as to offer the greatest resistance to stresses. In some ligaments the fibres are arranged parallel, as the interosseous radio-ulnar ligament; in some they are fan-shaped, as the internal collateral ligament of the knee; and in some the fibres are arranged in layers crossing in different directions, as in the sacroiliac, according to the stresses they are expected to resist.

The so-called white ligament consists of connective tissue fibres with few elastic elements; the so-called yellow ligament (for instance, the ligamentum flavum between the vertebral arches) is rich in elastic fibres. Some ligaments (articular ligaments) serve directly as capsular reinforcement. They are either closely attached to the outer layer of the capsular sac (for instance, the glenohumeral ligament reinforcing the shoulder joint capsule) so that they can be isolated from the capsule only with difficulty; or they appear as separate and distinct anatomic structures (for instance, the external collateral ligament of the knee joint); or they are partly enclosed attachments and partly free and easily separable from the joint capsule (for example, the internal collateral ligament of the knee).

There are other ligaments not directly in the vicinity of joints securing the relationship of bones to each other. They also restrict motion by acting as tie pieces between bones. Here belong, for instance, the interosseous ligaments, such as those that unite the forearm bones (radius and ulna), or the interosseous ligaments

of the leg between tibia and fibula, or the ligaments spanned between the ribs (intercostals) and the long and short ligaments between the bodies of the vertebrae (the so-called anterior column), as well as those that are spanned between the segments of the so-called posterior column of the spine formed by the vertebral arches.

Intra-articular ligaments exist in the knee (the cruciate ligaments, anterior and posterior). They are covered by synovial membrane so that they are, strictly speaking, extra-articular; however, they protrude into the joint.

The intra-articular cartilage is a formation that is found in four joints of the human body: the temporomaxillary joint (the joint between the lower jaw and the temporal bone); the sternoclavicular joint between sternum and clavicle; the wrist joint (triangular cartilage); and the knee joint, where these cartilages are known as menisci or semilunar cartilages. These cartilages are interposed between the bones so that their gliding will increase the range of motion of the joint. *See* BONE; CONNECTIVE AND SUPPORTING TISSUES; MUSCLE AND MUSCULAR SYSTEM; SKELETON, VERTEBRATE; *see* also references under "Joints and Ligaments" in the Index. (A. SR.; X.)

JOINTS AND LIGAMENTS, DISEASES AND DISABILITIES OF. This article deals with congenital deformities, common injuries or acquired infirmities, typical infections, characteristic tumours and miscellaneous disorders of the joints and ligaments. For information about anatomical structure, *see* JOINTS AND LIGAMENTS. For discussions of two common causes of disease and disability of joints, *see* ARTHRITIS and TUBERCULOSIS.

Congenital Defects.—A defect in the germ plasm or an aberration of the development of the embryo may cause joints to be missing, conjoined or grossly deformed. One or both bones entering into the formation of a joint may be absent, or two or more bones may be present and fused together. Joints of fingers and toes may be supernumerary and webbed. Undeveloped joints may be dislocated; congenital dislocation of the hip is a common example. The whole limb may be malformed from muscle imbalance, as in wry neck, club foot and club hand.

Dislocation of the hip is congenital when the head of the femur is not in its proper place in the acetabulum before, during or immediately after birth. The cause is not known but hereditary predisposition occurs in many cases. Endocrine disturbances in the mother, *e.g.*, hyperestrinism and excessive production of relaxin, may produce hypermobility of the ligaments. Girls are affected five times more frequently than boys. The condition is recognized by asymmetry of the buttocks, unequal leg length, swayback and limitation in the range of motion of the joint, particularly inability to spread the thighs apart in the sitting position. The characteristic findings in X-ray examination are delay in the formation of bone in the interior of the head of the femur, a sloping or shallow acetabulum and upward displacement of the proximal end of the femur. While it is often easy to return the joint to its proper position during early infancy and thus prevent crippling in later life, the condition is frequently difficult to recognize before the child begins to walk. In many instances, the joint is well articulated and the only defect is that the socket is shallow; in these cases the condition is termed congenital dysplasia of the hip and it is treated with a simple abduction splint for six months. Congenital dislocations and deformities of the joints and their supporting ligaments are usually localized in one part of a limb. In rare instances, all the joints and ligaments of the skeleton are inelastic, incongruent and stiffened by a disorder known as arthrogryposis multiplex congenita.

Injuries.—Closed or open injuries of ligaments and joints produce disability and deformity in various ways depending upon the causative agents and the severity of the condition. Sprains, consisting of overstretching and tearing of a single ligament, generally heal within six weeks without difficulty. Rupture of several ligaments around a large joint, such as the knee, or repeated sprains of small ligaments, such as those around the ankle, cause chronic instability of the joint. Twisting injuries of the ligaments frequently occur in football games; these extend into the interior of the joint, damaging the articular cartilages and menisci and causing the joint to lock. Surgical excision of the torn cartilage may be necessary to relieve pain and restore normal function. A blow on the knee can be transmitted through the thigh bone to cause dislocation of the hip. It may be associated with a fracture of the posterior rim of the hip socket.

Hemarthrosis designates a collection of blood mixed with synovial fluid in the joint space; it is associated almost invariably with injuries of ligaments and joint surfaces. Clotting does not occur since anticoagulants are present in the synovial fluid. In the knee joint the volume of bloody synovial fluid may exceed 30 ml. and aspiration may be necessary to relieve pain. When there is a deficiency in antihemophilic globulin in males and bleeding occurs into the joint spontaneously or following a trivial injury, the condition is called hemophilia (*q.v.*).

Long periods of immobilization in casts and braces should be avoided in adults in order to avoid atrophy of bone and adhesions of the synovia and ligaments surrounding a joint.

Infection and Disease.—Bacterial infections of ligaments and joints may occur following contamination of open wounds. Bullets, pellets or shell fragments carrying fragments of soiled clothing are a frequent cause of severe infections resulting from hunting accidents and warfare. Treatment consists of immediate *débridement* or excision of the affected parts and administration of antibiotic drugs to prevent spread of the infection and entrance of pyogenic organisms into the blood stream. Hematogenous or blood-borne infections also occur in joints of patients with bacterial infections, gonorrhea, typhoid fever and many other conditions.

Diseases of the central nervous system such as syphilis, syringomyelia and arteriosclerosis destroy the position sense and pain reflexes that normally help protect the ligaments and joint surfaces. This loss leads to the development of the neuropathic or Charcot joint (named for Jean Martin Charcot [*q.v.*], who first described it), in which the ligaments and joint surfaces disintegrate by some mechanism that is not clearly understood. The neuropathic joint dislocates or comes apart spontaneously, but it responds favourably to an arthrodesis operation if recognized early enough.

Ankylosing spondylitis is a most disabling affliction of the ligaments and joints that occurs chiefly in males between the ages of 20 and 40. The cause is obscure and treatment is unsatisfactory. (*See* also ARTHRITIS: *Ankylosing Spondylitis.*) Another but very different form of chronic inflammatory disorder of connective tissue is Dupuytren's contracture. This arises in the hand in the palmar aponeurosis in the area of the little and ring fingers, the soles of the feet and the dorsum of the penis. While a hereditary basis is found in some cases, the etiology is unknown and treatment is surgical excision of the palmar fascia.

Tumours.—Tumours of the ligaments are almost unknown. Cystic degeneration where ligaments enter into the formation of the capsule of the joint is common, however, and generally is classified under the term ganglion. In this meaning, ganglion describes a fibrous tissue sac filled with a clear jellylike fluid; it is relatively common around the wrist and midfoot and is harmless. Xanthoma, fibroma, hemangioma, fibrosarcoma and many different kinds of benign and malignant tumours may develop in and around joints. Metabolic disorders such as gout, hyperparathyroidism and ochronosis cause tumourous swellings but not neoplasms. Loose bodies that are derived either from fragments of articular cartilage or from osteocartilaginous tumours of synovial villi (often called "joint mice") can be nourished by the joint fluid with the result that they grow in the joint cavity. Synovial sarcoma, the dreaded malignant tumour of the joint and related structures, fortunately is rare. This metastasizes early through the blood to the lung. The diagnosis can be established by a biopsy operation and should be undertaken without delay. If there are no pulmonary metastases, the treatment is perfusion of the limb with carcinocidal (*i.e.*, antineoplastic) agents, radiotherapy and radical amputation.

See also BONE, DISEASES AND INJURIES OF: *Fractures;* FRACTURES AND DISLOCATIONS; GOUT; ORTHOPEDIC SURGERY; SPINE, DISEASES AND DISABILITIES OF; STEROIDS; TENDINITIS.

(M. R. U.)

JOINTWORM, the name applied in the United States to the larvae of hymenopterous gall-forming insects of the genus *Harmolita,* two of which, *H. tritici* and *H. hordei,* are important parasites of wheat and barley respectively, causing swellings in the stems near or on the joints (whence the name). The adult insects are small chalcid wasps, about $\frac{1}{8}$ in. long and black in colour. *See* HYMENOPTERA.

JOINVILLE, a noble house of the old French province of Champagne, taking its name from the small township of Joinville (in the modern *département* of Haute-Marne). The first recorded sire de Joinville was Étienne de Vaux, in the first decades of the 11th century. He and his early successors extended their dominion over much adjacent territory. Geoffroi III (d. after 1184), 5th sire de Joinville, accompanied Henry, count of Champagne, on his crusade in 1147 and was appointed seneschal of Champagne by 1152. This office became hereditary to the sires de Joinville. Geoffroi III's younger grandson Simon, 7th sire (d. 1233), married Beatrix of Burgundy, dame de Marnay, and through her brought his family into close kinship with the counts of Burgundy. His elder son Geoffroi, sire de Vaucouleurs, married Maud de Lacy and settled in England. Simon's younger son, Jean, 9th sire de Joinville (*q.v.*), was the famous historian. One of Jean's elder sons, Geoffroi, sire de Briquenay, founded a branch of the family in Naples. A younger son, Anseau or Ancel, 10th sire de Joinville (d. before 1343), married Marguerite, heiress of Vaudémont. Their son, Henry (d. 1374), was the last of the original male line. Joinville passed to the house of Lorraine through the third marriage (1393) of Henry's daughter Marguerite—to Ferry (d. 1415), a younger son of Duke John.

With other French possessions of Lorraine, Joinville in the 16th century was assigned to the house of Guise (*q.v.*), and the style of its lords was changed from sire to prince de Joinville. The duchesse de Montpensier, who had inherited it from the last heiress of Guise, left it in 1693 to Philippe de France, duc d'Orléans, with whose descendants it remained (*see* BOURBON). The castle, overhanging the Marne, was sold in 1791 for demolition.

JOINVILLE, FRANÇOIS FERDINAND PHILIPPE LOUIS MARIE, PRINCE DE (1818–1900), was born at Neuilly on Aug. 14, 1818, the third son of Louis Philippe, duc d'Orléans, afterward king of the French. On leaving the Collège Henri IV (Paris), he joined the navy in 1831 and was promoted lieutenant in 1836 and captain in 1839 as recompense for his bravery during the operations against Mexico. In 1840 he brought Napoleon I's remains from St. Helena to France. In 1843 he was promoted rear admiral and made a peer of France. By his marriage (1843) to Francesca of Braganza, sister of Pedro II of Brazil, he had two children: Françoise (1844–1925), married in 1863 to the duc de Chartres; and Pierre (1845–1919), duc de Penthièvre. In 1844 he conducted naval operations along the coast of Morocco, for which he was promoted vice-admiral. An article of his in the *Revue des Deux Mondes* on the deficiencies of the French navy caused a stir, and his open hostility to François Guizot won him popularity; but he had to leave his command in Algeria after the revolution of Feb. 1848, when he went with his father to England. In 1861 he journeyed to the United States to place his son Pierre and his two nephews, Louis Philippe Albert, comte de Paris, and Robert, duc de Chartres, at the disposal of Lincoln's government; and he himself was with Gen. George B. McClellan in the campaigns of 1862. On the fall of Napoleon III (1870) he went back to France but was expelled. Returning under the name of Colonel Lutherod, he fought against the Germans. Having divulged his identity he was exiled, but he returned again after the repeal of the law which exiled the Orléans family and in Feb. 1871 was elected deputy for Haute-Marne; his election was validated by the national assembly by 448 votes to 113. His rank of vice-admiral was restored to him. He retired from public life in 1875 and continued to live in France. The provisions of the law of June 1886, whereby the government was empowered to expel members of previously reigning families, were not applied to him, though he was deprived of his naval rank. He died in Paris on June 16, 1900.

Among his works are *Essais sur la marine française* (1853); *Études sur la marine* (1859); *La Guerre d'Amérique, campagne du Potomac* (1863); *Encore un mot sur Sadowa* (1868); and *Vieux souvenirs,* illustrated by himself (1894).

JOINVILLE, JEAN, SIRE DE (*c.* 1224–1317), author of the famous *Histoire de Saint Louis,* the second great crusade chronicle in French prose and a source almost as important for the history of the seventh crusade as Geoffroy de Villehardouin's *Conquête de Constantinople* was for the fourth, was a member of the lesser nobility of Champagne. He probably served as a squire at the court of his overlord Thibaut IV, count of Champagne, and attended him to the court held by Louis IX at Saumur in 1241. Joinville took the cross at the same time as the king (1244) and set out with him in Aug. 1248 on his expedition to Egypt, from where the crusaders planned to attack Syria from the south. Joinville was captured and ransomed with Louis, became his intimate companion during the king's subsequent stay at Acre and returned with him to France in 1254. He was made seneschal of Champagne in that year and seems thereafter to have divided his time between his fief of Joinville and the royal court. He refused to accompany the king on the crusade to Tunis (1270), having previously told him it was folly. He died on Dec. 24, 1317, at the, for the time, almost incredible age of 93, and was buried in his chapel of St. Laurent at Joinville.

The "Histoire de Saint Louis."—Jean de Joinville was the author of two works, the *Credo,* a somewhat naïve statement of belief, written in the Holy Land between 1250 and 1251 and probably revised later, and the *Histoire de Saint Louis.* A first draft of the crusade section may have been written as early as the 1270s, but in its present form it was composed at the command of Jeanne de Navarre, wife of King Philip IV; she died in 1305, however, and the book was eventually dedicated in 1309 to her son Louis X. The *Histoire* is divided into three main sections. In the first the author gives a fairly short account of the character and behaviour of St. Louis and of the early years of his reign. Joinville said that he did not wish to write anything in his book of which he was not certain; and his work derives its freshness and its value for the historian primarily because Joinville was a participant in most of the events or conversations he relates. The second and by far the longest section of the book provides a detailed narrative of the seventh crusade and of St. Louis' subsequent stay in the Holy Land; this is in reality an account of Joinville's own experiences and can in no way be regarded as scientific history such as Villehardouin wrote. The last part of the book provides certain important details about Louis' government of France after his return from the crusade, and incorporates a text of the ordonnance issued in 1254 to regulate the conduct of the provosts and bailiffs of the royal demesne. It records the king's death at Tunis in Aug. 1270, during the eighth crusade, and ends with a brief account of the canonization of St. Louis and of Joinville's dedication of an altar to him in his own chapel.

Joinville's account of the crusade of 1249 is of particular value in two respects. It records events as actually seen by the ordinary combatant in the action, and shows, among other things, the serious financial burden that participation in the crusade could cause and demonstrates the hazards of a sea voyage even in summer. It also gives a vivid description of the confusion and bad discipline of a typical medieval army—the contrast between the sharp detail of individual scenes of the battle of Mansura and the blurred impression conveyed of the action as a whole is not solely explained by Joinville's preoccupation as a combatant in the midst of the fray; it rather reflects the fact that nobody, not even the king, had any real knowledge of what was happening. Despite the very successful initial capture of Damietta, Egy., to the east of the Nile delta, bad staff work, faulty reconnaissance and inadequate and unsuitable supplies brought the invading army to a halt halfway on its march to Cairo. The military deficiencies of the crusaders were soon augmented by epidemics of dysentery and of what was probably scurvy. It is hardly surprising that when they attempted to retreat to Damietta the entire army was surrounded and captured. Louis, Joinville and most of the surviving nobles were eventually ransomed and sailed either for France or for the Holy Land, but the fate of the common soldiers was harsh. The sick were mas-

sacred at the time of the surrender and the rest were left behind in captivity. Joinville was long tormented by the memory of this betrayal, which prompted him to advise the king to remain, contrary to the advice of nobles of higher rank than Joinville, in the Holy Land rather than return immediately to France.

During the next four years, spent in the Syrian coast towns, the friendship between Louis and Joinville deepened, and in 1253 he swore homage to Louis in return for a grant of 200 livres tournois —homage which he had earlier refused to pay, on the grounds that the count of Champagne was his lord, not the king of France. It must have been during this period that he acquired much of his information about Muslim ways and customs—on the habits of the Bedouin and on the Old Man of the Mountain and his Assassins, and much else.

In the end however the *Histoire de Saint Louis* is read neither for historical information about the crusaders nor for sociological information about the Saracen world, nor even for evidence about the character of Louis IX. It is read because of the unconscious revelation in it of the character of Joinville himself. Simple, honest, straightforward, affectionate—he says that as he left home for the crusade he dared not look back for fear of being overcome by his fondness for his castle and his two children—he makes no attempt to conceal his occasional cowardice, his lack of sanctity, his tactlessness or his garrulity. But his charm is such that the modern reader loves him as his contemporaries must have loved him—for his essential goodness. Of the living characters in his book, he is himself the most alive.

BIBLIOGRAPHY.—The *Histoire de Saint Louis* survives only in manuscripts of a considerably later date and all the earlier printed editions present it in a relatively modernized form. Natalis de Wailly, whose great edition (containing the *Histoire,* the *Credo* and the *Lettre à Louis X*) appeared in 1874, produced, on the basis of contemporary documents, a reconstituted version of the *Histoire* using the linguistic forms Joinville himself probably used. He was criticized for creating an artificial text, but the other qualities of the edition are such that it has remained the standard one.

For translations into modern French *see* also H. Longnon, *La vie du Saint roi Louis* (1928), and A. Mary, *Jean de Joinville, le livre des saintes paroles et des bons faits de nôtre saint roi Louis* (1928). Translations into English include F. Marzials, *Joinville's Chronicle of the Crusade of St. Lewis* (1908); J. Evans, *The History of St. Louis by Jean Sire de Joinville* (1938); and R. Hague, *The Life of St. Louis by John of Joinville* (1955). This last also includes a translation of the letter written by Jean Sarrasin to Nicolas Arrode in 1249 (also ed. by A. Foulet, 1924), providing another account of the crusade. *See* also H. F. Delaborde, *Jean de Joinville* (1894); A. Foulet, "When did Joinville Write his Vie de Saint Louis?" *The Romanic Review,* vol. xxxii (1941). (G. ME.)

JÓKAI, MÓR (1825–1904), Hungarian novelist who is perhaps the most widely read Hungarian author, was born at Komárom on Feb. 18, 1825. He studied law and became a clerk in a solicitor's office, but soon abandoned the profession to devote himself entirely to literature. He was an intimate friend of Sándor Petöfi. In 1848 he married a famous actress, Róza Laborfalvi. Jókai played an active part in the events leading to the outbreak of the Hungarian revolution in 1848, but his gentle nature disapproved of extremists and his role remained insignificant. During the period of repression which followed, Jókai, like many other writers, had to hide, and only his wife's cleverness enabled him to escape arrest.

Jókai was a prolific writer. His collected works (published 1894–98) filled 100 volumes, which did not include his considerable journalistic output. In 1861 he was elected to the national assembly and kept his seat until 1896, when he was made a member of the upper house. His first wife died in 1886 and, although a septuagenarian, he then married a young actress. At his death in Budapest on May 5, 1904, the whole nation went into mourning. No Hungarian writer has been as popular as Jókai, or translated into so many languages. Though the quality of his work is uneven, there can be no doubt that he deserves the high esteem in which Hungary holds him.

Jókai's early work shows the strong influence of French romanticism mixed with a Petöfilike popular realism. His first novel, *Hétköznapok* ("Weekdays," 1845), is a curious blend of these apparently incompatible trends. In the years following the revolution Jókai made closer acquaintance with reality and learned to draw increasingly on personal experience. Nevertheless, he still did not picture things, persons and events as they actually were, but as he saw them; his kindness, his gentle humour, his optimism made him draw a rosier picture of both past and present than an impartial observer would have done. Jókai's life is dominated by illusions which he imparts to his readers. His historical novels, *e.g., Erdély aranykora* ("The Golden Age of Transylvania," 1852) and *Török világ Magyarországon* ("Turkish World in Hungary," 1853), have little claim to historical accuracy, but his evocation of the past is so compelling that it gains ascendancy over truth. Even in his novels dealing with contemporary Hungarian society or with the "reform era" of the first half of the century, Jókai managed to gloss over harsh reality. His novels *Egy magyar nábob* ("A Hungarian Nabob," 1853–54), *Kárpáthy Zoltán* (1854) and *Az új földesúr* ("The New Squire," 1863) are immensely entertaining, and in spite of weaknesses in characterization and a looseness in construction, are considered masterpieces.

Among his novels written in the less bracing atmosphere of the era following the compromise with the Habsburgs (1867), *Fekete gyémántok* ("Black Diamonds," 1870) and *Az aranyember* ("A Man of Gold," 1873) are outstanding. In a manner reminiscent of Balzac, Jókai tackles here some of the problems of a mercantile society through the lives of his heroes. But here, as elsewhere, he does not let either facts or theories hamper the flow of his imagination. His tales develop in a world of his own, enchanted and enchanting, the world of one of the greatest of storytellers.

See Mikszáth Kálmán, *Jókai Mór élete és kora* (1907); Sötér István, *Jókai Mór* (1941). (DS. SR.)

JOKL, NORBERT (1877–1942), Czech linguist, who was a leading authority on the Albanian language, was born on Feb. 25, 1877, at Bzenec, Czech. Having taken his advanced degree in Slavonic studies at the University of Vienna in 1908, he entered the University library, where he spent his entire career and rose to the highest post. Beginning in 1913, he concurrently lectured at the University of Vienna, where he received a professorial appointment in 1923. His entire scholarly life and publication were devoted to the study of Albanian, a field to which he became a capital contributor. Jokl significantly extended knowledge of the inherited Indo-European vocabulary of Albanian and of the complex linguistic prehistory of the Balkans, his best-known work being *Linguistisch-kulturhistorische Untersuchungen aus dem Bereiche des Albanischen* (1923). Jokl's complete and detailed annual critical bibliographies of Albanian linguistics from 1916 to 1939 are a tribute to his meticulous learning. He died in a concentration camp at Vienna about May 8, 1942.

See the obituary by C. Tagliavini, *Indogermanisches Jahrbuch,* 28:296–301 (1949). (E. P. H.)

JOLIET, a city of Illinois, U.S., on the Des Plaines river, 37 mi. S.W. of Chicago, and seat of Will county, has been called "Stone city" for its excellent limestone, used throughout the middle west (*e.g.,* in the Rock Island arsenal, state capitol and Lincoln monument, Springfield). Pop. (1960) 66,780. (For comparative population figures, *see* table in ILLINOIS: *Population.*) It is the centre of a rich farming and industrial area, served by railways, highways and the Great Lakes-Gulf waterway. The first settlers (1831) left because of the Black Hawk War. Charles Reed was the first permanent settler (1833). The town was incorporated in 1852 and adopted a commission form of government in 1918. Originally named Juliet in honour of Juliet Campbell, daughter of a settler, it was renamed (1845) for Louis Jolliet, French-Canadian explorer who visited the site (1673). Settlers from the northeast predominated and gave a definitive stamp to the city. In the 1840s and 1850s, British, Irish and German settlers came. Opening of the Illinois-Michigan canal (1848) and entry of a railway, the Rock Island, in 1852, gave a wider market to its farm products, coal and limestone. The industrial era began in the 1870s, expanding after 1890. Industries and products include oil refining, railroad shops, machinery, wire, chemicals, paper and printing.

Joliet claims the oldest public junior college (1902) and has a nationally famous high-school band. Pilcher Park arboretum is a preserve for native and imported trees and shrubs, and the 75-ac.

Bird Haven gives sanctuary to about 200 kinds of birds. (M. Ws.)

Penal Institutions.—In the Joliet area are two Illinois state prisons, both administered by one warden, and related penological facilities. On the edge of the city is the old prison, built in the mid-19th century from rock quarried in the vicinity. It is used to house occasional offenders and those who have committed less serious felonies and are not considered to be in need of maximum surveillance. Across the street is the diagnostic depot where new prisoners sentenced from northern Illinois are classified and transferred to a prison or other institution.

Stateville penitentiary (new prison), architecturally one of the world's most unusual penal institutions, is a maximum security prison about 5 mi. N. of Joliet. Begun in 1916, its 64 ac. are surrounded by a wall more than 30 ft. high. Within the wall are located the cell houses, dining hall, workshops, dormitories, hospital, storehouses and other structures necessary for the upkeep of the prison and the welfare and security of the prisoners. The dining hall, near the middle of the enclosure, is a circular building with narrow tables arranged so that all inmates must sit facing the centre of the hall where a guard post is located. Radiating from the dining hall are covered walks and corridors leading to the cell houses, most of which are circular with cells arranged in four tiers around the outer edge. A guard tower in the centre of each cell house provides a view of each cell. The dining hall and cell houses, similar to the panopticon designed by the English philosopher Jeremy Bentham but never built, are outstanding features of Stateville and are not duplicated elsewhere. A 2,200-ac. honour farm, worked by trusted prisoners, is situated outside the wall. (X.)

JOLIOT, (JEAN) FRÉDÉRIC (1900–1958), French physicist, also known as JOLIOT-CURIE after his marriage in 1926 with Irène Curie (*see* JOLIOT-CURIE, IRÈNE), was awarded in 1935, jointly with his wife, the Nobel prize for chemistry for the discovery of new radioactive elements prepared artificially. He was born at Paris on March 19, 1900, and first studied engineering and then chemistry. In 1925 he was appointed to the staff of the Radium institute, Paris, where he later became professor. In his striking experiments on artificial radioactivity, there were obtained three new radioactive elements that did not occur naturally; they were isotopes of nitrogen, phosphorus and aluminum, and accordingly were named radionitrogen, radiophosphorus and radioaluminum. The method consisted in bombarding boron, aluminum and magnesium, respectively, with alpha rays. In effect, this was the discovery of how to produce radioactivity in elements that did not normally exhibit radioactive properties, and it gave a means of studying the breakdown of atoms by observations on these unstable nuclei. Many other radioisotopes have since been produced by different methods; and they have been successfully used to follow, by means of their radioactivity, the course of various elements in living organisms. The assimilation of carbon by the green leaves of plants in sunlight has been followed by the use of carbon dioxide prepared from radiocarbon, the isotope of carbon with an atomic weight of 14 (instead of the normal isotope of atomic weight 12, which is not radioactive). Joliot in 1939 detected also the emission of neutrons in nuclear fission. In 1944 he was appointed director of the French *Centre nationale des Recherches scientifiques,* Paris, and in 1946 was made high commissioner for atomic energy; but he was removed by the government in 1950 because of his Communist views.

Joliot died in Paris on Aug. 14, 1958. (D. McK.)

JOLIOT-CURIE, IRÈNE (1897–1956), French physicist, daughter of Pierre and Marie Curie (*q.v.*), was awarded the Nobel prize for chemistry in 1935 jointly with her husband, Frédéric Joliot (*q.v.*), for their discovery of new radioactive elements prepared artificially. She was born in Paris on Sept. 12, 1897, and educated at the Sorbonne. In 1918 she became her mother's assistant at the Radium institute, Paris, where she acquired her remarkable knowledge of the radioactive elements and where she met Joliot, whom she married in 1926. In their researches they had bombarded boron, aluminum and magnesium, respectively, with alpha particles; and they had obtained radioactive isotopes of elements not ordinarily radioactive, namely, nitrogen, phosphorus and aluminum. These discoveries revealed the possibility of using artificially produced radioactive elements to follow chemical changes and physiological processes, and such applications were soon successful; the absorption of radioiodine by the thyroid gland was detected, and the course of radiophosphorus (in the form of phosphates) was traced in the metabolism of the organism. The production of these unstable atomic nuclei afforded further means for the observation of changes in the atom as these nuclei broke down. The Joliot-Curies observed also the production of neutrons and positive electrons in the changes that they studied; and their discovery of artificial radioactive elements was an important step toward the solution of the problem of releasing the energy of the atom, since the method of Enrico Fermi (*q.v.*), using neutrons instead of alpha particles for the bombardments which led to the fission of uranium, was an extension of the method of the Joliot-Curies for producing radioelements artificially. Mme. Joliot-Curie was dismissed by the French government in 1951 from her post in the French Atomic Energy commission because of her Communist views. She died in Paris on March 17, 1956. (D. McK.)

JOLLIET, LOUIS (1645–1700), explorer of the Mississippi river, was baptized at Quebec, Can., Sept. 21, 1645. Selected by the French intendant Jean Talon to ascertain the direction and mouth of the Mississippi, he embarked at Sault Ste. Marie in the spring of 1673 and went to Michilimackinac (St. Ignace, Mich.), where he was joined by Father Jacques Marquette; for the extent of their explorations, which established that the Mississippi did not flow into the Pacific ocean, *see* MARQUETTE, JACQUES.

On the return journey Jolliet's canoe was overturned and his journal and papers lost, but he made a map from memory which agrees with the autographed map of Marquette. Jolliet later traveled to Hudson bay and to the Labrador coast in the interest of the fur trade and fisheries. He died in 1700.

See also references under "Jolliet, Louis" in the Index.

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JOLLY, GEORGE (fl. 1640–1673?), English actor-manager who, after obscure beginnings at London, emerged in 1648 as the leader of a troupe of English strolling players in Germany. Having gained a foothold at Cologne, he moved on to other German cities, notably Frankfurt am Main, where he played regularly at the time of the fair. It is likely that Jolly's company performed—with Italianate scenery, actresses and music—before the future Charles II when he visited Frankfurt in 1655. At the Restoration Jolly received a royal grant permitting him to manage a theatre in London. In 1663, while Jolly was touring the provinces, Sir William Davenant and Thomas Killigrew, the two patentees holding the theatrical monopoly, conspired against Jolly and persuaded the king to revoke Jolly's grant. Jolly fought back but in the end had to accept the terms of the patentees; he agreed to serve as their "deputy" as manager of the "Nursery," a training school for young actors. After 1673 Jolly's name disappears from the records. (A. M. N.)

JOLLY BALANCE is a device for determining the specific gravity (relative density) of solids and liquids. In its usual form the Jolly balance consists of a long, delicate, helical spring suspended by one end in front of a uniformly graduated scale. To the lower end of the spring is attached a weight pan, and immediately below that a small wire basket for samples. In determining the specific gravity of a solid, the difference in the extension of the spring when the specimen is immersed in air and in water, respectively, may be taken as the loss of weight in water. The specific gravity so obtained is the apparent specific gravity in air, in terms of water at the temperature of the determination. In order to determine the specific gravity of a liquid, the same procedure is followed except that the loss of weight in water and the loss of weight in the unknown liquid are determined with any convenient specimen of a solid not affected by either liquid. The specific grav-

ity of the unknown liquid is the ratio of the loss of weight in the unknown liquid to the loss of weight in water. *See* also BALANCE; DENSITY. (H. W. BEA.; X.)

JOLO ISLAND, main island, Sulu archipelago, Philippines, 590 mi. S. of Manila. It is irregular in shape, measuring 35 mi. east-west and averaging 9 mi. north-south. Population (1960) 165,607. The people, largely Moro farmers, occupy the 345 sq.mi. of area. Lush tropical vegetation and several extinct volcanoes, culminating in Mt. Tumatangas at 2,664 ft., characterize Jolo. The municipality (pop. [1960] 33,259), port and capital of Sulu (*q.v.*) province, lies at the northwestern end of the island. The main pier provides accommodations for interisland vessels, occasional ocean-going freighters and craft of the Philippine navy. Numerous small piers accommodate a fleet of fishing, pearling, and native trading craft. Jolo serves as a focus for considerable trade between the Sulu Islands and the island of Borneo. It was formerly the centre of Moro military activity against the Spanish and the U.S. regimes. Settlement at this site antedated the introduction of Islam in the 14th century. (R. E. HE.)

JOLSON, AL (ASA YOELSON) (1886–1950), U.S. film and musical comedy entertainer who performed most often in blackface, was born in Srednick, Russia, on May 26, 1886. Brought to the United States when he was seven years old, Jolson was reared in Washington, D.C., and made his first stage appearance there. In 1909 he joined Lew Dockstader's minstrel troupe. He soon became a leading musical comedy entertainer and singer, appearing in *La Belle Paree* (1911), *Honeymoon Express* (1913), *Bombo* (1921) and *Big Boy* (1925). Some of his biggest successes were achieved under Leé Shubert at the New York Winter Garden. Jolson appeared in the first important talking motion picture, the Warner Brothers film *The Jazz Singer* (1927), and in other well-known films, including *The Singing Fool* (1928) and *Say It With Songs* (1929). He also collaborated in the writing of many popular songs. The story of his life was filmed in *The Jolson Story* (1946). He died Oct. 23, 1950, in San Francisco, Calif. Jolson's singing style was unique; his ability to gain the affection of audiences has seldom been equaled. (M. S. BY.)

JOLY DE LOTBINIÈRE, SIR HENRI GUSTAVE (1829–1908), Canadian politician, premier of Quebec, 1878–79, was born at Épernay, France, on Dec. 5, 1829. A descendant of an old French-Canadian family on his mother's side, he adopted her family name, Lotbinière, in 1888. Educated in Paris, he went to Canada with his parents and was called to the bar of Lower Canada in 1855. In 1861 he was elected to the legislative assembly of United Canada as Liberal member for the county of Lotbinière, which he represented after confederation in 1867 in the house of commons at Ottawa and in the legislative assembly at Quebec. In 1878 he was appointed prime minister of Quebec, but he was defeated in 1879 after 18 months in office. He was created knight commander of the Order of St. Michael and St. George in 1895. In 1896 he was returned to the house of commons as member for the county of Portneuf, and in the first cabinet of Sir Wilfrid Laurier he accepted the office of minister of inland revenue (1897–1900). From 1900 to 1906 he was lieutenant governor of British Columbia. He died at Quebec on Nov. 15, 1908. (J.-C. B.)

JOMINI, ANTOINE HENRI, BARON DE (1779–1869), military critic and historian who rose to be a general in the French army during the Napoleonic Wars, was born on March 6, 1779, at Payerne in the Swiss canton of Vaud, the son of a magistrate. He was employed in a bank at Paris in 1798 when he met and offered his services to an officer, Keller, who expected to become minister of war in the Helvetic republic. Keller did not in fact become minister, but Jomini worked with N. Répond, who was chosen instead, and with his successors. They organized Swiss battalions, and Jomini had a major's rank in 1800. He resigned to return to business in Paris in 1801. Meanwhile he began to write his *Traité de grande tactique,* later titled *Traité des grandes opérations militaires,* a criticism of two works on the campaigns of Frederick the Great. Michel Ney (*q.v.*), who had been commanding in Switzerland and who in 1804 invited Jomini to join his staff at the camp of Montreuil, helped him to publish the book in 1805. Jomini was volunteer aide-de-camp to Ney in Oct. 1805 in the battles that decided the fall of Ulm. When Ney sent Jomini from the Tirol to Vienna with his despatches, Napoleon read the *Traité* and made Jomini a staff colonel (Dec. 27, 1805).

Napoleon promised Jomini a place on the general staff, but Ney wanted him for his own staff and had him at his side at the battles of Jena and Eylau (1806). Then, after a period of sick leave, Jomini was made deputy chief and, in Nov. 1807, chief of staff in Ney's corps. He encountered difficulties for two reasons: he was a colonel in a general's post, and he disrupted the system of control devised by L. A. Berthier, who was already prejudiced against Jomini by Ney's former chief of staff, Gen. A. J. Dutaillis, Berthier's intimate friend. Ney also began to hear that his success at Elchingen and Jena was being attributed to Jomini's advice; and Jomini himself was dissatisfied and ready to leave Ney if he could obtain a post nearer to Napoleon. Jomini rejoined Ney in Spain in 1808 and they marched to Madrid. In the spring of 1809 they advanced into Galicia and the Asturias, whence Ney sent him again to Vienna in July to represent him in his disputes with Marshal Soult. When Ney returned to France, however, H. J. Clarke, the minister of war, reported that he wished Jomini to be transferred to another post. Napoleon in November decided to place him under Berthier. In June 1810 Berthier granted Jomini six months' sick leave.

Jomini now began his admirable *Histoire critique et militaire des guerres de la Révolution,* which he did not complete until 1824. In 1810 he also entered into negotiations with Russia and all but completed a contract of service under the emperor Alexander I, Napoleon's ally at that time. He resigned from the French service on Oct. 28, 1810, but Clarke replied with a peremptory summons to Paris, and on Dec. 7 Jomini was made general of brigade. In the French empire no other general had been appointed so young, except members of Napoleon's family and personal staff. In Jan. 1811 he became director of the historical section of the general staff. He now published an enlarged edition of his *Traité.*

For the first seven weeks of Napoleon's Russian campaign of 1812 Jomini was on the staff with headquarters; he wrote later that he refused to serve actively against Russia, but no more active assignment was likely than his actual appointment as governor of Vilna (Vilnius), and later of Smolensk. He was at the passage of the Berezina (Nov. 26–28), lost everything in the retreat and was allowed sick leave. When Ney's chief of staff was killed on May 1, 1813, just before the battle of Lützen, Jomini took his place. Ney was at the peak of his fame; his corps was the most important in the army; and, though it was not very effectively used in the battle of Bautzen (May 21), its officers received many rewards. Yet Ney's recommendation of Jomini to be general of division was refused, and Berthier put Jomini under arrest for being late with the corps returns.

On Aug. 14, 1813, Jomini rode, with a single hussar, from the French into the enemy lines. Gen. J. B. F. Koch, then his aide-de-camp, thought this an act of impulse on his sense of injury, not premeditated treason. Contemporaries did not forgive his desertion and stressed his vanity and susceptibility. At the same time they regarded him as the master who had most clearly defined the art of war. He reached Prague and for the rest of the war served as a Russian lieutenant-general and aide-de-camp of Alexander I, with whom he was present at the battle of Leipzig (Oct. 1813). He refused to enter Paris with the allies in 1814. He visited Switzerland and attended the congress of Vienna in 1815. Going to Russia in 1816, he was made military tutor to the grand dukes Nicholas and Michael.

Jomini lived at Paris for some years after 1817 and published his *Correspondance* (1819), a personal apologia. In 1822 he was at the congress of Verona. In 1826 he went to Russia again for Alexander's funeral and was made aide-de-camp to Nicholas I, with the rank of general-in-chief. He accompanied Nicholas on the Turkish campaign in 1828, including the siege of Varna. After 1829 he settled at Brussels, but in 1837 he was appointed military tutor to the tsesarevich Alexander, for whom he prepared his *Précis de l'art de la guerre* (1837), based on an earlier study. This, his most famous work, passed through many editions and left him pre-eminent in the vast output of the military literature in the first half

of the 19th century. Perhaps its chief feature was its insistence that the politics and philosophy of war ranked first in importance before the more technical sections of warfare. Jomini's point of view was well expressed in his comment that Napoleon must have been "sent into this world in order that generals and heads of states might learn what they must avoid." Pensioned by Nicholas I in 1848, Jomini returned to Brussels but went back to Russia in 1854 and advised the emperor during the Crimean War. In 1859 he settled at Passy, where he died on March 22, 1869.

See also LOGISTICS: *Changing Uses of the Word;* STRATEGY: *Development of Strategy.* (I. D. E.)

JOMMELLI (JOMELLI), **NICCOLÒ** (1714–1774), Italian composer of operas and religious music. Born at Aversa near Naples on Sept. 10, 1714, he studied at Naples and produced his first opera, *L'Errore amoroso,* in 1737. Three years later he went to Rome to produce two new operas, thence to Bologna, where he profited by the advice of Padre G. B. Martini. In 1749 he went to Vienna, where he wrote two operas on texts of Pietro Metastasio and revised his operas *Ezio, Didone* and *Merope.* In 1750 he returned to Rome, and in 1753 he was appointed *kapellmeister* to Duke Karl Eugen of Württemberg at Stuttgart, where he stayed until 1769 and wrote his best operas, including *L'Olimpiade* and *Fetonte.* On Jommelli's return to Italy he was criticized for the French character his music had acquired. He died at Naples on Aug. 25, 1774, his last composition being a *Miserere* for two female voices and orchestra that was long his best-known work. Jommelli introduced in his operas a free use of accompanied recitative. At the same time he broke with the tradition of the *aria da capo,* thus anticipating Gluck. The style of his overtures influenced the early symphonies of Johann Stamitz.

See A. Yorke-Long, *Music at Court* (1954). (CS. CH.)

JONAH, RABBI (ABUL WALID MERWAN IBN JANAH; also R. MARINUS) (*c.* 990–*c.* 1050), the greatest Hebrew grammarian and lexicographer of the middle ages. He was born in Córdoba, Spain, studied in Lucena and, after somewhat protracted wanderings, settled in Saragossa, where he died. Though a physician, Rabbi Jonah devoted himself to the scientific investigation of the Hebrew language and to a rational biblical exegesis based upon sound linguistic knowledge. His first work—composed, like all the rest, in Arabic—bears the title *Almustalha* and forms, as is indicated by the word, a criticism and at the same time a supplement to the two works of Yehuda 'Hayyuj on the verbs with weak-sounding and double-sounding roots. These two treatises, with which 'Hayyuj had laid the foundations of scientific Hebrew grammar, were recognized by Abul Walid as the basis of his own grammatical investigations. Rabbi Jonah's principal work, the *Kitab al Tankih* ("Book of Exact Investigation"), includes the *Kitab al-Luma* ("Book of Many-Coloured Flower Beds") and the *Kitab al-usul* ("Book of Roots"). The former (edited by J. Derenbourg, 1886) contains the grammar; the latter (edited by A. Neubauer, 1875) the lexicon of the Hebrew language. Both works were published in the Hebrew translation of Yehuda ibn Tibbon (*Sefer Ha-Rikmah,* edited by B. Goldberg, 1855; *Sefer Ha-Schoraschim,* edited by W. Bacher, 1897). The other writings were edited in Arabic with French translation by Joseph and Hartwig Derenbourg (1880). A few fragments and numerous quotations in his principal book form our only knowledge of the *Kitab al-Tashwir* ("Book of Refutation"), a controversial work in which he successfully answered the opponents of his first treatise. The grammatical work of Rabbi Jonah extended to the domain of rhetoric and biblical interpretation. His lexicon is important because of its ample contribution to the comparative philology of the Semitic languages—Hebrew and Arabic, in particular. Abul Walid's works had the greatest influence on Jewish exegesis.

JONAH, BOOK OF (PROPHECY OF JONAS), the fifth of the 12 Minor Prophets in the Hebrew Old Testament. According to the first verse, the hero is that son of Amittai mentioned in II Kings xiv, 25, who prophesied a full revival of Israel's fortunes under Jeroboam II, *c.* 785 B.C. This verse is certainly editorial; there is no other Jonah with whom the hero of the tale could be identified.

Contents.—The prophet Jonah is called by God to go to Nineveh and prophesy disaster against it because of its excessive wickedness. Jonah, however, wants nothing to do with Nineveh, so he rushes down to Joppa and takes passage in a ship which would carry him to the other end of the world. A storm of unprecedented severity strikes the ship, and in spite of all master and crew can do the ship shows imminent signs of breaking up and foundering. It is proved that Jonah's presence on board is the reason for this storm and as soon as, at his own request, he is thrown overboard, the storm subsides. God has "appointed" a great fish to swallow up Jonah and take him back again (ch. i). This happens, and after Jonah has prayed for release and has been "vomited out on dry land" (ch. ii), the command is, "Arise, go to Nineveh." And Jonah goes to Nineveh. He prophesies against the city, and the city repents (ch. iii).

Jonah becomes angry. He does not want Nineveh to repent and be spared. That is why he ran away, because always a prophet threatening disaster is really a prophet calling to repentance. But still Jonah hopes for disaster. He sits outside the city to wait for its destruction. Then there comes a strange story about a castor oil plant (usually translated "gourd" or "plant"). It is "appointed" by God to grow up in a night, provide welcome shade for Jonah, and then to die in a night. Jonah is angry at the destruction of the plant. The moral of the story is: " 'You pity the plant, for which you did not labour, nor did you make it grow, which came into being in a night, and perished in a night. And should not I pity Nineveh, that great city, in which there are more than a hundred and twenty thousand persons who do not know their right hand from their left, and also much cattle?' " (ch. iv).

Theme and Literary History.—Whether the story is told of Jonah the son of Amittai, any other Jonah or no real Jonah at all, the purport of the narrative is plain. It is a companion tract to the Book of Ruth, being a protest against the exclusive pure-race policy of postexilic Judaism as established by Nehemiah and Ezra in the latter half of the 5th century B.C. This policy excluded from Jewry every man who could not prove his pure Jewish blood, which in practice meant could not prove his descent from someone mentioned in the genealogies and lists given in the books of Chronicles, Ezra or Nehemiah. "Pure Jewish blood" meant descent from a returned exile as against those who stayed on in Palestine. The rivalry existed from the return onward until the matter was settled once and for all by the final break between the Jews and the Samaritans. Thus the book of Jonah could have been written any time between *c.* 500 B.C. and *c.* 350 B.C., but the literary style suggests the latter part of this period rather than the former—probably 450 to 350 B.C. Most scholars give the date as between 400 and 250 B.C., but it is difficult to see what point there could be in writing it at all after the matter was finally settled *c.* 400 B.C.

Interpretation.—It has long been realized by many that Jer. li, 34 and 44 provide the key to the intention of the author. The swallowing up by the great fish is a figure for the Babylonian exile. Nineveh was not nearly so big as this tract says, but it was the traditional ruthless persecutor of the Jews, the Hitler of that period. Even Nineveh shall live, if Nineveh repents (*cf.* similar sentiments in Isa. lvi, 3–8).

The second chapter is poetry and differs from the rest. It shows considerable familiarity with other psalms. It is really the prayer of exiled Israel (ii, 4); the billows and waves and the being sunk in the depths of the sea are traditional figures of speech for Israel being attacked and overwhelmed by the heathen. The Babylonian dragon myth (*see* CREATION, MYTHS OF) is often alluded to in the Old Testament, and the fight against the dragon (great fish) was made by the Hebrews to represent God's ceaseless fight against evil and against all the enemies of his people.

The story of Jonah was used twice by Jesus. He made it an illustration of his sojourn in the tomb (Matt. xii, 40) and he pointed out its true moral to the men of his own generation (Matt. xvi, 4). *See* also BIBLE.

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JONAS, JUSTUS (1493–1555), German Protestant reformer, who translated into German the writings of Martin Luther

and Philipp Melanchthon, was born at Nordhausen, Thuringia, on June 5, 1493. His real name was Jodocus (Jobst) Koch. He studied law and the humanities at the University of Erfurt and at Wittenberg. His great admiration for Erasmus first led him to Greek and biblical studies, and his election in 1519 as rector of the University of Erfurt was regarded as a triumph for the partisans of the "new learning." After the Leipzig disputation with Johann Eck (*see* Luther, Martin), Luther won his allegiance. He accompanied Luther to Worms in 1521, and was appointed professor of canon law at Wittenberg. During Luther's stay in the Wartburg, Jonas was one of the most active of the Wittenberg reformers. In 1546 he was at Luther's deathbed at Eisleben, and he preached the funeral sermon for Luther before the cortege left Eisleben. In the same year, however, he was banished from the duchy. He died at Eisfeld on Oct. 9, 1555.

Jonas' correspondence was edited by G. Kawerau in two volumes (1884–85).

JONATHAN. Of the many Jewish bearers of this name, three are well known: (1) The grandson of Moses, who was priest at Dan (Judg. xviii, 30). (2) The eldest son of Saul, who, together with his father, freed Israel from the Philistines (I Sam. xiii). Both are lauded in an elegy quoted from the Book of Jashar (II Sam. i, 17 *et seq.*) for their warm mutual love, their heroism and their labours on behalf of the people. Jonathan's name is most familiar for the firm friendship between him and David (*see* David). (3) Jonathan Maccabaeus (*see* Jews: *Greek and Roman Conquests: The Campaigns of Judas Maccabaeus;* Maccabees).

JONES, ALFRED GILPIN (1824–1906), Canadian politician, lieutenant governor of Nova Scotia, was born at Weymouth, N.S., on Sept. 28, 1824. Of United Empire Loyalist descent, he could trace his paternal ancestry back to an emigree from England to Massachusetts as early as 1635. Educated at the academy at Yarmouth, N.S., he engaged in business at Halifax and became head of a West Indian importing firm there. He attained prominence in public life as an opponent of the union of Nova Scotia with Canada, and a speech protesting the refusal of the British government to repeal such portions of the British North America act as referred to Nova Scotia won for him the nickname of Haul-down-the-flag Jones; but after opposing confederation in 1864–67, he was for many years a member of the federal parliament, and for a few months in 1878 was minister of militia in the Alexander Mackenzie government. Largely owing to his influence the Liberal party refused in 1878 to abandon its Free Trade policy, which led to its defeat in that year. In 1897 he represented Canada on the Pacific Cable commission. In 1900 he was appointed lieutenant governor of Nova Scotia and held that position till his death on March 15, 1906. (C. B. Fe.)

JONES, ERNEST CHARLES (1819–1869), English Chartist, was born in Berlin on Jan. 26, 1819, and educated in Germany where his father was a British army officer. In 1838 Jones came to England, three years later marrying fashionably and publishing anonymously a romantic novel. He was called to the bar by the Middle Temple in 1844, but from 1846 onward he devoted most of his time and energy to Chartism (*q.v.*). He quickly became well known as a stirring orator and a single-minded leader. He was closely associated with Feargus O'Connor, and became a co-editor of the *Northern Star* and of a new periodical *The Labourer* (1847) to which he contributed political songs and articles. In 1848 he was arrested for sedition and sent to prison for two years. He was seriously maltreated there. In 1851 he started *Notes for the People* (renamed the *People's Paper* a year later). It lasted until 1858. Jones was strongly influenced by Karl Marx and gave Chartism in its dying phases an increasingly socialist tinge. He stood repeatedly for parliament as a Chartist candidate, and wrote novels and political songs, the most famous of which is "The Song of the Lower Classes" (1856). He stood as an advanced radical candidate at Manchester in 1868 and died there on Jan. 26, 1869. (A. Bri.)

JONES, SIR HAROLD SPENCER (1890–1960), British astronomer, tenth astronomer royal, was born in London on March 29, 1890. After a distinguished career at Cambridge, he was appointed chief assistant at the Royal observatory, Greenwich, in 1913. In 1923 he went as his majesty's astronomer to the observatory at the Cape of Good Hope, and in 1933 returned to Greenwich as astronomer royal. Smoke and artificial illuminations made Greenwich no longer suitable for the highest class of astronomical observations and Spencer Jones took steps to have the observatory moved, but World War II intervened. After the war, a new site was procured at Hurstmonceux in Sussex, but the new observatory was not yet completed when he retired in 1955.

Spencer Jones's scientific work largely concerned the determination of the fundamental constants of astronomy, and in particular of the solar parallax, which shows the mean distance between earth and sun to be approximately 93,000,000 mi. He had also a keen interest in geophysics, particularly in problems concerned with the rotation of the earth and with magnetism, and in international astronomical co-operation. Knighted in 1943, he was created a knight of the British empire in 1955. He died in London on Nov. 3, 1960. (J. Jn.)

JONES, HENRY (1831–1899), English author, well known as "Cavendish," his pseudonym as a writer on whist, was born in London on Nov. 2, 1831, being the eldest son of Henry D. Jones, a medical practitioner. He adopted his father's profession, established himself in 1852 and continued for 16 years in practice in London. He was a member of several whist clubs, among them the "Cavendish," and in 1862 appeared his *Principles of Whist, Stated and Explained by "Cavendish,"* which became the leading authority as to the practice of the game. This work was followed by treatises on the laws of piquet and écarté. "Cavendish" also wrote on billiards, lawn tennis and croquet, and contributed articles on whist and other games to the ninth edition of the *Encyclopædia Britannica.* "'Cavendish' was not a law-maker, but he codified and commented upon the laws which had been made during many generations of card-playing." He died on Feb. 10, 1899.

JONES, HENRY ARTHUR (1851–1929), English playwright who achieved prominence in the field of melodrama, but later contributed much to the Victorian society drama, was born at Grandborough, Buckinghamshire, on Sept. 20, 1851. A Nonconformist upbringing kept him away from the theatre and he started a career as a commercial traveler. After the production of his play, *Hearts of Oak,* at the Theatre Royal, Exeter, on May 29, 1879, he devoted himself to writing for the theatre. His early work was mostly cast in the form of melodrama, and *The Silver King,* written in collaboration with Henry Herman and produced at the Princess' theatre, London, on Nov. 16, 1882, brought fame both to Jones and to Wilson Barrett the actor-manager. Melodrama coloured his later plays, especially *Saints and Sinners* (1884), *The Dancing Girl* (1891) and *Michael and His Lost Angel* (1896), but increasing familiarity with high society enabled him to develop a vein of comedy. *The Case of Rebellious Susan* (1894) and particularly *The Liars* (1897) were skilful essays in this direction, although they confirm Jones's acceptance of the Victorian moral code. *Mrs. Dane's Defence* (1900) with its finely wrought "cross-examination" scene, is similarly narrow-minded. Although he continued to write with much of his old theatrical skill, *e.g.,* in *The Lie,* first performed at the Harris theatre, New York, on Dec. 24, 1914, his conservative point of view tended to lose him the audience's sympathy. Jones wrote and spoke widely about the function of the theatre, notably in *The Renascence of the English Drama* (1895). He died at Hampstead on Jan. 7, 1929.

See D. A. Jones, *The Life and Letters of Henry Arthur Jones* (1930); R. A. Cordell, *Henry Arthur Jones and the Modern Drama* (1932). (Ge. R.)

JONES, HILARY POLLARD (1863–1938), U.S. naval officer, was born in Hanover county, Va., on Nov. 14, 1863, and graduated from the United States Naval academy in 1884. He served in the Spanish-American War (1898) and in World War I became a rear admiral in command of a cruiser division of the Atlantic fleet. After the war he became commander in chief of the U.S. fleet (1922–23) and was promoted to the rank of admiral. He was a member of the U.S. delegation to the arms limitation meetings at Geneva in 1926 and 1927 and at the London Naval con-

ference of 1930. After retiring he lived in Washington, D.C., where he died on Jan. 1, 1938. Jones's character won the universal respect and esteem of his fellow officers. (J. B. Hn.)

JONES, INIGO (1573–1652), one of the greatest of English architects and the first to be guided by the principles of the Italian Renaissance, was born in London on July 15, 1573, the son of a clothworker. At an undetermined date before 1603, when he figured in the earl of Rutland's household accounts as "a picture maker," he visited Italy. There he studied painting and, evidently, the theatre, thus fitting himself for the role in which he first appeared at the court of James I in 1605—that of designer of costumes and scenery for court masques. Theatrical design was his main work until 1611, when he was appointed surveyor to Henry, prince of Wales. In 1613, after the death of the prince, he was granted the reversion of the office of surveyor of the king's works and proceeded to enlarge his knowledge of architecture on a 19-month continental tour with the earl of Arundel. In Italy this tour took him to Rome, Naples, Venice and Vicenza. His study of the works of Andrea Palladio (*q.v.*) in and near the last city was as important for the future of English architecture in general as for the development of his own style (*see* PALLADIANISM).

In 1615 Jones became surveyor under James I. He continued in this position under Charles I. The first original work designed by him in this capacity was the Queen's house at Greenwich, Kent, completed in 1635; his first major executed design was the Whitehall banqueting house, London (1619–21), generally considered his masterpiece. As a conspicuous public building of purely classical design, this was at that time unique in England, and indeed in northern Europe. His later works included the Queen's chapel at St. James's (now Marlborough house chapel), St. Paul's, Covent Garden, London (1630–31), the restoration of St. Paul's cathedral in 1634, and unexecuted designs for a new Whitehall palace. In 18th-century England his designs were admired and imitated equally with Palladio's. He died on June 21, 1652, at Somerset house, London.

See also references under "Jones, Inigo" in the Index.

BIBLIOGRAPHY.—J. A. Gotch, *Inigo Jones* (1928); M. Whinney, *Renaissance Architecture in England* (1952); John Summerson, *Architecture in Britain, 1530–1830* (1953), with a bibliography. (Ms. W.)

JONES, JACOB (1768–1850), U.S. naval officer, was born near Smyrna, Del., in March 1768, and studied medicine at the University of Pennsylvania. When his practice in Kent county, Delaware, proved none too lucrative, he turned to politics and became clerk of the Delaware supreme court. In 1799, at the age of 31, carried away by enthusiasm over the naval war against France, he entered the United States navy as a midshipman on the frigate "United States," captain, John Barry. At the close of the quasi war with France, Jones was retained in the navy and promoted to a lieutenancy. As second lieutenant of the "Philadelphia," he was taken prisoner with the rest of the officers and crew when the frigate ran on the rocks off the harbour of Tripoli (1803). Jones was a prisoner for 19 months until the Barbary powers were subdued in 1805. In the War of 1812 he was commander of the first sloop of war, "Wasp," which, on Oct. 18, 1812, off Cape Hatteras, took the British sloop of war "Frolic." Of equal armament, the two vessels engaged in a 40-minute gun duel, but Jones's gunners were so superior that when the "Wasp's" crew boarded the enemy vessel there was no further resistance, the British having been literally swept from their own decks. Unfortunately for Jones, a British 74-gun ship happened upon the "Wasp" and "Frolic" as the battle ended, took the former and retook the latter. When exchanged a year later, Jones received a gold medal from congress, which also presented $25,000 to the officers and men. After the war, in command of the ex-British frigate "Macedonian," Jones was in Stephen Decatur's squadron which overawed the Barbary powers at Algiers in 1815. He commanded the Mediterranean squadron from 1821 to 1823, and the Pacific squadron from 1826 to 1829. After his retirement, he was appointed commander of the Philadelphia Naval asylum, where he died on Aug. 3, 1850.

See *Commodore Jacob Jones*, Papers of the Historical Society of Delaware, xliv (1906); and *Quasi War With France* and *Barbary War* documents, 11 vol. (1935–43). (W. B. Ck.)

JONES, JOHN PAUL (1747–1792), naval officer of the American Revolutionary War, was born John Paul in the parish of Kirkbean, county of Kirkcudbrightshire, on Solway firth, Scotland, on July 6, 1747, the son of John Paul, a landscape gardener. Apprenticed to John Younger, a Kirkcudbright merchant shipper, he sailed at the age of 12 as cabin boy on a ship to Virginia, there visiting his older brother William, a tailor at Fredericksburg. When Younger failed in 1766, the apprenticeship ended, and Jones received a warrant as acting midshipman in the British navy. That he ever served seems doubtful, as that same year found him chief mate of a Jamaica-owned slaver brigantine. After two years he quit the slave trade and took passage at Jamaica on a brigantine for Scotland. Master and chief mate died of fever on the passage, and he brought the ship safely home, to be appointed master. In April 1770, at Tobago, the ship's carpenter, whom he had had flogged for laziness, deserted, shipped on another vessel, and died a few months later. When John Paul reached Scotland in Nov. 1770, he was arrested on a charge of murdering the carpenter, but was released on bail. He sailed for the West Indies, hunting evidence to disprove the murder charge. He purchased a vessel in Sept. 1772 and made several voyages to Tobago, the final one culminating in "the great misfortune" of his life when, in Dec. 1773, he killed the ringleader of a mutinous crew. Upon advice of friends, he fled the island rather than await a future sitting of the admiralty court, and changed his name to John Paul Jones. While his movements are obscure for the next two years, it is apparent that he sought his brother in Fredericksburg and, when the latter died in 1774, participated in his estate. Meanwhile he had met some of the southern leaders of the revolutionary movement, one of whom, Joseph Hewes, of North Carolina, a member of the continental congress, induced him to go to Philadelphia. There, in the fall of 1775, he received a commission as senior lieutenant in the new Continental navy.

To Jones, on Dec. 3, 1775, fell the honour of first raising the Grand Union flag on the ship "Alfred," of twenty 9-pounders, flagship of the little fleet commanded by Esek Hopkins. When that fleet reached the Bahamas, in March 1776, Jones's knowledge of the topography of the islands contributed to the bloodless capture of New Providence with a great quantity of ordnance. Upon the return cruise, in command of the "Alfred's" main battery, he distinguished himself in the inconclusive engagement in which the British ship "Glasgow" escaped from the whole Continental fleet. As the captain of the sloop "Providence" was court-martialed for cowardice during that engagement, Hopkins gave Jones command of the "Providence," a vessel of twelve 4-pounders and 70 men, with a temporary commission dated May 10, 1776. Convoying a coal ship from Boston to Philadelphia, Jones arrived in August at a time when the marine committee was investigating Commodore Hopkins' conduct. It approved Jones's appointment to a captaincy, but issued him a new commission dated Aug. 8. He sailed from the Delaware capes on Aug. 21, under orders to cruise as long as his provisions and water lasted. The cruise consumed six weeks and five days and ranged from Bermuda to Nova Scotia. The "Providence" twice outwitted British frigates, the "Solebay" and "Milford"; manned and sent in eight prizes—six brigantines, a ship and a sloop; and sank or burned eight more—six schooners, a ship and a brigantine—some of which were cut out of Nova Scotian harbours. Jones brought the "Providence" safely into Rhode Island on Oct. 7, 1776. Transferred to the "Alfred" with his entire crew, Jones sailed in Nov. 1776 for a cruise off Nova Scotia in company with the "Providence" under Hoysteed Hacker. Off Louisburg they took a merchant ship and the valuable transport "Mellish," but on Nov. 18 the "Providence" parted in a light gale, which Hacker used as a pretext to return to port. Proceeding alone, Jones burned a large ship off Canso as well as the oil warehouses ashore, cut three ships out from under the nose of the British frigate "Flora" off Cape Breton and, on his return, cleverly fooled the "Milford" for a second time; he and his prizes reached Boston unmolested on Dec. 15. Meanwhile, congress had placed him 18th on the seniority list, preceded by a number of captains who had entered the service after he had, an injustice that rankled

in his mind for many years. Efforts to atone for the discrimination against him were attempted in congress, but most of them proved abortive.

On June 14, 1777, the same day the Stars and Stripes was selected as the national emblem, congress appointed Jones to the newly built ship "Ranger," of eighteen 6-pounders, at Portsmouth, N.H. Delays in outfitting and manning held him in port until Nov. 1, when he sailed for France with official word of Gen. John Burgoyne's surrender and the promise of a large frigate being built at Amsterdam. But the news of Burgoyne's capitulation had preceded him, and the frigate, to prevent British seizure, had to be sold to France. Disappointed on both counts, Jones secured permission from the U.S. commissioners at Paris for a cruise in European waters. Before sailing, he had the honour of receiving the first salute to the new U.S. flag from a French fleet in Quiberon bay, on Feb. 14, 1778. The subsequent cruise was a spectacular one through St. George's channel and the Irish sea, where a number of prizes were taken. Before dawn, on April 23, 1778, with 31 volunteers, Jones went ashore at Whitehaven, spiked the cannon in two forts, but was disappointed in efforts to burn the shipping. At noon the same day, he landed on St. Mary's Island, in Solway firth, intending to seize Lord Selkirk as a hostage. In the latter's absence from home, the "Ranger's" men insisted upon taking the Selkirk silver plate, which Jones later redeemed out of his own pocket and restored to the owners, with profuse apologies to Lady Selkirk. Off Carrickfergus, Ire., the next day, he climaxed the cruise by taking the British ship of war "Drake," of twenty 4-pounders, in an hour's encounter in which Jones lost 8 killed and wounded and the "Drake" lost 42. When he returned to Brest on May 8 he was hailed as a hero, and the French minister of marine asked that he be held in France to head a future naval expedition. Jones turned command of the "Ranger" over to an ungrateful and insubordinate lieutenant and cooled his heels, wild with frustration, for six months in French ports before the ministry acted.

When the expedition finally sailed from Lorient, on Aug. 14, 1779, it consisted of the "Bon Homme Richard," an old French East Indiaman armed with forty-two 18-, 12- and 9-pounders, named by Jones in honour of Benjamin Franklin and his *Poor Richard's Almanack;* the "Alliance," of 36 guns, a new U.S. frigate recently arrived in France; two small French ships, the "Pallas," of 32 guns, and the "Vengeance," of 12; and three privateers which soon abandoned the fleet. Proceeding around Ireland and Scotland, Jones had constant trouble with Peter Landais, the French captain of the "Alliance." A number of prizes were taken, but an attempt to attack the Scotch port of Leith was prevented by contrary winds. On Sept. 23, off Scarborough, Eng., on the return leg of the cruise, Jones won enduring fame in one of the most famous naval engagements of history. The little squadron intercepted the Baltic merchant fleet under convoy of the British ships "Serapis," of fifty-four 18-, 9- and 6-pounders, and "Countess of Scarborough," of 20 guns. Jones engaged the "Serapis" by moonlight, and for 3½ hours the vessels lay yardarm to yardarm, with the "Alliance" twice circling them and firing indiscriminately into both. When the "Serapis" struck, she was on fire, and the "Bon Homme Richard" was in a sinking condition. "No action before was ever, in all respects," wrote Jones afterward, "so bloody, so severe and so lasting." The carnage had been so great that neither Jones nor his opponent, Richard Pearson of the "Serapis," whether through inability or reluctance, ever issued a complete casualty list. One of Jones's junior officers estimated the killed and wounded on the "Bon Homme Richard" at 302.

Jones transferred his crew to the "Serapis" and, after his own ship had foundered, the squadron, with the "Countess of Scarborough" taken by the "Pallas," sailed for the Texel. There Jones preferred charges against Landais and took command of the "Alliance." Disdaining the subterfuge of a French commission, he escaped a British blockading squadron in Dec. 1779, and cruised in the "Alliance" without much success for several months. For his great victory Louis XVI gave him a gold-hilted sword and made him a chevalier of France. Meanwhile, Landais seized the "Alliance" at Lorient in June 1780, while Jones was ashore, and sailed off in her. Finally, in 1781, Jones returned to the U.S. in the borrowed French ship "Ariel," to receive the grateful thanks of congress on April 14, and be assigned to the 74-gun ship "America," being built at Portsmouth, N.H. But the "America" was shortly after given to France to replace a ship lost in Boston bay, and Jones's final service in the Revolution was as a volunteer on Vaudreuil's French fleet, which sailed to the West Indies but accomplished nothing before peace was declared.

Sent to France as prize agent in Nov. 1783, Jones effected a partial settlement by 1786, and returned to the U.S. in 1787 to be awarded a gold medal by congress and again dispatched abroad to seek restitution from Denmark for two prizes that government had turned back to England. While in Copenhagen in 1788, and on advice of Thomas Jefferson, then ambassador to France, he accepted an offer from Catherine II the Great and entered the Russian navy as a rear admiral. Sent to the Black sea and promised supreme command in the campaign against the Turks, Jones was soon disillusioned. His victories were credited to others. His subordinates were encouraged to dispute his authority. As a finale, in St. Petersburg in March 1789, he was falsely accused of criminal assault upon a young girl. Catherine had tired of him and, in lieu of dismissal, granted him leave of absence. He returned to France embittered and broken physically, and rapidly went into a decline. When he died, on July 18, 1792, he was buried in an unmarked grave in St. Louis cemetery for Protestants. More than a century later, the body having been found and identified through the efforts of Ambassador Horace Porter, an escort of U.S. warships brought Jones's remains back to the land of his adoption, where a crypt had been prepared in the naval chapel at Annapolis. His grave is a national shrine.

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JONES, JOSEPH STEVENS (1809–1877), U.S. physician, actor, theatrical manager and author of over 150 plays, was born in Boston, Mass., on Sept. 28, 1809. He is remembered for his Yankee characters, the most popular of which, Solon Shingle in *The People's Lawyer* (1839), was acted with great success by George H. Hill, Charles Burke, Joshua Silsbee and John E. Owens. Early in his career Jones acted in the Warren, National and Tremont theatres in Boston and managed the Tremont during its last two seasons. His first successful play, *The Liberty Tree, or Boston Boys in '76* (1832), was produced at the Warren. His last published play, *The Silver Spoon,* was first produced at the Boston Museum (1852) with William Warren as Jefferson S. Batkins. Though he continued to write plays, Jones left the stage in 1841, obtained his M.D. degree from the Harvard medical school (1843) and was a successful physician until his death on Dec. 29, 1877.

See John Bouvé Clapp, *Boston Evening Transcript* (Dec. 30, 1910). (B. HT.)

JONES, LEWIS RALPH (1864–1945), U.S. botanist who came to be recognized as dean of the plant pathologists of his generation and as a leader in biology and agriculture, was born at Brandon, Wis., Dec. 5, 1864. Besides valuable research in plant pathology, Jones had a constructive influence on early institutions and programs of higher education and research in North America. After receiving his bachelor's degree from the University of Michigan, he became botanist of the Vermont agricultural experiment station in 1889 and professor of botany of the University of Vermont in 1893. Twenty years at Vermont, interspersed with travel and advanced study (Ph.D., University of Michigan, 1904), established him as a leader in U.S. botany and plant pathology. In 1910 he went to the University of Wisconsin to found its department of plant pathology.

For a biographical memoir, *see* G. W. Keitt, and F. V. Rand, "Lewis Ralph Jones 1864–1945," *Phytopathology* 36:1–17 (1946). (G. W. KT.)

JONES, OWEN (1809–1874), English designer, writer and architect, was born in London on Feb. 15, 1809. He studied at the Royal Academy. From 1833 to 1834 he traveled in the near east and in Spain. His *Plans, Elevation, Sections and Details of the Alhambra* (1842–45) drew attention to Islamic design. He soon became influential and pioneered prefabricated metal building for the tropics. He also worked as an interior decorator and book illustrator. In 1851 he was appointed a superintendent of works for the Great exhibition and in 1852 supervised the decorations of the re-erected Crystal palace. His main, and still standard, work, *The Grammar of Ornament* (first edition 1856), is a systematic pictorial collection of eastern and western design motifs, emphasizing colour and the application of logical principles to the design of everyday objects. He died in London on April 19, 1874.

(A. K. P.)

JONES, ROBERT (fl. 1600–1611), one of the school of English lutenist song writers, which flourished *c.* 1580–*c.* 1620. Details of Jones's life are scanty. He took his B. Mus. degree at Oxford in 1597. In 1610, together with Philip Rosseter and two other partners, he was granted a patent to train a group of children in London, to be called "The Children of the Revels to the Queene," but when the building in which they were to play was nearly finished the privy council issued an order against its completion and it was demolished. Jones's works include the *First Set of Madrigals* (1607), now incomplete, and five books of songs for voice and lute published between 1600 and 1611. These songs are mostly light in character, full of melodic inventiveness and rhythmic ingenuity. (D. Po.)

JONES, ROBERT EDMOND (1887–1954), U.S. theatrical and motion-picture designer, was born at Milton, N.H., Dec. 12, 1887. He graduated from Harvard university in 1910 and began designing scenery for the theatre in New York city in 1911. He attracted attention by the boldness of his conceptions and in 1933 began designing for colour motion pictures. Jones died in Milton on Nov. 26, 1954. He published, with K. MacGowan, *Continental Stagecraft* (1922) and *The Dramatic Imagination* (1941).

JONES, ROBERT TYRE, JR. (Bobby Jones) (1902–), only golfer in history to win the "Grand Slam"—the four major tournaments of the golf world, the amateur and open championships of Great Britain and the United States—a feat accomplished by the U.S. star in 1930. Born in Atlanta, Ga., on March 17, 1902, Jones was only 14 when he entered his first national championship. Before retiring after that triumph, Jones had played in 13 U.S. amateur championships, winning 5 and finishing second twice. Competing as an amateur against the best golf professionals in the world, he won four U.S. open championships and four times finished second out of 11 trials. He captured three out of the four British open championships in which he competed, and the British amateur once. He won 13 national championships from 1923 through 1930. Jones's excellence was in his putting, and his putter was known as "Calamity Jane."

After quitting golf competition, Jones established a law practice in Atlanta. In 1958 Jones was presented with the freedom of the burgh of St. Andrews, Scot., home of the premier golf club of the world. He was the first American to be so honoured since Benjamin Franklin won the freedom of the burgh in 1759.

(J. D. McC.)

JONES, RUFUS MATTHEW (1863–1948), U.S. Quaker teacher, writer and humanitarian, one of the founders of the American Friends Service committee, was born in South China, Me., on Jan. 25, 1863. After attending Friends' schools he studied at the University of Heidelberg (Ger.) and at the Universities of Pennsylvania and Harvard, his attention focusing more and more on "man's inner life and the spiritual ground and foundation of the universe." In 1893 he became editor of the *Friends' Review* (later the *American Friend*) and joined the faculty of Haverford college as a teacher of philosophy.

A meeting in 1897 with John Wilhelm Rowntree, a brilliant and like-minded English Friend, resulted in an ambitious plan for a collaborative history of mysticism and Quakerism. Rowntree's untimely death did not prevent the fruition of the plan. Jones published *Studies in Mystical Religion* in 1909, *The Quakers in the American Colonies* (with others) in 1911, *Spiritual Reformers in the 16th and 17th Centuries* in 1914, and *The Later Periods of Quakerism* in 1921. Two volumes on early English Quakerism by William Charles Braithwaite rounded out the series, which stands as an impressive record and interpretation of spiritual religion in western culture. Of the more than 50 books which Jones published between 1889 and 1948, the majority dealt with one aspect or another of mysticism.

When the United States entered World War I, Jones joined other Friends in organizing the American Friends Service committee, which provided opportunities for conscientious objectors to do relief work in Europe as an alternative to military service. During the next three decades till his death on June 16, 1948, he was steadily active in the committee's work, serving during most of that period as its chairman or honorary chairman. Through his preaching, his writing, his humanitarianism, and his radiant, buoyant personality he became the most widely known and respected American Quaker of his time. Within the Society of Friends Jones was a powerful force for unity and liberal thought; among religious people generally he was considered the leading U.S. exponent of the mystical viewpoint.

Bibliography.—Jones was author of several autobiographical works, among them *A Small-Town Boy* (1941); *Finding the Trail of Life* (1926); *The Trail of Life in College* (1929); and *The Trail of Life in the Middle Years* (1934). *See* also David Hinshaw, *Rufus Jones, Master Quaker* (1951); H. E. Fosdick (ed.), *Rufus Jones Speaks to Our Time* (1951). (F. B. T.)

JONES, THOMAS GWYNN (1871–1949), Welsh poet and scholar best known for his narrative poems on traditional Celtic themes, was born at Betws-yn-Rhos, Abergele, on Oct. 10, 1871. He spent much of his earlier life as a journalist, particularly in Denbigh under Thomas Gee whose biography, *Cofiant Thomas Gee*, he published in 1913. In 1909 he joined the National Library of Wales at Aberystwyth, moving in 1913 to the University of Wales as lecturer and, later, professor of Welsh literature. He first achieved distinction as poet with *Ymadawiad Arthur* (1902), an eisteddfod poem which like the later *Gwlad y Bryniau* (1909) revealed such a mastery of the strict Welsh metres that it was hailed as the morning star of a renaissance of Welsh poetry. But both poems are of the 19th century in spirit, and later critics have seen his greatest achievement in the poems "Tir na n-Óg," "Broseliawnd," "Anatiomaros," "Argoed" and "Cynddilig." He was a translator of genius, as his *Faust* (1922) or *Blodau o Hen Ardd* (with H. J. Rose, 1927) reveal. But the virtues of his historical poems, such as his emulation of earlier forms of syntax, expression and metre often mar his prose, giving it an obvious air of artificiality. His academic work also, such as *Bardism and Romance* (1914) or *Gwaith Tudur Aled* (1926), misses the pre-eminence of his poetry and translations. He died at Aberystwyth on March 7, 1949.

See *Y Llenor*, vol. xxviii, pt. 2 (1949) for biography and bibliography.

(G. H. Hu.)

JONES, SIR WILLIAM (1746–1794), British orientalist and jurist who did much to encourage interest in oriental studies in the west, among both scholars and the general public, was born in London on Sept. 28, 1746, of Welsh parentage. While still at Harrow, he was noted as a classics scholar and poet, and showed general precocity and a remarkable memory. He taught himself Hebrew, and on proceeding to University college, Oxford, in 1764, he read Arabic and Persian. Henceforward, by organizing his time, he was able to pursue a wide variety of interests, ranging from the sciences to literature and politics. His greatest facility was in languages. Of these he had learned 28, including Chinese, by the end of his life, often teaching himself.

In 1766 he became a fellow of University college, and also tutor to Lord Althorp, Earl Spencer's heir. In 1768 he translated into French, for King Christian VII of Denmark, a Persian life of Nadir Shah. Then he decided to give up oriental scholarship in favour of a more active life, partly for financial reasons. He studied law and was called to the bar in 1774. Later, he was appointed a commissioner in bankruptcy. His *Essay on the Law of Bailments* (1781), which became a standard authority, was meant as the precursor of a whole series of legal works. Meanwhile, he

did not give up orientalism. His *Grammar of the Persian Language* (1771) held the field for a long time. In 1774 appeared his treatise *Poeseos Asiaticae Commentariorum Libri Sex.* His *Moallakât* (1782), a translation of the famous seven pre-Islamic Arabic odes (*see* MU'ALLAQAT), introduced these poems to the British public. During this period he had political ambitions, and became a champion of the American colonists. But a plan to stand for parliament for Oxford university came to nothing.

In 1783 he was knighted, and sailed for Calcutta as judge of the supreme court. In 1784 he founded the (later Royal) Asiatic society of Bengal to encourage oriental studies. He himself took up Sanskrit, to equip himself for the preparation of a vast digest of Hindu and Muslim law. Of this uncompleted venture, his *Institutes of Hindu Law* was published in 1794 and his *Muhammedan Law of Inheritance* in 1792. In his 1786 presidential discourse to the Asiatic society, he postulated the common ancestry of Sanskrit and Greek, his findings providing one of the earliest examples of the science of comparative philology. He died in Calcutta on April 27, 1794.

BIBLIOGRAPHY.—*Works,* 6 vol. (1799; supplement, 2 vol., 1801); his poetry is included in vol. 21 of A. Chalmers' *English Poets* (1810). *See* also Lord Teignmouth, *Memoirs of the Life, Writings and Correspondence of Sir William Jones* (1804); A. J. Arberry, *Asiatic Jones* (1946), *Oriental Essays* (1960). (J. A. HD.)

JONGEN, JOSEPH (1873–1953), outstanding modern Belgian composer, was born at Liège on Dec. 14, 1873. He studied at the Conservatoire there. After winning the Belgian Grand Prix de Rome in 1897 with his cantata *Comala,* he studied in Italy, Germany and France. In 1903 he became professor of harmony at Liège. As a refugee in England during World War I, he formed a piano quartet with D. Defauw, L. Tertis and E. Doehaerd. He became professor of composition at Brussels Conservatoire in 1920 and director, 1925–39. Of his numerous works, the most widely known are Harp Concerto (1944), *Concert à cinq* (1923), three string quartets and two pianoforte trios. He died July 13, 1953, at Sart-lez-Spa, near Liège. (H. GA.)

JONGKIND, JOHANN BARTHOLD (1819–1891); Dutch painter and engraver, an important figure in the development of Impressionism, was born at Lattrop, near Rotterdam, on June 3, 1819. He studied at The Hague in the studio of Steffens and at the Academy under the landscape painter, A. Schelfhout. In 1846 he moved to Paris, and worked under J. B. Isabey and François Picot. He exhibited at the Salon in 1848, and again in 1852, when he received a medal and worked much at Le Havre. After a stay in the Netherlands (1855–60) he returned to Paris. His works were exhibited with those of Corot, Daubigny and Troyon at an exhibition arranged by Count Armand Doria, and by his style he belonged to the Fontainebleau group. He chose his subjects on the banks of the Seine and in other picturesque old quarters of Paris, on the sea coast of Normandy and on the Dutch canals. Refused at the Salon of 1863, he joined in the Salon des Refusés, and made the acquaintance of Claude Monet. His rendering of atmosphere and his study of fleeting effects of light and reflections make him a pioneer of Impressionism—though his oil pictures were not painted directly from nature, and are carefully arranged compositions. His drawings and water colours were done out of doors. In 1878 he settled at Côte-Saint-André (Isère), where he painted the simple landscape motifs for which his art is famous. He died at Côte-Saint-André on Feb. 9, 1891. *See* also PAINTING: *The Netherlands: 18th and 19th Centuries.*

JÖNKÖPING, the name of a county (*län*) of southern Sweden and of its capital city. Population of the county (1960) 285,271; area 4,436 sq.mi. The county, extending southward from Lake Vättern, in northern Småland province, is studded with lakes and drained by the Em, Laga and Nissa rivers. Primarily a wooded region, it has some manufactures, most of them exploiting the country's timber. Chief towns, in addition to Jönköping, are Nässjö, Huskvarna, Värnamo, Esksjö, Tranås, Sävsjö and Vetlanda.

The town of Jönköping is beautifully situated on the southern shores of Lake Vättern (*q.v.;* Vetter). Pop. (1960) 50,522. Two lakes, Munksjön and Rocksjön, lie within the boundaries of the town. It is connected by rail with the main Swedish lines and has water connections through the Göta canal to the Kattegat as well as the Baltic; there is an airport, and bus service is extensive. The town's industries include manufacture of matches (in which it leads the country), paper, fans, airplanes, machinery and scales. Jönköping has a number of buildings of historic interest, including the Old Town hall (1696–99); the Göta Hovrätt (court of appeal), a Renaissance building of 1655; and the Kristinekyrkan (Christina church), which dates from 1649–73. The county museum is also situated at Jönköping, and the town is the educational centre of the county.

In 1283 Franciscan monks built a monastery on this site, and in 1284 the town received a charter. The monastery was fortified, enlarged and made into a military castle in 1544. When, in 1612, the Danes approached the town, the inhabitants themselves burned it to the ground, but afterward Gustavus Adolphus II ordered it to be rebuilt as a defensive point. In 1809 Jönköping witnessed the conclusion of peace between Sweden and Denmark. It was there that the author Viktor Rydberg was born in 1828. The match industry was begun in 1852 by J. E. Lundström, founder of the Swedish match industry. (A. T. NI.)

JONQUIÈRE, a city of Chicoutimi county, south central Quebec, Can., on the Au Sable river (tributary of the Saguenay river), 10 mi. W. of Chicoutimi on the Canadian National railway, is an important wood-pulp and lumber centre. The city was named after the marquis de la Jonquière, who was governor of New France, 1749–52. Settlement began in the area in 1847, and the township was incorporated in 1866. Jonquière became an incorporated village in 1904, a town in 1912 and a city in 1956. In addition to a large pulp mill, there are several small manufacturing plants, and retail trade was increasing in importance in the second half of the 20th century. Many of the inhabitants work in the nearby aluminum-producing town of Arvida, and it is commonly considered part of the metropolitan area that also includes the town of Kénogami (pop. [1961] 11,816) to the north. The population of Jonquière was 28,588 in 1961. (J. D. I.)

JONQUIL, the name applied to several species of *Narcissus,* especially the yellow-flowered *N. jonquilla,* native to southern Europe and Africa, and *N. odorus. See* NARCISSUS.

JONSON, BEN (1573?–1637), English dramatist, poet and masque-writer, who is remembered for his realistic, satirical depictions of London life, his learning and his position in the society of his time. The details of his life are obscure and most of the chief dates have been the subject of dispute. He was born two months after his father's death, in or near London, probably on June 11, 1573, and almost certainly not before Oct. 1572. Two years later, his mother married her second husband, a master builder named Brett, of Hartshorn lane, Westminster. This was either Thomas Brett, employed on building at Lincoln's Inn in 1588, or Robert Brett, later master of the Tylers' and Bricklayers' company, who was employed by the pensioner of Lincoln's Inn in 1590 and 1591, and built the New Buildings there between 1600 and 1609. His name and Jonson's appear in the accounts for 1597 of the churchwardens of St. Martin's. Jonson was "brought up poorly" in the Charing Cross neighbourhood. His stepfather sent him to a private school in St. Martin's church; later a friend (possibly William Camden or John Hoskins) sent him to Westminster school. As he speaks of Camden as his master from first to last, Jonson may not have got much beyond the fourth form. He always acknowledged that to Camden he owed "All that I am, all that I know." Jonson may have left school in 1588, to work unwillingly at bricklaying.

Some time before 1592 he served as a volunteer in the Low Countries, where on one occasion he fought and killed an enemy in single combat publicly in sight of both armies, stripping his victim of his arms according to ancient custom. The incident is typical of Jonson in its mixture of flamboyance, insistence upon the validity of tradition and an awareness of being engaged in an ancient and honourable calling, with rewards as well as hazards. He soon returned to what he described, obscurely, as his "wonted studies." Some time between 1592 and 1595 he married; this is probably the marriage between a Ben Jonson and Anne Lewis recorded at the church of St. Magnus the Martyr on Nov. 14, 1594. The marriage was not happy; he was not domesticated, and described himself

later as "given to venery." But his remark that his wife was "a shrew yet honest" shows respect, if not liking. The number of their children is uncertain; it has been thought erroneously that his daughter, Mary, who died in infancy, was the child buried at St. Martin's-in-the-Fields on Nov. 17, 1593. In 1603 the eldest son, Benjamin, died of the plague, aged 7; there may have been another, Joseph, baptized Dec. 9, 1599, and a second Benjamin, baptized Feb. 20, 1608, and buried Nov. 18, 1611. The accepted belief that a son of this name died in 1635 has been disproved.

Jonson's activities in the years after his return to England are not known in detail. He became a strolling player and almost certainly played Hieronimo in Thomas Kyd's *The Spanish Tragedy,* and possibly Christopher Sly in Shakespeare's *The Taming of the Shrew.* In London he played Zulziman in a lost play at Paris garden, owned by Philip Henslowe, who apparently employed him to finish Thomas Nashe's satire, *The Isle of Dogs;* the performance sometime before the end of July 1597 led to the closing of the theatre because of the play's "seditious" content, and the arrest of Jonson among others. On July 28, Henslowe lent him £4 and received from him 3*s*.9*d*. of his share in a performance; he was in prison by Aug. 15, when the privy council ordered Richard Topcliffe, the informer, to interrogate him. Research has established that this must be the episode which Jonson mentioned later to William Drummond (*q.v.*) as one in which spies were placed to trap him. As the grave suspicions showed themselves unjustified, a warrant for his release was drawn up on Oct. 2, and signed the next day, when he was freed. It is probable that this release was followed by the banquet at his expense attended by John Selden and William Camden, in the midst of which (as Drummond records) "his old mother drank to him, and showed him a paper which she had intended (if the sentence had taken execution) to have mixed in the prison among his drink, which was full of lusty strong poison," which she, too, would have drunk. Jonson said that the prisoners had been threatened with mutilation of ears and nose.

Early Work.—On leaving prison Jonson took up work again for Henslowe, who advanced him 20*s*. on Dec. 3 for "a book" of a play to be finished before Christmas. During 1598 Jonson collaborated with two others on a lost play for Henslowe at Paris garden, and wrote two lost comedies played elsewhere. On April 2, he borrowed £10 from Robert Browne, the actor, giving a bill binding repayment by May 27. His position was improving by the summer, with at least one successful tragedy, now lost. In the early autumn Francis Meres mentioned him in *Palladis Tamia* among those "who are our best for tragedy." This may have been a slip of the pen, but Jonson was not yet known as the great comic writer, and he may well have had a reputation for popular tragedies which he excluded from his collected *Works.* By mid-September, 1598, he had shown his true self in *Every Man in His Humour* at the Curtain theatre, played by the Lord Chamberlain's men, with Shakespeare probably playing Old Knowell. On Sept. 22, Jonson killed an actor, Gabriel Spencer, in a duel fought in Hoxton fields. He was arrested for felony, and became a Roman Catholic while in prison; it may be that he then began the systematic reading in theology which lasted the rest of his life.

Jonson confessed the indictment at the Old Bailey in October. He was found guilty, but escaped hanging by the not unusual expedient of claiming right of clergy: the Tyburn mark (the letter T) was branded on his left thumb and all his goods were confiscated. His reputation was growing among the educated, particularly among the younger members of the Inns of Court, who appreciated much in *Every Man in His Humour* that was ignored or resented by the popular audiences. That autumn saw the successful performance of *The Case Is Altered* by the Children of the Chapel at Blackfriars. Jonson did not consider this, probably written in 1597, worthy to be printed in his *Works.* Late in Jan. 1599 he was imprisoned in the Marshalsea for the unpaid debt to Browne. Offering no defense, Jonson was ordered to pay £1 damages as well as what he owed. The indictment for the manslaughter of Spencer describes him as yeoman; but a document of the Queen's Bench shows that he must have obtained the freedom of the Company of Tylers and Bricklayers, for it describes him legally as "Citizen and Bricklayer of London."

In the second half of 1599 Jonson wrote more ephemeral work for Henslowe, who advanced 40*s*. on Aug. 10 to him and Thomas Dekker jointly for collaboration on *The Page of Plymouth.* John Marston's revised version of the anonymous *Histriomastix* was probably performed in that month. Jonson did not immediately express his resentment at finding his likeness in the pedant Chrisoganus, meant as a flattering portrait; he was engaged on a tragedy on the life of Robert II of Scotland, for which he, Dekker, Henry Chettle "and other gentlemen" accepted earnest money from Philip Henslowe. Late in 1599 or early in 1600, Jonson struck at Marston in *Every Man out of His Humour.* He was now in the midst of the War of the Theatres. When the play was performed by the Lord Chamberlain's Men at the newly built Globe theatre, contemporaries recognized the satirizing of Marston and Dekker, but modern authorities are not agreed as to how and through which characters it was done. Marston seems to have suffered as Clove, and fought back, with Jonson apparently as Brabant Senior in his *Jack Drum's Entertainment,* performed about Aug. 1600. Jonson had probably already started *Cynthia's Revels* in which Hedon and Anaides are generally regarded as portraits of Marston and Dekker respectively. Performance by the Children of the Chapel, probably in Jan. 1601, raised a scandal, partly because there seemed to be allusions to the queen and the earl of Essex, and partly because of resentment at the playwright's impertinence in dragging the queen into his private quarrels. Anticipating another rumoured attack by Marston, Jonson wrote one of his own, *The Poetaster,* in 15 weeks. But Marston's *What You Will,* satirizing Jonson as Lampatho, was apparently played just before Jonson's work was acted by the Children of the Chapel. This time, not only Marston, satirized as Crispinus, and Dekker (Demetrius Fannius) took offense; lawyers and soldiers in general objected. Prosecution was threatened, but Jonson was protected by Richard Martin, a lawyer and wit of the Middle Temple, and determined to abandon comedy, not replying to Dekker's attack on him as Captain Tucca in *Satiromastix.* There were still payments from Henslowe: on Sept. 25, 1601, £2 for additions to Kyd's *Hieronimo* (*The Spanish Tragedy*), followed by £10 (a large sum) on June 22, 1602, for more additions and in earnest of a play *Richard Crookback* which was excluded from the *Works.*

About this time Jonson seems to have left home. As he was at the home of Sir Robert Townshend in Feb. 1603, and as he told Drummond that he lived apart from his wife at the home of Esmé Stewart, Lord d'Aubigny, for five years, it was long assumed that this was from 1602 to 1607. But it is more likely that Jonson was there between 1613 and 1618. It is certain that in 1602 he turned his back on the theatre and for some years accepted the hospitality of various friends of rank such as Townshend, D'Aubigny and Sir Robert Cotton. Probably helped by George Chapman, Jonson started *Sejanus* in 1603. After Elizabeth's death, he was required to write *The Satyr* played before the queen and prince of Wales, when they stopped at Althorpe on their way south. Late that year the performance of *Sejanus* by the King's Men at the Globe theatre led to outcries against its flouting of popular taste and against the dangerous political implications which some claimed to find in it. Possibly with the earl of Northampton, whose servant he had beaten, as his accuser, or possibly because of pressure from people regarding themselves as attacked in the play, Jonson was called before the council. He may have been accused of treason, but there is no record of any punishment. Some authorities suggest that this episode occurred not in 1603, but in 1605 when the revised text was printed without the work of his collaborator. He was certainly free in Jan. 1604, and admitted to court entertainment, for early that month he and Sir John Roe were thrust out of court by Suffolk, the lord chamberlain, for unmannerly behaviour, and Jonson wrote speeches with Dekker to celebrate James I's entry into the city on March 15. He addressed the king in a *Panegyre* when parliament was opened some days later, and wrote the little masque that entertained the king and queen on May day at the house of Sir William Cornwallis at Highgate.

At the end of 1604 Jonson, Chapman and Marston, reconciled, collaborated on *Eastward Ho!* It has been thought that the ridicule of the Scots and of the king in the performance by the Chil-

dren of the Chapel at Blackfriars led to the imprisonment of Chapman and Marston, with Jonson joining them voluntarily. But he was free and in favour at Christmas, and his *Masque of Blackness* was performed at court on Jan. 6, 1605. It is possible that the trouble came with the unauthorized publication of *Eastward Ho!* Jonson's letters to three unnamed noblemen, an unnamed noblewoman and the earls of Salisbury, Montgomery and Pembroke, confirm that he and Chapman were in prison, although not mentioning Marston. The letters were written after May 4, 1605, probably in September. The intervention of friends, including D'Aubigny and Suffolk, brought Jonson's release, and about Oct. 9, he was a guest at the supper given by Robert Catesby to a number of persons involved in the Gunpowder plot. On Nov. 7, Jonson received a warrant from the privy council "to let a certain Priest know (that offered to do good service to the state) that he should securely come and go." His attempt to meet the priest with the help of the Venetian ambassador's chaplain failed. Reporting this to Salisbury next day, he made clear how large and well-organized the plot was.

The Major Plays and Masques.—The most successful period of Jonson's life was now beginning. He was favoured by the king and government, appreciated by scholars for his learning, by the wits and the educated for his plays, by the court for his masques. His *Hymenae,* to celebrate the wedding of Suffolk's daughter to the earl of Essex, was performed at court with *The Barriers,* on Jan. 5, 1606. He wrote *Volpone* in five weeks, apparently early that year: it was performed successfully before March 24. In April 1606 he and his wife appeared at the consistory court of London for not attending divine service and communion. His declaration that they had attended the service in the half-year since the plot was accepted; and his scruples against taking communion led to an arrangement whereby he would try to be resolved by studying the question with the dean of St. Paul's, the archbishop of Canterbury's chaplain and others. Nothing is known of the outcome, but he remained a Roman Catholic. No evidence was forthcoming on another charge of attempting to proselytize "youthe to the Popish religion." The churchwardens were charged to give particulars next court day: no more is known except that the case was called several times in May. Jonson wrote the entertainment for the king of Denmark on July 24. This year *Volpone* was played with success before the two universities, possibly in the summer.

The writings of the next few years which survive are chiefly masques, but much prose may have perished in manuscript in a fire in Jonson's apartment in 1623. He wrote the entertainment which Salisbury gave to the king on May 22, 1607, on the occasion of the presentation of Hatfield in exchange for Theobalds. Jonson, now in vogue at court, provided his *Masque of Beauty,* on Jan. 10, 1608; the magnificent *Hue and Cry After Cupid* for Lord Haddington's wedding on Feb. 9, 1608; and the *Masque of Queens* in which he gave more importance to the antimasque, on Feb. 2, 1609. He returned to the theatre with *Epicoene,* probably performed at Whitefriars by the Children of the Queen's Revels sometime between Jan. 4 and March 25, that year; its success evoked anger as well as delight, but royal favour continued with the grant of an annual pension of 100 marks. Jonson wrote the entertainment, *Prince Henry's Barriers,* for Jan. 6, 1610, and in November, or later, the successful performance of *The Alchemist* provoked the usual mixture of approbation and objection. In this year he rejoined the Church of England. His masque, *Oberon, the Fairy Prince,* was performed at court on Jan. 1, 1611, followed by *Love Freed From Ignorance and Folly* on Feb. 3. Later that year the publication of *Epicoene, or The Silent Woman,* and *The Alchemist* was stayed after entry in the Stationers' Register. The King's Men's performance of the second Roman tragedy, *Catiline,* failed miserably with the whole audience, the judicious as well as the groundlings. But royal favour continued: the masque *Love Restor'd* was performed at court on Jan. 6, 1612.

During the next 12 months *Epicoene* and *The Alchemist* were published, and Jonson left England again for a sojourn in France as the tutor of Sir Walter Raleigh's son, "Wat," at Raleigh's expense. Jonson's task was none too easy; his own French was poor, that of his high-spirited charge was fluent. An anecdote is told of how young Raleigh got Jonson "dead drunk," and had him drawn through the streets of Paris on a cart, "at every corner showing his governor stretched out and telling them that was a more lively image of the crucifix than any they had." Dangerous as this escapade was, there are no reports of consequences. On Sept. 4, 1612, Jonson witnessed a theological debate between Daniel Featley, of Oxford, and Smith, later bishop of Chalcedon, on the real presence, and signed a statement confirming the accuracy of a summary of the discussion when it was printed by a certain "S. E." It has been suggested that he may have returned to England, only to visit France again very shortly. It is more probable, however, that his visit was unbroken. He also met Cardinal du Perron, whose free translation of Virgil had interested James I. According to Drummond Jonson "told Cardinal de Perron [*sic*], who shewed him his translations of Virgil, that they were naught." How he was able to be so certain, in view of his incomplete knowledge of French, is not explained. Jonson was back in England before the end of June: he saw the burning of the Globe theatre on June 29, 1613. That Christmas he wrote the entertainments with which the court honoured the marriage of the earl of Somerset and Lady Frances Howard, the divorced countess of Essex, which took place on Dec. 26. *The Irish Masque* and *A Challenge at Tilt* were performed on Dec. 29, and Jan. 1, respectively, the former being repeated on Jan. 3, 1614.

Jonson returned to the public stage with the performance of *Bartholomew Fair* on Oct. 31, 1614, at the Hope theatre with great popular success. The next day it was given, apparently as successfully, at Whitehall. His theatrical prestige was again as high as that of his masques at court, where *Mercury Vindicated From the Alchemist* was performed on Jan. 6, and Jan. 8, 1615. But *The Devil Is an Ass* (1616) was unsuccessful. Jonson's *Golden Age Restored* was the court masque on Jan. 1 and Jan. 6, 1616: his position was now such that London livery companies called on him for their addresses to the king; a letter of June 14, 1616, recounts how "Dyers, clothdressers, with their shuttles, and Hamburgians, were presented to the King, and spake such language as Ben Jonson put into their mouths." In this same year, the publication of the folio edition entitled *Works* caused much sneering on the part of those who refused to admit that plays in English, performed in the popular theatres, could merit a title hitherto reserved for works of learning and editions of the ancients (*i.e.,* classical authors). Jonson's conscience was clear: he had carefully amended his text, revising, expunging, ensuring especially the purity of the verse. In Dec. 1616, his *Christmas His Masque,* really more of a mumming play, was performed at court. *Stilo recitativo* in the performance of *Lovers Made Men* before the French ambassador extraordinary on Feb. 22, 1617, has led some to see Jonson as responsible for the first English opera. For Christmas 1617, collaborating with Inigo Jones (*q.v.*), Jonson wrote *The Vision of Delight.* He also wrote *Pleasure Reconciled to Virtue.* When this was performed on Jan. 6, 1618, it was not well received, and he rewrote it, with a new version of the antimasque, to be performed as *For the Honour of Wales* on Feb. 17, 1618. This year, Jonson's courageous intervention softened the king's anger against John Selden for his *History of Tithes.* That summer he walked to Scotland, reaching Edinburgh probably in August. In September he was at Leith as the guest of John Stuart, in whose house he was visited by John Taylor (*q.v.*), the "water poet." Two days later, Jonson was made an honorary burgess and guild-brother of the Edinburgh town council, by whom he was entertained to a dinner in October. He stayed with William Drummond at Hawthornden for two or three weeks, either at Christmas or shortly after, leaving by Jan. 17, 1619. Jonson's opinions expressed on this visit are recorded in the work entitled *Conversations With Drummond.* He left for England on Jan. 25.

The University of Oxford paid him a great and rare tribute by inducting him formally into the degree of master of arts on July 19, 1619; on this visit he stayed with Richard Corbett. Jonson's next work for fashionable society was the entertainment (not intended for the press) to celebrate a christening, almost certainly of Charles Cavendish on May 20, 1620. The next masque, *News From the New World Discover'd in the Moon,* was performed at

court on Jan. 6, 1621. *The Gipsies Metamorphosed* entertained James at the duke of Buckingham's seat of Burley-on-the-Hill on Aug. 3; it was repeated at Belvoir on Aug. 5, and at Windsor in September. *The Masque of Augurs* was also successful at court on Jan. 6, 1622, and was repeated on May 6. The masque for Jan. 6, 1623, was *Time Vindicated to Himself and to His Honours.* A document of Oct. 20 of this year refers to Jonson as a gentleman, and as "of Gresham College." It has therefore been conjectured that he might have acted as deputy to the professor in rhetoric in that institution from 1619 onward. Late in 1623 the fire in Jonson's apartment destroyed the manuscript results of many years, including part of a play, an epic and a prose history of Henry V.

Last Years.—As the position of his enemy, Inigo Jones, grew stronger at court, Jonson's became weaker: his *Neptune's Triumph,* written for Jan. 6, 1624, was not performed. But probably the king's birthday, June 19, was celebrated by *Pan's Anniversary* in this year; and on Aug. 19, the *Masque of Owls* was performed at Kenilworth. Parts of *Neptune's Triumph* were used in *The Fortunate Isles and Their Union,* Jan. 9, 1625, the last masque required from him at court for five years. *The Staple of News* was ill-received in public and at court late in Feb. 1626. Early in 1628 his first stroke handicapped him further in his struggle with enemies there. In September he was appointed city chronologer; shortly after this he was suspected of approval of Buckingham's murder, but on examination by the attorney-general gave a satisfactory denial of the authorship of verses praising John Felton, the murderer. Jonson also explained how he had given his knife at supper to the author, Zouche Townley, a clergyman who had admired it. Another stroke prevented Jonson attending the performance of his *New Inn* at Blackfriars, probably on Jan. 19, 1629; it was not repeated at court. The chapter of Westminster relieved Jonson's poverty with £5; and the king gave him £100 and commuted his pension of 100 marks to £100 and an annual "terse of canary," on March 26, 1630. Jonson provided *Love's Triumph Through Callipolis* and *Chloridia,* the masques at court, on Jan. 9, and Feb. 22, 1631, respectively. In November the city withdrew his stipend as he had written nothing as chronologer. His next work, *The Magnetic Lady,* was performed successfully at the Blackfriars theatre in Oct. 1632. In May 1633 he provided Newcastle with *The King's Entertainment at Welbeck.* In the thick of his feud with Inigo Jones, Jonson's *Tale of a Tub* was restrained from performance until he excised the offending character of "Vitruvius Hoop." Public performance, probably in 1633, was followed by one at court on Jan. 14, 1634. He attacked Jones as "Coronel Iniquo Vitruvius" in *Love's Welcome at Bolsover* before the king and queen on July 30. On Sept. 18 at Charles' request, the city converted Jonson's withheld "fee" into a "pension" with no commitments. For the rest of his life Jonson was in retirement; but he read and wrote, and the unfinished play, *The Sad Shepherd,* was in his papers when he died on Aug. 6, 1637.

Contemporary Reputation and Character.—Both as writer and as personality, Jonson made an impact on his contemporaries that was unusual for his time. After about 1598 he mixed, often on equal terms, with acquaintances and friends of both sexes in higher ranks of society. Not only were there younger members of the Inns of Court, such as his valued friend, John Donne (*q.v.*), but he associated with more established personages such as Richard Martin and the more sedate John Hoskins. By about 1602 Jonson was being welcomed in a widening circle, thanks to his vitality and charm, and his sense of dedication to an art which was genuine enough to transcend the arrogance of his personal self-assurance. His pride and self-confidence admittedly derived from the certainty of his own intellectual superiority, but this was always tempered by the conviction that he served an art more important than any individual. He spoke plainly, disdaining flattery and compromise in a society where rank was supreme and where wealth was beginning to matter too much: his triumph was not one of tact, smooth manners or even pleasing appearance, but of intelligence and integrity. Although he was learned and dedicated to the service of morality, he was never wholly a pedant, nor in any way a prig. Living intellectually and physically with gusto, he was yet always the man of outstanding intellect, of delicate as well as of robust fancy, sensitive to beauty, appreciative of the qualities of others, and with a body and mind of enormous vitality. As talker and listener he inspired and was inspired by a varied society for about ten years before his trip to France of 1612.

He was accepted by men of such learning as Camden, Selden and Cotton; he contributed (without acknowledgment, he complained to Drummond) a "piece of the Punic war" to Sir Walter Raleigh's *History of the World;* he was the friend of the important London family, the Roes, and was valued by men of the standing of Townshend, D'Aubigny and Suffolk. There was also the famous circle of men of letters, meeting convivially at the Mermaid tavern, personages of the calibre of Thomas Coryate (*q.v.*) and John Fletcher (*see* BEAUMONT AND FLETCHER). Here, according to Thomas Fuller in *The History of the Worthies of England* (1662), took place the wit-combats between Shakespeare, whose tactics resembled those of the swift darting ships of England, and Jonson, bulky and ponderous like the galleons of Spain. Not the least of Jonson's feats was his ability to nullify the barriers normally separating his rank and profession from intimacy with court circles. He won the esteem, and probably the love, of at least one court lady, the unknown "Charis" of his poems. He was welcomed as a friend into the Sidney and Harington families, particularly by Lucy, countess of Bedford, by the countess of Rutland, by Sir Robert and Lady Wroth, Sir Robert Sidney and the earl of Pembroke. Sir Henry Goodyere entertained him at Polesworth, and he was friendly with the Scottish courtier, Sir Robert Ayton. Jonson's success was strongest from about 1616 until King James died in 1625. In those years the best writers of the age were happy to consort with him in "lyric feasts" at various London taverns, notably at the Devil's tavern, where the Apollo room was embellished with his list of rules for the company's behaviour. It became a privilege to be "sealed of the tribe of Ben"; and among his "sons" then, and after his stroke in 1628, are found the names of many Caroline lyrists and playwrights, of the calibre of Robert Herrick and Richard Brome (*qq.v.*). His circle still included men of rank, such as Lucius Cary, 2nd viscount Falkland; William Cavendish, earl of Newcastle; and Sir Kenelm Digby. Such who valued him as man and writer clung to him to the end, long after fashionable society had forgotten him.

The alternation of success and failure in Jonson's life, with his gradual winning of the esteem of choicer spirits, especially of those whom he influenced in their approach to the Caroline stage, makes it easy to misunderstand his critical position in his own times. It would be wrong to depict him as a lone fighter for classical principles who gradually overcame a hostile school of writing, to triumph as literary dictator, the legislator for a new generation of writers bound by a common attitude and purpose. In fact his critical principles were never disputed. His battles were not such as modern critics understand as literary warfare; the opposition was to his personality and to his practice, not to his principles. What he has to say critically of literature and its ideals in *Timber or Discoveries* (pub. 1640) is Renaissance common form expressing the wish to replace the absurdities of popular drama with the discipline of the classical critics, especially Aristotle and Horace, by insisting on polished, self-conscious workmanship, realism and a respect for the unities of time, place and action. His opponents did not dispute the classical principles of *The Discoveries* or of his polemic introductions, prologues and epilogues. He outraged them, not by preaching classical ideals, but by insisting on realizing the ideals in practice, not as a writer for the few, but determined to make his impact on as large an audience as possible.

At this point his personality became involved in the conflicts; for, denying the need to stoop to the multitude, he did not hide his contempt for those who did so, whether deliberately or in ignorance. Arrogantly he demonstrated not only what should be done, but how incompetent were all who did not do it. His opponents did not subscribe to different critical principles; they merely denied the relevance of principles to popular playwriting. They regarded the application of such standards to this activity as

ridiculous pedantry, much as if the dancing of a musical comedy chorus were to be judged by the strict rules of classical ballet. But Jonson refused to agree that the poet should ever debase his art. When he insisted upon the function of the poet as one who teaches and delights, and upon poetry as conducive to morality as well as entertainment, he was not writing against anyone who denied this, as was Sir Philip Sidney, but merely repeating an accepted commonplace; it was no new critical manifesto, yet for him it was a burning confession of faith. He is unusual not in holding the faith, but in his consistent refusal to deny it even in the popular theatre. This, and not his classicism, separates him from his opponents. Even when individual failures drove him to denounce "common wits" and to declare that he wrote only for the "capable," he was not a coterie writer in the modern sense. He aimed at pleasing a large public without abandoning his principles; and to a great extent he succeeded.

Chief Works.—Jonson's chief plays, *Every Man in His Humour, Every Man out of His Humour, Volpone, The Alchemist, Epicoene* and *Bartholomew Fair,* are still very good theatre, in which Jonson's insistence on putting classical theory into practice has reinforced rather than weakened the effect of his gift of lively dialogue, robust characterization and intricate, controlled plotting. He holds the mirror up to nature, showing his time to itself and to the future, teaching and delighting simultaneously. In each of them he maneuvers a large cast of vital personages, all consistently differentiated from one another. His plots are skilfully put together; incident develops out of incident with consistency and taking into account the respective natures of the personages involved. Sometimes his comedy derives from the dialogue, especially when it is based on his observation of contemporary tricks of speech. But there are also superbly ludicrous situations, often hardly removed from practical joke. His enjoyment of sheer fun can be seen in such incidents as the incarceration of Dapper in the privy in *The Alchemist,* the torture inflicted by noise on Morose in *Epicoene,* the mountebank speeches in *Volpone* and Justice Overdo's sermon on ale and tobacco in *Bartholomew Fair.* Jonson is renowned for his method of concentrating on a selected side, or on selected sides, of a character, showing how they dominate the personality. This is to some extent a natural outcome of his classical conception of art: but it also derives from his clear, shrewd observation of people.

Such fundamental tendencies expressed themselves more completely in his "Comedy of Humours," which was originally inspired as an attack on affectation and on the misuse of the term "humour" in the fashion of the late 1590s. Really, according to Renaissance physiology and psychology, the humours were four physical secretions, corresponding in the body to the four elements —earth, air, fire and water. It was also believed that a human being's psychological constitution was the result of the blending of these physiological humours in the body, hence the origin of the term "complexion" meaning "blending." An alternative term was "temperament" with reference to the fact that each humour was hot or cold, so that their blending produced a particular temperature. A person dominated by one or the other of the humours was described as melancholy, phlegmatic, choleric or sanguine. Jonson's indignation was aroused against the misuse of the word to describe any strange behaviour or affectation of dress, as he says through the person of Asper in the commentary at the beginning of *Every Man out of His Humour.* Later plays have characters whose behaviour is dominated by one psychological idiosyncrasy, such as Morose in *Epicoene.* Jonson was a model in this respect for Thomas Shadwell and William Congreve.

Dramatic Powers.—The outstanding quality of Jonson's comedy is consistency. It appears in his theory and practise of the humours, in which both eccentricity and normal behaviour are derived from a dominating characteristic, so that the result is a live, truthfully conceived personage in whom the ruling passion traces itself plainly. In *Volpone*—a play packed with felicities—Jonson's greatest triumph lies in the consistency with which the Fox's ruling passion sweeps him along to disaster. Jonson's plotting at its best is also a consistent chain of cause and effect, taking character into account, and proceeding confidently through a twisting, turning action which is full of surprises without relying on coincidence or chance. And few classical principles are violated. In his comedies Jonson shows himself as a man who lives fully, not as one in terror of contamination by life; but he sees clearly and disapprovingly what he knows to be wrong. His satire is that of the man who despises everything that is not fruitful and generous, detesting meanness of spirit, barrenness of mind and behaviour; he can countenance physical, but not spiritual, sordidness. As a tragic poet he was impeded by his gift for seeing reality and for reconstructing it imaginatively. It prevented him from conceiving his Roman plays in the spirit of idealization essential to tragedy in the tradition in which he was trying to write. He was preoccupied with the pettiness of those whom he was ostensibly treating on a heroic scale. When Catiline, Sejanus and most of their respective contemporaries are shown as detestable creatures for whom no sympathy can be felt, it is impossible to arouse tragic pity. It is not the pedantry of these plays that kills them in itself; realistic detail destroys the tragic spirit on the one hand, while on the other his awareness of historical fact seems to have deprived Jonson of his faculty for plotting. He does not imagine tragically, but as realist and satirist; Sejanus and Catiline do not fall as the inevitable result of the interaction of character and circumstance.

Jonson also persisted in putting principle into practice in his masques. He regarded these as a superb opportunity for symbolic expression of Platonic theories of the nature of love and beauty as interpreted by the Renaissance. He made use of the theories and practice of the age on symbolic expression by means of hieroglyph, emblem and impresa: their use in the masque was primarily spectacular in other hands; but in Jonson's they were employed to do more than convey delight to the senses. For him the masque as music and spectacle was of less importance than as a way of communicating to the understanding in symbol and allegory. Memory could leave to the senses a mere recollection of colour, form and harmony; but there remained in the understanding of the "sharp and learned" a clear knowledge of profound meaning.

In his dramatic and nondramatic verse Jonson often attained his aim of achieving in his native language those qualities which he valued in the classics. His poems in *Epigrams* and *The Forest* (1616) and in *Underwoods* (1640) have strength, clarity and some grace, but lack the music, colour and obscurity of many writers who were his contemporaries in a long literary life. He told Drummond that he wrote first in prose which he then turned into verse. We should not be tempted too easily, however, to describe his poetry as prosaic on that account; and it is not certain if it was his invariable practice, even in drama. Here his verse lacks the imaginative complexity of Shakespeare's, but it is remarkable for suiting so perfectly in spirit and texture his dramatic needs. Always presenting the right word, never descending too low nor rising too high, his verse in comedy never sinks into versified prose. In his prose dialogue itself he shows a wonderful knowledge of linguistic fashion and affectation, suiting every speaker, whatever the rank, sex, occupation, idiosyncrasy or character.

Jonson's solidness and originality are shown in his *English Grammar* (1640); his attempt to expound English usage on the analogy of Latin fails, but he is before his time in his attention to phonetics and in his method of classifying verbs. Linguistics is but one of the many activities in which Jonson was thorough and brilliant. Indeed, thoroughness and brilliance are fundamental to his nature and his art.

See also references under "Jonson, Ben" in the Index.

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(B. L. J.)

JOPLIN, a city in the Ozarks region of southwest Missouri, U.S., near the Kansas and Oklahoma borders, and 134 mi. S. of Kansas City. Once the centre of an important lead- and zinc-mining area, Joplin has after World War II attracted other industries. Products include automotive and aircraft parts, mining machinery, leather goods, lead oxides, batteries, insulation and work clothing. The school system received national recognition for the Joplin reading plan, an innovation in the teaching of reading, instituted in 1953 and designed to improve reading skills in the elementary grades. The city also operates a junior college, opened in 1937. The council-manager form of government was instituted in Joplin in 1954.

A Tennessee preacher gave his name to the creek and the settlement near it, in 1838. Joplin was incorporated as a town in 1871 and as a city in 1873. In the 1890s mining made it a boom town and gave it a cosmopolitan population; the tailing piles in the vicinity are virtually the only remnants of the once thriving industry.

For comparative population figures *see* table in MISSOURI: *Population.* (E. R. ST.)

JOPPA, an ancient city on the seacoast of Israel, the port for Jerusalem (Arabic Yafa, Jaffa), now part of the metropolis of Tel Aviv-Jaffa (*q.v.*). It was an old Canaanite city taken by Thuti, general of Thutmose III in the 15th century B.C. It is twice mentioned in the Amarna letters of the 14th century; Yapu (Joppa) was a provincial capital during the Egyptian New Kingdom. Excavations at Jaffa after 1956 by J. Kaplan unearthed the monumental gateway of the Egyptian citadel of that period. In the papyrus Anastasi I (13th century) the traveling merchant found workers in wood, metal and leather there. In the Old Testament it is assigned to the tribe of Dan, but the Philistines early controlled the city. David and Solomon occupied it, the latter using it as the port for landing Lebanon timber floated down the coast from Tyre (II Chron. ii, 16). In 701 B.C. Sennacherib captured Joppa, then belonging to Ascalon. The inscriptions of Eshmunazar (*c.* 400 B.C.) record that Joppa was given to the Sidonians by the Persian monarch, but 50 years later it is recorded as independent. After Alexander the Great's conquest, Ptolemy I Soter garrisoned it (318 B.C.), and it was besieged and taken by Antigonus I (315 B.C.). In Maccabaean times the Syrians garrisoned the city, but Jonathan captured it in 148 and Simon recaptured it, installed a garrison and completed the harbour. St. Peter stayed at Joppa in the house of Simon the Tanner. In A.D. 68 Vespasian captured it on his way to Jerusalem; by that time the superior artificial harbour and port city of Caesarea was already bringing decline to Joppa, an inadequate port. In Christian times it became the see of a bishop. The crusaders captured it (1126) but lost it to Saladin (1187). It was recaptured by Richard I Coeur-de-Lion (1191) and finally lost in 1196. Joppa was razed and its harbour choked by the Mameluke sultan of Egypt Nasir al-Din Mohammed in 1345 because of a threatened new crusade. Toward the end of the 17th century it began to develop again as a seaport. On Nov. 16, 1917, it was entered by British troops without opposition. In 1950 Joppa was incorporated into Tel Aviv, a key port for the state of Israel. (J. S. I.)

JORDAENS, JACOB (1593–1678), outstanding Flemish historical, genre and portrait painter of the baroque school, a successor to Rubens, was born at Antwerp on May 19, 1593. He studied, like Rubens, under Adam van Noort, and he married his master's daughter in 1616, the year after his admission to the guild of painters as a painter in water colours, though he painted mostly in oil. He never went to Italy like other Flemish artists of his time and his work is essentially Flemish in its exaggerated treatment of form and crude humour. His colour is warm and glowing, his figures incline to corpulency, his faces are red and healthy. He was a prolific painter and employed a large number of pupils in his studio.

Although he was a Calvinist, Jordaens received numerous commissions for Catholic churches, and after the death of Rubens he was considered the greatest painter in his country. He is represented in many galleries in Europe and North America. In 1652 he decorated the "Huis ten Bosch" near The Hague with mural paintings representing the "Triumph of Frederick Henry of Orange, Stadtholder of Holland" and "The Victory of Time."

He also executed designs for tapestries. A large number of his drawings and water colours are extant; and nine engravings are ascribed to him. He died at Antwerp on Oct. 18, 1678.

See Max Rooses, *J. Jordaens, His Life and Work* (English trans., 1908).

JORDAN, (MARIE ENNEMOND) CAMILLE (1838–1922), French mathematician who specialized in higher algebra, was born at Lyons on Jan. 5, 1838. He was educated at Paris and was professor of mathematics in the École Polytechnique from 1876 till 1912. Jordan edited the *Journal de Mathématiques* from 1885 till his death at Milan on Jan. 20, 1922.

Jordan's early researches were on geometry. In 1870 he was awarded the Poncelet prize for his *Traité des substitutions et des équations algébriques,* a comprehensive account of Galois's theory of groups of substitutions which Jordan applied to algebraic equations. He was able to solve a problem suggested by Niels Abel as to whether a given algebraic equation is soluble by radicals. Jordan published his lectures, together with most of his researches on analysis, in his *Cours d'Analyse de l'École Polytechnique* (3 vol., 1882). The third edition (1909–15) of this notable work contained a good deal more of Jordan's own work than the first. He treated the theory of functions from the modern point of view. He dealt with the function of bounded variation and applied it to the curve known as Jordan's curve.

JORDAN, DAVID STARR (1851–1931), U.S. educator, naturalist and philosopher, was born at Gainesville, N.Y., on Jan. 19, 1851. After study at Cornell university and Indiana medical college (M.D., 1874), he became in 1879 professor of zoology at Indiana university and in 1885 president. From 1891 to 1913 he was president of Stanford university. His later career Jordan devoted primarily to the cause of peace, acting as chief director of the World Peace foundation and receiving in 1924 a $25,000 prize for a plan of education to promote peace. He opposed imperialism and U.S. participation in World War I and advocated world federalism. An apostle of Puritanism and of Nordic superiority, he was also an ardent defender of freedom and a champion of progressive reforms. He died at Stanford, Calif., on Sept. 19, 1931. Jordan wrote over 50 books, including *Manual of the Vertebrates of the Northern U.S.* (1876), *Imperial Democracy* (1899), *The Heredity of Richard Roe* (1911), *War and Waste* (1914), *Democracy and World Relations* (1918) and *The Days of a Man* (1922).

See E. M. Burns, *David Starr Jordan: Prophet of Freedom* (1953); O. L. Elliott, *Stanford University, the First Twenty-five Years* (1937). (E. MCN. B.)

JORDAN, DOROTHEA (DOROTHY) (1762–1816), Irish actress, especially famed for her playing in high-spirited comedy parts, was born near Waterford, Ire., in 1762. Her mother, Grace Phillips, also known as Mrs. Frances, was a Dublin actress. Her father, named Bland, was said to have been an army captain but was most probably a stage hand. Dorothea Jordan made her first stage appearance in 1777 in Dublin as Phoebe in *As You Like It.* She came to Drury Lane theatre, London, in 1785 as Peggy in *A Country Girl* and soon became an established favourite, her comedy acting being declared second only to that of Kitty Clive. She played a great variety of parts, being especially successful as Lady Teazle, Rosalind and Imogen, and in "breeches" parts as well. After the fire of 1809 which destroyed Drury Lane, she went to the Haymarket theatre and then in 1811 to Covent Garden. She remained there until 1814, when, except for an appearance at Margate the following year, she retired. She had a daughter by her first manager in Dublin, three children by Richard Ford, whose name she bore for some years, and ten children by the duke of Clarence (afterward William IV). These last were ennobled under the name of Fitzclarence, the eldest being created earl of Munster. In 1811 she and the duke separated by mutual consent and Mrs. Jordan received a handsome allowance. In 1815 she went to France and is said to have died at St. Cloud, near Paris, in 1816, although there is a legend that she returned to England and lived for several years after her presumed death.

See Philip W. Sargeant, *Mrs. Jordan* (1913); Clare Jerrold, *The Story of Dorothy Jordan* (1914). (W. J. M.-P.)

JORDAN, THOMAS (1612?–1685?), English poet, playwright and prolific Royalist pamphleteer, was born in London and started life as an actor at the Red Bull theatre in Clerkenwell. He published, in 1637, his first volume of poems, entitled *Poeticall Varieties*, and in the same year appeared *A Pill to Purge Melancholy*. In 1639 he recited one of his poems before King Charles I. He wrote many volumes of verse, and after the Restoration many plays, in at least one of which, *Money is an Asse* (1668), he acted.

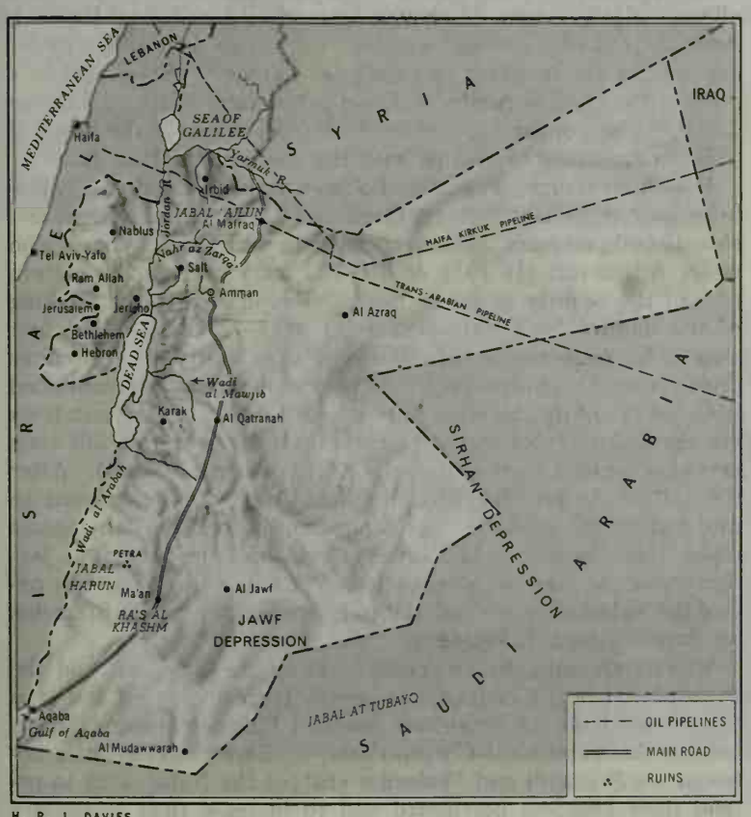
In 1671 Jordan was appointed laureate to the city of London; from this date till his death (which was probably in 1685, since another poet, Matthew Taubman, succeeded to the laureateship in that year) he annually composed a panegyric on the lord mayor, and arranged the pageantry of the lord mayor's shows, which he celebrated in verse. Many volumes of these curious productions are preserved in the British museum.

In addition to Jordan's numerous printed works, of which perhaps *A Royal Arbour of Loyall Poesie* (1664) and *A Nursery of Novelties in Variety of Poetry* are most deserving of mention, several volumes of his poems exist in manuscript.

See F. W. Fairholt, *Lord Mayors' Pageants with Specimens of the Pamphlets Published by the City Poets* (Percy Society, 1843–44).

JORDAN (THE HASHEMITE KINGDOM OF JORDAN, in Arabic AL MAMLAKAH AL URDUNNIYAH AL HASHIMIYAH), an Arab state of southwest Asia, comprising the former British mandated territory of Trans-Jordan and the part of eastern Palestine, west of the Jordan river, that was occupied by Jordanian forces at the time of the Israel–Jordan armistice agreements in 1949. It is bounded north by Syria, east by Iraq, west by Israel and south by Saudi Arabia. The western border divides Jerusalem (*q.v.*), with Jordan occupying the Old City. The 12 mi. coast line on the Gulf of Aqaba contains the only port, Aqaba. The area is 34,434 sq.mi. Population (1961) 1,706,226, including more than 500,000 displaced Palestinians. The capital is Amman (*q.v.*).

Physical Geography.—The Great Rift valley stretching from the Sea of Galilee (Lake Tiberias) to the Gulf of Aqaba is the key to Jordan's physical features. Movements began in the mid-Tertiary period and have probably not yet ceased. The Judaean hills conveniently describe the area west of the Jordan. This consists of a north-northeast south-southwest trending anticline with strata pitching steeply under the Quaternary deposits of the Mediterranean coastal plain (the Tul Karm area is in Jordan) and toward the Rift valley. Faulting in the north produced Esdraelon (Jezreel) plain. Lower Cretaceous rocks are exposed at the centre of the anticline but elsewhere the Upper Cretaceous outcrops. The hills are deeply dissected especially toward the Rift. Limestones and sandstones produce a rugged landscape, while chalk features are more rolling. The highest point on the ridge is Tall 'Asur (3,805 ft.). Soils are thin and poor, except in certain basins. The Rift valley slopes from the Sea of Galilee (696 ft. below sea level) to the Dead sea (surface level about 1,300 ft. below the Mediterranean; bottom 2,624 ft. below sea level), and contains the lowest dry land in the world. Southward it reaches 721 ft. in the Dead sea–Gulf of Aqaba water divide. Its width exceeds 3 mi. A complicated series of faults and monoclines marks its edges. The valley north of the water divide was formerly covered by the Dead sea, which laid down saline deposits (Lisan marls). As the sea retreated the rivers incised themselves into the old level (Ghor or Ghawr) to form their present flood plains (Zor or Zawr). At Jericho the valley is 7½ mi. wide, with the Jordan Zor accounting for 1 mi. Hill streams have built up salt-free alluvial fans on the Ghor so that salinity increases toward the Jabal al Qattar (the dissected scarp separating Ghor from Zor). Saline soils and underground water hinder agricultural development. South of the divide the valley is choked with sand dunes interspersed with salt marsh. The eastern highland comprises all Jordan east of the Rift valley. The Rift disturbances tilted this block gently eastward so that the land slopes in that direction. Gentle doming occurred in the south making Ra's al Khashm (6,088 ft.) the highest point. In the north the Jabal 'Ajlun (4,001 ft.) anticline balances that of the Judaean hills. Eastward closed depressions containing mud flats are encountered, probably caused by minor folding, though Wadi as Sirhan at the Jordan-Saudi Arabian border may be a graben (depressed tract bounded by faults). Vulcanicity accompanied the rifting. The Jabal Druse (Jabal al Duruz) lava flows of the north give rise to gaunt hills and boulder strewn plains. Farther east the typical rolling landscape reasserts itself. Most of the rock outcrops are Upper Cretaceous and Lower Tertiary limestones and sandstones, giving rise to soils similar to the Judaean hills. In parts of the Rift scarp, outcrops from the Cambrian onward are found. East of the Dead sea the scarp towers 3,937 ft. above the valley floor. The scarp has been deeply dissected and streams like the Yarmuk, Zarqa', Mawjib and Hasa have captured easterly flowing drainage. Near Ra's al Khashm, Nubian sandstones produce a chaos of wadies with sheer cliffs rising to about 2,000 ft. There near the foot of Jabal Harun lies Petra (*q.v.*), the Nabataean rock city, entered through a cleft in the rock at times not over nine feet wide. Pre-Cambrian rocks form the Rift scarp in the Shafat ibn Jad. To the east the plateau degenerates into sandstone hills separated by dunes.



H. R. J. DAVIES

MAJOR CITIES AND PHYSICAL FEATURES OF JORDAN

Climate.—This varies from Mediterranean to desert, but is typified by aridity. Toward the east and south conditions become more continental and the Rift valley is a continental warm area. Mean monthly temperatures are: Ram Allah (2,952 ft.) 9°–24° C. (48°–75° F.); Amman (2,362 ft.) 8°–25° C. (46°–77° F.); Jericho (492 ft. below sea level) 16°–32° C. (61°–90° F.). Winter snow and frost are common on the hills but rare in the valley. Winds are dominantly westerly. East winds are hot and dusty in summer. Winter cold snaps in the Jordan valley are caused by northerly winds, as other winds are either southerly or warmed by descent. Precipitation occurs between November and April; 88% of Jordan receives on average less than 7.8 in. per year. The Rift is drier than its surroundings (less than 1 in. at Aqaba to 15.7 in. in the north). The hills to east and west contain the only extensive areas with more than 15 in. Toward east and south rainfall tails off to less than 4 in. The rivers reflect the rainfall pattern. Perennial streams flow into the Rift north of At Tafilah, with the Jordan and the Yarmuk the largest. Maximum flow occurs in February and March, and minimum in June and July. The Dead sea level fluctuates accordingly.

Vegetation and Animal Life.—Jordan has vegetation and animal life similar to those of Israel; they include Mediterranean, steppe and desert types according to the distribution of the rainfall. In many areas the natural vegetation has been destroyed. The main wooded area is Jabal 'Ajlun. Other patches of woodland are found in some of the damper areas in the hills. The most common species are the olive, evergreen oak, ilex, Aleppo pine and mastic tree. The exact varieties present depend not only on rainfall but also on soil. The Aleppo pine and ilex are rarely found on gravelly soils. Most trees exhibit xerophilous features. The typical vegetation is grassland varying in quality with the rainfall, and green only during the rainy season. In spring the northern hills are carpeted with flowers, including the rock rose. Many wadies carry shrubs including the oleander. Various species of palm grow in the oases. In the lowlands salt bush is widespread.

Over 600 varieties of vertebrate animals are recorded. Hyrax (biblical cony) and hyenas live in mountainous areas. Ibex is occasionally met with near the Dead sea. Gazelle, mole rat, desert fox and mongoose are other notable animals. Scorpions are common. Birds include the golden eagle and the vulture nesting in rocky areas, and the ubiquitous bulbul. Locusts are an occasional menace. Among moths the large oleander hawk moth is noteworthy. (H. R. J. D.)

The People.—Sunni Muslim Arabs predominate in the Jordanian population. The Arabs are divided into Qays (north) and Yaman (south), with a further division between the *bedu* east of the railway and the settled inhabitants of the highlands west of the railway and the Jordan. The *bedu* (nomads; *see* BEDOUIN) of the north include the Beni Sukhr (Sakr), Sirhan, Beni Khalid, Issa and Sleet; and of the south the Howeitat, Manaiyoun and Hajaya. The Ruwalla pass through Jordan but are not classified as a Jordanian tribe, their habitat being Syria and Saudi Arabia. The two most important tribes are the Beni Sukhr and the Howeitat. Christian Arabs are settled round Jerusalem, Bethlehem and Ram Allah, including certain semisettled tribes who total about 100,000. The largest group is Greek Orthodox, numbering about 50,000; the rest are made up of Greek Catholics, Latins and Protestants of various denominations. Non-Arab Christians include Armenians, Nestorians or Assyrians, and Syrian Orthodox groups. The most important non-Arab Muslim community is the Circassian (*q.v.*), who migrated from the Caucasus in the 19th century and are settled round Amman (which they refounded), Wadi Sir, Jarash and Maur. Another Caucasian Muslim community is the Chechen, who migrated at the same time and who live in Ar Rusayfah, Az Zarqa' (Zerka) and Suwaylih. The only Turkmen settlement left is that at Ar Rumman south of Jarash, the rest having withdrawn to Turkey after World War I. The Samaritans, an ancient Jewish sect who have occupied Nablus since the 8th century B.C., are steadily declining in numbers because of their migration to Israel. Officially minorities are not recognized by the kingdom of Jordan, and no law for their protection exists.

The population, which is largely concentrated in the northwestern corner of the country, has trebled since 1948 because of the influx of refugees from Israel. Their resettlement remains one of the major social and economic problems of Jordan and in the early 1960s they numbered more than 620,000. The main population centres are Amman, Nablus and Jerusalem (*qq.v.*). Various Arabic dialects are spoken by the townspeople, refugees, villagers and nomads.

History.—Modern Jordan occupies an area which is rich in archaeological and religious associations.

The Jordanian desert appears to have been the home of hunters from Lower Paleolithic times, as their flint tools are found widely distributed. At Bayir Wells, between Ma'an and the Saudi Arabian frontier, unrolled Acheulean tools were found *in situ* in a gravel bed. At Madamash a rock shelter of Upper Paleolithic type has been examined. In the southeast of the country at Jabal at Tubayq there are rock carvings of all periods, the earliest of which have been attributed to the Paleolithic–Mesolithic. A settlement of the latter period and one of the pre-pottery Neolithic have been partly excavated at Seyl Aqlat near Petra. Mesolithic hunters appear to have visited Jericho (*q.v.;* Tall as Sultan), as the lowest deposits show, to be followed by a series of levels with, first, round houses and then plastered rectangular houses built by people who did not know the use of pottery. Following these were two pottery levels and a series of deposits on the site and in the neighbouring tombs, extending to the Late Bronze Age. This site, excavated first by J. Garstang and later by K. M. Kenyon, is important also for its massive pre-pottery defensive works, dated by radiocarbon tests to *c.* 7000 B.C. In the Chalcolithic period the neighbouring site of Telailat el Ghassul (also in the Jordan valley) shows a well-built village of *c.* 4500–3000 B.C. with painted plaster walls.

The Early Bronze Age (*c.* 3000–2100 B.C.) is marked by deposits at the base of Dhiban; but although many sites have been found in the north of the country few had been excavated up to the early 1960s, and little evidence of settlement in this period is found south of Al Shobak. The Early Bronze Age was terminated by a nomadic invasion which destroyed the principal towns and villages and marked the end of a period of apparently peaceful development. (For evidence of Early Bronze Age settlement in north central Jordan *see* GIBEON.) Security was not again re-established until the advent of the Egyptians after 1580 B.C. At one time it was thought that the area was unoccupied during the centuries between 1900 and 1300 B.C., but a systematic archaeological survey has shown that the country had a settled population throughout the period. At Amman a small temple with Egyptian, Mycenaean and Cypriot imported objects has been found confirming this.

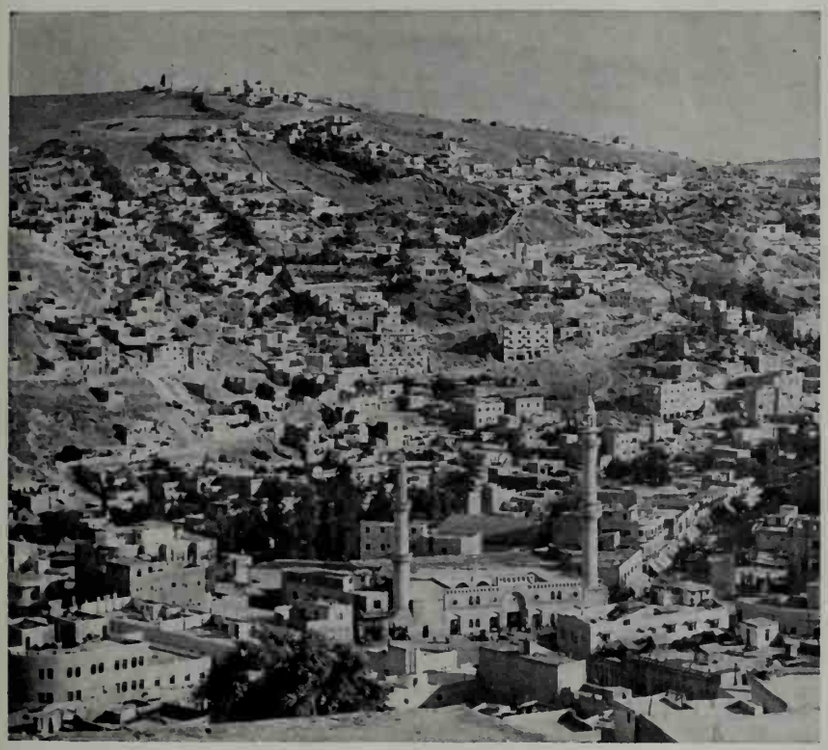
Biblical Associations.—From the Middle Bronze Age onward there are biblical accounts of the area, mentioning kingdoms such as Gilead (*q.v.*) in the north and those of Moab (*q.v.*), in central Jordan, and Midian (*q.v.*). At the time of the Exodus (*q.v.*) the Israelites tried to pass through Edom (*q.v.*) in southern Jordan, but were refused permission. They were at first repulsed by the Amorites, whom they later defeated. The Israelite tribes of Gad, Reuben and half Manasseh settled in the conquered territory of the Ammonites, Amorites and Bashan (*qq.v.*), and rebuilt many of the towns they had partially destroyed. A nearly contemporary record of this period is the Mesha or Moabite stone found at Dhiban in 1868 and now in the Louvre, Paris. It is inscribed in an eastern form of Canaanite, closely akin to Hebrew.

The next few centuries (1300–1000 B.C.) were marked by constant raiding from both sides of the Jordan. David attacked Moab and Edom, killing two-thirds of the population of Moab and all the males of Edom. Although Ammon with its capital Rabbath Ammon (modern Amman) was held for a time, it regained its independence on the death of David (*c.* 960 B.C.). Solomon had a port on the Gulf of Aqaba at Ezion-geber, later Elath or Eilat in Israel, where copper ore was smelted from mines in the Wadi al 'Arabah and trade carried on with the southern Arabian states.

Hostilities remained constant between Judah and Edom. A Hebrew king, Amaziah, even captured Sela (Petra), the capital, and slew 10,000 prisoners. The next invaders were the Assyrians, who under Adadnirari III (811 or 810–782 B.C.) overran the eastern part of the country as far as Edom. Revolts led to the retaking of the country by Tiglath-pileser III (745–727 B.C.) in the first year of his reign and to the division of the country into provinces under Assyrian governors. This policy of direct rule continued until the fall of the Assyrian empire in 612 B.C. The Assyrian texts are the first to refer to the Nabataeans (*q.v.*), who at this time occupied the land south and east of Edom (ancient Midian). After the fall of Assyria the Moabites and Ammonites continued to raid Judah until the latter was conquered by the Neo-Babylonians under Nebuchadrezzar II. Little is known of the history of Jordan under the Neo-Babylonians and Persians, but during this period the Nabataeans infiltrated into Edom and forced the Edomites out into southern Palestine.

It was not until the Hellenistic rule of the Seleucids and the Ptolemies that the country prospered, trade increased and new towns were built. Amman was renamed Philadelphia, and Jarash became Antioch-on-the-Chrysorrhoas, or Gerasa. Hostilities between the Seleucids and Ptolemies enabled the Nabataeans to extend their kingdom northward and to increase their prosperity based on the caravan trade with Arabia and Syria. The northern

VIEWS IN JORDAN



Aerial view of Amman, capital of Jordan

A scene along the Jordan valley near Nablus

Jabal al Quruntul, the traditional Mount of Temptation, near Jericho

The Wadi Naqb valley, seen from near the village of Ras En Naqb, about 35 mi. from the Gulf of Aqaba

Desert scene near the fort at Zuwayza in north central Jordan

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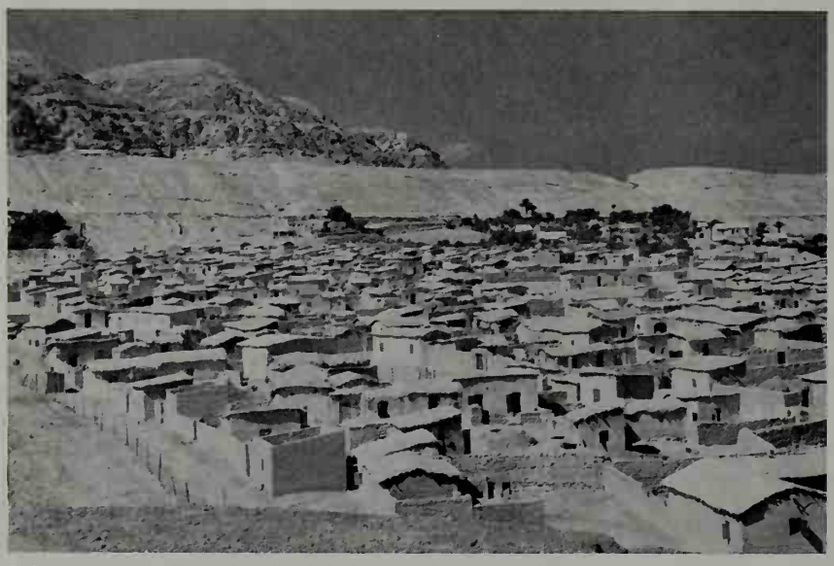
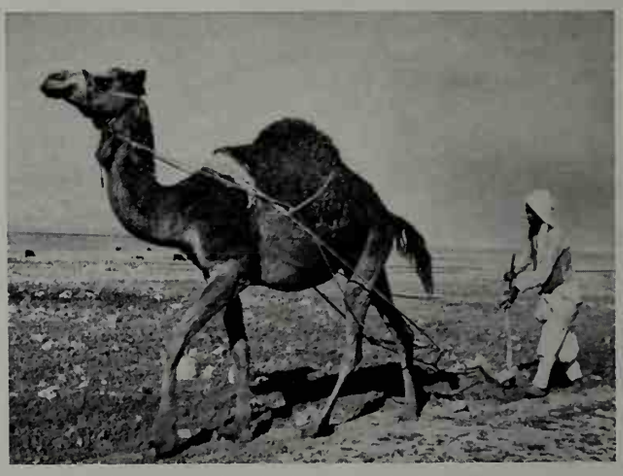
JORDAN

SCENES IN JORDAN

The town of Bethlehem which has a predominantly Christian population

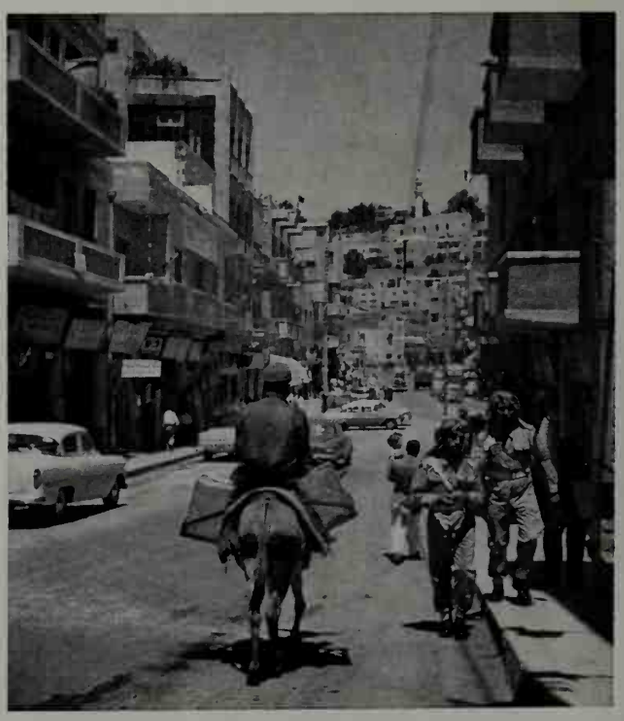


Refugee camp on the outskirts of Jericho at the eastern foot of the Judaean hills in the Dead Sea valley



A farmer using a camel for plowing in the Jordan valley

The main street through the Damascus gate in the Old City of Jerusalem



The principal thoroughfare of Amman

PHOTOGRAPHS, (TOP, CENTRE LEFT) FEDERICO ARBORIO MELLA, (CENTRE RIGHT) UPI, (BOTTOM LEFT) © ENCYCLOPÆDIA BRITANNICA, (BOTTOM RIGHT) THREE LIONS INC.

part of Jordan was for a time in Jewish hands, and there were constant struggles between the Jewish Maccabees and the Seleucids. It is to this period that the majority of the Dead sea scrolls (*q.v.*) may be attributed.

During 64–63 B.C. the country was conquered by the Romans under Pompey, who restored the Hellenistic cities destroyed by the Jews and set up the Decapolis (*q.v.*). The country remained independent but paid imperial taxes.

In 40 B.C. Herod the Great became king of Judaea with Roman support and extended his kingdom into central Jordan at the expense of the Nabataeans, who were finally taken over by the Romans in A.D. 106. Under Roman rule Jordan prospered, and many new towns and villages were established. The whole country, except the Decapolis, was made part of the new province called Arabia Petraea, with its capital first at Petra and later at Bostra (Busra) in Syria. After A.D. 313 Christianity became a recognized religion and a large number of churches were built. Bethlehem (*q.v.*) is now one of Christianity's principal shrines.

The Latin Kingdom and Muslim Domination.—The country was devastated in the 6th and 7th centuries by Persian invasions. The Byzantine emperor Heraclius (A.D. 610–641) vanquished the Persians and re-established order in the country, only to be defeated by Muslim invaders at Yarmuk in A.D. 636.

The early Omayyad caliphs with their capital at Damascus built splendid hunting lodges and palaces in the Jordanian desert. These can still be seen at sites such as Qasr 'Amrah, Kharanah, Tuba and Qasr al Mushatta. Many Roman forts were rebuilt. After the transfer of power to the Abbasids, who established their capital at Baghdad, Jordan fell into decay. With the capture of Jerusalem by the crusaders in A.D. 1099 the Latin kingdom of Jerusalem was extended east of the Jordan, and a principality known as Oultre Jourdain was set up. A capital was established at Krak or La Pierre du Désert (Karak). The crusaders also built castles at Montreal (Shobak or Ash Shawbak), south of Krak, commanding the road from Damascus to Egypt; Le Val de Moise (Wadi Musa) near Petra; and the Island of Graye (Jazirat Pharaon) in the Gulf of Aqaba. After the crusaders retreated the history of Jordan remained uneventful. In the 16th century it submitted to Ottoman rule and became part of the vilayet of Damascus. In the 19th century the Turks settled Circassian, Caucasian, and other refugees in Transjordan to protect their communications with Arabia; in 1908 they completed the Hejaz railway linking Damascus and Medina.

Transjordan, the Hashemite Kingdom, and the Palestine War.—World War I led in 1916 to the Arab revolt against the Turks and to the cutting of the Hejaz railway in which T. E. Lawrence (*q.v.*) played an important role. Aqaba was taken in July 1917 and by Oct. 1918 Damascus had fallen into Allied hands, partly owing to the assistance of the Arab forces in pinning down the Turkish army in Jordan. In July 1920 Abdullah ibn Husain (*q.v.*) of the Hashemite house (*see* HASHEMITES) appeared in Jordan from the Hejaz intent on raising the tribes and attacking the French, who had forced his brother Faisal to relinquish his newly founded kingdom in Syria. Abdullah was persuaded by the British government to refrain and, instead, to take over the government of what became known as Transjordan (1921).

Transjordan, although part of the Palestinian mandate, was expressly excluded from the clauses regarding the establishment of a "Jewish national home." After the signing of an agreement with the United Kingdom in 1928 it became largely self-governing. In 1939 an elected cabinet took the place of an executive council and the amir was authorized to raise military forces and to open independent Transjordanian consulates. After World War II, in 1946, a new treaty was signed with the U.K., and in May of that year Abdullah became the first king of the Hashemite Kingdom of Transjordan (later Jordan). Two years later the Palestinian mandate ended, and the Transjordanian Arab Legion, commanded by Glubb Pasha (later Sir John Bagot Glubb; *q.v.*), joined Egyptian, Syrian, Lebanese and Iraqi troops in an attempt to prevent the creation of a Jewish state. A considerable enclave of Palestinian territory—including Hebron (Al Khalil), Bethlehem (Bayt Lahm), Ram Allah and Nablus (Nabulus), as well as part of Jerusalem (the Old City)—totaling about 2,000 sq.mi. (5,200 sq.km.) remained in Jordanian hands at the time of the signing of the Jordan-Israeli armistice pact on April 3, 1949. This accession of territory brought with it a large refugee population.

King Abdullah was assassinated by a follower of the former mufti of Jerusalem, Amin al-Husaini, on July 20, 1951. His elder son, Talal, succeeded him, but mental illness caused his deposition by parliament in Aug. 1952. Talal was succeeded by his son Husain, a minor of 17, who was crowned in Amman on May 2, 1953 (*see* HUSAIN IBN TALAL).

King Husain.—The early years of Husain's reign were beset by problems and difficulties. In 1955 Jordan refused to join the Baghdad pact (*q.v.*). In 1956 Husain dismissed his British advisers including Glubb, and later that year the Jordanian treaty with Great Britain was abrogated. In 1957 Husain survived a military plot to overthrow his regime; political parties were also dissolved by royal decree. The federation of Jordan with Iraq in 1958—a countermove to Egypt's union with Syria—was dissolved after the Iraqi revolution later in the same year.

Thanks largely to Husain's courageous personality, his authority and that of the government gradually grew stronger, and from 1961 to 1966 there was a period of general political stability. Husain dealt firmly with discontent among the Palestinian Arabs and with attempts by Syria and Egypt to discredit his regime after a damaging raid by Israeli forces into Jordan on Nov. 13, 1966.

Development was carried on rapidly, with financial help from the U.S., Britain, the Federal German Republic, the UN, the International Bank, and other Arab states, in particular Kuwait. Irrigation works were constructed in the Jordan valley; plans were made for exploiting the minerals of the Dead sea; roads, schools, and hospitals were built; and a university was opened. In 1966 work began on the Mukhaybah dam on the Yarmuk river, which was financed by the Arab states to counter the diversion of Jordan waters by Israel. (M. V. S.-W.; X.)

When war between Egypt and Israel seemed imminent in May 1967 Husain pledged his full support to the Arab states and when fighting broke out on June 5 Jordanian forces were immediately engaged. On June 7, after the Israeli Army had captured the Old City of Jerusalem and had advanced to the west bank of the Jordan River, Jordan accepted the UN call for a cease-fire. (X.)

Administration and Social Conditions.—Jordan is a constitutional monarchy. The legislature consists of two houses: a lower house, or house of representatives (60 members), elected by universal male suffrage, and a senate consisting of former ministers, retired generals and large landowners, all over 40 years of age, appointed by the king. The cabinet consists of about 12 members. The king has wide powers over the executive, legislature and judiciary. He appoints the prime minister, and may dismiss individual ministers or the whole cabinet. All laws and amendments to the constitution must have his approval; his veto may be overruled by a two-thirds vote of both chambers. The king exercises his ceremonial functions through the royal council (Arabic *diwan*). For administrative purposes Jordan is divided into eight *liwa's* (districts), each controlled by a governor. The nomads are divided administratively into eastern (the Bedouin) and western nomads, administered by the ministry of interior. (*See* Table.)

Health.—There are hospitals at Amman, Irbid, Jerusalem, Karak, Salt, Tafilah, Aqaba and Janin. There is a tuberculosis

*Area and Population**

Liwa's (Districts)	Area (sq.mi.)	Population (1952 census)	Density (per sq.mi.)	Population (1961 census)	Density (per sq.mi.)
'Amman	962	190,499	198.0	417,519	434.0
Balqa	431	92,892	215.5	79,057	183.4
Hebron	418	125,651	300.6	119,432	285.7
Irbid†	1,500	213,877	142.6	256,017	170.7
Jerusalem	795	301,402	379.1	344,279	433.0
Karak	1,872	60,556	32.4	63,064	33.7
Ma'an	1,555	29,061	18.7	18,932	12.2
Nablus	969	315,236	325.3	341,748	352.7
Total settled area	8,502	1,329,174	156.3	1,640,039	192.9
Desert area	26,318	...	...	66,187	2.5
Total	34,820	1,329,174	...	1,706,226	49.0

*Area and population of the *liwa's* includes only the settled areas within each *liwa*'; desert area includes total desert areas of all *liwa's*. †Formerly 'Ajlun.

hospital at Nablus and a large number of dispensaries throughout the country. Extensive national schemes are being carried out for the prevention of malaria.

Justice.—The judiciary was established by the court establishment law of 1951. There are magistrates' courts for minor offenses, and district courts, with three presiding justices, for more important cases. There are two courts of appeal, one for east and one for west Jordan, and a supreme council of justices and notables. There are tribal courts for *bedu* disputes, established in 1928, which sit at Amman, Irbid, Karak, Ma'an and in the Desert region. There is also a traveling land settlement court. *Shari'a* courts judge Muslim matters, and there are religious courts for the non-Muslim communities.

Education.—Primary and secondary schools are of three types: state, private and those of the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA). Education begins at six years of age and about 85% of the males and 40% of the females receive primary training. There were about 500,000 pupils in the early 1960s. Increasingly large grants are being made to education. University education has to be undertaken outside Jordan, but there are several teachers' training colleges and agricultural and industrial institutes. There are also several research institutes, libraries and museums.

Defense.—The king is the commander in chief. In 1921 an armed force for internal security was formed, called the Arab legion, at first commanded by Col. F. G. Peake and later by Brig. Gen. J. B. Glubb. In 1928 the Trans-Jordan frontier force was formed; both groups were originally officered by the British, but in 1948 the frontier force became the army, and within the next ten years most of the British military advisers and officers were dismissed. There is a small air force and a Dead sea flotilla. Defense expenditure is one of the heaviest items on the budget, and is met from outside loans.

Economy.—Jordan is traditionally an agricultural country with a fair percentage of its population engaged in stockraising (goats, sheep, donkeys, camels, cattle) although manufacturing has made slight headway since World War II.

Agriculture.—The main crops are wheat and barley, and lentils, beans, sorghum, sesame, tobacco and maize (corn) are also cultivated. In western Jordan olives, grapes and figs flourish. Bananas, citrus fruits and dates grow in the irrigated areas. Jordan does not produce enough grain for its own requirements and in years of drought there is a marked deficiency in cereal crops. The east Ghor canal project, financed with U.S. aid and begun in August 1958, is the largest irrigation scheme so far undertaken; it consists of a $43\frac{3}{4}$ mi. canal to tap the waters of the Yarmuk river, for the irrigation of 120,000 *dunams* (1 dunam = $\frac{1}{4}$ ac.) of cultivable land on the eastern slope of the Jordan valley, the Ghor. In Jan. 1960 a provisional bill to distribute land in the east Ghor, in amounts varying between 30 and 500 *dunams*, was adopted by the house of representatives. In the west Ghor 9,600 *dunams* have been irrigated by the Wadi al Fari'ah. The amount of cultivated land available in Jordan is insufficient for the needs of the population, a large portion of the country being desert which could not be intensively cultivated under any conditions. At least half of the land is in the hands of tenant farmers and absentee landlords, and many small landowners are seriously in debt, not to official agencies or the agricultural bank but to local shopkeepers and moneylenders. The government has various loan schemes for crop and seed propagation. There is some fishing (about 50,000 tons annually) in the Gulf of Aqaba.

Mineral Resources.—Jordan's principal minerals are potash and phosphates. Potash occurs in the Dead sea, and was recovered by the Palestine Potash company between 1930 and 1948, when their plant in Jordan was destroyed. A second plant in Israel later resumed work, and a further plant was proposed at Kaliya. Good quality phosphates are exported to Italy, Czechoslovakia, Japan and India. There is a local market for superphosphates, made of local phosphate and imported sulfur. Phosphate is mined at Ar Rusayfah by a company in which the government owns 50% of the shares. Copper and manganese ores have so far been found in limited quantities; although iron ores are of high quality they are widely scattered and fuel is not available for smelting. Two oil pipelines cross Jordan: one from Kirkuk in Iraq to Haifa in Israel has not operated since Arab-Jewish hostilities began in 1948; the other, the Trans-Arabian pipeline from the Dhahran oilfields (Saudi Arabia) to the Mediterranean port of Saida (Sidon) in the Lebanon, passed into government ownership in June 1961 and produces £60,000 ($168,000) annually in royalties. Oil refineries have been set up in the country and a cement factory in Fuhays supplies all the cement needed for building in Jordan. Otherwise industries are in an embryonic state. The craft of marble cutting and polishing is being developed. There are butter and cheese factories, many local olive oil presses and two olive oil refineries at Jerusalem and Nablus; there is also a sugar refinery and tobacco factories which supply most of the local demand. Amman and Hebron have tanneries, and soap is manufactured in Jerusalem, Ram Allah and Hebron.

Trade and Finance.—Jordan has issued its own currency since 1950 and the basic unit is the dinar (divided into 1,000 *fils*) at par with the pound sterling. A largely desert area primarily dependent upon agriculture, Jordan has an enormous balance-of-payments deficit and needs foreign grants and loans to balance its economy. The main exports are agricultural products (fruit, tomatoes, olive oil, vegetables) also fertilizers, marble, lime and cement mainly to neighbouring Arab countries. Imports, principally from the United Kingdom, United States, Federal Republic of Germany, Italy, Lebanon and Syria, include textiles, fuel and oil, motor vehicles and equipment, machinery, iron and steel manufactures and cereals. Domestic revenue from customs dues, income tax, rural and land tax and aviation revenues supply only about 40% of the total requirements. Taxes are not levied on income from agriculture or from livestock producers, but excise duties are levied on spirits, tobacco and salt, even when home produced. In 1955 a land-tax law was introduced to unify the systems in east and west Jordan. There is also a tax on irrigated and nonirrigated land, and on certain livestock. A social-welfare tax was introduced in 1953, which amounts to 10% of personal income. Tourism is an important source of revenue, the main attractions being the holy places of Islam (the Dome of the Rock and Al Aqsa mosque in Jerusalem and the tombs of the patriarchs in Hebron) and of Christendom (Church of the Nativity in Bethlehem, and the Church of the Holy Sepulchre, the garden of Gethsemane, etc., in Jerusalem), and Petra and Jericho.

Communications.—Asphalt and metaled roads connect Amman with the main towns. The Jordan Royal Hashemite railway, formerly part of the old Hejaz railway (Medina to Damascus), enters Jordan from Syria south of Dar'a and runs approximately for 180 mi. to Naqb Shitar where connection is made by road to the port of Aqaba, Jordan's only direct access to the sea. The airports near Amman and Jerusalem are served by several foreign airlines and there are regular flights to the middle eastern Arab countries. The radio station at Amman is government owned.

Aspects of Jordan's geography, archaeology and history will be found in the articles on PALESTINE; DEAD SEA; JORDAN RIVER; ISRAEL; PETRA; and JERICHO. *See* also references under "Jordan" in the Index. (M. V. S.-W.)

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JORDANES, historian writing in the mid-6th century A.D., was a Goth, the son of Alanoviiamuthis and the grandson of Paria who was secretary of one Candac, a chieftain of the Alani and other barbarians. He himself was secretary of Candac's sister's son Gunthigis (also called Baza), who held the imperial office of *magister militum* ("master of the soldiers"). Jordanes later appears to have become a monk, and, although he admits (by no means without reason) that he was unlettered, devoted himself to historical writing. He wrote in Latin. He began with a chronicle, but while still engaged on it was persuaded by his friend Castalius to summarize in one volume the 12 books of Cassiodorus (*q.v.*) on the history of the Goths from the earliest times until his own day. He declares that he had access to Cassiodorus' work for only three days so that he was merely able to reproduce the general sense of it. He states that he added material from certain Greek and Latin authors and that the beginning and end of his work were his own. The book was completed in A.D. 551, and Jordanes appears to have composed it in the Danubian provinces of the Roman empire; his knowledge of what are now the Dobruja and Bulgaria is much more detailed than his knowledge of the rest of the world.

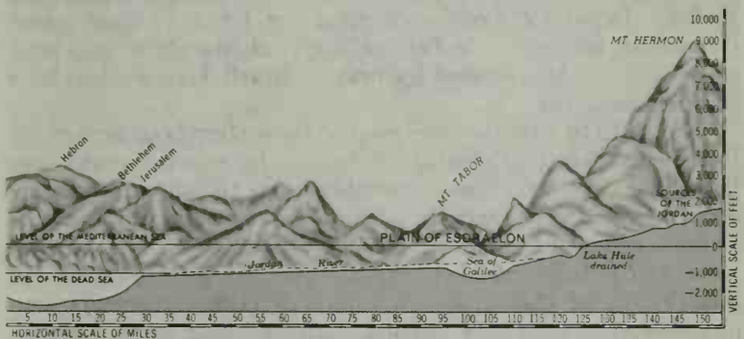
The very title of the work, *De origine actibusque Getarum* (now commonly referred to as the *Getica*), illustrates Jordanes' inadequacy as a historian, for he has fallen into the error, which is found in other authors beside him, of confusing the Goths with the Getae, a wholly distinct people. But although his work is exceedingly confused, it contains matter of great value. He preserves Gothic legends of the origin of the nation in Scandinavia and of their crossing under their king Berig from there to the area around the mouth of the Vistula; of their migration in the 2nd century A.D. to the Ukraine and Rumania; of the wars of the Goths against the Vandals and Gepidae in Transylvania and of the huge empire of Ermanaric in southeastern Europe. On the Huns he is especially valuable, for his ultimate source of information is the work of the Greek historian Priscus, who had traveled among the Huns in 449 and whose book, apart from some substantial fragments, is now lost. Among much else he is thus able to preserve the beautiful song sung by the Huns at Attila's funeral, valuable facts about the battle of the Catalaunian plains (*q.v.*) and much information about the collapse of the Hun empire after Attila's death and about the confused movements of peoples in central Europe in the second half of the 5th century. The work is biased in favour of the Goths and Alani and against the Vandals. But since Jordanes himself lived and worked in the eastern Roman empire he is also predisposed in favour of Justinian, who did so much to damage the Germanic kingdoms. Jordanes was not the first author to write the history of the Goths; he refers to a certain Ablabius who did so before him and who is known from no other ancient writer.

After completing the *Getica* Jordanes returned to the chronicle on which he had been working and finished this book, too, in the year 551. This is an outline of world history entitled *De summa temporum vel origine actibusque gentis Romanorum* (usually referred to as the *Romana*) intended in the main to record the growth of Roman power from the time of its legendary founder Romulus to that of the emperor Justinian in the 6th century. It is of much less value than the *Getica*, as the major sources used by Jordanes —Jerome, Florus, Rufius Festus, Count Marcellinus and others— are still extant. The plan of this work was suggested to him by one Vigilius, to whom Jordanes sent both the *Getica* and the *Romana* when they were completed.

The standard edition of Jordanes is the masterly one by T. Mommsen in *Monumenta Germaniae Historica* (1882), with an excellent introduction on Jordanes, the character of his work and the manuscripts in which it has survived. There is no noteworthy study of Jordanes. (E. A. T.)

JORDAN RIVER (NAHR AL URDUNN), the Holy Land's river, forms in the Hule (Huleh) basin and empties into the Dead sea. The name means the "river that comes down," or "river of Dan"; the Arabs also call it esh-Sheri'a, the "watering place." It flows within the Jordan valley, called the Aulon by Greeks and the Ghor by Arabs. Christianity, Judaism and Islam revere its waters, which played a central role in the lives of Elijah, Elisha and John. Lot chose the valley as the most favoured land and the crossing of the Jordan marked the entry of the Jews into the Promised Land of Canaan after the Exodus from Egypt. Three of its sites are inextricably bound with the life of Jesus—Caesarea Philippi (modern Banias) to which he retreated, Bethsaida where he preached and Bethabara (or Bethany) where he was baptized. From these and many other associations the Jordan came to symbolize cleansing and purity and both the last barrier and the final passage to the achievement of blessedness.

The Jordan valley is part of the Great Rift valley system—a series of down-dropped blocks confined by two parallel faults that extends from Lake Nyasa in central Africa through Tanganyika, Kenya, Ethiopia, the Red sea, the Gulf of Aqaba, the Dead sea and the Jordan trough. It continues northward, but with a single fault, forming Lebanon's Bekaa valley and Syria's Ghab marshes.



FROM J. L. HURLBUT, "BIBLE ATLAS"; RAND MCNALLY & COMPANY

PROFILE OF JORDAN RIVER VALLEY

Sometimes the term "Jordan valley" is applied only to the area between the Sea of Galilee and the Dead sea, and known as the Ghor. Physiographically, the valley extends northward to Jebel ad-Dahar in Lebanon, a ridge 2,000 to 3,600 ft. high, forming the water divide between the Litani river and Jordan headwaters. The length of the entire valley is 110 mi.; the width varies, being 14 mi. at Jericho, 7 mi. at Beisan and 1.5 mi. at Merj 'Iyun. The valley floor is filled with Quaternary alluvium and diluvium, with beds of Eocene marls and limestones occurring northwest of the Sea of Galilee and near Wadi Fari'ah. In addition, Cretaceous limestones, dolomites and chalks line the Rift's edges, and basalt outcrops widely around the Sea of Galilee and in eastern Hule.

The Jordan's sources stem from mountains that frame the Hule basin. Nahr Banias rises in Syria at the southern base of Mt. Hermon. It passes through a series of rapids before entering the Hule. Nahr Leddan, the major summer source, rises in Mt. Hermon and joins the Banias at Huliot. Its main springs, 'Ain Leddan, are at Tell al Qadi (Tell-el-Kadi or Kadhi), the site of Dan, in Israel. Nahr Hasbani, the chief winter source, rises in Lebanon on western Mt. Hermon, flows parallel with the Litani and then joins the Leddan-Hasbani at Sdeh Nehemia in Israel. This marks the beginning of the Jordan.

Nahr Bareighit, the westernmost source, rises from Mt. Hermon-fed springs in Merj 'Iyun and tumbles down 60-ft. falls at et-Tannur. In 1957 Israel completed the Hule drainage project by which the Jordan has been channeled in two main canals. The Leddan-Banias flows in the eastern canal; the Hasbani and Bareighit in the western. River flow through the Hule has been speeded, and 65,000,000 cu.m. of water, once lost in the marshes through evaporation, have been conserved. This project has drained the papyrus marshes and most of shallow Lake Hule, making available 15,000 ac. for agriculture.

South of the eastern and western canal confluence, the river bed has been deepened to the gorge of the upper Jordan, below the B'not Ya'akov bridge. Within this 4-mi. gorge, the river tumbles 480 ft. In its 10-mi. course from Lake Hule to the Sea of Galilee, it drops from 230 ft. above to 689 ft. below sea level. While the upper Jordan runs clear and fairly straight, it becomes muddy and turbulent south of the Sea of Galilee, twisting over 200 mi. of valley floor in traversing a straight-line distance of 65 mi. Its narrow flood plain is as deep as 150 ft. below the Rift floor, and is crisscrossed with abandoned stream channels. Downcutting is

strongest at spring flooding. The flood plain (the Zor) is covered by a dense, tropical thicket that becomes especially pronounced when the valley drops below the −1,275 ft. contour line at Wadi Kufrinjah in the Central valley. Approaches to the Zor from the Rift are marked by barren, broken, gray-white marl hills. When in flood, the river fills much of the Zor. In summer it is less than 100 ft. wide, and in places is only 3 ft. deep.

The Jordan has rarely been an effective political or economic boundary. Many fords and lateral valleys link it to both east and west. Major openings on the west are: Wadi Waqqa, Wadi al Birah, Beisan valley (Jalud), Wadi al Malih, Wadi al Fari'ah and the Jericho fan (Wadi al Qilt). Streams from the east are larger and more numerous. The perennial streams are: Yarmuk, Wadi al 'Arab, Wadi Ziqlab, Wadi al Yabis, Wadi Kufrinjah, Zarqa', Wadi Nimrin, Abu Gharaba. Nelson Glueck's explorations in the 1930s uncovered many ancient settlements, especially east of the Jordan. Important modern crossings are B'not Ya'akov bridge (Damascus highway), Gesher (railway), el Manshiya (pipeline) and Allenby bridge (Amman highway). Israeli-Arab tensions have curtailed their use.

From 1918 to 1948 the river marked the eastern boundary of the British mandate in Palestine, except in the extreme north (*see* PALESTINE). When Israel was established as an independent country, the Jordan lay entirely within that country south to the Yarmuk confluence. From there to latitude 32° 22′ N., the river forms the Israeli-Jordanian border. (*See* ISRAEL; JORDAN.) In Israel's part of the valley are numerous farm settlements, emphasizing vegetables, fish farming, dairying, sugar beets, bananas, citrus fruits and cotton. In Jordan, the valley population is more scattered, with nodes at Jericho, Wadi al Fari'ah and north of Zarqa'. Winter vegetables, grown under irrigation, have a six weeks' market advantage. The valley's saline soils have heavy water requirements for desalination and irrigation.

Its new function as an international boundary, and inclusion of its waters or tributaries in three demilitarized zones, have made the Jordan an object of controversy. Regional irrigation and power proposals for the river have been rejected by riparian and headwater states (Israel and Jordan, the major potential users, and Syria and Lebanon).

Plans include dams along headwaters and the Yarmuk; reservoirs in Galilee, the Sea of Galilee (Lake Tiberias) and the Yarmuk; power plants; and canals within and outside the valley. Progress has been stalemated by differences over water allocation and storage areas, and by broader economic and political implications of the Israeli-Arab dispute.

Meanwhile, unitary steps have been undertaken by Israel and Jordan to exploit the river's waters—Israel through a diversionary canal at B'not Ya'akov to carry water to the Negev, and Jordan with programs for exploiting the Yarmuk. (S. B. Co.)

JORDANUS CATALANI (d. after 1330), French Dominican missionary and explorer in Asia. He went to the east in 1302, and in 1321 he was on his way to China when his fellow missionaries were massacred at Tana near Bombay. After working in Gujarat and at Suali near Surat, he revisited Europe in 1328. In 1330 he was appointed bishop of Columbum (Quilon) in Travancore. He wrote several letters, and the *Mirabilia* (Eng. trans. by H. Yule, 1863), with excellent information on India.

See C. R. Beazley, *The Dawn of Modern Geography*, vol. iii, pp. 215–235 (1906). (H. C. G.)

JORIS, DAVID (1501/02–1556), eccentric Belgian Anabaptist, founder of the sect of the Davidists, chiefly renowned because of a posthumous execution. He was a painter of stained glass who in 1524 married and settled in Delft. Swept into the Lutheran ferment he engaged in scurrilous attacks on the Catholic Church. In consequence he was condemned by the court at The Hague in 1528 to fine, whipping, tongue boring and three years of banishment. He was next drawn into the Anabaptist maelstrom and after trying to mediate between the revolutionary Münsterites and the peaceful Mennonites came forward himself as a prophet, the third David (the first having been David the king and the second Christ the son of David). In 1543, with his family and an abundant retinue, he established himself in Basel under the name of Johann van Brugge, "a refugee for the gospel," which the inhabitants of Basel understood to mean Lutheranism. Supported by his followers in the Netherlands Joris poured out interminable tracts and a ponderous volume, the *Wonder Boeck*, all printed in Dutch in Holland. Increasingly he was moving away from the messianic role to a mystical experience which led him to deprecate contention over points of dogma: the only true religion is inward, and inward religion must be free.

In the meantime strife commenced among his followers. Since Joris had given up open witness, his son-in-law, Nicolaes van Blesdijk, believed that the sect should be dissolved. But others in the colony still looked upon Joris as the third David. In the midst of strife he died in Basel on Aug. 25, 1556. In 1559 a trial was held in Basel over his corpse which in an auto-da-fé was solemnly reduced to ashes. His sect soon died out.

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JOS, a tin-mining and resort centre in Northern Nigeria, lies in a valley between rocky hills on the Northern Nigeria plateau at an elevation of 4,300 ft., 250 mi. S. of Kano by road. African pop. (1960 est.) 36,278. The streets are wide and tree lined and, except in the commercial area around the railway station, residences and offices are hidden behind flowering trees and shrubs. High above the town, to the west, a residential hotel in semi-Dutch colonial style overlooks rock gardens and the park area containing the museum, in which are examples of the Nok culture that flourished about 2,000 years ago. There is also a small but expanding zoo exhibiting specimens of Nigerian fauna. The courthouse, post office and several commercial buildings are modern.

Jos is a focal point for air, road and rail communications, being linked by air with Lagos, Kano and other centres and with trunk roads leading north, south and east. The main railway through Kafanchan connects the town with the rest of the rail system and in the 1960s a line was being built to Yerwa-Maiduguri, about 400 mi. E.

Tin and columbite are mined in open-cast workings from cassiterite overlying the granite of the plateau, in the areas south of Jos; many of the mine workers come from the surrounding Birom tribe. Market gardening is widespread, vegetables being sent by rail to Lagos and other towns together with dairy produce from Vom, about 15 mi. S.W. At Vom are the headquarters of the federal veterinary research department and the West African Institute for Trypanosomiasis Research. The dry climate and the altitude of Jos are in contrast to the humid heat of southern Nigeria; and the discovery of the tin-bearing lodes about 1903 quickly led to the development of the old village of Geash into the present township. Its value as a holiday centre was emphasized in World War II by the selection of Jos as a rest centre for officials unable to take overseas leave. (W. H. I.)

JOSEL OF ROSHEIM (JOSELMANN, JOSELIN; JOSEPH BEN GERSHON LOANS) (*c.* 1478–1554), Jewish leader and diplomatic spokesman (*shtadlan*) in Germany. Born to a family which had included several martyrs of a "blood accusation" in Endingen, Baden, Josel early realized the precarious status of German Jewry, caught between rival imperial, princely and municipal sovereignties. Although never officiating as a rabbi, he was learned enough in the principles of Judaism to challenge Martin Luther and other theologians to public debates and to write a Hebrew apologetic treatise, *An Epistle of Comfort*. Josel's main achievements, however, were diplomatic. He found listeners at the imperial court, which, through him, sought to strengthen its own hold over the Jewish communities. An imperial decree of 1545 styled Josel the "commander of all our Jewry in the Holy Empire." Soon after the coronation in 1530 of the emperor Charles V, Josel presented him a memorandum defending the Jews against the widespread accusation of their alliance with the expansive Ottoman empire, and he later secured a number of significant imperial decrees for German Jewry. He was less effective in his negotiations with the electors of Brandenburg and Saxony and other princes. Josel

exercised also considerable influence on the inner affairs of German Jewry. In connection with the Diet of Augsburg of 1530 he convoked an assembly of representatives of all German-Jewish communities, whose decisions he formally submitted to the Diet.

Josel's writings, including his *Memoirs,* are only partially preserved in the excerpts published in Joseph Hahn's *Yosif Omez.*

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JOSEPH, SAINT, in the New Testament, the husband of Mary (*q.v.*), the mother of Jesus. His genealogy appears in Matt. i, 1–17 and Luke iii, 23–38. The former, obviously artificial in structure, traces the Davidic descent through Kings to prove the messianic claim. The facts concerning Joseph, common to the birth narratives (Matt. i–ii, Luke i–ii), are (1) that he was a descendant of David; (2) that Mary was already betrothed to him at the birth of Jesus; and (3) that after the birth he lived at Nazareth. But these facts are handled differently, Joseph being prominent in Matthew but completely subordinated in Luke. At Nazareth Joseph followed the trade of a carpenter or builder (Matt. xiii, 55), and probably died before the public ministry of Christ began (cf. John xix, 26). Two early writings, the 2nd-century Protevangelium of James and the 4th-century History of Joseph the Carpenter, present him as a widower with children at the time of his betrothal to Mary. His special veneration began in the East, and his feast was introduced into the Roman calendar in the 15th century (March 19); Pius IX declared him Patron of the Universal Church in 1870, and the feast of the Patronage is kept the third Wednesday after Easter; Pius XII established May 1 as the feast of St. Joseph the Workman.

JOSEPH, SAINT, OF ARIMATHEA (fl. *c.* A.D. 30), a Jew who undertook the burial of Jesus and whom later legend connected with the Holy Grail and Glastonbury. The oldest tradition in the New Testament describes him as *bouleutes* ("member of the council"; Mark xv, 43; *cf.* Luke xxiii, 50–53), a word suggesting membership of the town council in Jerusalem (sometimes designated *boule* in Greek), not of the Sanhedrin whose members voted unanimously for Jesus to be put to death. In any case he held high office and according to Matt. xxvii, 57–58 was a rich man who persuaded Pontius Pilate to deliver the body of Jesus into his hands.

The motive of his action given by Mark was that he expected the Kingdom of God. John says he was a secret disciple of Jesus (John xix, 38). Joseph wished both to prevent the body from hanging on the cross overnight and to secure an honourable burial for it. Whereas the former aim was in accordance with Jewish Law (Deut. xxi, 23), the latter actually offended against numerous legal provisions of late Judaism, which allowed only a burial of disgrace to the executed. That is why the Gospels emphasize that it was a new grave (Luke xxiii, 53) and Joseph's own family grave (Matt. xxvii, 60). By burying Jesus in such a manner Joseph demonstrated his disagreement with the verdict. His feast day is March 17.

Joseph has a long history in later literature. In the apocryphal Gospel of Peter (2nd century), he is a friend of Jesus and of Pilate. In the apocryphal Gospel of Nicodemus, otherwise known as the Acts of Pilate (? 4th century), Joseph is imprisoned by the Jews after the burial of Jesus and set free by the risen Lord, thus becoming the first witness of the resurrection. The earliest extant work to connect Joseph with the Holy Grail is Robert de Borron's verse romance *Joseph d'Arimathie,* also entitled *Le Roman de l'estoire dou Graal,* probably written *c.* 1200. In this poem Joseph is entrusted with the cup of the Last Supper, and together with his brother-in-law Bron or Hebron sets up a table for it. The grail is eventually to be brought by Bron to the *vaus d'Avaron* in the west.

A mid-13th-century interpolation in *De antiquitate Glastoniensis ecclesiae* by William of Malmesbury relates that Joseph went to Glastonbury in England as head of 12 missionaries sent thither by the apostle Philip. Glastonbury sources, however, make no reference to the connection between Joseph and the grail, the quest for which later became part of the Arthurian legend (*q.v.*). In the *Morte Darthur* by Thomas Malory, when Galahad receives the vision of the grail he sees his kinsman Joseph, whose shield he has inherited, standing at the altar dressed as a bishop. *See* also GLASTONBURY; GRAIL, THE HOLY.

See J. Blinzler, *Der Prozess Jesu,* 3rd ed. (1960). (E. BL.)

JOSEPH, SAINT, OF VOLOKOLAMSK (1439–1515), Russian churchman and Orthodox saint, was born at Yazvishche, near Volokolamsk. After spending his early years in various monasteries he was made abbot of the great Pafnutiev monastery (1477) which was closely linked with the grand prince's family. In 1479, after a clash with Ivan III Vasilievich, he set off to found his own monastery in Volokolamsk, in the district of Ivan's rebellious brother Boris. Based on cenobitical principles, the Josephian monastery grew in size, wealth and influence to become by Joseph's death one of the largest monasteries in Muscovy, the foremost nursery for prelates and the greatest centre of social services in the state.

Joseph's life was dedicated to furthering the interests of his monastery and to combating the heresy of the so-called Judaizers (*Zhidovstvuyushchie*). In 1507 he persuaded Vasili III Ivanovich to remove his monastery from the jurisdiction of Boris' son Fedor and place it under his own protection. For this act he was excommunicated (1508) by Serapion, archbishop of Novgorod, in whose diocese Volokolamsk lay and whose permission he failed to ask; in 1509 the interdict was removed by a prejudiced court and Serapion was unjustly excommunicated in his turn. Joseph fiercely combated the Judaizers, a sect which originated in Novgorod in the 1470s and which denied most of the tenets of Christianity; he fought them probably because he saw in them his ideological opponents.

During the reign of Ivan III he supported, it appears, the adherents of separatism, opposed the grand prince politically and appeared as one of the leaders of the church militant, vigorously defending the right of the monasteries to own lands. Only after 1507 did he develop the theory of the divine origin of kingship. He wrote the vast *Prosvetitel* ("Enlightener"), a work of learned compilation directed against the heretics; a monastic rule; and a large number of epistles. He died on Sept. 9, 1515, and was canonized on Dec. 20, 1578. (J. L. I. F.)

JOSEPH, in the Old Testament, the son of the patriarch Jacob by Rachel and the name of a tribe of Israel. Unlike the other "sons" of Jacob, Joseph is usually reckoned as two tribes (viz., his "sons," Ephraim and Manasseh), and closely associated with them is the small tribe of Benjamin, which lay immediately to the south. These three constituted the "sons" of Rachel, and with the "sons" of Leah are thus on a higher level than the "sons" of Jacob's concubines. The "house of Joseph" and its offshoots occupied the centre of Palestine from the plain of Esdraelon to the mountain country of Benjamin, with dependencies in Bashan and northern Gilead. Practically it comprised the northern kingdom, and the name is used in this sense in II Sam. xix, 20; Amos, v, 6 and vi, 6; the extension of the term being parallel to the development of the name Jacob. The story of the tribal ancestor is recounted in Gen. xxxvii, 1. Joseph, the younger and envied son, is seized by his brothers at Dothan and is sold to a party of Ishmaelites or Midianites, who carry him to Egypt. After various vicissitudes he gains the favour of the king of Egypt by the interpretation of a dream, and obtains a high place in the Pharaoh's kingdom.

Forced by a famine, his brothers come to buy food, and in the incidents that follow Joseph shows his preference for his young brother Benjamin (*cf.* the tribal data above). Jacob is invited to come to Goshen, where a settlement is provided for the family and their flocks. This is followed many years later by the exodus, the conquest of Palestine, and the burial of Joseph's body in the grave at Shechem which his father had bought. *See* also TWELVE TRIBES OF ISRAEL. (T. H. R.)

JOSEPH I (1678–1711), Holy Roman emperor from 1705 to 1711, was born in Vienna on July 26, 1678, the eldest son of the emperor Leopold I and his third wife Eleonore of Palatinate-Neuburg. He was crowned king of Hungary in 1687 and was

elected king of the Romans, or successor designate to the empire, in 1690. In 1699 he married Wilhelmina Amalia of Brunswick-Lüneburg (1673–1742), by whom he had two daughters and a son, Leopold, who died in infancy. In 1703 he renounced his claims to the Spanish succession in favour of his younger brother Charles, the future Charles VI (*see* SPANISH SUCCESSION, WAR OF THE).

Joseph succeeded his father as emperor on May 5, 1705. Throughout his reign the War of the Spanish Succession continued and the imperial armies under Prince Eugene of Savoy won victories in Italy, Germany and Flanders. The danger of another war, with Charles XII of Sweden, who in his conflict with Frederick Augustus of Saxony (Augustus II of Poland) had led his army through Silesia, was prevented by the treaty of Altranstädt (Aug. 22, 1707). The year 1708, however, brought the climax of a conflict between the emperor and Pope Clement XI: the pope had recognized the Bourbon Philip V as king of Spain instead of Charles and had forbidden the duke of Parma to pay a contribution demanded for the Austrian troops in Italy. An imperial army occupied Comacchio in May 1708 and invaded the papal states; and in 1709 Clement had to recognize Charles as king of Spain. Joseph's generals were also successful against the insurrection of Francis Rakoczy II in Hungary, but before this conflict was ended the emperor had died of smallpox, in Vienna, on April 17, 1711. His death deprived the Habsburgs of the Spanish succession, as the other powers did not wish to see the empire of Charles V revived under his brother and successor, Charles VI. Like his father and his brother, Joseph had enjoyed music and was himself a good musician; his musical works, together with those of Ferdinand III and Leopold I, were edited by G. Adler (1892–93).

See O. Redlich, *Das Werden einer Grossmacht: Oesterreich von 1700 bis 1740,* 2nd ed. (1942); W. Bauer, "Kaiser Josef I.," *Mitteilungen des Oberösterreichischen Landesarchivs* (1955). (AD. WA.)

JOSEPH II (1741–1790), Holy Roman emperor from 1765 to 1790, was born in Vienna on March 13, 1741, the fourth child and eldest son of Maria Theresa and Francis Stephen of Lorraine (the future emperor Francis I). The handsome boy soon showed a promising intellect but also a certain reserve and a cold haughtiness. The dark side of his character began to lighten during his exceedingly happy union with the Bourbon princess Isabella of Parma, whom he married on Oct. 6, 1760, and who gave him a daughter, Maria Theresa; but Isabella died of smallpox on Nov. 27, 1763. Joseph did not forget his grief even during his colourful coronation as king of the Romans, or successor designate to the empire, in 1764. His heart hardened still further during his second marriage, to Maria Josepha of Bavaria, his consort from Jan. 25, 1765; the unhappy marriage ended when she too died of smallpox on May 28, 1767. After the sudden death of his father, on Aug. 18, 1765, Joseph exchanged the freedom of the student for the responsibilities of the statesman as Holy Roman emperor and as co-ruler with his mother of the Austrian dominions.

External Affairs.—Joseph directed his attention first to Germany, where he aimed at strengthening the imperial power; but the attempt, begun in 1767, to revive the imperial chamber (*q.v.*) was wrecked by the opposition of the diet. He abandoned further attempts at reforming the *Reich* and concentrated exclusively on raising the power of the Habsburg dynasty. This was the political idea that guided him in his meetings with Frederick II of Prussia at Neisse (Nysa in Silesia) in 1769 and at Mährisch-Neustadt (Uncov in Moravia) in 1770. The two interviews brought only a temporary relief of tension, as Prussia remained Austria's enemy; hence Joseph held fast to the French alliance as the pivot on which hinged the monarchy's international position. His efforts to invigorate the French alliance had little success, however, as was shown by France's unfriendly attitude in the War of the Bavarian Succession in 1778–79. Joseph was more successful with his eastern policy: the conflict of interest between Russia, Prussia and Austria was solved at the expense of Poland by the partition of 1772, when Joseph gained for Austria a considerable area, Galicia, to which moreover he added Bukovina in 1775.

After the death of his mother in 1780, Joseph was freed from all restraint. He cemented Austria's friendship with Russia and concluded a formal alliance with Catherine the Great in 1781, which protected him against Prussia. Even so, his attention was mainly given to the west. In 1782 he abrogated the Barrier treaty with the Dutch, ignoring the protest of the estates-general; but in 1784, when he wanted to open the Scheldt river to benefit the commerce of the Austrian Netherlands, the Dutch objected strongly and he had to renounce his intention, especially because France's attitude was ambiguous. Joseph hoped that his yielding on the Scheldt question would gain him at least France's support for his plan to exchange the Austrian Netherlands against Bavaria, but Prussia's objection prevented this again, as it had done at his first attempt to acquire Bavarian territory in 1778.

The complete failure of Joseph's policy for the *Reich* became clear when Frederick II's skilful diplomacy succeeded in uniting numerous German princes in the *Fürstenbund* or the League of Princes (July 1785), directed against Joseph's plans. As relations between Austria and Prussia thus became worse, Austria's bonds with Russia were tightened, and this was unfortunate for Joseph because his alliance with Catherine forced him to join the Russo-Turkish War of 1787. The inglorious campaign of 1788 damaged Austria's military prestige and the emperor's health; and the reputation of the Austrian army was restored only by E. G. von Laudon's efforts. Hence at the end of 1789, when Joseph was near death, the monarchy was in a critical condition: the Turkish war had not brought any important gains; the alliance with France was collapsing in the gales of the beginning Revolution; Prussia was a certain enemy. Of the Habsburg provinces, moreover, the Netherlands were in open revolt, Hungary was showing symptoms of dangerous unrest and even the German and Bohemian hereditary lands were seething with discontent.

Internal Affairs.—While Maria Theresa was alive, Joseph could intervene less in domestic matters than in foreign affairs. Only the army was entrusted to him by his mother as early as 1765; the young ruler improved its equipment and raised its strength.

Joseph's own plans for the creation of a unitary state could be put into practice only after his mother's death. Aiming at strict centralization and despotic absolutism, under which everything should be organized to serve his purpose of unification, Joseph was determined to standardize the administrative structures of the Austrian lands and of Hungary. In 1782 the whole administration (save that of the Netherlands and of Milan) was concentrated in two offices, one in Vienna, one in Buda; the Austrian lands were distributed among larger units formed according to density of population and without regard to their individual histories; and in 1785 a system of districts was superimposed over the counties of Hungary and Transylvania. The decision of 1784 to make German the official language everywhere except in the Netherlands and in Italy was likewise taken in order to promote administrative uniformity, not to germanize the Magyars or the Slavs; it was bitterly opposed, especially by the Magyars.

Maria Theresa had already separated judiciary and executive at the highest level of government; Joseph extended this downward. He abolished several special tribunals and thus brought nearer equality for all before the law. Criminal procedure was regulated; and torture, the death penalty and brutal punishments were abolished (1776–88). The codification of the law was completed.

Joseph's economic policy developed from mercantilism through a tendency toward free trade to moderate protectionism influenced by physiocratic ideas. The mercantilist stress on population as a source of wealth for the state had its beneficial effect, especially in the eastern frontier areas, where cultural standards were raised by the settlement of German peasants there. Serfdom was abolished in 1781; forced labour, personal services and payments in kind were regulated and made commutable into money.

These social decrees caused widespread unrest; but even greater was that caused by Joseph's religious policy. Joseph, personally devout and a practising Catholic, hoped to bring about a renewal of faith. This remained the aim of all his ecclesiastical reforms: the *Toleranzpatent* or Patent of Toleration in favour of the Protestants (1781); the dissolution of "unnecessary" monasteries (from 1782); the creation of a church fund; the strict use of the *placetum regium* concerning the entry of papal bulls into the monarchy; the redrawing of diocesan frontiers; the placing of

seminaries under state control (1783); the augmentation of parishes and the payment of their priests by the state; the concordat with Rome in 1783; and so on. (*See* also AUSTRIA, EMPIRE OF; GERMANY: *History.*)

Joseph's reforms touched all aspects of life and all classes of the population, but nobody was satisfied: a general agitation ran through the monarchy leading to dangerous fermentations here and there and to open revolt in the Netherlands (*see* BELGIUM). The ancient realm of the Habsburgs threatened to split apart and Joseph had to repeal most of his reforms before his death, which took place in Vienna on Feb. 20, 1790. Yet despite his comparative failure Joseph towers over all his crowned successors. Admiration cannot be denied to his fanatical efforts to weld together his multinational realms, to modernize them and to make them a great European power by an active foreign policy. His insatiable lust for work, his personal unpretentiousness and humanitarian feelings make him a great man whose tragic life can be summed up in the words "too soon" and "too hasty."

There are editions by A. von Arneth of Joseph's correspondence with his mother Maria Theresa, three volumes (1867–68); with his brother and successor Leopold II (1872); and with Catherine II of Russia (1869).

See also references under "Joseph II" in the Index.

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JOSEPH (1714–1777), king of Portugal from 1750 to 1777, was born at Lisbon on June 6, 1714, the son of John V and Mariana of Austria. In 1729 he married Mariana Vitoria, daughter of Philip V of Spain. Joseph succeeded his father in 1750, but exercised little influence on government, being for most of his reign under the domination of the marquês de Pombal, who converted Portuguese monarchical absolutism into a more efficient type of despotism. Pombal's ascendancy over the king dated from 1755, the year of the great Lisbon earthquake. An attempt on the king's life in 1758 served as a pretext for persecution of the most important noble families; the Jesuits were expelled in 1759; and a large number of economic reforms were introduced. Joseph died in Lisbon on Feb. 24, 1777, and was succeeded by his daughter Maria I. *See* also PORTUGAL: *History.* (DA. A. P.)

JOSEPH, FATHER (FRANÇOIS LECLERC DU TREMBLAY) (1577–1638), French Capuchin mystic, religious reformer and, in effect, Richelieu's foreign minister, popularly called his *eminence grise,* was born in Paris on Nov. 4, 1577. He appeared at court at the age of 18, but despite the promise of a brilliant secular career he entered one of the most severe religious orders, and was wholly devoted to prayer, preaching and the conversion of heretics. His reform of part of the abbey of Fontevrault into a new order of Calvarian nuns brought him into touch with the bishop of Luçon, the ambitious Richelieu. Père Joseph's successful apostolic zeal within France extended itself to the wider hope of converting the infidels through a great crusade led by France. This spiritual ambition coincided with the political plans of Richelieu for the destruction of the Habsburg power and the domination over Europe of an internally united France. Père Joseph, believing in the spiritual destiny of his country, thus lent himself wholeheartedly to a policy which imposed on Europe the miseries and crimes of the Thirty Years' War. His spiritual ideals were better served by his labours in sending Capuchin missionaries to the near east and Africa. He died at Rueil near Paris on Dec. 18, 1638, hated by his countrymen.

See G. Fagniez, *Le Père Joseph et Richelieu,* 2 vol. (1894); Aldous Huxley, *Grey Eminence* (1941). (M. DE LA B.)

JOSÉPHINE (1763–1814), empress of the French as consort of Napoleon I, was born at Trois-Ilets, Martinique, on June 23, 1763, the eldest daughter of Joseph Tascher de la Pagerie. Her father's family came originally from Orléans but had long been settled in Martinique, where after service in the French navy he had from 1763 devoted himself to his plantations. Taken to Paris, Joséphine was there married in 1779 to the vicomte Alexandre de Beauharnais, by whom she had two children, Eugène de Beauharnais and Hortense. Having gone back to Martinique in 1788, she returned to Paris in 1790 to make some sensation in society as a member of a circle that included the vicomte de Barras and Joseph Fouché (*q.v.*); but her husband's lack of success in command of an army on the Rhine in 1793, together with his noble birth, made him suspect to the Jacobins, and in June 1794 he was guillotined. Joséphine herself was imprisoned from April 1794 till Robespierre's fall in July. She then found herself in a precarious situation; but Barras and Madame Tallien (Thérèse Cabarrus) helped her, and by the time of the inauguration of the Directory (1795) she was a leader of Parisian society. The young Napoleon Bonaparte, who was making his name at this moment, paid court to her; and when he was nominated to command the army of Italy she decided to marry him. The civil marriage took place on March 9, 1796, just before his departure. After having at first declined to accompany him, Joséphine followed him to Italy in July.

Bonaparte's letters to Joséphine during the campaign reveal the ardour of his love, but she rarely answered them. During his absence in Egypt in 1798–99, her relations with an officer, Hippolyte Charles, were compromising; and Bonaparte on his return thought of divorcing her. Her tears and the entreaties of Eugène and Hortense brought about a reconciliation; and during the consulate (1799–1804) their relations were on the whole happy, though Napoleon's conduct now gave his consort cause for concern. His brothers and sisters more than once begged him to divorce Joséphine, and from the time when he became first consul for life (1802), with large powers over the choice of a successor, he kept open the alternative of a divorce. Joséphine's anxieties increased on the proclamation of the empire (May 1804), and on Dec. 1, 1804, the eve of the coronation at Notre Dame, she gained her wish that she should be married anew to Napoleon with religious rites. Despite her care, Napoleon arranged for the omission of one formality, the presence of the parish priest; but at the coronation scene Joséphine appeared radiant with triumph over her envious relatives. The marriages contracted by her children Eugène and Hortense seemed to establish her position; but her ceaseless extravagance and, above all, her failure to bear him a son strained her relations with the emperor. She complained of his infidelities and growing callousness; and after the campaign of 1809 Napoleon caused the announcement to be made to her that reasons of state compelled him to divorce her. Despite her pleadings he held to his resolve. The most was made of the slight technical irregularity at the marriage ceremony of 1804; and the marriage was declared null and void in Jan. 1810. At her private retreat, La Malmaison at Rueil near Paris, which she had beautified with curios and rare plants and flowers, Joséphine continued to entertain lavishly, and Napoleon cared for her welfare and paid her debts. After Napoleon's abdication she won the protection of the Russian emperor Alexander I, but died at La Malmaison on May 29, 1814.

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JOSEPHINISM: *see* GALLICANISM.

JOSEPHUS, FLAVIUS (A.D. 37/38–after 93), historian of the Jews, was a Jew of priestly family born in Jerusalem. Well educated in the Law, he became a Pharisee after living for three years in the desert as the disciple of a hermit named Bannus. About A.D. 64 he is known to have been in Rome on an embassy for the release of Jewish prisoners, and to have gained the favour of the empress Poppaea. From 66 he was fighting in the Jewish War. He was captured by the Romans but prophesied that Vespasian would become emperor, and was released in 69 when his prophecy was fulfilled. Hated by the Jews as a traitor for changing sides and for acting as interpreter for Titus during the siege of Jerusalem, he accompanied Titus to Rome, where he received a pension and Roman citizenship. Here he became a writer, publishing his *Peri tou Ioudaikou polemou* (*History of the Jewish War*) in 77 or 78 and *Ioudaike archaiologia* (*The Antiquities of the Jews*) during the 90s. He also published an apologetic autobiography and a work called *Kata Apionos* (*Against Apion*), an attack upon

critics of his history or of his person. For the work on the supremacy of reason attributed to him *see* MACCABEES, BOOKS OF.

As a character Josephus was lively and fascinating, relating his own lack of principle with engaging candour, and these qualities sometimes appear in his historical work. As a firsthand authority for the Jewish wars and for the system and methods of the Roman army, he is of great importance. He was not scrupulous in presenting the portrait most favourable to his point of view. He hated the Jewish zealots, whom he termed bandits, and wanted to discourage opposition by showing the Roman armies as invincible; and his *History,* which was written first in Aramaic and afterward translated into Greek, was probably intended as a kind of warning to those near the eastern frontier or beyond who might be thinking of resistance. He was writing official history, and secured Titus' approval for it. In the *Antiquities* he was trying to make the best case possible for commending the Jews to the Roman reader. He makes Judaism very respectable, a religion for the reasonable man, by evacuating it of zeal and feeling, praising its institutions and laws rather than its prophets, and attempting to recover the interest thus lost by the use of apocryphal amplification of old stories. He provides information on social conditions under the early Roman empire and uses important sources for the period after 400 B.C.

Josephus mentioned Christ twice; once as the "so-called Christ," and once in a passage which in its present form has certainly been interpolated or altered, perhaps by a Christian editor, and may indeed be spurious altogether. It cannot be by Josephus for it implies the divinity of Christ. Eusebius at the beginning of the 4th century knew this text in its present form. Josephus was much used by the Church fathers. His *History* formed the basis of the medieval work known as *Josippon,* a collection of stories about Jewish history.

See also references under "Josephus, Flavius" in the Index.

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(W. O. C.)

JOSHUA THE STYLITE (5th–6th century), a monk of the convent of Zuknin and the reputed author of a chronicle covering mainly the period 495–506. Incorporated in a history which some have ascribed to Dionysius Telmaharensis (*q.v.*) but others regard as anonymous, it was written at the request of Sergius, abbot of a convent near Edessa, immediately after the war between the Persian and Byzantine empires (502–506) by one who had lived in Edessa and witnessed many of the events described. After an elaborate dedication to Sergius, a brief recapitulation of events from the death of Julian in 363, and a fuller account of the reigns of the Persian kings Firuz (Peroz) and Balash, the writer describes in detail the events of his own time, plagues and famine, earthquakes and other natural phenomena which occurred during the reign of Kavadh I (488–531), and ends with a full account of the war of 502–506.

See A. Baumstark, *Geschichte der syrischen Literatur* p. 146 (1922); C. C. Torrey, "Notes on the 'Chronicle of Joshua the Stylite'," *Hebrew Union College Annual,* vol. 23, part 1, pp. 439–450 (1950–51).

(W. D. McH.)

JOSHUA (JOSUE), **BOOK OF,** the sixth book of the Old Testament and the first of the group known as the Former Prophets (Joshua, Judges, I and II Samuel, I and II Kings). It takes its name from Joshua the son of Nun, an Ephraimite who assumed leadership of the Israelite tribes after the death of Moses (Deut. xxxi, 14–15, 23) and is reported to have carried through the conquest of Canaan (Josh. i–xii) and the distribution of the land to the 12 tribes (Josh. xiii–xxii, 9). The book is connected thematically with the Pentateuch inasmuch as it portrays the fulfillment of the promise made to Abraham and to his descendants (Gen. xii, 1–3). Viewed historically, however, the materials in Joshua are closely connected with the events portrayed in the remainder of the Former Prophets.

Contents.—The book consists of three parts: ch. i–xii contain the story of the conquest of Canaan under Joshua's leadership; ch. xiii–xxii relate how the land is divided among the 12 tribes of Israel; and ch. xxiii–xxiv contain farewell addresses by Joshua delivered to representatives of the tribes. The book may be outlined as follows:

i, 1–xii, 24:	conquest of Canaan
i, 1–18:	introduction
ii, 1–24:	espionage in Jericho
iii, 1–v, 1:	Jordan crossing
v, 2–15:	camp at Gilgal
vi, 1–27:	conquest of Jericho
vii, 1–viii, 29:	conquest of Ai
viii, 30–35:	building of altar on Mt. Ebal
ix, 1–27:	treaty with Gibeonites
x, 1–43:	southern campaign
xi, 1–23:	defeat of northern confederacy
xii, 1–24:	summary
xiii, 1–xxii, 34:	division of the country
xiii, 1–xiv, 15:	introduction and beginning of land division
xv, 1–63:	portion of Judah
xvi, 1–xvii, 18:	portion of Joseph
xviii, 1–xix, 51:	portion of other tribes
xx, 1–9:	appointment of cities of refuge
xxi, 1–42:	appointment of Levitical cities
xxi, 43–45:	summary statement
xxii, 1–34:	departure of Transjordanian tribes
xxiii, 1–xxiv, 33:	Joshua's farewell and death
xxiii, 1–xxiv, 28:	Joshua's farewell addresses
xxiv, 29–33:	burials of Joshua, Joseph and Eleazar

History of the Book and of the Period.—The tradition that Joshua was the author of the book has appeared only in postbiblical times; the book itself gives no indication of authorship. Critical studies of Joshua frequently have proposed that the sources or traditions found in the Pentateuch (*q.v.*) continue into the Book of Joshua; for this reason, the term "Hexateuch" often appears in biblical scholarship to designate the first six books of the Old Testament. The most cogent argument against this view has been presented by Martin Noth, who maintains that the Book of Joshua is a part of a connected history of Israel written by an individual in Judah after the destruction of the city of Jerusalem in 586 B.C. The total work, to which Noth gives the title "The Deuteronomistic Historical Work," includes the Books of Deuteronomy, Joshua, Judges, I and II Samuel and I and II Kings. The author, depending upon many sources of various ages, constructed one great historical document which traces the history of Israel under her God from the death of Moses in the plains of Moab up to the fall of Jerusalem and the beginning of the period of Babylonian exile. Noth's thesis has been widely accepted, although judgments differ concerning the age of the materials used by the Deuteronomistic historian and on the question of the reliability of the traditions preserved in this historical work. The differences of judgment are considerable in the case of the Book of Joshua.

During the centuries in which the book assumed its present form, numerous additions and modifications of the materials contained in it occurred. It is possible to distinguish in the book several ancient sources which are of great historical and religious importance. The later additions have been made primarily for the purpose of portraying more clearly the guidance of God in this critical period of Israelite history and in order to indicate that the conquest of Canaan was effected by the God of Israel in a series of swift and decisive battles led by Joshua and involving all of the 12 tribes of Israel.

The Conquest.—In the first part of the book (ch. i–xii), ancient stories of the conquest underlie the present form of the text. Archaeological data from the cities of Bethel, Lachish, Debir (Kirjath-sepher, modern Tell Beit Mirsim) and possibly Hazor reveal that each of these cities was destroyed in the second half of the 13th century B.C. Subsequent settlements upon these sites were of a sort that indicated a radical cultural break with the settlements that had been destroyed. It seems evident, therefore, that the archaeological evidence in support of a conquest of portions of the land of Canaan under Joshua toward the end of the 13th century B.C. deserves to be taken seriously into account. In Josh. x, Lachish and Debir are listed among the cities taken by Joshua in the southern campaign (verses 31–39). The following chapter relates the story of the defeat of a coalition of northern kings and the de-

struction of the city of Hazor (xi, 7–15). The conquest of Bethel, however, is not reported in the Book of Joshua; elsewhere the "house of Joseph" is said to have overthrown this city, with the help of one of its inhabitants (Judg. i, 22–25). (For a map of the region before the Israelite conquest, *see* CANAAN.)

The stories of the conquest of Jericho (ch. vi) and of Ai (ch. vii–viii) have a central place in the traditions of the conquest. In neither instance, however, does the archaeological evidence support the biblical picture. Excavations at the site of ancient Jericho (*q.v.*) reveal very little evidence of significant occupation during the Late Bronze Age (*c.* 1500–1200 B.C.). If a walled town existed on the site in the 13th century B.C., both the walls and other evidences of occupation have virtually disappeared. Archaeological work at the site of Ai (*q.v.;* the word means "the ruin") has shown that this site was definitely unsettled from late Early Bronze times (*c.* 2200) until about the 10th century B.C. It is possible that the destruction of Bethel was effected by Joshua and that, later on, the story of the fall of Bethel was associated with the destruction of the ancient ruin Ai, located only a short distance to the southeast.

The Book of Joshua clearly indicates that the conquest of Palestine was only partially carried through in the days of Joshua. Apart from Hazor, no walled town was taken in northern Palestine (Josh. xi, 13). Other cities and regions not taken are referred to in several places in ch. xiii–xxii (xiii, 1–7, 13; xv, 63; xvi, 10; xvii, 12, 14–18). The miscellaneous list of areas taken by the several tribes (Judg. i, 1–ii, 5) also indicates that portions of the land remained in the possession of non-Israelites. Later editing of the conquest traditions has resulted in the portrayal of a contrary picture: Joshua is represented to have taken the entire land in a series of swift and devastating campaigns (x, 40–42; xi, 16–23; ch. xii). It is noteworthy that no conquest of central Palestine (in the region of the city of Shechem) is attributed to Joshua. From viii, 30–35 and ch. xxiv it may be concluded that this region was already in the hands of allies of the invading tribes under Joshua.

The history of the conquest may be reconstructed somewhat as follows, on the basis of biblical and nonbiblical sources.

1. Prior to the time of Moses, the ancestors of the later Israelite tribes had secured a strong foothold in the central hill country of Palestine. These peoples then joined with the invading tribes under Joshua and made unnecessary any conquest of their region.

2. Under Joshua's leadership, a significant number of Israelites entered Palestine in the latter half of the 13th century. They carried through a campaign against the more vulnerable cities of the southern hill country, without attempting to conquer such strong cities as Gezer and Jerusalem or the towns of the Philistine plain. A second campaign against the northern cities was carried out, resulting in the defeat of the Canaanite forces and the destruction of Hazor but leaving many towns uncaptured.

3. During the course of the subsequent centuries—up to the time of David—the Israelites sought to solidify their holdings and to extend them. Treaties were made with the inhabitants of a number of the regions, in all probability (Josh. ix). Additional gains in territory were accomplished by warfare (Judg. iv–v).

4. Finally, under the leadership of David, the ideal dimensions of the land of the promise were secured, from Dan to Beersheba and from the Mediterranean to the eastern edge of the habitable land in Transjordania.

5. Traditions of the conquest under Joshua have been augmented by attributing raids carried out by local tribal leaders to the great Ephraimite hero Joshua.

6. The later tradition, probably that emanating from the Deuteronomistic historian (*see* above), describes the conquest as a single act under God's guidance in the days of Joshua; but this later ideology has not been permitted to obliterate all traces of the older, and more nearly historical, tradition of a gradual process of conquest, initiated by Joshua in his raids against certain portions and peoples of the land of Canaan.

Division of Land Among the Tribes.—In ch. xiii–xxii, two sources from different periods can be distinguished. The first consists of a list of boundaries of the tribes of Israel, which stems from the period prior to the kingship (Judah, xv, 1–12; Joseph, xvi, 1–3, 5–8; xvii, 7–9; Benjamin, xviii, 11–20; Zebulun, xix, 10–16; Issachar, xix, 17–23; Asher, xix, 24–31; and Naphtali, xix, 32–39). The lists given for Reuben and Gad (xiii, 15–28) appear to be a combination of boundary and city lists and perhaps come from a later period. The second source is a list of cities occupied by the several tribes (Judah, xv, 21–62; Benjamin, xviii, 21–28; Simeon, xix, 2–8; and Dan, xix, 41–46). This city list is assigned to various periods in the history of the kingship, from the 10th to the 7th centuries B.C. In any case, the list does not belong to the period of Joshua; it reflects, rather, the territory actually possessed by the tribes in a period considerably later than that of the conquest.

Farewell Addresses.—The third portion of the book contains two farewell addresses by Joshua to the representatives of the tribes. The first of these (ch. xxiii) is a creation of the Deuteronomistic historian; it illustrates his basic theological outlook and probably served, for a time, as the actual conclusion of the book of Joshua. During the period of Babylonian exile, in all probability, the final chapter of the book (ch. xxiv) was placed at the end of Joshua. This chapter, apart from the grave traditions (one of which also appears in Judg. ii, 6–10), is a very ancient document which probably owes its continued existence to the regular celebrations of the Feast of Tabernacles, one element of which was the renewal of the covenant between God and Israel. It is not clear whether the ceremony of covenant renewal occurred annually or once every seven years (Deut. xxxi, 9–13).

In any case, the event recorded in Josh. xxiv was not a single occurrence. The people of Israel were formed (or re-formed) into a confederation of 12 tribes, most probably under the leadership of Joshua. Representatives of the tribes, it is believed, came regularly to the central sanctuary of the tribal system (here Shechem; later this central sanctuary was located at Shiloh; under David, Jerusalem came to be the centre of the tribal system, II Sam. vi), for the purpose of reaffirming allegiance to the God of the covenant. The people heard the story of God's past deeds of salvation rehearsed in their hearing (Josh. xxiv, 2–13); they were summoned to decide for Yahweh the God of Israel and to put away all evidence of allegiance to foreign gods (verses 14–24); then the covenant ceremony was observed and the basic law of the covenant people was read or recited (verses 25–27). Other elements of this ceremony of covenant renewal are preserved, in all probability, in other places (Exod. xxiv; Deut. xxvii, etc.). It is possible that the ceremony of covenant renewal provided the occasion for the reception into Israel of peoples and regions that formerly had been outside the community of Israel (xxiv, 15). Thus this chapter may also be of importance in portraying the way by which the community came to possess the land of the promise.

The chapter is of fundamental significance for an understanding of how the tribal system maintained itself over against the cultural and religious influences of the land and people of Canaan. In a regular ceremony of covenant reaffirmation, the community was in a position to rid itself of the adoption of motifs and practices which belonged to the nature and fertility religion of the Canaanite population.

Themes.—The Deuteronomistic historian has placed his own theological judgment upon the various materials employed by him in the writing of the Book of Joshua. He has made it clear that the gift of the land of the promise is a divine act, from first to last. The community has not won the battle for Canaan; Yahweh won the battle. The land is theirs to inherit and make their own, but it may be taken from them at any time, should the people become apostate (*see* especially ch. xxiii). The land was not always their land; and it will be theirs only so long as they hold firmly and unswervingly to the covenant they have made with Yahweh. Fidelity to God, therefore, is a matter of life-or-death significance. The radical dimensions of the choice laid before Israel are best summarized in Deut. xxx, 15–20, which is also the work of the Deuteronomistic historian.

The pathos of this historian's entire work can be sensed only when it is remembered that he completed this recasting of the history of Israel at a time when the community had been destroyed by the great empires of Assyria and Babylonia. Jerusalem lay in ruins

around him; Judaean exiles had been carried off to Babylonia. In the bleak years following 586 B.C., it might appear that the hope of Israel is lost (Ezek. xxxvii, 11). The Book of Joshua, and the vast historical work to which it belongs, tell a different story. The community after 586 B.C. stands in the same position before God in which it always stood: the choice is then, as formerly, "choose life, that you and your descendants may live" (Deut. xxx, 19).

Although the name "Jesus" is a form of the name "Joshua," neither Joshua nor the book that bears his name is often referred to in the New Testament (Acts vii, 45; Heb. iv, 8). Yet the central motif of the book—the inheritance of the land of the promise—is of great importance for the faith of the New Testament community. The inheritance promised to the forefathers was conferred upon the community in Joshua's day, as the tribes departed to take up their allotted portions of the land. Nonetheless, the "rest" and the inheritance promised to Israel remained promises. The New Testament community understood the promised "rest" to have been provided in the work of God in Jesus Christ (*see* especially Heb. iv, 1–10), and an inheritance to have been given which was "imperishable, undefiled, and unfading" (I Pet. i, 4). *See* also BIBLE. (W. HA.)

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JOSIAH (in the Douai version of the Bible, JOSIAS), the grandson of Manasseh, king of Judah (II Kings xxii, 1–xxiii, 30), ascended the throne at the age of eight, after the assassination of his father, Amon, in 641/640. His 31-year reign witnessed the collapse of the Assyrian empire, whose last great king, Ashurbanipal, died in 630, and the final destruction of Nineveh. Egypt also was weak, and few kings of Judah since the days of Solomon can have been as independent as Josiah. It was, perhaps, this freedom from interference which enabled him to carry out *c.* 623/622 a thorough religious reform, based on a book of Law discovered in the Temple during some repairs, and commonly (though not now universally) identified with Deuteronomy or a part of it. The Temple at Jerusalem was purged of all foreign cults, and dedicated wholly to the worship of Yahweh, and all local sanctuaries were abolished, sacrifice being concentrated at Jerusalem. (*See* DEUTERONOMY; JEREMIAH, BOOK OF.)

Egypt, meanwhile, had revived, and the young king Necho made an effort to save the falling Assyrian empire. Josiah seems to have taken the opposite side, either secretly or openly. He met Necho during one of the latter's expeditions to Mesopotamia, and was put to death at Megiddo. The Chronicler (II Chron. xxxv, 20–24) speaks of a battle in which Josiah was killed by the Egyptian archers, but this may be a much later exaggeration of a slight skirmish in which his attendants were involved, and the Book of Kings does not in the least suggest an armed expedition.

Josiah was long remembered as approaching the Israelite ideal of monarchy, kindly, open and democratic in ways and spirit, and scrupulously fair in judicial procedure. (T. H. R.)

JOSQUIN DES PRÉS: *see* DESPRÉS, JOSQUIN.

JOSS, in the pidgin-English of Chinese seaports, the name given to idols and deities. It is used adjectivally in connection with religious rites, such as "joss house," a temple; "joss stick," a stick burned as incense; "joss paper," paper cut to resemble money (and sometimes with prayers written upon it) burned in funeral and other ceremonies. "Joss" is possibly a corruption of the Portuguese *deos*, "god," applied by Portuguese navigators in the 16th century to the idols worshiped in the East Indies.

JOSUE, BOOK OF: *see* JOSHUA, BOOK OF.

JOTA, a traditional dance of northern Spain, especially popular in Aragon. It is danced in couples, in bouncing 3/4 rhythm, usually accompanied by castanets and singing. Its lively jumps make it effective in theatrical adaptations for solo, duo or group performance. (LN. ME.)

JOTUNHEIMEN ("Giant's Home"), a mountainous region of southern Norway, lying between Gudbrandsdal and Jostedalsbreen glacier. Within an area of about 1,350 sq.mi. it contains the highest mountains in the Scandinavian peninsula, Galdhöpiggen (8,100 ft.) and Glittertind (8,104 ft.), in the central part of the region. The latter is continuously covered by a snowcap about 60 ft. thick. Memurutind (7,756 ft.), Knutsholtind (7,677 ft.) and several other peaks exceeding 7,000 ft. are found to the south, in the vicinity of the Gjende and Bygdin lakes. Skagastølstind (7,890 ft.), in the west of the region, above the head of the Sognefjord, is the chief summit of the magnificent mountain Horrungene. The region is the locale of many legends and of Ibsen's *Peer Gynt*.

The bedrock of Jotunheimen, a part of the Caledonian chain, consists mainly of gabbro and similar rocks in thrust masses. The underlying sedimentary rock, mainly phyllite, is exposed in a comparatively level plateau (3,000 ft.), with many lakes surrounding the rugged mountainous region. (L. H. HG.)

JOUBERT, JOSEPH (1754–1824), a penetrating French thinker on philosophical, moral and literary topics, was born May 6, 1754, at Montignac (Dordogne). He went to Paris in 1778, engaged in desultory literary work, and after his marriage in 1793 retired to Villeneuve-sur-Yonne. In 1808 he was appointed an inspector general for the new *lycées*. Joubert threw off the early influence of Diderot, and after the Revolution, in private diaries full of original insights, developed a subtle wisdom of Platonic tone, remarkable in that age for its cool and disciplined idealism. He died in Paris on May 3, 1824.

BIBLIOGRAPHY.—A selection of his *Pensées, essais, maximes et correspondance* was published by P. de Raynal in 1842, and the complete *Carnets* by A. Beaunier in 1938. *See*, for a biographical summary, with bibliography, Joan Evans, *The Unselfish Egoist* (1947); also A. Monglond, *Histoire intérieure du Préromantisme français* (1929); R. Tessonneau, *Joseph Joubert éducateur* (1954); A. Pizzorusso, *Studi sulla letteratura dell'età preromantica in Francia* (1956). (A. J. ST.)

JOUBERT, PIET (PETRUS JACOBUS JOUBERT) (1831–1900), associate and rival of Paul Kruger (*q.v.*), commandant general and vice-president of the South African republic, was born in the Oudtshoorn district of the Cape colony on Jan. 20, 1831. He was the son of an indigent farmer, who in 1837 trekked with his family to Natal in Piet Retief's party. After losing his father at the age of nine, Piet Joubert migrated to the Transvaal and eventually settled in the Wakkerstroom district, near the Natal border. He combined farming with legal work (having educated himself in the Roman-Dutch law) and took part in various expeditions against African tribes. As member of the *volksraad* for Wakkerstroom (1860–76), he supported Pres. T. F. Burgers, acting as vice-president during the latter's European visit in 1875–76. Burgers subsequently made him superintendent of native affairs, though he opposed Burgers' expedition against Sekukuni in 1876.

Joubert offered token verbal resistance to Sir Theophilus Shepstone's annexation of the Transvaal in 1877 but later played a prominent part, with Paul Kruger, in building up opposition to British rule. He was a member of the triumvirate (the rival Boer government) established in Dec. 1880 and as commandant general was in control of the operations at Laing's Nek, Ingogo and Majuba. He was also largely responsible for the success of the subsequent peace negotiations which led to the Pretoria convention (1881). The political history of the restored Transvaal republic revolved largely round the developing antagonism between Joubert and Kruger, dating from the presidential election of 1883, which Kruger won by 4,602 votes to Joubert's 1,171. Joubert became vice-president and subsequently associated himself, somewhat irresponsibly, with frontier expansion to the east, west and north. Kruger was more cautious and curbed him. Joubert became chairman of the Transvaal "province" of the Afrikaner Bond, an organization Kruger came to mistrust. Joubert tried to draw the Cape and the Transvaal closer together, notably by advocating the extension of the railway northward from Kimberley, while Kruger looked to Delagoa bay as an independent outlet. Joubert objected to the influence of Hollanders in Kruger's republic and to Kruger's policy of granting concessions to favoured firms. In three further presidential elections (1888, 1893 and 1898) Joubert unsuccessfully opposed Kruger, running him closest in 1893, when he obtained 7,246 votes to Kruger's 7,911. By 1898, however, Kruger

was firmly in the saddle, and Joubert's attempt to defeat him on a policy of conciliation toward the *uitlanders* proved vain. Joubert made suggestions for a settlement of the *uitlander* franchise dispute in May 1899 which were far more favourable to the *uitlanders* than even the "minimum demands" made by Sir Alfred (later Viscount) Milner at the Bloemfontein conference in June. On the outbreak of the South African War, which he had had no part in causing, Joubert commanded the Transvaal forces. His extreme caution, however, combined with his hope for a quick peace, prevented the exploitation of an initially favourable strategic situation. Joubert retired because of ill-health and died at Pretoria on March 27, 1900.

See J. A. Mouton, "Genl. Piet Joubert in die Transvaalse Geskiedenis," in the *Archives Year Book for South African History*, vol. i (1957). (T. R. H. D.)

JOUHAUX, LÉON (1879–1954), French trade union leader and Nobel prize winner, was born in Paris on July 1, 1879, the son of a worker who fought for the Commune in Paris. He started working at the age of 16 in a match factory. An anarchist in his youth, and a voluble public speaker and good organizer, he became one of the leading propagandists of revolutionary syndicalism and was appointed secretary-general of the Confédération Générale du Travail (C.G.T.; the federation of French trade unions) in 1909. In World War I, with the majority of the C.G.T., he supported the war effort and the governments of the Union Sacrée, for which he was later violently reproached by the Communists. After the war his policy was that the unions should be represented wherever the interests of the workers were at issue, not least in government organizations; and from 1919 he was urging the foundation of the Economic council, which was set up in 1925. In 1934 he tried to rally the middle classes round the C.G.T. with a new program inspired by the ideas of Henri de Man; but this was unsuccessful, and in 1936, at the time of the Popular Front government, he accepted the return to the C.G.T. of the Communists, who since 1921 had had their rival confederation. Temporarily allied with the Communists against pacifism and "Munichism," he broke with them again when World War II broke out.

The Vichy government dissolved the C.G.T. and arrested Jouhaux in 1940. Handed over to the Germans in 1941, he was at Buchenwald till 1945, when he returned to France to become one of the two secretaries-general of the reconstituted C.G.T., the other being a Communist. He left this post in Dec. 1947 to become secretary-general of the anti-Communist C.G.T.-Force Ouvrière. He was president of the Economic council from 1947 and was one of the founders of the International Confederation of Free Trade Unions (1949). On Nov. 5, 1951, he was awarded the Nobel peace prize. He died in Paris on April 28, 1954.

See B. Georges, D. Tintant and M. Renauld, *Léon Jouhaux, cinquante ans de syndicalisme*, vol. i, *Des origines à 1921* (1962). (Cl. H.)

JOULE, JAMES PRESCOTT (1818–1889), English physicist who established the principle of the interconvertibility of the various forms of energy, *i.e.*, the first law of thermodynamics, and whose name was given to an energy unit, the "joule." He was born at Salford, Lancashire, on Dec. 24, 1818. Except for some tuition from John Dalton, he was self-taught in science. He early realized the importance of accurate measurement, and the attainment of exact quantitative data became characteristic of his researches. In a long series of experiments he studied the quantitative relation between electrical, mechanical and chemical effects, and was thus led to his great discovery. Joule announced in 1843 his determination of the amount of work required to produce a unit of heat. This is called the mechanical equivalent of heat (*see* HEAT: *Mechanical Theory of Heat*). He used four increasingly accurate methods of obtaining this. The first consisted in measuring the rise in temperature, the current and the mechanical work resulting from the rotation of a small electromagnet in water between the poles of another magnet. By the second method, rise in temperature was measured on the forcing of water through capillary tubes. The third depended on the compression of air. The fourth method, now the best known, produced heat from friction in water by means of paddles rotating under the action of a falling weight. An experiment of this last type in 1845 gave a result of 890 foot-pounds (ft.-lb.) per British thermal unit; the result obtained in 1847 was 781.5 ft.-lb., and an attempt with sperm oil gave 782.1 ft.-lb. Joule adopted the mean result of 781.8 ft.-lb. In 1849, with water again, he obtained 772 ft.-lb. In 1853, with W. Thomson (later Lord Kelvin), he made researches on the work done in compressing gases, and on the thermal changes which they undergo when forced under pressure through small apertures.

Joule also studied the change of volume on solution, the change of temperature produced by the longitudinal extension and compression of solids, etc. His *Scientific Papers* were collected and published in two volumes by the Physical Society of London (1885–87). Joule died at Sale, Cheshire, on Oct. 11, 1889. (D. McK.)

JOURDAN, JEAN BAPTISTE, COMTE (1762–1833), French army officer of the Revolutionary and Napoleonic wars, the sponsor of the law of conscription and one of Napoleon's marshals, was born at Limoges on April 29, 1762, the son of a surgeon. He entered the army in 1778, but after serving in the West Indies was invalided and in 1784 became a draper at Limoges. A supporter of the Revolution, he was elected lieutenant colonel of volunteers in Oct. 1791. He had little fighting in the army of the North, but his general noted his "simplicity and truthfulness." J. N. Pache, the minister of war, advised by Xavier Audouin of Limoges, discovered in him a "pure sans-culotte" and made him general of brigade in May 1793 and of division in July.

Jourdan's firmness secured victory at Hondschoote (Sept. 8) and saved Dunkerque. A fortnight later he was commander in chief. With Lazare Carnot at his side and superior numbers he fought at Wattignies (Oct. 16) and saved Maubeuge, but he would not commit his army to a winter offensive and was sent back to his shop in Jan. 1794. Yet he was considered loyal and more "pure" than Lazare Hoche, whom he replaced in March as commander of the army of the Moselle. Circumstances led Jourdan to march west to the Sambre, where, with more divisions added to his command, he took Charleroi (June 25) and met the attack at the battle of Fleurus (June 26) so successfully that Belgium could be occupied. The army of Sambre-et-Meuse, as the army of the Moselle was now called, cleared the rivers Ourthe and Roer in well-conducted battles; and by October Jourdan held the left bank of the Rhine. In Jan. 1795 he crossed the Rhine, but the problems of the long Rhine front were too difficult for the French government and its generals, and Jourdan retreated from Mainz. A second passage of the Rhine in May 1796 brought him almost to the Danube, only to make a second and more damaging retreat. A third advance into Germany in 1799 ended a month later in the defeat at Stockach on March 25.

Jourdan left his army in confusion but was still respected. As deputy for Haute-Vienne in the Council of 500 from 1797 to 1798, he had moved the *loi Jourdan* of Sept. 5, 1798, which legalized mass conscription. Re-elected after Stockach, he opposed the *coup d'état* of Brumaire and was not a member of the Corps Législatif. Napoleon, however, employed him in Italy, where he helped to pacify the new Cisalpine republic, but in 1805 he was superseded by André Masséna: Jourdan was "a good administrator, but not fit for great events." He had been made a marshal in 1804 but was given less pay than his colleagues. In 1806 he was made governor of Naples and military adviser to the king, Joseph Bonaparte.

Jourdan's reputation sank in the disastrous system which gave Joseph the command in Spain (1808). The generals tried to ignore this arrangement, and both king and generals received orders from Napoleon. Jourdan's failure (partly due to illness) to control the army at the battle of Vitoria (June 21, 1813) was the last blow to his credit, and Napoleon retired him. He favoured Napoleon's abdication, but during the Hundred Days was given command in Normandy in 1814. Louis XVIII made him a count (1816) and a peer of France (1819). At the revolution of July 1830 Jourdan was minister of foreign affairs for a few days until Aug. 11, when he was made governor of the Invalides. He died in Paris on Nov. 23, 1833. His *Mémoires militaires de la Guerre d'Espagne* are edited by E. H. de Grouchy (1899). (I. D. E.)

JOURNAL, a word which came into English from late Latin *diurnalis*, through French *journal* with the original meaning of "daily," as in Spenser's *Faerie Queene* (xi, 31): Phoebus' steeds, descending into the west, "watred in ocean deepe, Whiles from their journall laboures they did rest." Later and current meanings are derived from the idea of daily records, though the periodicity of the record may now be anything from daily to annual. Thus, journal as diary need not have daily entries; journal as official record of meetings (as journal of house of lords, begun 1509; of house of commons, 1547; of U.S. congress, 1789; of learned societies) is set down by sessions; and a published journal may be daily, monthly, quarterly or even annual. Diurnal and journal were both used for periodical in the 17th and 18th centuries. In the 20th century journal is more frequently applied to reviews and learned publications. (F. L. Mt.)

JOURNAL, that part of a shaft or axle which makes circumferential contact in the bearing, or a plain shaft bearing as distinguished from an end or thrust bearing. An axle box for a railroad-car axle is often called a journal box. Ball and roller bearings have displaced solid plain bearings in most classes of machinery. *See* Bearings; Shaft, Driving.

JOURNALISM includes the writing and editing of newspapers and periodicals. Although this is the basic definition, various tasks and processes intimately connected with the production of serial publications are commonly classified as journalistic. Thus the gathering and transmission of news, business management of journals, and advertising in all its phases are often thought of as coming within the field of journalism. And following the advent of radio and television, there was a trend toward including all communication dealing with current affairs in the term.

The scope of the field and the vagueness of its limits are emphasized by the number of men who gained equal fame as journalists and statesmen, journalists and men of letters, etc. Benjamin Franklin, Alexander Hamilton, William Cullen Bryant, Mark Twain, Walt Whitman and Theodore Roosevelt are only a few of many famous in other fields to be closely identified with journalism in the United States; in Britain, Joseph Addison, Samuel Johnson, Daniel Defoe, Thomas Macaulay, Charles Dickens, William Makepeace Thackeray, William Gladstone and Winston Churchill were editors or constant contributors to journals; in France a long line of statesmen from Richelieu to Clemenceau and in Germany such great writers as Goethe and Schiller were journalists. Both Hitler and Mussolini came to power largely through journals they controlled and edited respectively.

During the second quarter of the 20th century the tradition that anyone could be a journalist first came into conflict with a growing sense of professionalism among workers for press and radio. There were four important factors in this trend: the organization of working pressmen; specialized education for journalism; a growing literature dealing with the history, problems and techniques of mass communication; and an increasing sense of social responsibility on the part of journalists.

By the second half of the 20th century, organizations of journalists abounded throughout the world. One of the oldest and strongest of general organizations was England's chartered Institute of Journalists, founded in 1883 and recognized by proprietors as an official body for salary negotiation. There is also the National Union of Journalists (1907) affiliated with the Trades Union Congress and also recognized for negotiation; and there are many special professional groups, such as the Association of British Science Writers, the Press Photographic Guild and the Guild of British Newspaper Editors (provincial, 1946).

In the United States, the American Newspaper Guild was organized in 1933 and soon became the bargaining union of journalists on most of the large papers, wire services, etc. The American Society of Newspaper Editors (1922) is professional in intent and widely influential; and there are scores of specialized groups of writers for the press. In France the chief association of journalists is Fédération Nationale de la Presse française, and in Italy Federazione Nazionale della Stampa Italiana.

The literature of the subject, which in 1900 was limited to two textbooks, a few collections of lectures and essays, and a small shelf-full of histories and biographies, became copious and varied in the 20th century.

The sense of social responsibility, the chief criterion of professionalism, made notable growth in the period referred to, as a result of specialized education and widespread discussion of press responsibilities in books, in periodicals and at the meetings of the associations. Such reports as that of the Royal Commission on the Press (1949) in Great Britain, and the less extensive *A Free and Responsible Press* (1947) by an unofficial Commission on the Freedom of the Press in the U.S. did much to stimulate self-examination on the part of practising journalists. Printed discussions of such matters occupied much space in the magazines and reviews, and oral discussions of them were prominent in group meetings. They also occupied some space in such trade periodicals as *World Press News* (London), *Editor & Publisher* (New York), and *L'Echo de la Presse et de la Publicité* (Paris). Before World War II scholarly quarterlies in several countries were devoted to the problems of journalism, such as *Zeitungswissenschaft* (Berlin), *Cahiers de la Presse* (Paris) and *Journalism Quarterly* (Minneapolis, Minn.); after the 1930s only the last named persisted. A new quarterly entitled *Gazette: International Journal of the Press* was begun in Leiden, Neth., in 1955.

Although the core of journalism has always been the news, the latter word has acquired so many secondary meanings that the term "hard news" has gained currency to distinguish items of definite news value from others of marginal significance. This is largely a consequence of the advent of radio and television reporting, which bring news bulletins to the public with speed that the press cannot hope to match. To hold their audience, newspapers have provided increasing quantities of interpretive material—articles on the background of the news, personality sketches, and columns of timely comment by writers skilled in presenting opinion in readable form. By the mid-1960s most newspapers, particularly evening and Sunday editions, were relying heavily on magazine techniques, except for their content of "hard news," where the traditional rule of objectivity still applied. News magazines in much of their reporting were blending news with editorial comment.

Mass-circulation magazines of general interest, including the women's magazines, were devoting less of their space to fiction and more to journalism. In the keen competition for circulation, the constant quest was for topics that would have the impact of novelty and would be provocative of discussion. Timeliness, always an editorial imperative in journalism, calls for a high degree of skill in the case of monthly magazines, the makeup of which is decided weeks in advance. An article for a present-day mass-circulation periodical usually begins with a brief outline, subject to change of emphasis after consultation with the editor.

Journalism in book form has a long history. Following World War II, it received a fresh impetus in the popularity of paperbound books, John Hersey's *Hiroshima* (1946) being a well-known example. Many works of journalism, particularly those dealing with crime and topics of controversial interest, are written for paperback publication.

For the history of journalism *see* Newspaper; *see* also Photojournalism.

Education.—*United States.*—The first program looking toward the preparation of young men for journalism to be adopted by any educational institution was one proposed by Pres. Robert E. Lee, of Washington college, later Washington and Lee university (Lexington, Va.), and carried on there in 1869–71. This plan, under which several boys were enrolled, provided for a regular classical course of study combined with work in a printing office. A few years later Cornell university (Ithaca, N.Y.) offered a similar program for a short time. The first university course in journalism was taught by David R. McAnally at the University of Missouri (Columbia) in 1879–84. It dealt with the history of journalism and "practical explanations of daily newspaper life."

The Wharton school of business in the University of Pennsylvania offered the first curriculum in journalism in 1893, and the University of Illinois the first four-year curriculum in 1904. The

first regularly organized school of journalism was established in the University of Missouri under Dean Walter Williams in 1908. Joseph Pulitzer in 1903 had agreed to endow Columbia university with $2,000,000 to establish a graduate school of journalism, but the program did not open until 1912. By the 1950s approximately 600 schools and colleges were offering a course or a sequence of courses in journalism.

The professional journalism schools confine their work in general to the last two years of the student's four-year course, with roughly half the junior and senior years devoted to technical courses, thereby giving about three-fourths of the curriculum to arts and sciences and the other fourth to training based on laboratory work, courses in the history and principles of journalism, studies in theories of communication, etc. A fifth year, leading to the master's degree, is offered by many schools, and a few (notably the one at Columbia university) accept only students who have already completed four years in arts and sciences. Thus education for journalism in the United States represents a combination of work in arts and sciences, technical training based on laboratory work, and study of press and communications in general.

Europe.—The first recognized institutions for education in journalism in England were established in 1919—the London school of journalism, and the diploma course for journalism of London university. The first was founded under the patronage of Lord Northcliffe and other newspaper proprietors and offers instruction by correspondence. The latter, which was discontinued on the outbreak of World War I, had a small yearly enrollment. In 1952 the National Council for the Training of Journalists was organized by leading trade and editorial associations; it established a system of three-year apprenticeships on newspapers, combined with some courses in local colleges for further education.

In Germany several important institutes for the study of *Zeitungswissenschaft* ("journalism") flourished under the Weimar republic; five were revived after World War II, some changing emphasis from journalism to *Publizistik* ("publicity"). These institutes represent the German tradition of studying communications from sociological, psychological and anthropological viewpoints. Schools of journalism set up at Aix-la-Chapelle and Munich (in 1945 and 1949 respectively), however, included technical training.

In France, institutions for education in journalism include Centre de formation des journalistes (Paris) and the Catholic École supérieure de journalisme (Lille). Belgium established an institute at Brussels governed by press associations, a department at the University of Brussels, and a school at the Catholic University of Louvain. The Institute of Press Studies, University of Amsterdam (Netherlands); schools at Aarhus (Denmark) and Oslo (Norway); and courses at the University of Göteborg and Stockholm (Sweden) are supported in varying degrees by press associations. The school at the University of Madrid is government controlled. Italy has a Public Opinion centre and a Catholic institute in Rome, and departments at the universities of Urbino and Palermo. Journalism schools or courses were developed after World War II at the universities of Vienna, Istanbul, Helsinki and Warsaw, and at Charles and Comenius universities in Czechoslovakia.

In the U.S.S.R. official faculties of journalism administered work in a number of institutions, the largest at Lomonósov State university (Moscow); these are five-year courses including laboratory and internship.

Other Countries.—Between World War I and II China had ten schools of journalism; in 1960 there were three on the mainland and one in T'ai-Pei, Formosa. By that year Japan had ten, Korea five, India eight, Pakistan three, the Philippines two, and Thailand one. Australia's "cadet" system resembled England's apprentice plan, but there were also courses at the universities of Melbourne and Queensland. On the U.S. plan were Canada's schools at Carleton university and the University of Western Ontario; and Egypt's at American university and Egyptian university. Latin-American countries with schools or courses in journalism included Argentina, Brazil, Chile, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Mexico and Venezuela. (F. L. Mt.)

JOUVENET, JEAN (1644–1717), French painter of religious subjects, was born at Rouen. He was the most celebrated of a family of artists and was the son and pupil of Laurent Jouvenet. On arriving in Paris in 1661 he attracted the attention of Charles Le Brun, by whom he was employed at Versailles, and under whose auspices, in 1675, he became a member of the Académie Royale, of which he was elected professor in 1681, and one of the four perpetual rectors in 1707. Four large paintings at the Louvre, Paris, include the celebrated "Miraculous Draft of Fish" and "Descent From the Cross." Jouvenet died on April 5, 1717.

JOUVET, LOUIS (1887–1951), French actor, director, designer, and technician, was born in Crozon, Finistère, on Dec. 24, 1887. Beginning as a pharmacist at his parents' wishes, he soon turned to his real interest, the theatre, and, after being refused admission several times to the Conservatoire for stuttering, made his Paris debut in 1910 in *The Brothers Karamazov.* He served in World War I, and in 1924 became director of the Comédie des Champs-Élysées in Paris where he remained until 1934 when he was appointed director of the Athenée, a position he retained until his death in Paris, Aug. 16, 1951. Jouvet introduced the playwright Jean Giraudoux and the designer Christian Bérard to the theatre, brought new insight to the interpretation of Molière's plays, developed lighting techniques, created simplified but highly suggestive settings, and brought new importance to the interpretive power of the actor's voice. His greatest successes as actor-producer-director were *School for Wives* (1936) and *The Madwoman of Chaillot* (1945), and as an actor in the motion pictures *Carnival in Flanders* (1935), *Volpone* (1940), and *Life Dances On* (1949). He was a deeply respected and indefatigable theatre worker, a teacher, lecturer, and writer and an honoured citizen and cultural ambassador of his country when he and his company toured North and South America.

See Alice Venezky, "Reflections of an Actor," *Theatre Arts,* vol. 35, pp. 19, 82–83 (Dec. 1951); Bettina Knapp, *Louis Jouvet, Man of the Theatre* (1957). (E. P. K.)

JOVANOVIC, SLOBODAN (1869–1958), Serbian jurist, historian and statesman, was born on Dec. 3, 1869, at Novi Sad (then in Hungary), where his father Vladimir Jovanovic was in exile because of his liberal views. After studying law at Geneva, Switz., Jovanovic entered the Serbian diplomatic service (1890). In 1897 he was appointed professor at the Belgrade university where he remained until he retired in 1939. Just before the invasion of Yugoslavia by the Axis powers in 1941 he was appointed deputy prime minister. In the Yugoslav government in exile in London, he became prime minister and deputy minister of war on Jan. 11, 1942, but he resigned on June 26, 1943. After World War II and the recognition by the Allies of the Yugoslav Communist government, he became president of the Yugoslav National committee in exile. At the trial of Gen. Dragoljub Mihailovic (*see* Mihajlovic, Draza) in Belgrade in July 1946, Jovanovic was condemned *in absentia* to 20 years' hard labour. He died in London on Dec. 12, 1958.

Jovanovic was twice vice-chancellor of the Belgrade university, president of the Serbian Academy of Sciences and a member of many foreign academies. He was one of the greatest Serbian scholars and was considered to be Yugoslavia's leading authority on constitutional law. An unsurpassed historian of modern Serbia, he was also a brilliant stylist who strongly influenced modern Serbian writing. He entered politics late in life, but his liberal views powerfully influenced Serbian social and political thought. For nearly half a century he was the recognized leader of the Serbian intelligentsia. His collected works, in 17 volumes, appeared in Belgrade between 1932 and 1940. His *O totalitarizmu* ("On Totalitarianism") was published in Paris in 1952, his *Moji savremenici* ("My Contemporaries") in Windsor, Can., in 1962. (K. St. P.)

JOVELLANOS, GASPAR MELCHOR DE (1744–1811), Spanish statesman and author who typified the Spanish version of the Enlightenment, was born at Gijón (Asturias) on Jan. 5, 1744. After studying law at Alcalá de Henares, he was appointed criminal

judge at Seville in 1767, judge in Madrid in 1778, and a member of the council of military orders in 1780. Known to be a reformer, Jovellanos fell a victim of the conde de Floridablanca's panic reaction to the French Revolution and in Aug. 1790 was banished to Asturias. There he founded the Real Instituto Asturiano for the study of navigation and mineralogy. In 1797 Jovellanos was made secretary of grace and justice with control of religious affairs, in which capacity he attacked the jurisdiction of the Inquisition. Having made known his disapproval of Manuel de Godoy's policy and conduct, he was dismissed and banished again to Asturias in Aug. 1798. His political enemies and the Inquisition accused him of heterodoxy. He was arrested on March 10, 1801, and imprisoned in Majorca until 1808. Jovellanos joined the central junta, and on its fall in 1811 went to Gijón. In face of the French advance he took refuge at Vega (Asturias) where he died on Nov. 27, 1811.

Jovellanos was not a revolutionary in any sense. In religion he was a Catholic. Politically he remained attached to absolute monarchy and the established order. Where he towered above most of his contemporaries was in his intellectual qualities and his political integrity. Of his vast literary output, the most important work is an analysis of the agricultural situation in Spain.

See C. Nocedal (ed.), *Obras publicadas e inéditas de . . . Jovellanos,* in *Biblioteca de autores españoles,* vol. 46–50 (1858–59); P. Peñalver Simó, *Modernidad tradicional en el pensamiento de Jovellanos* (1953). (Jo. L.)

JOVIAN (FLAVIUS JOVIANUS) (*c.* 331–364), Roman emperor 363–364, was born *c.* 331 in Singidunum (Belgrade), the son of Varronianus, count of the domestics. He took part in the Persian expedition of Julian, and when the latter was killed on June 26, 363, Jovian was proclaimed emperor by the troops after the praetorian prefect Salutius Secundus had declined the honour. He at once made peace with the Persians, resigning to them all Roman territory annexed under Diocletian in the east together with the cities of Singara (Sinjar in Iraq) and Nisibis (Nusaybin in Turkey), and was thus able to bring back the army to safety. This treaty was regarded by contemporaries as highly dishonourable. As soon as Jovian reached Roman territory he forbade magical practices, restored Constantine's gifts to the churches, and he is said by Christian writers to have forbidden sacrifices and to have closed the pagan temples. He died at Dadastana on the borders of Bithynia and Galatia on Feb. 17, 364, and was buried in the Church of the Holy Apostles in the capital. He was succeeded as emperor by Valentinian I. (E. A. T.)

JOVIUS, PAULUS (PAOLO GIOVIO) (1483–1552), Italian historian, the author of vivid historical works in Latin, and the owner of a famous early art collection. He was born at Como on April 19, 1483, studied at Pavia and Padua, and qualified as a doctor. About 1513 he settled in Rome and was favoured by Leo X (who compared him to Livy), and even more by Cardinal Giulio de' Medici, later Clement VII, whom he helped during the 1527 siege. In 1528 he became bishop of Nocera. Giovio wrote a Latin history of Florence from 1494 to 1547, *Historiarum sui temporis libri XLV* (1550–52) and a series of lives of famous men. He was dependent on patronage and has been accused of having one pen for his friends and one for his enemies; but though he may soften or sharpen he does not actually distort facts. His work lacks depth and political interest, but it is sparkling, elegantly written, and full of useful information. After Clement VII's death Giovio retired to his villa on Lake Como where he invested the wealth he had acquired in antiquities, pictures, and curiosities, some from the New World. He died in Florence on Dec. 10, 1552.

See L. Ravelli, *L'opera storica e artistica di Paolo Giovio* (1928); B. Croce, *Conversazioni critiche* (1932).

JOWETT, BENJAMIN (1817–1893), English classical scholar and theologian, and outstanding tutor of great influence who became master of Balliol College, Oxford, was born at Camberwell, London, on April 15, 1817, and educated at St. Paul's School and Balliol. His scholarship secured for him a fellowship at Balliol in 1838 and an appointment as tutor in the college in 1842, the year in which he was ordained. His friendship with A. P. Stanley led him to adopt liberal theological views. When a tutor he spent the long vacations on the continent of Europe, meeting many distinguished scholars who awakened in him an interest in the philosophy of Hegel. In 1848 he planned with Stanley an edition of the Pauline Epistles, but the work was interrupted by the royal commission on Oxford University.

After failing to be elected as master of Balliol in 1854, in the following year Jowett finished his book on *The Epistles of St. Paul.* His essay on the atonement was attacked as unorthodox, but in spite of strong opposition he was appointed regius professor of Greek. His contribution to *Essays and Reviews* (1860) caused him to be accused of heresy, but proceedings were eventually dropped. During this period his lectures on the *Republic* stimulated intense interest in Plato.

His election as master of Balliol in 1870 enabled him to rebuild a considerable portion of the college, to establish a hall for non-collegiate students, and to publish his translations of the *Dialogues of Plato* (1871) and Thucydides' *History* (1881). As vice-chancellor of the university (1882–86) he encouraged drama and music and completed his translation of Aristotle's *Politics,* but the publication of his edition of the *Republic,* on which he had worked for 30 years, was undertaken by Lewis Campbell in 1894. The strain of his numerous activities produced a series of illnesses which culminated in his death at Headley Park, the Hampshire home of an old pupil, Sir Robert S. Wright, on Oct. 1, 1893.

Jowett was a distinguished classical scholar rather than an original philosopher, and one of the greatest teachers of the 19th century. An insight into human nature, devotion to his pupils, many of whom became lifelong friends, and a belief in the value of close contact between tutor and individual minds, combined in inspiring scores of young men who were called upon to take a leading part in the national life. Jowett never failed in assisting men of ability, whether of the poorer or more wealthy classes. All he required was sincerity and promise of ability.

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JOYCE, JAMES (AUGUSTINE) (1882–1941), Irish author, was one of the outstanding novelists of the early 20th century and one of the greatest stylists in English literature. Critical opinion, at various times outraged by his obscurity, apparent indecency, and revolutionary techniques, has come to accept him as a major humourist and realist; the claim that he is a great symbolical writer, with the stature of Dante, has not been so widely admitted. Nearly all Joyce's work is autobiographical in content, and to understand it at all deeply the reader should have some knowledge of Joyce's life, such as may be learned from Richard Ellmann's monumental study (see *Bibliography*).

James Augustine Aloysius Joyce (the saint's name Aloysius was added at his confirmation) was born at Rathmines, Dublin, on Feb. 2, 1882, the eldest surviving son of John Stanislaus Joyce, a gentleman from Cork who came down in life through his own improvidence, and of Mary Jane Murray, from Longford. He was educated at Clongowes Wood College, Belvedere College, and University College, Dublin; apart from a short interlude with the Christian Brothers, he received nearly all his formal instruction from Jesuits. At an early age he lost his faith, but remained imaginatively attached to the liturgy and theology of the church, an attachment which is reflected throughout his work. An arrogant and dissolute young man, he had great gifts for modern languages and music (he had a beautiful tenor voice). He left Dublin in 1904 together with Nora Barnacle, whom he later married and who was his devoted companion to the end of his life. Their son Giorgio was born in 1905, their daughter Lucia in 1907. During the next 12 years Joyce gained a precarious livelihood by teaching English; for most of the time he lived at Trieste. He returned twice to Dublin in 1909, on his second visit to set up a motion-picture theatre. In 1912 he paid his last visit to his native city, which, however, remained the main subject of all his writing. In 1915 he moved to Zürich, where his fortunes greatly improved because of generous private patronage and the serialization of his books. For a while he helped run a stage company. In 1920 he

settled in Paris, where he remained, a withdrawn and enigmatic figure, suffering from serious eye trouble and domestic worries, until the fall of France in 1940. At the end of that year he returned to Zürich where he died on Jan. 13, 1941.

Joyce's first published work was *Chamber Music* (1907), a small volume of poems; another such was *Pomes Penyeach* (1927). These contain minor but genuinely lyrical verse, in a curiously traditional style, modeled on the Elizabethans and the early works of W. B. Yeats. Over the publication of his other early works he ran into difficulties. He could not find a publisher willing to print *Dubliners* until 1914, although this collection of short stories had mostly been written by 1905, the magnificent longer story "The Dead" being added in 1907. Joyce began a picturesque autobiographical novel, *Stephen Hero,* in 1904, but abandoned it after a few years; a long fragment was published in 1944. In 1907 he began to recast this work into a highly organized and symbolic novel, *A Portrait of the Artist as a Young Man,* which was probably completed in 1915, the year after its serialization had begun; the complete book was published in 1916 in the U.S. and in 1917 in England. *Exiles,* an Ibsenic drama, written 1913–15, was not published until 1918; it was first produced in 1919. *Ulysses,* generally accepted as Joyce's masterpiece, was begun in 1914, finished after immense labour in 1921, and published in Paris in 1922. Even during its serialization in the *Little Review* there was trouble with the censorship, and *Ulysses* was banned in Britain and the U.S. until after the U.S. District Court decision of 1933. Joyce wrote the first sketches for his last book, *Finnegans Wake,* in 1923; extracts began to appear in reviews and as pamphlets from 1924, but his work was interrupted by ill-health after 1930. It was completed in 1938 and published early in 1939; Joyce died still disappointed with its critical reception.

Joyce's work is remarkable both for consistency of theme and for rapid evolution of style and technique. The themes found throughout his books include those of the exiled artist betrayed by false friends like his hero Parnell, the pathos of lower middle-class family life, and the humour of Dublin conversation. He projected one aspect of his character into Stephen Dedalus, the young and detached intellectual of the *Portrait* and *Ulysses,* and into Shem the Penman in *Finnegans Wake;* and another into the worried, middle-aged family men, like Gabriel Conroy of "The Dead," Leopold Bloom, and H. C. Earwicker, the Everyman hero of the *Wake.* His style, however, went on changing radically throughout his career. *Dubliners* he described as "written for the most part in a style of scrupulous meanness," which is partly an imitation of Flaubertian Naturalism; but already in "The Dead" he had made brilliant progress with the modulation of style to match the development of plot and character—a technique brought nearer to perfection in *A Portrait of the Artist.*

Ulysses is divided into 18 sections, each written in a special narrative form and style, to reveal new significance in the life of Leopold Bloom, the Ulysses of Edwardian Dublin. Common to most sections is Joyce's use of the "interior monologue" to express the unspoken thoughts or "stream of consciousness" of the main characters, a device which Joyce claimed to have learned from the French novelist Édouard Dujardin (1861–1949), and which is used with the deepest psychological insight in the final soliloquy of Molly Bloom. An even more important innovation is the novel's analogical and symbolic structure, by which the events of a day in Dublin are made to correspond to parallel "myths" not only in Homer's *Odyssey* but in *Hamlet, Don Giovanni,* and the Bible. This method is pushed to greater extremes of intricacy in *Finnegans Wake,* which is at once the story of a Dublin publican's family and the poetic epic of all religion and civilization: a dream vision organized around Giambattista Vico's (*q.v.*) cyclical philosophy of history, expressed in a language of polyglot puns. Despite the progress made by critics in the interpretation of *Finnegans Wake,* it still remains too obscure even for the many readers who enjoy the rich comedy and humane spirit of *Ulysses.*

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(M. J. C. H.; X.)

JOYEUSE, a French peerage-duchy of the 16th century. Its seat was at Joyeuse in the Vivarais region of Languedoc (in the modern *département* of Ardèche), which had been held by a branch of the house of Châteauneuf de Randon as a barony from the 13th century and as a viscounty from 1432. ANNE DE JOYEUSE (1561–87), the handsome favourite of Henry III of France, was created duc de Joyeuse and married to the king's sister-in-law Marguerite de Vaudémont in 1581; he was appointed admiral of France in 1582 and governor of Normandy in 1586. A champion of Catholic reaction against Henry de Montmorency's tolerant policy toward the Huguenots in Languedoc, he led an army against the Huguenots in Guienne, massacred some of them at Mont-St. Éloi but was captured and killed at Coutras (Oct. 20, 1587). Of his surviving brothers, the eldest, FRANÇOIS (1562–1615), was archbishop of Narbonne from 1582 and cardinal from 1583, later to be archbishop of Rouen (1604); and the next was a Capuchin (*see* below). Consequently the leadership of the Catholic extremists in Languedoc passed on Anne's death to his third brother, ANTOINE SCIPION, who campaigned for some years with Spanish help but was drowned in the Tarn after defeat at Villemur in 1592. Thereupon his brother HENRY (1567–1608), who had at first been known as the comte de Bouchage but had become a Capuchin friar under the name of Frère Ange on his wife's death (1587), laid aside his habit to continue the duchy and the warfare. Reconciled with Henry IV of France in 1596 and made a marshal of France, he returned to the Capuchins in 1599. His daughter HENRIETTE CATHERINE (1585–1656), was married first, in 1599, to Henry de Bourbon, duc de Montpensier; and second, in 1611, to Charles de Lorraine, duc de Guise, whose descendants inherited the duchy.

JOYEUSE ENTRÉE was the name given during the middle ages and the *ancien régime* to the ceremonial first visit of a new prince to his country and its main cities. It was traditionally the occasion for the granting or confirming of privileges.

The most famous is the charter of liberty confirmed on Jan. 3, 1356, under the name of *La Joyeuse Entrée,* to the duchy of Brabant by the new duchess, Johanna, elder daughter and heiress of the duke John III (d. 1355), and her husband Wenceslas, duke of Luxembourg, brother of the Holy Roman emperor Charles IV. The direct occasion was the fear of the Brabançons that Wenceslas, being a foreigner, would try to ignore their traditional liberties. *La Joyeuse Entrée* confirmed the existing liberties of the country

and stipulated especially that the duchy could not be divided, that public offices were only open to Brabançons and that the duke should consult the country on various important matters, such as the coining of money, foreign alliances and the declaration of war. The Brabançons had already received notable liberties under the charter of Cortenberg (1312), but *La Joyeuse Entrée* became the model for other provinces of the Netherlands and the bulwark of their liberties. Its provisions remained practically unchanged from the reign of the emperor Charles V onward. The ill-advised attempt of the zealously reforming emperor Joseph II to abrogate this charter caused the revolt of Brabant under H. van der Noot (*q.v.*) in 1789–90. *See* also BELGIUM: *History*.

See E. Poullet, *La Joyeuse Entrée* (1863); R. van Bragt, *De Blijde Inkomst van de hertogen van Brabant* (1956). (R. C. v. C.)

JÓZSEF, ATTILA (1905–1937), one of the greatest Hungarian poets of the 20th century, was born in Budapest, on April 11, 1905, into a poor family. His first poems were published when he was only 17, but he was never able to make a living from poetry. From the age of seven he had to support himself by casual labour and his life was spent in great poverty. Although his works were known and loved by a small circle of devotees, real fame came only after his death. Attracted by Marxist ideology, in 1928 he became a member of the then illegal Communist party but was soon expelled. In both political and private life József remained a forlorn, solitary figure. In 1932 he launched a short-lived literary periodical, *Valóság,* and in 1936 became one of the cofounders of the review *Szép Szó.* His last poems reveal his desperate struggle against schizophrenia. He threw himself under a train and died at Balatonszárszó, Dec. 3, 1937.

No one in Hungarian literature has drawn so intimate a picture of proletarian life as Attila József. His mother, a poor washerwoman whom he immortalized in many poems, became the symbol of her class. His technique is varied and free: he created a style of his own, a melancholy realism shot through with irrationality, capable of expressing the complex feelings of modern men, and revealing his own sensitive personality, and the faith in life's essential beauty and harmony which, despite his tragic experiences, never left him.

See the critical edition of his works, 3 vol. (1955–58); J. Rousslot, *Attila József, sa vie, son oeuvre* (1958). (N. KI.)

JUAN DE FUCA strait lies between the Olympic peninsula of Washington state and Vancouver Island, B.C., Can. The international boundary between the United States and Canada lies in its mid-channel. The strait is about 80 mi. in east-west length and averages about 15 mi. in width. The eastern end of the strait is separated from the waters of Puget sound mainly by Whidbey Island. Mid-channel depths average about 50 fathoms at the eastern end of the strait and increase steadily to the westward to depths of about 150 fathoms where the strait opens out to the Pacific ocean opposite Cape Flattery. Tidal movements are complicated due to the northward-moving flood tide from the Pacific coast of Washington entering the strait during part of the time when a conflicting west-moving ebb tide is coming out. Tide rips are common off prominent points or over shallow banks. Strong winds are frequent through the strait, coming from the west or southwest. Incoming flood-tide waters are cold (4.4°–7.2° C. [40°–45° F.]), caused by upwelling of cold Pacific ocean waters off the strait entrance. (J. L. R.)

JUAN FERNÁNDEZ ISLANDS (ISLAS JUAN FERNÁNDEZ), a small group in the South Pacific ocean, between latitude 33° and 34° S. and longitude 78° and 81° W., which belongs to Chile and is administered as a part of Valparaíso (*q.v.*) province, 400 mi. to the east. The principal island, noted for its association with Alexander Selkirk and *Robinson Crusoe* (*see* below), is called Más a Tierra (Spanish for "nearer land") to distinguish it from a slightly smaller island Más Afuera ("farther out"), 100 mi. farther west. Off the southwest of Más a Tierra lies the islet of Santa Clara. The islands are volcanic peaks rising from the Juan Fernández submarine ridge, Más a Tierra having a summit, 3,002 ft. above sea level, called El Yunque from its resemblance to a massive anvil, and Más Afuera, a summit even more precipitous, of 5,415 ft. The areas of the two islands are 36 and 33 sq.mi. respectively, Más a Tierra being about 13 mi. long and from 2 to 4 mi. wide. Cumberland bay on the north side of Más a Tierra and Padre bay at the western extremity are the only fair anchorages. A wide valley watered by several streams opens into the former bay, and is partially enclosed and cultivated. The islands abound in springs, waterfalls and deep ravines.

Más Afuera is quite heavily wooded but on Más a Tierra most of the valuable indigenous trees have been practically exterminated, such as the sandalwood, which the earlier navigators found one of the most valuable products of the island. Ferns are prominent among the flora, about one-third of which consists of endemic species. There are no indigenous land mammals but bird life is varied and peculiar, the hummingbirds being especially interesting. Pigs, cattle, horses, donkeys and dogs have been introduced, and goats in considerable numbers run wild. Sea elephants and fur seals were formerly plentiful, but the latter were so hunted by British and United States fur traders that they have almost disappeared. The waters around Más Afuera are especially rich in species of fish.

Juan Fernández was discovered about 1563 by a Spanish navigator of that name (*see* FERNÁNDEZ, JUAN), who obtained from the Spanish government a grant of the islands, where he resided for some time, stocking them with goats and pigs. He soon, however, appears to have abandoned his possessions, which were afterward for many years visited only occasionally by fishermen from the coasts of Chile and Peru. In 1616 Jakob Le Maire and Willem Schouten, after rounding Cape Horn which they named, called at Juan Fernández for water and fresh provisions. Pigs and goats were then abundant on the islands, and many ships called to refresh their sick crews, usually decimated by scurvy, with fresh water, palm cabbage, meat and fish. In 1704 an English privateering galley "Cinque Ports" entered Cumberland bay. Alexander Selkirk (*q.v.*), one of her crew, quarreled with the captain, Thomas Stradling, and demanded to be set ashore with his property. He became the island's most famous colonist, for his adventures are commonly believed to have inspired Daniel Defoe's *Robinson Crusoe*. A tablet to commemorate Selkirk's lonely four-year sojourn on the island was erected there in 1858 by British naval officers. The visit of Commodore George Anson in the "Centurion" in 1741 led, on his return home, to a proposal to form an English settlement on Juan Fernández; but the Spaniards, hearing of this, decided to occupy the island, and it was accordingly garrisoned in 1750. With the coming of Chilean independence at the beginning of the 19th century, the islands passed into the possession of that country. On many occasions Más a Tierra was used as a penal settlement by the Chilean government, particularly for political prisoners. This was especially the case during the dictatorship of Diego Portales, but in 1837 the islands were uninhabited, remaining so until 1877 when Alfredo de Rodt leased them and went to live there. Más Afuera and Santa Clara are still uninhabited.

During World War I the German cruiser "Dresden," the only German ship to survive the decisive battle of Falkland Islands (*q.v.*), anchored in Cumberland bay in 1915, and failing to obtain an extension of time in neutral waters was interned. A British naval division finding her demanded her surrender, but the "Dresden," after a short exchange of fire, was scuttled by the captain, who blew up the ship's ammunition store.

The population in 1952 was 333, most of whom lived in the village of San Juan Bautista on Cumberland bay. Their principal occupation is lobster fishing, the lobsters being shipped to the mainland as the island's only exportable produce. With regular communications, the abundant variety of fish could be commercially exploited. Tourists occasionally visit Más a Tierra from central Chile during the summer months, the climate being mild and the historical associations of the island most attractive. A naval wireless station maintains contact with the mainland.

(G. J. B.)

JUAN MANUEL, DON (1282–1348?), son of the infante Don Manuel, the youngest son of Ferdinand III of Castile, was a precursor of the political thought of his time, as well as an active and astute politician. Born at Escalona in 1282, Juan Manuel

went to court shortly before the death (1295) of his cousin Sancho IV. He was loyal during the minority of Sancho's son Ferdinand IV, but afterward united with his uncle Enrique in opposition to the influence of Sancho's brother Juan. Enrique died in 1304, but before then Juan Manuel had safeguarded his own position by his betrothal to Constanza, daughter of James II of Aragon. The death (1312) of Ferdinand IV was followed by another minority and Juan Manuel was himself regent from 1321 until Ferdinand's son Alfonso XI came of age in 1325. The proposed marriage of Alfonso to Juan Manuel's daughter kept the former regent loyal to the crown, but the rejection of this match in 1327 led to civil war. Peace was made in 1334, but Juan Manuel's ambitions were increased by the marriage of his daughter to the heir to the Portuguese throne and he again rebelled against Alfonso. He was defeated and his submission in 1337 marked the end of his political power. In a certain sense, his personal defeat was due to the triumph of his ideas: he had preached a strengthening of the monarchy, and, once strengthened, the monarchy had overcome him. He is thought to have died at Cordoba in 1348.

Despite his political activity, Juan Manuel achieved a considerable literary output. His major work, *Libro de los exemplos del Conde Lucanor et de Patronio,* notable for its widely various sources—traditional, Jewish and Arabic—is a masterpiece of 14th-century Spanish prose and was considered by Menéndez Pelayo to share with the *Decameron* the distinction of initiating the novel in Europe. Of the various extant manuscripts, that of the conde de Puñonrostro, now kept in the Real Academia Española, is the most authentic. Of his other works, two—*Libro de la caballería* and *Libro del caballero et del escudero*—were clearly influenced by Ramon Llull: the first, a code of honour, is known only through references to it in the *Libro de los estados;* the second is a moral treatise written as a fable in dialogue form. The *Libro de los estados,* derived from *Barlaam and Josaphat,* the Christian version of the legend of Buddha, is an exposition of Juan Manuel's ideas on the education of princes. The *Libro de la caza,* a hunting treatise, contains references to another work, now lost, the *Crónica abreviada,* thought to have been a continuation of the historical books of Alfonso X. Juan Manuel also wrote *Libro de los castigos,* a narrative of the life of a medieval nobleman; *Tractado . . . sobre las armas;* and *Tractado en que se prueba por razón que Santa María está en cuerpo y alma en el paraíso.* (C.-J. Ce.)

JUÁREZ, BENITO (PABLO) (1806–1872), Mexican president, was born on March 21, 1806, in San Pablo Guelatao, near Oaxaca, Mexico. His parents, both Zapotec Indians, died when he was three, leaving him to the care of an uncle. During his youth he worked as a household servant in Oaxaca and, under the influence of his employer, began to study for the priesthood. However, in 1829 he entered the Oaxaca Institute of Arts and Sciences, where he studied law and science.

After his graduation he began the practice of law, often taking the cases of poor Indians. His social and economic position gradually improved, and in 1843 he married Margarita Maza, daughter of a prominent family. After serving a term in the national congress during the war with the United States, Juárez returned as governor of Oaxaca (1847–52). He continued to defend the interests of the Indians and gave Oaxaca an administration exemplary for its honesty and efficiency. He then retired to the practice of law and to teaching at the Oaxaca institute.

When Antonio de Santa Anna returned to power in 1853, Juárez was forced into exile. In New Orleans, La., he participated in the plotting against the military dictator and joined the successful revolt of Ayutla, led by Juan Álvarez and Ignacio Comonfort, which drove Santa Anna into exile and then evolved into the Reform movement. The leaders of this movement, imbued with liberal political and economic ideas, proposed to establish constitutional government, abolish the privileges of the clergy and the military, and stimulate economic progress by putting the property of the church in circulation. Some envisioned a modern capitalist state. Others dreamed of a nation of small property owners.

Juárez served in the cabinets of Álvarez and Comonfort and was the author of the Juárez law (1855), which abolished the judicial immunities of the clergy and the military. In 1856 the Lerdo law struck at corporately held property, especially that of the church. The following year the liberal constitution of 1857, incorporating the Juárez and Lerdo laws, was adopted and the stage was set for a bitter civil war (1858–61).

While conservative elements controlled the capital, Juárez maintained himself at Veracruz as the *de jure* head of the nation. The United States recognized his government in 1858. The following year the Reform movement, driven by the intransigence of the conservatives, assumed a more radical character. New legislation nationalized ecclesiastical property and secularized the church. By 1861 the conservatives had been defeated, and Juárez was constitutionally elected president. However, the government was without funds, foreign creditors were demanding satisfaction and economic chaos prevailed. Juárez suspended payment on all foreign debts for two years. Armed intervention by France, Great Britain and Spain followed.

When Britain and Spain discovered that Napoleon III had imperial ambitions, they withdrew their troops. The French marched on Mexico City, which they occupied despite a delaying reversal at Puebla (May 5, 1862). Juárez and his government were driven north, and the Austrian prince Maximilian accepted Napoleon's offer to become ruler of Mexico. However, Maximilian, constantly resisted by the uncompromising Juárez, was betrayed by the Mexican conservatives and by Napoleon, and his position was further threatened by United States insistence that the French troops withdraw. Their decision to do so made Maximilian's position untenable. He was captured and, despite numerous pleas for mercy directed to Juárez, executed.

Juárez returned to Mexico City in July 1867 and was re-elected president. As he undertook the difficult task of reconstruction, his rule was handicapped by uprisings and factional opposition. In 1871 the Liberal party split into three factions, with Porfirio Díaz and Sebastián Lerdo de Tejada opposing Juárez for the presidency. When the congress declared Juárez re-elected, Díaz immediately headed a rebellion. The movement failed, but shortly thereafter, on July 18, 1872, Juárez died.

Juárez was the dominant figure in Mexican history from 1856 to 1872. He tried to destroy Mexican feudalism and to make Mexico into a democratic, federal republic. He was determined to save the nation from its internal and foreign enemies. While Juárez did not completely achieve his objectives, the Reform movement brought a new class, the *mestizo,* to power, and it is only at the end of this period that one can properly begin to speak of the Mexican nation.

See R. Roeder, *Benito Juárez and His Mexico* (1947); W. V. Scholes, *Mexican Politics During the Juárez Regime, 1855–1872* (1957). (S. R. R.)

JUBA, the name of two kings in north Africa in the 1st century B.C. and the 1st century A.D.

Juba I (*c.* 85–46 B.C.), king of Numidia who played an important part in the war between the followers of Pompey and those of Caesar in north Africa, succeeded his father, Hiempsal II, between 63 and 50 B.C. He was bitterly hostile to Caesar, who had personally insulted him, probably in 63, and one of whose supporters, the tribune Curio, had unsuccessfully proposed in 50 the incorporation of Numidia as a Roman province. The following year the same Curio landed in Africa to expel the Pompeians, but was defeated and killed by Juba. The latter now considered himself the potential master of all north Africa, and of the Pompeian leaders only Cato (Uticensis) proved able to check his pretensions. After the death of Pompey the Pompeians in Africa still resisted, and in 46 Caesar came in person to reduce them. Juba, who had a substantial army of infantry, cavalry and elephants, was obliged to divide it on the news that his kingdom had been invaded from the west by Caesar's ally Bocchus, king of Mauretania, and an Italian adventurer, P. Sittius. He himself was defeated with the other Pompeians at Thapsus and his general sent to the west was killed by Sittius. Repulsed from Utica by Cato and from Zama, his temporary capital, by the inhabitants, he called on a slave to kill him. Ancient writers describe him as arrogant and cruel.

Juba II (*c.* 50 B.C.–*c.* A.D. 24), son of Juba I, king of Numidia 29–25 B.C. and of Mauretania 25 B.C.–A.D. 24. As a child of about

five he was paraded at Rome in Caesar's triumphal procession after the death of Juba I, but subsequently was given a good education in Italy. Augustus befriended him as a young man and in 29 B.C. made him king of Numidia, which had been made a province in 45. In 25 Numidia was again made a province while Juba was given Mauretania, which he ruled till his death. Sometime before 20 B.C. he married Cleopatra Selene, daughter of Mark Antony and Cleopatra, and she exercised much influence on him. Although he was a Roman citizen and lived in the west, he sought to imitate certain features of Hellenistic kingship. He was a prolific writer in Greek on a variety of subjects, including history, geography, grammar, and the theatre. He was highly praised by succeeding generations, but from the meagre fragments that survive it seems clear that though his interests were extremely wide he had little originality and was content to excerpt or rearrange material from earlier authors whom he collected in a substantial library at his capital city, Caesarea (Cherchel in northern Algeria).

(B. H. WA.)

JUBA (Italian GIUBA), a river of northeast Africa, principal watercourse of the Somali Republic, flows about 1,030 mi. from its source in the southern Ethiopian highlands through Dolo on the frontier to reach the Indian Ocean just north of Kismayu. It is formed by the junction of the Webi Gestro, Ganale Dorya, and Dawa rivers near Dolo. These streams all rise in the mountain range northeast of Lake Rudolf, the most remote being a branch of the Ganale Dorya, which rises in 7°30′ N, 38° E at an altitude of 7,000 ft. The Juba depends chiefly upon rain in the southern Ethiopian highlands, whose main rainy season (mid-June to mid-September) coincides with the *haga* or dry season of the Somali Republic; hence the river never dries up. It is low from the end of December until mid-April, when the first floods swell its volume. From its mouth to 20 mi. above Bardera, where in latitude 2°35′ N rapids occur (in which the German explorer Baron K. K. von der Decken's steamship "Welf" foundered in 1865), the Juba is navigable by dhows and shallow-draft vessels.

Below the mountainous region of the headwaters, the Juba and its tributaries flow through arid country, except close to the banks. The soil is sandy and thorn covered, or clad with rank grass. In the lower reaches the soils are clayey and rich in minerals, with considerable tracts of high forest. The low-lying fertile belt stretches for about 300 mi. inland, but is rarely more than a mile wide.

The sources of the river in Ethiopia flow first through country occupied by the Galla (*q.v.*) and then by the Somali peoples from about 200 mi. above Dolo to the sea. These pastoralists depend upon the Juba for watering their livestock, especially camels and cattle, but have to avoid swampy areas where the tsetse fly abounds. Between Dolo and Lugh Ferrandi (pop. 2,800) the banks are cultivated by a Bantu people, the Gobawein, and by some of the local Somali. Another cultivating Bantu group, the Shebelle, occurs north of Gelib (pop. 10,000). After Gelib the river reaches Giamama (pop. [1965 est.] 22,030) and then the port of Kismayu (pop. [1964 est.] 12,193), which has a sheltered anchorage and an airstrip. Game is plentiful along the banks of the river, which is infested with crocodiles and contains some hippopotamuses.

In 1885 the British explorer F. G. Dundas penetrated about 400 mi. upstream from the mouth. The middle and upper courses of the Juba were first explored by the Italian Vittorio Bottego in 1892–95.

(I. M. L.)

JUBAYL: *see* BYBLOS.

JUBE, in architecture, a term (from the French *jubé*) for a construction marking off the chancel (*q.v.*) or sanctuary of a church from the rest of the interior, as an area of particular reverence. Its mature medieval form consisted of three basic elements: a screen (known also in England as a rood screen), a gallery or loft above from which the words *Iube Domine benedicere* (hence *jubé*) were spoken, and a crucifix (rood) surmounting the whole. Jubes offered magnificent opportunities for sculpture and decorative work through the later Middle Ages and the Renaissance; *e.g.*, in the Flamboyant Gothic church of the Madeleine at Troyes and in the St. Étienne du Mont, Paris (*c.* 1600).

From the 17th century, use of jubes declined steadily. They obstructed the favourite baroque effect of a single dramatic vista culminating in the altar. By 1800 jubes had become almost obsolete.

(AN. G.)

JUBILEE, YEAR OF (HOLY YEAR), as observed by the Roman Catholic Church, resembles the Old Testament institution (Lev. 25) but does not seem to be based upon it. In Hebrew tradition the 50th year (*i.e.*, the year following the last of seven sabbatical cycles, or cycles of seven years) was the Jubilee (from the Hebrew *yobel*, the blast of the ram's horn that announced it), a period of perfect rest, with no sowing or even gathering of the natural products of field and vine. During the year hereditary properties were to be restored to the original owners or their heirs, and Israelite slaves whose poverty had forced them into the employment of others were to be emancipated (Ex. 21:2–11). With the destruction of the Temple by the Romans in A.D. 70 the custom lapsed.

The institution of the Holy Year in the Roman Catholic Church is known as a certainty from the year 1300, when, during the pontificate of Boniface VIII, vast crowds of people flocked to St. Peter's, in Rome, in the belief that a plenary indulgence could be gained (*see* INDULGENCE). As this turned out to have some obscure basis in tradition, the pope confirmed the expectation and formally established the centenary jubilee observance. In 1350 the interval was reduced by Clement VI to 50 years, and in 1470 Paul II further reduced it to 25. The year begins on Christmas Eve, with the opening of the "Holy Doors" at the Roman basilicas of St. Peter, St. John Lateran, St. Paul, and St. Mary Major, and ends with their closing on the following Christmas Eve.

Although the most spectacular feature of the ordinary Holy Year has always been the pilgrimage to Rome with a view to the Jubilee indulgence, the year is intended more broadly as a period of grace, in which all the faithful are invited to prayer and works of charity and penance, for their own sanctification and the sanctification of the world. Since 1500, moreover, it has been the practice to extend the Jubilee to the whole world in the year following the Holy Year, in the sense that in place of the pilgrimage to Rome certain churches in each diocese are designated as places for visitation.

Since at least 1560 it has also been the practice to declare extraordinary jubilees, on the occasion of special commemorations or with a view to timely supplications. In that year the occasion was the Council of Trent, for which the guidance of the Holy Spirit was invoked. Such jubilees have been decreed, *e.g.*, on the occasion of a pope's 50th anniversary of priesthood (Pius XI, 1929); in commemoration of the 16th centenary of the Edict of Milan (1913), of the 19th centenary of the redemption (1933), of the 1st centenary of the definition of the Immaculate Conception of Mary (1954); etc.

At the close of the second Vatican Council (1965) Pope Paul VI declared an extraordinary jubilee (Jan. 1–May 29, 1966) to promote the knowledge and application of the council's achievements. On this occasion, in consonance with the prominence given by the council to the individual and collegial significance of the episcopate, the focal point of pilgrimage was made the cathedral churches of the local bishops throughout the world rather than the major basilicas of Rome.

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(J. J. RE.)

JUBILEES, BOOK OF, an apocryphal Jewish work, an apocalyptic retelling of Genesis and some parts of Exodus (Gen. i, 1–Ex. xiv, 31) marked by the particular theological and ceremonial attitudes of a group within the Jewish community toward the end of the pre-Christian period. This work was known to the Church Fathers by several titles. Its usual designation *ta Iobelaia, hoi Iobelaioi,* apparently derived from a Hebrew original, *Sefer Mahlaqot ha-ittim leyovelehem uveshevuotehem,* "The Book of the Divisions of Times Into Their Jubilees and Weeks," mentioned in the Damascus document (portions of a work of the 2nd century B.C., discovered by Solomon Schechter [*q.v.*]). It was also referred to as *he lepte Genesis, Bereshit Zuta,* "The Little Genesis,"

and *The Apocalypse of Moses,* its form being a revelation to Moses, by "the angel of the Presence" (prologue), of secret lore transmitted by the antediluvian saints and then the patriarchs.

Contents.—The title of the work indicates the major interest of the author. The history of the world is divided into "jubilees" (*i.e.,* periods of 49 years) composed of seven "weeks of years" (*i.e.,* seven series of seven years), with the heptad, the seven-year period, as the basic structure for reckoning time. All events in the biblical narrative are therefore indicated by (1) the number of jubilees, (2) the "week" of years and (3) the year within a "week." The biblical idea of the jubilee year, the 50th year following the seven weeks of years (Lev. xxv, 8–12), is ignored (*see* JUBILEE, YEAR OF).

In addition to this mode of counting the years, there is a division of each year into four equal periods of 13 weeks reflecting events connected with the Flood. Each period is divided into three months, one apparently of 31 and two of 30 days. Every year is thus composed of 52 weeks or 364 days exactly. This is in contrast to the lunar year of 354 days plus adopted by rabbinic Judaism, which was then adjusted to the solar year by a process of intercalation. This practice was strongly condemned by the author (vi, 32–38), who declares that "there will be those who will assuredly make observations of the moon" and who attributes to this practice the confounding of "all the days, and the holy with the unclean, and the unclean days with the holy." The calendar and divisions described by the author are said to be divinely ordained and are observed in heaven, where they are inscribed on tablets as well as on earth.

The author held that the messianic age had begun and would continue to develop progressively. His ideas in this area contrast with those of other apocalyptic writers, who insisted upon a cataclysmic or catastrophic introduction to the new age (*see* APOCALYPTIC LITERATURE). While there is no clear reference to a messianic figure, of particular interest is the reversal of the biblical estimate of Levi recorded in Genesis (xlix, 5–6). He is given precedence over Judah and his priesthood is connected with a blessing imposed on him by Isaac (ch. xxx, xxxi, xxxii). The sanctity of the sabbath is emphasized and the pilgrimage festivals (Passover, Weeks, Tabernacles) are described in detail. Particular interest is focused on the Feast of Weeks, which is observed in the middle of the third month (vi, 17–22). The rite of circumcision is exalted as a heavenly sign meant to distinguish Israel from the heathen (ch. xv).

Literary History.—The only known version of the full work is the Ethiopic, of which four manuscripts are extant. A Latin version amounting to one-fourth of the book exists and there is inconclusive evidence that there may have been a Syriac version. R. H. Charles demonstrated that the Ethiopic and Latin were translations of a Greek version, which was itself a translation of a Semitic original. The discussion as to whether this was Hebrew or Aramaic may be thought to have been settled by the discovery of six Hebrew fragments of the work together with fragments of what appear to be related works among the Qumran manuscripts (*see* DEAD SEA SCROLLS).

It is generally agreed that the work was produced in the 2nd century B.C., perhaps in the reign of John Hyrcanus, although some have put it as late as the 1st Christian century and others in the early postexilic period. The attribution of the authorship to a Pharisee urged by Charles and others, at best highly questionable, was made entirely untenable by the Qumran discoveries. The calendar of Jubilees is as intimately related to that of the Qumran community as it is divergent from that developed by rabbinic Judaism out of its Pharisaic antecedents. The glorification of the Law, which has been used to support Pharisaic authorship, along with emphasis on the Sabbath, also reflect attitudes within the Qumran community. The unusual episode of the blessing of Levi and the tendency to give him precedence points to the emphasis in the Qumran writings on the two "anointed," one priestly from Aaron, the other royal from Israel, in contrast to the major rabbinic interest in the Davidic messianic ruler. *See* also APOCRYPHA, OLD TESTAMENT.

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JÚCAR, a river of eastern Spain, rises in the Montes Universales (Cerro de San Felipe, 6,037 ft.) and flows in a devious course of 309 mi. (498 km.) to enter the Gulf of Valencia at Cullera. Beyond Cuenca its valley widens and then narrows into a series of gorges as it plunges over the edge of the Meseta. The María Christina canal connects it with Albacete. On its upper course the Alarcón dam produces more than 1,000,000,000 kw.hr. of electricity. The waters irrigate about 126,000 ac. of the plain of La Ribera from Alberique to the lagoon of La Albufera, mostly under orange groves and rice fields. The stream has had a great tendency to flood. (J. M. Ho.)

JUD, JAKOB (1882–1952), Swiss Romance linguist known for his use of comparative linguistics in reconstructing cultural history, was born on Jan. 12, 1882, in Wängi, Switz. He studied and, after 1922, taught at the University of Zürich. Jud mediated imaginatively between the traditions of Germany and Austria (W. Meyer-Lübke's Neogrammarianism, H. Schuchardt's "Wörter-und-Sachen" approach), France (J. Gilliéron's cartographic projections and theory of a lexical balance) and Italy (sharp etymological focus in C. Salvioni's Alpino-Lombard dialect studies). Jud favoured Raeto-Romance, French, Provençal and Italian and preferred subtle lexicology to rigid historical grammar. His masterly monographs depict early contacts between Latin, Celtic and Germanic, the impact of the church and the changing Swiss linguistic configuration. His principal work (with K. Jaberg) is the monumental *Sprach- und Sachatlas Italiens und der Südschweiz* (8 vol. [1928–40], introductory companion volume, P. Scheuermeier's album of photographs and sketches). Jud left a cachet of distinction on his journal *Vox Romanica,* on book reviews, on doctoral dissertations (*Romanica Helvetica* monograph series), and on his far-flung correspondence.

Jud died on June 15, 1952, in Rütli. (Y. M.)

JUD, LEO (1482–1542), Swiss biblical scholar and religious reformer, was born in Alsace, studied medicine at Basel, then, influenced by the Christian humanist Thomas Wyttenbach, studied theology there with his fellow student Huldreich Zwingli. He became a priest in Alsace, in 1519 succeeded Zwingli at Einsiedeln and thence moved in 1523 to Zürich where he ably supported Zwingli's Reformation. Jud prepared a baptismal service and catechism in German and translated some patristic and contemporary works into German, assisted in the Swiss German translation of the Bible and also provided an admirable Latin version of the Old Testament. Together with Heinrich Bullinger he sustained the Zürich Reformation after Zwingli's death. He died in Zürich on July 19, 1542.

See L. Weiss, *Leo Jud: Ulrich Zwinglis Kampfgenosse* (1942). (B. H.)

JUDAEA (or JUDAH, as the Old Testament called it) was the southern of the three traditional divisions of ancient Palestine; the other two were Galilee on the north and Samaria in the centre. (*See* also JUDAH.) No clearly marked boundary divided Judaea from Samaria; the east-west line usually ran a little south or north of the site of ancient Bethel (Beitin); at that point the irregular type of hill country found in southern Samaria gave way to a somewhat more level plateau, but no valley or sharp break separated the two regions. The boundary on the south varied even more than on the north. Beersheba was the traditional southern limit of the promised land of the people of Israel (Judg. xx, 1). At that point the central ridge that ran south from the Lebanon mountain range and extended through Palestine (except where broken by the Plain of Esdraelon between Galilee and Samaria) sloped down to the dry Negev region. The Negev (*q.v.*), except when intensive water-conservation programs were undertaken, as in the early Christian centuries, supported little population in its arid wilderness. It was at times controlled by the kings of Judah, and could then be considered part of Judah, but it usually was not so considered.

The region of Judaea between Samaria and the Negev presents five geographical features. Along the Mediterranean coast lay Philistia, the fertile plain where the Philistines settled in the 12th century B.C. Their chief cities were Gaza (*q.v.*), an important trade centre to which caravan routes led from the south (Egypt), the east (Arabia) and the north; Ashkelon, called Ascalon (*q.v.*) in New Testament times, the only important Philistine city located on the seacoast; Ashdod (*q.v.*), called Azotus in New Testament times (Acts viii, 40); Ekron (*q.v.*), called Accaron in New Testament times; and Gath (*q.v.*). Noteworthy also was Jabneel or Jabneh, later called Jamnia (*q.v.*); there the rabbinical movement centred for a time after the fall of Jerusalem in A.D. 70. Philistia was never really conquered by the kings of Israel, and even under the Romans much of its coastal area was governed independently of Judaea proper.

East of the Philistine plain lay a series of low hills; this fertile area, called the Shephelah, lay on the western slope of the Judaean watershed, partially separated from the upper hill country by valleys which ran north and south. It was an important part of the ancient kingdom of Judah and the site of such important cities as Lachish (*q.v.*), Debir or Kirjath-sepher (*q.v.*) and Beth-shemesh.

The real core of Judah or Judaea was the upper hill country, extending south from the region of Bethel to Beersheba and including the area where Jerusalem, Bethlehem and Hebron (*qq.v.*) were located. On this plateau country, which near Jerusalem attains an altitude of 2,693 ft. and just north of Hebron rises to 3,346 ft., was the life centre of the tribe and kingdom of Judah and the later Jews. The plateau actually lies on the gentle slope stretching west from the north-south watershed. Clouds coming eastward from the Mediterranean dropped their rain there, and while the rainfall was not abundant it was sufficient to sustain the life of a pastoral people and provide limited opportunities for farming.

East of the watershed the land slopes rapidly down toward the Jordan valley and the Dead sea. Because the rain clouds emptied their moisture mainly on the western slope, the eastern region, called the Wilderness of Judah, was dry and few towns were found there.

The western side of the lower Jordan valley was connected with the district of Judaea, but its most important city, Jericho (*q.v.*), was easily accessible to Samaria as well as Judah. (The Old Testament Jericho was at Tall as-Sultan; the New Testament Jericho was a mile to the west of the modern town of Jericho.) Important sites along the western shore of the Dead sea were Qumran, famous in modern times as the place where the Dead sea scrolls were found; En-gedi, an oasis with fresh-water springs; and Masada, where Herod the Great built a fortress and the Jews in revolt against Rome made their final, futile stand until A.D. 73.

In the days of the patriarchs, the Canaanites dominated the region, and Hebron was an important centre. When the tribes of Israel invaded Palestine, the tribe of Judah claimed the entire region from just south of the site of Jerusalem into the Negev region. The tribe of Simeon apparently had some hold in the area near Beersheba, perhaps just to the west, but this tribe seems soon to have been absorbed into the tribe of Judah. The tribe of Benjamin held a small region between Bethel and Jerusalem, and the tribe of Dan for a time settled just north of Beth-shemesh and Ekron before it migrated to northern Galilee (*see* also TWELVE TRIBES OF ISRAEL). When David became king of Judah, he captured the old Canaanite (Jebusite) stronghold, Jerusalem, which the Israelites had never before been able to seize, and made it the capital of the united kingdom of the tribes of Israel. After the death of Solomon, the ten northern tribes separated from Judah, and Jerusalem remained the capital of the kingdom of Judah. This kingdom continued, though often harassed by and at times forced to pay tribute to neighbouring powers, until the Babylonians completely conquered it and destroyed Jerusalem in 586 B.C. Cyrus, who overthrew the Babylonian empire, and other Persian kings permitted captive Jews to return from Babylonia to their native land and rebuild their Temple and the Jerusalem walls.

After Alexander the Great's conquest of the near east, Palestine was first under the Ptolemies and then under the Seleucids. The attempt of the latter to suppress the Jewish ancestral faith was repulsed under Maccabaean leadership (*see* MACCABEES) and, as a result, Jerusalem and its Temple were preserved to be the centre of Jewish life until the destruction of Jerusalem in A.D. 70. The Romans took over Palestine in 63 B.C. Herod the Great, king of all Palestine from 40 to 4 B.C., rebuilt the Temple and in other ways carried on extensive building programs in Jerusalem, though his political capital was Caesarea. His son Herod Archelaus was governor of Judaea, Samaria and Idumaea (as the region south of Judaea had come to be called) from 4 B.C. to A.D. 6. The Romans then deposed him and sent a series of Roman governors of Judaea, Samaria and Idumaea from A.D. 6 to 41. Best known of these was Pontius Pilate (A.D. 26–36), under whom Jesus Christ was crucified. After Herod Agrippa I, grandson of Herod the Great, was king of all Palestine (41–44), Roman governors again ruled Judaea and neighbouring areas until the Jewish revolt broke out in 66. Jerusalem was destroyed in 70, and a second revolt, in 132, was crushed in 135, after which Jerusalem was rebuilt as Aelia Capitolina and Jews forbidden to live there. (For history, *see* further JEWS: *Earliest Times to* A.D. *135.*)

A notable feature of the later history of Judaea was the extensive development of Christian churches not only in Jerusalem and Bethlehem, the city of David and the birthplace of Jesus, but also in Christian settlements in the southwestern part of Judaea, as in Eleutheropolis (Beit Jibrin) and in the Negev, as at Nessana ('Auja el-Hafir).

See also GALILEE; ISRAEL; PALESTINE; SAMARIA.

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JUDAH, one of the 12 tribes of Israel, descended from Judah, one of the sons of Jacob by Leah (Gen. xxix, 35). The tribe settled itself in the hill country south of Jerusalem. It is disputed whether the name Judah was originally that of the region and later became that of its inhabitants, or was transposed from the tribe to the territory it occupied. Although the early history of the settlement remains obscure, in the time of David "the men of Judah" (II Sam. ii, 4) formed a strong unity.

The centre of its territory was "the mountain of Judah," a lofty and stony tableland, which reaches a height of about 3,000 ft. just north of Hebron, the city which in those times was Judah's "capital," because of its central position and according to its venerable ancient traditions. To the west lies what the people of the central tableland called "the lowland" (Hebrew Shephelah), a strip of hills of 900 to 1,200 ft. high and about 10–15 mi. wide, in the north quite sharply distinguished from "the mountain," receiving more rains and relatively fertile. It took nearly two centuries for the people of Judah to gain assured possession of it, because the Philistines on the other side were constantly trying to occupy it. The eastern slopes of Judah's territory, which they called "the wilderness," go down from the central ridge to the shores of the Dead sea, some 400 ft. lower. Except from En-gedi and some villages south of Jericho, there were no settlements in this barren rainless region. About 12 mi. south of Hebron the central mountain range suddenly ends. There begins "the dry land" (Hebrew Negev, the word which became the usual designation of the south as a quarter of the compass) with Beersheba, an ancient caravan city, situated in its centre.

Separated from the northern tribes by some Canaanite cities, including Jerusalem, the tribe of Judah developed in its own way. After the temporary union with the other tribes under David and Solomon, it regained sovereignty after the schism. The "kingdom of Judah" then included the territory of Benjamin, north of Jerusalem. However, it retained Jerusalem as a capital and remained profoundly attached to the Davidic dynasty. The kingdom was probably divided, for administrative reasons, into 12 districts, like

the Solomonic state. Some modern scholars infer this from the arrangement of the list of Judah's cities (Josh. xv; including that of Benjamin, Josh. xviii, 21–28), which in any case reflects a situation after the schism, under either Josiah (7th century B.C.) or Jehoshaphat (9th century B.C.). Judah barely escaped the Assyrian invasion of Palestine in 701 B.C., but was utterly destroyed and depopulated by the Babylonians in 587. Under the Persian domination, the former kingdom of Judah became the small province of Yehud, which after Alexander became known as Judaea during the whole Greco-Roman period. *See* further JEWS; JUDAEA; KINGS, BOOKS OF THE; TWELVE TRIBES OF ISRAEL.

(L. H. GR.)

JUDAH HA-NASI ("the Prince") (*c.* A.D. 135–220), Palestinian patriarch and redactor of the Mishnah. A descendant of the Hillelite family, he succeeded his father, Simon ben Gamaliel II of Usha, to the patriarchate about 170. A disciple of the school of Rabbi Akiba, he was recognized as one of the foremost scholars of the period. His main activity, which lasted about 50 years, took place in Beth-shearim, Galilee, where he sifted the Oral Law and compiled it into the six orders of the Mishnah according to subject matter, as set by Rabbi Akiba and his pupil Rabbi Meir. Judah's purpose was to prepare not merely a storehouse of tradition and learning but to determine the *halaka* (the authoritative norm of Jewish Law). Neglect of the Oral Law after the Hadrianic persecutions and also the dissemination of sectarian writings may have stimulated this effort. Judah's work became the basis of the Talmud.

Though a pure Hebrew was spoken in his household, Judah also was vitally interested in Greek language and studies. Humble and God-fearing, he was honoured by his contemporaries because of his saintly conduct. He led the patriarchate with firmness, bringing it to the pinnacle of dignity, and was called *rabbi* ("teacher") par excellence, or *rabbenu* ("our teacher") or *rabbenu ha-kadosh* ("our saintly teacher"). By judicious interpretation of the Law, he sought to alleviate the hardships of his people. The Talmud records his friendship with the Antonine family (perhaps the emperor Antoninus Pius or Marcus Aurelius), with whom he discussed philosophic questions such as reward and punishment. Judah's outstanding pupils carried on his work by editing the Tosefta (supplements to the Mishnah) and assembling the extraneous citations (Baraitot).

Among his aphorisms are: "I have learned much from my masters, more from my colleagues but most of all from my pupils" (Makkoth 10a). "Which is the right way a man should choose for himself? That which is an honour to him personally and honour in the sight of mankind . . . . Keep in view three things and thou wilt not come unto sin: know what is above thee—a seeing eye, a hearing ear and all thy deeds are written in a book" (Aboth 2.1). *See* also TALMUD: *The Mishnah.*

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(S. B. HO.)

JUDAISM. It is not uncommon to regard Judaism, or the Hebrew religion, primarily based on the Old Testament, as coming to an end with the rise of Christianity. As against this is the considerable body of opinion which holds that the line of Hebrew religion has come down in unbroken continuity through Pharisaism to the Judaism of today; and this is the view here maintained. By Judaism, therefore, is meant the religion that, going back to the Hebrew Scriptures, extends beyond their chronological limits down to modern times—the religion of the Jews (*i.e.,* the people of Judaea).

Attempts to reconstruct Hebrew history and religion within the framework of the documentary theory are highly subjective and unconvincing. Furthermore, the fundamental assumption in Old Testament criticism that the Prophets precede the Law stands controverted by a mass of contemporary external material from which it is clear that many of the decisive biblical passages relating alike to basic Jewish doctrine and practice belong to the preprophetic age. For this reason the present treatment follows the pentateuchal tradition. The article is organized as follows:

I. The Bases of Judaism
II. Biblical Period
  A. The Law and the Covenant
    1. Origins
    2. The Exodus and Sinai
    3. The Torah
    4. Israel's Accommodation to Idolatry
  B. Prophecy
    1. Rise of the Prophets
    2. Deuteronomy
    3. Prophets of the 6th Century
    4. The Servant of YHWH
    5. Prophets of the Return
  C. Ezra and the Scribes
    1. Survival of Judaism
    2. Sopherim (Scribes)
III. Sectarian Judaism
    1. Pharisees and Sadducees
    2. Christianity and Judaism
    3. Effects of the Fall of Jerusalem
IV. Middle Ages
    1. Philosophical Theology
    2. Mysticism
V. Modern Period
    1. Enlightenment
    2. Hasidism
    3. Reform
    4. Conservative Judaism
    5. Orthodoxy
    6. Religious Philosophers
    7. Judaism in the State of Israel

I. THE BASES OF JUDAISM

Judaism rests on two basic doctrines: (1) monotheism, the belief in the one and only God; (2) the covenant election of Israel to be the bearers of this belief. Monotheistic tendencies and beliefs as well as notions of covenanting gods have been traced in other religions, but whereas elsewhere the relation between the deity and the worshipers is rooted in the natural and physical, in Judaism it is determined exclusively by an act of free choice whereby God discloses his presence and will to his elect. The denial of any nature bond between God and his people produces results which constitute the distinguishing features of Judaism, as compared with any other form of god belief, and can be summarized as follows:

1. Divine transcendence. The substitution of the covenant relation for the nature bond has as its correlative the idea of the transcendence of God. Everywhere else the divine is comprehended as immanent, as compounded with nature; in Hebrew monotheism God is conceived as transcendent, unbounded by any form or manifestation of physical existence.

2. God as ground of all existence. Transcending every phenomenon, God is the only ground of all existence, the sole creator of all things. The creative principle is thus no longer to be looked for as elsewhere in the regenerative powers of some natural element, from which the deity itself was said to emerge, but in the enlivening spirit and free will of God himself.

3. Ethical conception of God. As the transcendent creator, God is not force but character, a free personality possessed of ethical attributes. The moral qualities ascribed to the deity in some of the nature religions do not necessarily make the god ethical, as these qualities are invariably identified with the selfish interests of the tribe, not with the cause of ethical virtue itself, as is the case in Hebrew monotheism.

4. Concern for individual moral culture. Hebrew monotheism not only affirms the ethical character of God but also makes conformity to the divine pattern the supreme task of man (Lev. xix, 2). This is in contrast to nature religions in which the gods worshiped, even when conduct comes under their control, are at best mere custodians of tribal custom and morality, with no concern for individual moral character.

5. Universalism. The transcendental ethical conception of God implies universalism, alike in religion and morality. All men are bound to seek God, the creator of the world and the maker of them all, and to obey his moral law.

6. Election for service. Universality of true religion and morality demands for its realization a knowledge of God and his law. Hence the Hebrew doctrine of election by virtue of which a people

or individuals become the recipients of the divine revelation which they are called to share with all men. The idea of divine choice and mission that is found throughout the ancient near east has nothing in common with the Hebrew conception, where alone election is not for domination but for service.

7. Unity of history in the purpose of God. This universal quest for the one and only God imparts a unity to all history in the purpose of God. Everywhere else history is at bottom meaningless, a mere repetition of sin and misery; in Judaism it is full of meaning and significance, every fresh phase in the historical process being a further stage in the development of the purpose of God for the establishment of his universal rule among all the sons of men.

II. BIBLICAL PERIOD

A. The Law and the Covenant

1. Origins.—The Hebrew religion, according to the Bible, originated with Abraham. He is said to have learned by reflection and revelation of the existence of the one, everlasting God, maker of heaven and earth, who rules the world and whose way is the doing of "righteousness and justice" (Gen. xviii, 19). The recognition of Abraham as founder of the Hebrew religion is not now deemed as eccentric as it would have been in the rationalist period of the 19th century when the biblical patriarchs were considered mere mythical figures. Archaeological discoveries in the 20th century, particularly at Mari (*q.v.*) on the middle Euphrates, have confirmed in many details the narratives of Abraham. It is known that Ur, said to have been his birthplace, was a great centre of the worship of the moon, and its cult was probably included among those of the "other gods" served by Terah, the father of Abraham, and his household (Josh. xxiv, 2). After a sojourn for some time at Harran, which was also a centre of moon worship, Abraham, in response to a divine urge, left his native country and kindred and, gaining converts to his new faith, made his way to Canaan. According to biblical chronology Abraham's migration to the west took place in the late 20th century B.C., a date which fits well into the framework of general contemporaneous history.

In Canaan God is said to have entered with Abraham into a covenant to give the land to his seed and to make them a blessing to all the nations of the earth (*see* also Covenant: *In Religion*). This covenant was sealed by the rite of circumcision, a rite which provided for the inclusion within its scope of all the sons of men (Gen. xvii). The passages in which expression is given to these two basic monotheistic conceptions of covenant election and universalism belong even on the critical view to the preprophetic age; which makes the insistence of some scholars that monotheism is the product of the 8th- and 7th-century prophets difficult to follow.

That does not, however, mean to imply that Abraham discovered what is commonly called monotheism. Evidence is not wanting that the ancient Semites had the idea of one single God, the maker of all things, one supreme El; and the Bible itself confirms that in Canaan there was a king of Salem (Jerusalem) who was the priest of El Elyon (Most High God), who was called "maker (or possessor) of heaven and earth" (Gen. xiv, 19). That the religion of the Sumerians, of which Ur was one of the states, was originally monotheistic is a view which was argued with considerable force by Stephen Langdon (*Evangelical Quarterly*, April 1931); but it was not transcendental-ethical and therefore faded into polytheism.

It was only with Abraham that transcendental-ethical monotheism came on the scene. Whether or not Abraham formally denied the reality of other gods is more of speculative than practical interest. All that matters from the religious standpoint is the fact that the God whom he worshiped, though named also Shaddai, which is taken to mean "(God) of the mountain," was no territorial deity, nor bound to any natural phenomenon, but was the one and only creator, whose dominion was absolute and universal and who was just and righteous. This of necessity implied that all other gods, even if they did exist as genii, or demons, were of no account.

2. The Exodus and Sinai.—From Abraham the ideals of monotheism were transmitted to Isaac and Jacob, with both of whom God renewed the covenant that he had made with Abraham, and from them to their descendants until the Exodus (*q.v.;* which, according to a large number of scholars, took place in the 13th century B.C.) and to the revelation at Sinai. Then, under the dominating personality of Moses (*q.v.*), the formerly enslaved Hebrew tribes, now known as the children, or people, of Israel (*see* Israel), became a nation and Hebrew monotheism was organized and developed.

But the religion Moses brought to them was not a new creation; it had its roots in the lives of the patriarchs. YHWH (the Tetragrammaton; for explanation, *see* Yahweh), the God who appeared to Moses at the burning bush and in whose name Moses brought a message of deliverance to the people, was the God of Abraham, Isaac and Jacob and the God whose name they already knew. And the covenant which he was subsequently to make with them was but a renewal of the covenant he had already made with the patriarchs, and of which they had been aware. A tradition that the worship of YHWH antedates Moses is preserved in Gen. iv, 26, as well as in many subsequent passages which claim that the name was known to the patriarchs. Historical criticism would therefore assign these Genesis passages to a different author, "J" (Jahwist; for discussion of the Jahwist and other sources, *see* Pentateuch); but this is not warranted as the revelation to Moses did not concern the name in itself but, as the context indicates, its significance, as denoting the God who is ever-present in history and with his people.

The name YHWH was thus the covenant name of God in Israel, the covenant which was to be initiated by mighty acts of deliverance and to constitute the charter of the divine election of Israel. It was this significance of the name, not fully realized in the experiences of the patriarchs, which was revealed to Moses at the burning bush and communicated by him in turn to Israel. The hypothesis that YHWH was a Kenite deity, a storm god, first suggested by Richard von der Alm in 1862, no longer enjoys the vogue that it did; Moses could hardly have succeeded in inducing the people to entrust their fate to a foreign god of whom they had no knowledge and upon whom they could not look with anything but distrust. YHWH, in whose name Moses brought the enslaved tribes a message of deliverance, was indeed their God and the God of their ancestors, whose name they had known but whose full power was yet to be made manifest to them.

Thus it is that the people followed Moses out of bondage and repaired to Sinai, where God's covenant with the patriarchs received its ratification, in all its implications, alike for their descendants and for all other peoples. The election for service which the covenant involved was expressed in the words "And you shall be to me a kingdom of priests and a holy nation" (Exod. xix, 6). As such, the covenant rested on moral principles, and its operation depended on the people's loyalty to these principles. What these principles were was promulgated at the revelation of Sinai. The psychological experience involved in the Sinaitic revelation, like all other self-disclosures of the divine to man, cannot be determined; but it is unique in its claim to have been shared by a whole nation.

Connected with the Sinaitic revelation are the Ten Commandments (*see* Decalogue). Basic to them is the interdependence of morality and religion. They forbid the deification of nature, as well as the making of graven images, and enjoin the observance of the day of rest, the honour of parents, respect for property, life and a woman's honour, and the eschewing of any deed or thought potentially inimical to one's fellow men. The Ten Commandments were followed by a series of revelations to Moses, which he transmitted to the people, and which, incorporating the Decalogue, finally became the Torah, of which the Pentateuch is the written record.

3. The Torah.—Torah, usually translated "Law," denotes "teaching" and includes doctrine and practice, religion and morals. The Torah was a necessary consequence of the covenant. Its object was to train the people in holiness, in conformity with the covenant. The significance of this holiness is indicated in the meaning of its Hebrew equivalent, *kadosh*, which expresses a quality that consists negatively in "separation from" and positively in "dedication to." Applied to the Hebrew people, holiness, in the

negative sense, entailed separation from all the demoralizing influences of the sensuous cults and self-centred morals of the surrounding idolatrous nations. Positively considered, holiness involved a dedication to the service of God. In the midst of the evil order it was not enough for them simply to keep aloof from all that was abominable and evil; they also had to strive to cultivate the good and noble. For the fulfilment of this twofold task, the Hebrews were given the Torah. Instead of a cult that was degrading, the Torah offered a system of religious observances which was conducive to high morality. Instead of a morality that was self-centred, the Torah provided an ethic that placed service to others at the centre of its system.

Religious Observances.—As for the religious observances, these extended to almost every detail of life, and their underlying motive of holiness was introduced and maintained by special symbols, such as the fringes (or tassels) and the frontlets under the technical names "remembrances" or "signs" (*e.g.*, Num. xv, 37–40). Special emphasis on the motive of holiness seems to have been laid in connection with observances that had their counterpart in practices observed among other peoples for reasons essentially idolatrous. Thus the prohibition of eating the flesh of certain animals, classed as unclean, is motivated over and again by the principle of holiness (*e.g.*, Lev. xi, 43–44), in marked contrast to the totem notion that lay behind the abstention from certain flesh by other Semitic peoples.

Similarly with the sabbath. Whatever the connection of the Hebrew sabbath with the Babylonian *šappattu* may have been (*see* SABBATH: *Origin*), the peculiar quality of holiness ascribed to it transformed it from a day of danger to a day blessed by God (Exod. xx, 11). The same is true of the three pilgrimage festivals: the Feasts of Unleavened Bread (Pesach, or Passover), of Weeks (Shabuoth) and of Booths (Sukkoth), all of which were of distinctly agricultural character corresponding respectively to the barley harvest, wheat harvest and vintage. They are all described as "holy convocations" in contrast to the harvest festivals of the Canaanites which were marked by fertility rites and orgiastic scenes. The discovery at Ras Shamra of texts which show that the Tammuz ritual formed the central feature of the Canaanite New Year celebrations gave new significance to the ascription of "holy convocation" to the biblical New Year, which, as is generally recognized, is the festival referred to in Num. xxix, 1, as well as to the Day of Atonement (Yom Kippur) with which it is closely connected.

Holiness is particularly stressed as the keynote of the sacrificial system of the Torah. The Ras Shamra materials proved that much of what the original school of J. Wellhausen had taken to be the innovation of the so-called P (the "Priestly" section of the Hexateuch) was really very ancient. But this very antiquity of sacrifices made it all the more necessary to safeguard the institution against the introduction of any idolatrous elements. This was provided for by enveloping the whole system with holiness. Everything pertaining to the sacrifices—the sanctuary, the priests, the vessels and the offerings themselves—were designated holy. But in biblical thought, ritual holiness with reference to any object, whether things or places or human beings, has nothing to do with the tabu which was the common feeling among all Semites, as the holy does not attach itself to any object but to God or to whatever belongs to God. An object becomes holy not because it is tabu; rather it becomes tabu because it has come to belong to God. And the holiness ascribed to the sacrificial system and all its appurtenances was symbolic of the divine holiness which was to influence individual and corporate life.

Moral Conduct.—Applied to moral conduct, holiness was to express itself in terms of justice and righteousness. In the common life, this meant the recognition of six fundamental rights: the right to live, the right of possession, the right to work, the right to clothing, the right to shelter and finally the right of person, which, as exemplified in the sabbath law, includes the right of leisure and the right of liberty. The concern for the poor and the weak, the afflicted and oppressed, and the restrictions placed on the powerful, as set forth in Lev. xix, show how deeply this passion for justice and righteousness was to be felt. It was also to be shown in the conception of earthly goods, the possession of which was to be regarded not as a natural thing but as a divine trust. The misfortunes of our fellow men were not to be exploited to increase our income. When a neighbour was in difficulties, a loan was to be made to him for which no interest could be charged. All land of inheritance sold was to return to the original owners or their heirs in the Jubilee year, thus preventing the land from becoming concentrated in the hands of a few to the impoverishment of the masses. Economic life in Torah ethics thus meant service to fellow man. And behind this ethic stood as a whole the law of love as formulated in the command "You shall love your neighbour as yourself" (Lev. xix, 18), which is expressly stated (verse 34) also to include strangers.

The Unity in the Laws of the Torah.—But over and above the ritual and moral laws stood the will of God, as their common source of authority and sanction. It is this which imparts to the Torah its unity, allowing for no distinction between one class of law and another, a conception nowhere more strikingly illustrated than in Lev. xix, where the golden rule of love to fellow man (verse 18) is followed by the ritual law forbidding the mixture of species in animals, crops and garments (verse 19).

With the divine will as the common source of all these laws, the violation of any of them was a sin against God that could not go unpunished. The Torah accordingly provides a system of penalties, varying in accordance with the gravity of the offense and the intent with which it had been committed. Promises of rewards, primarily temporal and national, are also made for obedience. No specific mention is made of reward and punishment after death. Yet it would be wrong to infer from this silence that the early Hebrews did not believe in survival beyond the grave. In a world largely dominated by the prospect of life after death it would be strange if the Hebrews alone did not share this belief. As a matter of fact, they had some notion of the hereafter which in its practical bearing was not different from what is known as immortality. The verse which speaks of God breathing into man's nostrils the breath of life (Gen. ii, 7) can only mean that the "breath breathed in by the Creator who was immortal conferred upon man the faculty of becoming immortal" (W. O. E. Oesterley, *Immortality and the Unseen World*, p. 198, Society for Promoting Christian Knowledge, London, 1921). Yet, notwithstanding this conviction, the Hebrew scriptures found it necessary to observe a reticence over the question of man's survival in order to wean the people away from the idolatrous cult of the dead with which this belief was generally associated.

The fear of God's punishment and the hope of his reward is held up as motive for obedience; but equally stressed is the higher motive of the love of God. In the love of God, no appeal is made to the senses as in the polytheistic cults. In every case the call is followed by the injunction to observe his commandment.

Holiness was not the only charge laid upon the people. By virtue of the covenant Israel was to become also a kingdom of priests, a call which signifies spiritual ministration to others. Israel had thus to be apart from the world and yet to remain of the world. While resisting any accommodation to the corrupting influence of surrounding heathen nations, their priestly mission demanded that they should not only be good themselves but also seek to establish goodness everywhere.

4. Israel's Accommodation to Idolatry.—The charge that accompanied the Hebrew tribes on their entry into Canaan was not beyond their power. As all evidence goes to show, when Israel reached Canaan, under Joshua, they were already imbued with a national consciousness which made them feel and act as one people, with a common resolve to take possession of that little land to which they were drawn by the thought that it had been the home of their fathers. To this national consciousness was linked a national religion, fostered by an organized sacrificial ritual and a code of ethical, civil and religious laws. But this national and religious unity did not survive the days of Joshua, which were followed by a period of almost complete political anarchy (Judg. xvii, 6).

Corresponding with this loosening of the national bond was the loosening of the religious bond. In settling down from a nomadic to an agricultural life, the Israelites had to learn these matters from the Canaanites and, in the process, came under the influence of the fertility cults of the natives, with their child sacrifices, sacred prostitution and depraved godlets. Some deserted YHWH for the local Baals and Astartes, to whom they came to ascribe the yield of the soil and the increase of cattle. Others served YHWH and Baal, YHWH being the custodian deity of the nation and the Baals the territorial gods, the givers of the harvest and vintage. Others again practised a syncretism, transferring to YHWH all the titles, attributes and modes of worship of the local gods. Brave resistance to these tendencies was offered by the judges, who, appearing on the scene as liberators from foreign oppression, succeeded in recalling the people to the pure worship of YHWH; but their influence, which was rarely more than local, waned with the passing of each of the successive crises.

Yet by dint of the persistent efforts of generations of leaders, supported by the Levites, who were in charge of the ark and of the sanctuary, the cause of YHWH advanced, so that by the time of Samuel the worship of YHWH had established itself firmly in the north, where was situated the central sanctuary of Shiloh. The capture of the ark and the destruction of Shiloh by the Philistines made a deep impression upon the tribes, and Samuel, taking advantage of the situation, brought about a reform which led to the abolition of the Baal worship from Israel, to be restored only about two centuries later by the Sidonian princess Jezebel.

The revival of the national religion coupled with the Philistine advance, which threatened to reduce Israel to hopeless servitude, worked in favour of centralization of authority. Thus arose the clamour for a king, not so much to fight their battles as to judge them (I Sam. viii, 5). Saul, the first to become king, did not, however, realize the hopes placed in him. He was followed by David, who, as a result of a series of brilliant victories over external enemies, became king over all the tribes, north and south, and succeeded in effecting true unity, cementing it by making Jerusalem both the national capital and the seat of the ark and thus the symbol of religious no less than national unity.

This work of centralization was carried on and developed by his son Solomon, whose reign was marked by the systematic administration of the country and the building of the Temple. Whatever foreign models and designs may have been adapted by the Tyrian artisans in the building of the Temple, there is not the slightest indication that these in any way influenced the Israelites' idea of God, who remained invisible, enthroned in majesty in the holy of holies above the cherubim, derived only in name and form from contemporary Canaanite art but neither worshiped nor thought of as intercessors. The Temple was intended to serve as a central sanctuary, superseding all the multiplicity of local shrines, the high places (*see* HIGH PLACE), which since the destruction of Shiloh had been considered legitimate places of worship but which because of their idolatrous associations were henceforth forbidden.

But the centralizing influences of the Temple were unable to eradicate from the people's minds the false notions about God's character which had come down to them through generations of apostasy. YHWH was no longer the one and only God but a mere national God, fettered to his people by some nature bond and standing in the same relation to Israel as Chemosh to Moab. This was not without effect upon personal religion, as it was not the part of a national god to concern himself directly with the individual, to whom he was linked by ties of the most precarious character. Thus was the way open for the intrusion of all kinds of petty cults (*e.g.*, magic and necromancy) for the satisfaction of individual desires, as well as for the accommodation of Yahwism to strange gods of all sorts, as political expediency (foreign alliances, marriages and economic relations) dictated. This accommodation varied in intensity throughout the remaining centuries of the first Hebrew state, north and south, ranging from the bull cult (*see* GOLDEN CALF), introduced by Jeroboam on the division of the monarchy, to the introduction and establishment by Ahab, under the influence of Jezebel, of Baalism as the state religion of the northern kingdom, in rivalry to YHWH.

The same idolatrous accommodation proceeded in the southern kingdom, where during the early period of its existence it was practised mainly by the court and nobility, while the people as a whole remained loyal to YHWH, notwithstanding the recrudescence of sacrifices on high places (which, although equipped in Canaanite fashion with pillars and sacred poles, did not affect the purity of the cult itself). It was this loyalty of the masses that made possible the several reformations, varying in scope and character, under Asa, Jehoash and Hezekiah, which marked the religious history of the kingdom. Yet, in spite of the outward loyalty of the masses, their notions of YHWH did not differ much from those entertained by their brethren in the north, and all Israel was thus in danger of succumbing to polytheism, involving ultimately its own extinction as well as the loss of all true religion and morality.

B. PROPHECY

1. Rise of the Prophets.—With the crisis of those times a line of great prophets arose and saved the situation. The first of these was Elijah (*q.v.*), the prophet of action. His firm stand for YHWH against Baal was followed by his fearless denunciation of Ahab on account of the judicial murder of Naboth (I Kings xxi), which was a practical affirmation of the Hebrew monotheistic doctrine that YHWH was not only the God of nature but also the God of righteousness, whose demands stood above everything else, even above the interests of the state; while his commissioning Elisha, his disciple, to anoint, in the name of God, Hazael as king of the Syrians, so that he might scourge the northern kingdom for its sins, was but a public demonstration that God was not only the God of Israel but also the God of all nations, whom he used as instruments of his purpose.

Elijah's attitude was enforced by the "literary prophets" of the 8th and 7th centuries, Amos, Hosea and Isaiah. In the days of Amos and Hosea, Israel had entered into world history. Almost overwhelmed by its former ally, Damascus, it had been brilliantly restored by Jeroboam II. These were no mere interstate rivalries; the great powers of Assyria and Urartu (Ararat, Armenia) themselves had been behind these vicissitudes. Israel had now seen its national God moving history on its behalf. Amos, however, shifted the emphasis from Israel's national God who had restored his people to a universal God, of universal righteousness, whose relation was based on an eternal moral law and who required a higher standard of life from an Israel that claimed to stand in a unique relationship to him (Amos iii, 2). Hosea stressed the personal side of the relationship between God and Israel. It was a relationship rooted in God's love for Israel, and this made its sins, religious and moral, all the more heinous since these offended against divine love. Amos and Hosea thus attacked the idolatrous accommodation which fostered unethical conceptions of God, as well as the resultant moral corruption which existed on every side. Israel's deflection from the required standards could not fail to provoke divine punishment in the form of defeat and exile, through God's appointed instrument, Assyria, which was a mere tool in his hands but no more than a tool; for YHWH, who threatens Israel or punishes it, continued to be the God who would ultimately restore his own people to himself.

Isaiah began his prophetic activity when Israel was in the throes of dissolution as a result of the Assyrian attacks and Judah was facing peril from the encroachments of the same foe. He took up the same burden as his predecessors and directed it against both Israel and Judah; but in denouncing the religious decay in Judah he struck a new note. What he condemned there was not the cult itself but the way in which it was practised by the people, the divorcement of inner piety and moral integrity from their worship, from their Temple sacrifices, from their sabbaths and from their prayers.

2. Deuteronomy.—The warnings and exhortations of the prophets went unheeded and the northern kingdom succumbed to its fate in 722/721 B.C. Nor did the prophets meet with greater success a century later, when Judah was entering upon its decline.

That this failure of Hebrew prophecy in its own age did not spell its failure on the permanent field of history was due to the discovery of the book on which the reforms of Josiah (II Kings xxii–xxiii; II Chron. xxxiv) were based, now generally identified with the whole or part of Deuteronomy (*q.v.*). But this identification throws no light either on the date of Deuteronomy or on the origin of the one sanctuary law. As against the long-prevalent view that Deuteronomy is a product of the 7th century are the opinions of many modern scholars who assign it to an earlier date, not a few insisting that the conditions reflected in the book fit best the Mosaic age; research tends to confirm the existence of a central sanctuary from the earliest times of Israelite history. Edward Robertson sums up the situation when he writes (*The Old Testament Problem*, p. 142, Manchester University Press, 1950) that the old Deuteronomic law of the central sanctuary was rendered inoperative with the disruption of the monarchy and that the "rediscovery of the book in the reign of Josiah was opportune, for by then the Northern Kingdom had fallen and 'all Israel' could be reunited under the same code." In any event it was the reading of Deuteronomy, as is evident from the scriptural account, that affected deeply the king and roused him to action. The rediscovery of the book (or of the volume that contained it) thus preserved for Israel an authentic and inspired guide which, by its unique blending of ritual law and ethical precept, of outward action and inward motive, saved the teaching of the prophets from evaporation into platitudinous vagueness and thereby enabled Israel to rediscover, amid the ravages of defeat and exile, the way to a personal faith in a truly living God and to his service in all walks of life.

The idea that Deuteronomy is an attempt at a compromise between the prophetic and the priestly spirit is based on the supposition of an antagonism between prophet and priest for which there is no support in the Old Testament. The prophets were first and foremost teachers of religion, not of ethics. Their supreme concern was the will of God, rather than the rule of righteousness. Fundamentally then, the prophet was animated by the same ideal as the priest, who also, in his own manner, sought to win obedience to the divine will, although they differed in their approach, the prophet by emphasizing moral and religious principles, the priest by attending to ritual and worship. There could consequently be no conflict between prophet and priest. The conflict, when it did arise, was between the true prophet and the false priest who misrepresented the character of God by encouraging a belief that sacrifices were more pleasing to him than moral conduct; just as the true prophet clashed with the false prophet who, misconstruing the purpose of God, lulled the people into a false sense of security.

3. Prophets of the 6th Century.—The same period witnessed the activity of Jeremiah and Ezekiel, who in their enunciation of individual responsibility sought to restore to the people the sense of personal relationship to God, which they had lost under the impact of pagan influence. This was a time of general national disintegration, when religious and social organizations were rapidly breaking up. Jerusalem and the Temple were shortly to be destroyed by the Babylonians (586 B.C.) and religion stripped of its national associations, which for many meant the end of all religion. From various writings of that period (*e.g.*, Jeremiah, Habakkuk, Zephaniah) it can be seen that serious minds were utterly overwhelmed by the changing conditions. Some surrendered to a blank skepticism (Zeph. i, 12); while the generation of Jeremiah, blind to their own moral turpitude, were impugning the justice of God who had brought upon them suffering for sins which not they but their ancestors had committed. Jeremiah, after repudiating the popular notion concerning the transference of punishment from ancestors to descendants and from the guilty to the innocent, sought to impress upon the people the stark fact of their own sinfulness, as well as the recognition of the responsibility they each bore for the misfortunes that had overtaken them (Jer. xxxi).

Ezekiel, taking up Jeremiah's teaching, strove to educate the exiled people in the faithful consciousness of personal accountability for sin and to bring at the same time a message to all sin-conscious individual souls of divine reconciliation through an inward renewal wrought by the power of God (Ezek. xviii). This reality of personal relationship with God meant that city, Temple and sacrifices were no longer indispensable and that the people in exile could individually, as well as corporately, be both loyal to their new home and worshipers of YHWH, who would be with them wherever they might be.

Jeremiah nevertheless foresaw the restoration of historic Israel, which was one day to lead all nations to the worship of the one and only God through their realization of the worthlessness of their idols (Jer. xvi, 19–20). The key to this universal consummation was to be the new covenant (Jer. xxxi, 31–34) which God would inscribe upon the heart of the people and which would be grounded not in the mighty acts of deliverance that he had done for them in the far-off days of the past but in his deeds of salvation in their everyday life; so that the knowledge of him would become the common possession of all Israel and, through them, of all nations of the world. But while Jeremiah's gaze here was directed toward the horizon of the distant days to come, Ezekiel was concerned with the more immediate future, and he accordingly drew up an order of worship and of society for the community of exiles who were about to be restored.

4. The Servant of YHWH.—Jeremiah's vision of Israel's world-wide mission receives powerful expression in Isai. xl, *et seq.* and in the "Servant of YHWH" chapters, where in a series of passages of unequaled force the prophet passes from the unique monotheistic teaching of Israel's God to the unique world destiny of his people Israel. The interpretation of these biblical passages has been keenly disputed, but their application to the people Israel still holds the field. The prophet depicts a scene of universal salvation in the midst of which stands the servant of YHWH—Israel—whom hitherto the nations had thought to have been forsaken by God; now, however, they had come to realize that all the sorrows he had endured were but the work of their own wickedness and misdeeds. It was they who had sinned in crushing the servant of God; while he, by a martyrdom endured without flinching, had been able to fulfil his divinely imposed duty culminating in the salvation that they were all now sharing in common.

So penetrating is this doctrine in its significance for religious thought that all earlier conceptions of the special relation between God and Israel here reach their climax. Israel had been called for high office, and this demanded a readiness to submit to the severest tests and trials without murmur and without losing faith or hope in the ultimate vindication of its cause. (*See* also ISAIAH, BOOK OF: *Themes.*)

5. Prophets of the Return.—The severe discipline of the Babylonian exile, which came to an end in 538 B.C., purged the people of all idolatrous taints and tendencies. The monotheistic faith became as a result irrevocably established in Israel. But the moralization of the conception of God and his relation to man, which had now found common acceptance, led many to disparage the Temple and its cult. As against this attitude, Haggai, Zechariah and Malachi insisted on the need of the Temple for the strengthening of religious life. Again, the removal of idolatry—which, the people had always been told, was the root of all evil—meant for many the fulfilment of the moral law with no further claims upon them. Zechariah, who made this problem his own, urged upon the people those moral and spiritual truths without which Temple worship would be a hollow mockery (Zech. viii, 16–17).

The Temple was rebuilt under the Davidic Zerubbabel and consecrated in 516 B.C. Malachi, in the spirit of his predecessors, shows equal zeal for the Temple cult and for ethical conduct and, while exhibiting an extraordinary universalistic attitude (Mal. i, 11), concludes with an exhortation to remember the Law of Moses, its statutes and judgments (religion and ethical precepts). With this message Hebrew prophecy takes leave of Israel and the rest of mankind. It has by now fulfilled its divinely appointed role, having told Israel and, through Israel, the world the principles by which nations and individuals must live in fulfilment of their destiny. *See* also PROPHET.

C. Ezra and the Scribes

1. Survival of Judaism.—The years following the building of the Temple present a complete blank, but in the meantime great changes took place in Judaea and outside. The old monarchy of Israel had been destroyed, the old land broken up; the disorganization seemed complete. Yet under Persian tutelage there arose an autonomous theocratic state, and disintegration gave place to reintegration, a new national consciousness and new corporate responsibility. Outside Judaea, in the places of dispersion, with their main centres in Babylon and Egypt, the old religion, under influences and circumstances which have been concealed and forgotten, was stripped of its territorial limitations and political loyalties and became a religion founded on a common tradition, ideals and hopes, fed and sustained by the religious centre in Jerusalem. The study of the changes involved continues to absorb scholars, so vital are the problems. In any event it is remarkable that, notwithstanding the immense political and social changes arising out of the Assyrian conquests and after the fall of Nineveh (612 B.C.), a continuity was maintained, and the individualism of an age of disintegration was followed by a rebirth and reorganization amid the decay and death of other nations. Israel's kindred, Edom, Amon, Moab, like the great surrounding empires, fell in their day; even Samaria disappeared from history, but Hebrew religion, or what has since come to be known as Judaism, survived.

This is due mainly to Ezra, who came up from Babylonia (in 458, according to the traditional date, but more likely 398; *see* Ezra and Nehemiah, Book of) with the book of the Law of God and was chiefly instrumental in getting it put in force as the law of the returned exiles in Judaea. The view that Ezra's main concern was with the Temple and the priesthood is contradicted by the terms of the royal warrant (Ezra vi, 11–26) and the other relevant documents. The fact is that what saved Judaism from becoming a purely priestly religion was the work of Ezra. When he came to Judah there was already in existence a Temple, a high priest and a sacrificial system, but little more of organized religious and spiritual life. The plea of the prophets Zechariah and Malachi for the whole Torah had yet to take effect. Then came Ezra who "had set his heart to seek the law of the Lord, and to do it, and to teach in Israel statutes and ordinances" (Ezra vii, 10). Under his leadership the Torah in its entirety—alike in its religious and moral aspects—was established sovereign in the state, and knowledge of it was no longer as hitherto the exclusive monopoly of a class but the common possession of the nation as a whole. This enthronement of the Torah in the heart and mind of the people provided a powerful safeguard against the heathen accommodation which brought about the destruction of the first Hebrew state and thus ensured the purity of the national religion and survival of Judaism.

2. Sopherim (Scribes).—After Ezra there follows another obscure period, during which Persian rule in Palestine was replaced by the Macedonian and the Ptolemaic, but it is a period of great importance in the history of Judaism. This is not because of any direct influence on the religion that can be traced to Persian or to Greek thought. Such influences are still largely a matter of debate and in any case were not more than peripheral and never central. (*See* Hellenistic Age: *Hellenistic Civilization: Hellanism and the Jews.*) As a matter of fact the better the knowledge of the cultural milieu of the early phase of Hebrew history becomes, the more consistently does modern scholarship affirm the independence and in many ways the priority of such central concepts as the Kingdom of God, resurrection and immortality, as well as the idea of angels, in ancient Israel. The importance of this obscure period is that, under the patronage of its foreign rulers, the little Judaean community was able to maintain and develop without any outside interference the work begun by Ezra.

A succession of teachers known as *sopherim* (scribes; *q.v.*), generally identified with the "men of the great assembly," arose with the resolve to uphold the authority of the Torah and enhance its power as a sanctifying source of all life and action. With this aim in view, they interpreted the biblical ordinances, civil, domestic, economic and social (formulating their underlying principles, classifying their details, fixing their norms and regulating their usages), and adapted the laws to changes in conditions and circumstances. This was no innovation of the *sopherim;* it was but an application, extension and development of the oral tradition which, going back to the earliest times, had been transmitted from generation to generation as Oral Law (*torah shebe-al pe*), in part interpreting, in part supplementing, the written Torah (*torah shebikthab*) and in its total effect transforming scripture from being only a written document liable to become obsolete into a continuous revelation, keeping pace with the ages.

In their interpretation of the holy writ the *sopherim* sought to harmonize the spirit and the letter, as exemplified in their substitution of compensation for the *lex talionis,* as well as in their lenient application of the sabbath law, in comparison with the rigorism of, say, the Book of Jubilees (*q.v.*), which, following the strict letter of the law, imposed complete abstention from all physical activity on the day of rest. On the other hand, in order to safeguard the scriptural ordinances against any infringement, they enacted stringent cautionary rules known as "fences for the Torah." They further held regular expositions of the Scriptures, the Law and the Prophets, as well as the other sacred books which belong to Israel's wisdom literature (*see* Wisdom Literature); organized daily worship, which included the rich expression of prayer and praise in the Psalms; and prescribed the principal benedictions as well as most of the rites which constitute the present-day extrabiblical observances of the devout Jew. The effect of all this was a mass loyalty which proved its depth and strength in the revolt of the Maccabees (*q.v.*) against the totalitarian paganizing policy of Antiochus IV. *See* also Talmud: *Oral Law.*

III. SECTARIAN JUDAISM

1. Pharisees and Sadducees.—Out of this struggle there gradually emerged a state that eventually became a kingdom. But no sooner had the new kingdom come into being than the question had to be faced as to the position of the Torah in the affairs of the state. At this point occurs the cleavage between the Sadducees and the Pharisees, the two principal parties of the period. The Pharisees desired that the new state in all its affairs should continue to be governed on strict Torah lines, whereas the Sadducees maintained that it was all very well for the Torah to remain the constitution of the new state but that it was impossible to carry on a government under the changed conditions without making political expediency and economic interest the final arbiter of things. The issue involved was the inclusion of the oral tradition within the concept of Torah. If the Torah meant only the written text, as it did to the Sadducees, then evidently it was impossible to obey it under the new conditions. If Torah, however, included the oral tradition—as, according to the Pharisees, it did—then the way was open for its interpreters to discover from the written text its true meaning as applied to the needs of their own time.

The Sadducees, with all their recognition of Torah, laid primary stress on the nation; the Pharisees, with all their attachment to the state, laid primary stress on Torah. This difference of attitude stemmed from their respective conceptions of God. To the Sadducees God was essentially a national God, the God of Israel only; to the Pharisees a universal God, a God of all mankind. The nationalist conception of religion had a pernicious effect on the subsequent trends in the kingdom. The Maccabees became fanatical nationalists. Before long, John Hyrcanus was conquering the Samaritans, destroying their temple; the Idumaeans (the earlier Edomites) were forcibly Judaized; and a Jewish kingdom, almost Solomonic in its extent, flourished between the end of the Seleucid and the beginning of the Roman period (141–63 B.C.). But with this policy they were merely sowing dragons' teeth. Through the Idumaean Herods, the Jews entered upon the last period of prosperity under Roman patronage with all the dangers that this meant for national Judaism; the final catastrophe (A.D. 70) was witnessed—if not hastened—by the last of this strangely non-Jewish family, Agrippa II.

Meanwhile, the Maccabaean revolt against a semi-Greek and semioriental life had given a fresh endorsement to Judaism shortly before Judaea became subject to the Romans. It was a newly

consolidated Judaism that now entered upon the western phase of its history, with a profounder conception of the part it was to play in universal history. The Jew with his Torah, his traditions and his universal God had something to offer a world from which, however, his own religion tended to keep him apart. Judaism had already attracted the attention of the world, whether from the curious Hecataeus of Abdera (fl. 4th century B.C.) or his contemporary, the anti-Jewish historian Manetho. Judaism in conformity with its priestly mission felt a world call, and classical authors testify to the vigour of Jewish missionary enterprise. Indeed there was a remarkable vigour throughout the oriental religions, and many diverse tendencies of thought and a variety of sects characterize the Eastern Roman empire at the birth of Christianity—primarily another Jewish sect. Besides certain striking ethical tendencies and also the more impressive messianic expectations (*see* MESSIAH), a Damascene body of Jewish covenanters, whose date is disputed and whose further history is unknown, looked for a "Teacher of Righteousness" (a name that reappears in the Dead sea scrolls), who is to be followed by a Messiah. They testify to some reforming movement, based on the Law and the Prophets, outside Judaea, and therefore in districts more remote from the Judaism of Jerusalem. Similarly, the Book of Enoch (*see* ENOCH, BOOKS OF) appears to proceed from a north Palestinian (Galilean) district, largely non-Jewish. (*See* also JEWISH SECTS DURING THE SECOND COMMONWEALTH.) (I. E.)

2. Christianity and Judaism.—It is against this kaleidoscopic background of a Judaism harbouring, in addition to the main groups or parties, a large number of greater and smaller sects, that the beginnings of Christianity have to be seen. In spite of all that was essentially original in the message of Jesus, the points of contact with the contemporary Jewish scene, whether by way of identity or of polemical rejection, are obvious. A considerable part of Jesus' ethical and religious teaching parallels that of the rabbis; on some essential points he espouses Pharisaic doctrines as against the Sadducees (*e.g.*, regarding belief in the resurrection of the dead). Whether or to what extent John the Baptist was connected with the Essenes is a moot question, but at any rate his preaching and ministry exhibit both the eschatological mood and the practice of baptisms common in certain Jewish sects. Jesus' sojourn in the wilderness and his baptism at the hands of John also testify to some at least indirect Essenic influences. In this connection the evidence of the Qumran scrolls is of special importance, as they exhibit striking similarities with New Testament teachings and thus help to reconstruct part of the context of early Christianity. It seems that, on the one hand, the life and teaching of the early church owed much to the sectarian climate in general and that, on the other hand, a number of Jesus' polemical sallies were addressed to the ascetic sectarians (*see* DEAD SEA SCROLLS).

It is, however, in his attitude to the Law that Jesus differed most strikingly from both Pharisees and Essenes. The rigorous, puritanical piety of the Essenes made Pharisaic rigorism almost look mild, but Jesus went even further. Though himself wishing to "fulfill the law," even every jot and tittle of it, his interpretation of it as well as his rejection of man-made "fences round the law" bespeak an impatience with Pharisaic piety and an independence of spirit which could easily be made to serve as authority for later more radical attacks on the Law (*e.g.*, by the apostle Paul or by groups of Hellenistic Jews such as the one represented by Stephen). Though Jesus was probably closer to the Pharisees than to any other group in Jewry, the higher authority he claimed and the independence with which he opposed Pharisaic legal norms, as well as his invectives against Pharisaic hypocrisy, probably did far more than his messianic claims to alienate Pharisaic sympathies. With the Sadducees the situation seems to have been the reverse: it was the messianic agitation round the person of Jesus and the dangers, from the Sadducean point of view, which any eschatological movement involved in a precarious political situation, that would make Sadducean leadership wish to get rid of an actual or potential troublemaker.

A brief mention of the methodological difficulties in the way of an accurate, reliable and fair presentation of the Jewish-Christian issue during the early years of the church is unavoidable. The sources for the knowledge of rabbinic piety and teaching may be extensive and copious, but they are comparatively late. No doubt the rabbinic writings (Mishnah, Talmud) may be taken to reflect faithfully much of the genuine Pharisaic spirit, since it was Pharisaism that survived the fall of Jerusalem (A.D. 70) and that was the main stream to go into the river of later Judaism. It may be possible, by careful analysis, to isolate the very oldest and actually "Pharisaic" traditions in the Talmud, but even so it should always be remembered that talmudic literature as a whole is late.

Of contemporary references, on the other hand, those in the works of Josephus are too much "written up" with an eye to a specific reading public to be accepted at their face value, whereas the presentation in the New Testament can hardly be said to be fair or objective. There is no justification for the extreme view that original Christian hostility was directed exclusively against the Sadducees and that only at a later stage the word Pharisees was substituted for Sadducees in the text of the New Testament. It is obvious that in the circumstances Christians were sensitive only to the negative sides of Jewish religious life; their animosity was intensified by the fact that Pharisaism was the backbone of Jewish resistance to Christian preaching and the rock against which it broke, to be deflected from there to the gentiles. When the Jewish sects disappeared after the fall of Jerusalem, Pharisaism and Judaism as such became practically identical in the eyes of Christians—socially, as threats to the progress of the church, and morally, as the standard of carnal obstinacy.

Though the Gospels thus present a caricature of Pharisaism, the Pharisees on their part, being human, did not always match the strictness of their ritual observance with a corresponding religious inwardness. But this failing, which is practically coextensive with religion as such, was branded by the Pharisaic teachers and moralists themselves, who had some very harsh things to say about hypocritical, overzealous and overscrupulous Pharisees. It therefore seems probable that in spite of serious clashes with "scribes and Pharisees," it was the Sadducean authorities who engineered the execution of Jesus. The conflict with Pharisaism hardened only afterward when the early church, faced with the alternative of remaining an obscure messianic sect or becoming a universal religion, chose the latter course and thus had to turn against Judaism and to abolish its Law with the claim of having fulfilled it.

A distinction probably has to be made between the question of the relative lack of success of Christian preaching among the main body of Palestinian Jewry and the quite different problem of the final break between the synagogue and the church. Pharisaic and Essenic attachment to the Law was probably shared by many of Jesus' followers. With his death, the question of his messianic claims would have been automatically settled in the eyes of most Jews; belief in his person in spite of apparent failure would have been possible and significant only to a very limited circle that, in the last instance, would only have added one more facet to the kaleidoscopic landscape of sectarian Judaism. The decisive change came with the reorientation of the church in an anti-Pharisaic and ultimately anti-Jewish direction. Gravitating round the Greek-speaking synagogues in the Roman empire was a great mass of Judaized semiconverts that had been won over to Judaism by an active missionary propaganda, wondering (unlike the much smaller number of full converts) whether to shoulder the full burden of the Law and especially of circumcision. They were the first to respond to the new Christian message concerning the fulfillment of Judaism and the Law. Their ranks were swelled by members of non-Pharisaic or anti-Pharisaic sects, last but not least by what seems to have been a pre-Christian sect of Hellenistic Jews that rejected the Temple and "normative" Pharisaism as a whole. A probably representative statement of their attitude and views appears to be preserved in the speech of Stephen (Acts vii, 2–53).

When attempting to summarize the points of difference between Judaism and Christianity, the difficulty of determining the exact scope and meaning of these two words arises. If the question is posed in purely historical terms, it amounts to a careful examination of the views held by the conflicting parties at any precise

moment and place (*e.g.*, Jesus and contemporary Palestinian Jewry; the primitive church and the Jewish authorities in Jerusalem; Paul and his relations to Palestinian Pharisaism and to the Greek-speaking Jewries of the empire; Judaism after the fall of Jerusalem and the subapostolic church; etc.). If the problem is couched in more general terms, it presupposes some kind of generalization about "Judaism" and "Christianity" which would then be conceived under some form that is considered, often arbitrarily enough, as their standard, mature and authoritative expression.

By and large, however, it may be said that a Messiah that died and "failed," as well as a purely spiritual conception of messianism that disregarded the continued existence of a world "unredeemed" to all social, historical and individual intents and purposes, would be unacceptable to the average Jewish religious consciousness. However, belief or disbelief in a Messiah would hardly have counted as a major issue had it not been for subsequent developments of Christian doctrine that contradicted some of the basic attitudes of Judaism. Among these were the Christian rejection of traditional observances (*i.e.*, of the Law), the repudiation of the continued election of Israel as a national-religious group, the doctrines of the incarnation and the Trinity, the view that faith saves or that a special, superhuman act of salvation was necessary to bring sinful mankind to God. It is not so much that Judaism gave different answers to the questions of atonement and salvation but that it conceived these questions in a very different context and in a different manner. For Judaism forgiveness of sins and nearness to God (for select individuals) are, generally speaking, independent of eschatology and hence irrelevant to the problems of messianism.

With the rift between the two parties widening naturally, all kinds of hybrid combinations among marginal groups were possible. Various kinds of Jewish sectarians (Hebrew *minim*) joined the still uncrystallized Christian fold (more and more the word *minim* came to mean "Christians") and, by preserving many of their sectarian traditions, provided the seeds of various heresies inside the church. As time went on and the church became an organization clearly separate from Judaism, older and more rigidly conservative groups of Jewish Christians found themselves pushed to the margin as heretics; *e.g.*, the Nazarenes or the Ebionites (*qq.v.*) who, apart from their belief that Jesus was the Messiah, conformed to a large extent with Jewish observance of the Law. By the end of the 1st century the "malediction over the *minim*" (*i.e.*, Hebrew Christians in particular), a kind of formal statement of excommunication, had become an integral part of the daily liturgy of the synagogue.

3. Effects of the Fall of Jerusalem.—This development was accelerated by the fall of Jerusalem in A.D. 70. This national disaster had far-reaching effects both on Judaism and on Christianity, as well as on their mutual relations. For Christians it served as decisive confirmation of the rejection of the old Israel. In fact, the consciousness of solidarity which bound the Judaeo-Christians to the rest of Jewry seems to have been considerably weakened by the time of the revolt (66–70), since at its beginning the Christians left Jerusalem for Pella in Trans-Jordan. (According to some scholars, however, the opposite was the case: the Jerusalem church belonged to the extreme nationalist Zealot wing and took an active part in the revolt. With the fall of the city the church of Jerusalem too received a blow from which it did not recover, hence ceasing to play a major part in the history of the church.)

The fall of Jerusalem also spelled decline and death for most Jewish sects and parties. The Sadducees, as an aristocratic minority whose prestige and power centred round the Temple, lost the social and ideological basis of their existence. Most of the other sects were probably absorbed either by the church or by the normative, rabbinic-Pharisaic Judaism which emerged from the cataclysm as the only force strong and elastic enough to adapt to the new situation and to give guidance to the stricken people. Their religious conceptions (belief in God, afterlife, resurrection, messianic redemption, divine economy of mercy and judgment, election, the Torah as the supreme mark of divine love to Israel, and its acceptance as Israel's way of loving and serving God and of acknowledging his kingdom), their institutions (communal worship and prayer in the synagogue as compared with sacrificial ritual in the Temple; the *Bet ha-Midrash*—*i.e.*, "house of study"—for instruction, preaching and study of the Law; religious leadership by scholars instead of priests, etc.) and, above all, their notion of an Oral Law enabled them to reconcile development and change with loyalty to tradition and to undertake the far-reaching adjustments which the new conditions demanded.

Also Hellenistic Judaism disappeared completely as a spiritual force. This is not to say that all traces of Greek influence vanished, since even Pharisaic and rabbinic Judaism in Palestine was affected in many ways by Hellenistic culture. A good many haggadic-philosophical notions and halakic concepts clearly betray their origin in contemporary Hellenistic civilization. The Mishnah and Talmud contain hundreds of Greek words that had become absorbed into Hebrew and Aramaic. But these influences in matters of detail did not decisively affect the structure of Palestinian Jewish belief and practice. In fact, since the Hasmonaean revolt, in which a small people for the first time stemmed the apparently irresistible tide of Hellenism, Hellenization had ceased to be the political program of any Jewish faction, though individuals, even noted scholars like Elisha ben Abuyah, might succumb to Hellenistic (including Gnostic) ideas and heresies.

It was in the Jewish Diaspora in Egypt, Syria and Asia Minor, however, that Hellenism flourished and that a distinct "Hellenistic" type of Jewish piety and philosophy developed as a result of the steady absorption of Greek thought. As early as the 3rd century B.C. the Jews of Egypt had adopted Greek, and the Septuagint (Greek) translation of the Bible had been completed. By the 1st century A.D. a variegated Judaeo-Hellenistic literature had developed whose tendency was consciously apologetic, propagandist and missionary. The most outstanding authors were Philo and Josephus. Philo and the Alexandrian school in particular interpreted the Bible and Jewish tradition in terms of that Neoplatonic and Stoic philosophy which represented the best religious aspirations of Hellenism (*see* JEWISH PHILOSOPHY: *Origins*). They assumed that Greek philosophy was ultimately of Jewish origin and that Judaism embodied the highest intellectual and moral values. Their literary efforts seem to have impressed the pagan world but little. Philo, the greatest representative of Jewish Hellenistic piety was almost completely forgotten by later Jewish generations; his memory and writings were preserved by the Church Fathers. The reason for this disappearance of Jewish Hellenism as a religious force must be sought partly in the situation after the fall of Jerusalem and even more after the catastrophic failure of Bar-Cochba's great revolt against Hadrian (A.D. 132–135), when the Jewish people of Palestine and Babylonia were forced more and more into seclusion, severing their links with the outside world and finding strength, inspiration and guidance in their heritage of sacred Scripture and traditions. Another reason for the ultimate rejection by the Jews of the achievements of Hellenistic Judaism was the fact that Christianity too had adopted them and begun to exploit them for its own purposes. The symbolic-allegorical interpretation of Scripture, or speculations concerning the divine Logos, once taken up by the church as means for elucidating its own experience, became suspect or even positively dangerous to a persecuted Judaism fighting for its very survival.

The result of this turning inward was a remarkable literary achievement. The collections of teachings of the early generations of rabbis (*tannaim*) were brought together, sifted and edited by Rabbi Judah ha-Nasi ("the Prince"; 2nd–3rd century) in the Mishnah, which, in its turn, became the basic text for further elaboration and discussion in the schools of Palestine and Babylonia, where they were finally edited in the two vast compilations known as the Palestinian and Babylonian Talmuds. With the economic and cultural flowering of Babylonian Jewry, their academies and the Babylonian Talmud (completed about the 6th century) also acquired decisive influence and authority over Jewry as a whole. A vast encyclopaedia of rabbinic learning, piety, wisdom and legal ingenuity, the Talmud (concerned mainly with minutiae of ritual, civil and criminal law) and the so-called haggadic Midrashim (collections of moralizing and edifying homilies) together with the

Bible formed the inexhaustible storehouse of tradition, guidance and instruction to which Jews turned for elucidation of God's revealed will. In keeping with the rabbinic conception of the Law as the embodiment of God's love and will, telling man "what the Lord thy God requireth of thee," legal casuistry forms the major part of the Talmud. Often absurd in the eyes of the unsympathetic outsider, it was, for the Jew, the concrete application of his religious concern: to translate his love of God, his faith and his hope of salvation into a life of service and obedience to the divine will. The talmudic literature, which fell short only of the Bible in prestige and authority, inculcated the virtues of faith and "acceptance of the yoke of the kingdom of heaven," taught the ways of justice, mercy and charity as the true imitation of God, and comforted a harassed people by reminding them of God's promises of a glorious messianic future. Often the persecutions suffered at the hands of the gentiles led to an exaggerated correlation of good and evil with Israel and the nations respectively, and eschatological conceptions were formulated accordingly. Whatever subsequent influences molded the spiritual physiognomy of Judaism (medieval philosophy, cabalistic mysticism, etc.), the Talmud remained the foundation of Jewish life, practice and piety for centuries to come. *See* also TALMUD.

IV. MIDDLE AGES

Judaism was shaped in the biblical and talmudic periods and interpreted in the middle ages. The former periods gave it most of its substance, the middle ages mainly sought to elaborate its meaning. The midrashic preachers and talmudic lawyers had developed and ramified the contents of religion—tenets of faith as well as minutiae of ritual. The medieval thinkers attempted to provide rational proofs or else to attain insight into hidden, mystical significances. Of course the study of the Talmud and legal casuistry continued to flourish. The spiritual leaders of the Jewish communities were the Talmudists; *i.e.,* teachers and judges who very often stood at the head of important academies. Frequently the acknowledged authorities and codifiers of the Law were also the most illustrious philosophers (*e.g.,* Maimonides) and cabalist mystics (*e.g.,* Joseph Qaro), yet one of the most distinctive marks of medieval Judaism was undoubtedly its theology or, to be more exact, its philosophy of religion.

1. Philosophical Theology.—The rise of medieval Jewish philosophy is connected with the renascence of Greek philosophy among the Arabs and its impact on Muslim theology. Articles of faith and their presuppositions were discussed in the light of current Neoplatonic and Aristotelian doctrines. The nature of revelation, knowledge, tradition, reason and faith as well as their relation to each other, the nature of the human personality and its relation to God, the existence of God and its rational proofs, the attributes of God, the eternity or createdness of the world, providence and theodicy—these were among the problems examined with a profound religious seriousness, but on the assumption that reason was not only competent to deal with them but was, in fact, required to do so as a religious duty. Reason was man's noblest part. Through reason alone he was the "image of God" and capable of communing with his Creator. The exercise of the rational faculty (*i.e.,* philosophy) thus became transfigured with the halo of mystical contemplation.

Many of the essentials of later Judaism were formulated with intellectual precision during that period, though it must be remembered that these discussions took place among philosophers and not among official theologians authorized to proclaim truths or to pronounce anathemas (though this too happened on occasion). Even dogmatic formulations that were accepted by common consent never attained the same kind of binding authority enjoyed, for example, by the legal rulings of a rabbi duly based on talmudic texts. In the last resort Jewish theology developed as if the "divine commandments," as defined and elaborated by the *halaka,* were the truest reflection of an unuttered and perhaps unutterable theology. Judaism is made articulate in action rather than in words, and philosophers, mystics and theologians were merely engaged in the search for the deeper meaning of the divinely ordained pattern of life. Schisms arose as a result not so much of divergences in doctrine as of deviations from the rules of conduct regulating religious life.

Two factors contributed to the rise of philosophical theology. There was the apologetic stimulus and the desire to uphold one's faith against philosophic rationalism in general and, more particularly, against competing religions claiming to have superseded Judaism by divine and authoritative revelations of their own. The neutral sphere of rational thinking provided the only possible common ground on which the discussion could move. There was, moreover, the challenge of internal Jewish deviationism—heresy would be too strong a term—such as, for example, that of the Karaite sect which arose in Babylonia (8th century) and which saw a remarkable flowering in Palestine (10th century) and the Byzantine empire, until its spread was checked and it survived (after the 12th century) only as a static Jewish sect in a few centres (Egypt, the Crimea, Russia, Lithuania). The Karaites recognized the authority of Scripture only and denied that of rabbinic tradition and the Oral Law. In their attacks on the rabbis they emphasized the anthropomorphisms in which midrashic literature abounded. Their challenge could be met only by a systematic and convincing statement of the orthodox faith. In fact, the great anti-Karaite polemicist Saadia ben Joseph (*q.v.*), *gaon* of the academy of Sura in Babylonia in the 10th century, was also the first major Jewish philosopher and the founder of Jewish Aristotelianism. (*See* also KARAISM.)

Jewish Aristotelianism (which, like all medieval Aristotelianism, bore many Neoplatonic traits) reached its zenith in the 12th century with the work of Maimonides (*q.v.*), a famous physician and one of the most illustrious Talmudists, whose systematic code of rabbinic law is the most complete of its kind. His philosophy, as expounded in his *Guide for the Perplexed,* provoked a storm of orthodox indignation, but the 13 articles of faith which he considered to represent the minimum formula of Judaism have attained wide popularity and acceptance, particularly as there existed few alternative formulas. Judaism, it is true, always had a "faith content" and even dogmas, but these were never worked out in an authoritative and binding system of dogmatic theology, comparable to the authoritative system of Law. The 13 articles are worded with a view to the ordinary believer and contain no indication of the subtlety and radicalism of Maimonides' teaching. They are (1) the existence of God, Creator of all things, (2) his absolute unity, (3) his incorporeality, (4) his eternity, (5) the obligation to serve and worship him alone, (6) the existence of prophecy, (7) the superiority of Moses to all other prophets, (8) the Torah as God's revelation to Moses, (9) the Torah's immutability, (10) God's omniscience and foreknowledge, (11) reward and punishment according to one's deeds, (12) the coming of the Messiah and (13) the resurrection of the dead.

In Maimonides' view, however, prophecy is the highest form of contemplative knowledge of and loving communion with God. It is the supreme religious ideal and an essentially intellectual realization. With regard to articles 2, 3 and 4, Maimonides held that any positive attribute predicated of God implied a denial of his unity. Hence apparently innocent statements such as "God is good, great, powerful," etc., were really pregnant with heresy unless reinterpreted in terms of a negative theology. In this part of his system the almost unbridgeable gulf between the philosopher's God and the perhaps all-too-human God of the simple, devout believer becomes glaringly manifest. Moreover, by his uncompromising statement of the negative way Maimonides prepared the way for some of the speculations of the Cabala.

The idea of prophecy is also at the centre of the teaching of Judah ben Samuel Halevi (*q.v.*), one of the greatest Hebrew poets (12th century). His prose *Kuzari* is cast in the form of a dialogue between a Jewish sage and the Khazar king, using the historical conversion of the Khazars to Judaism (8th century) as a stage setting for developing his own theology. The book is an all-out attack on philosophy, and Halevi, long before Pascal, sharply formulates the distinction between the "God of Aristotle," who is at best a bloodless abstraction, a prime mover, and the "God of Abraham," who is the living God experienced in history and revelation. Central to Halevi's theology is the mystery of the

election of Israel. Called to the life of prophecy, the *ecclesia* of Israel is a mystical community whose election and suffering are mysteriously interwoven. Corresponding to the election of one nation, there is also the election and predestination of one particular country, the Holy Land, where alone Israel can realize its prophetic destiny.

Other writers, such as Bahya ben Joseph ibn Pakuda (*q.v.;* Spain, 11th century), gave expression to the ascetic trend of Jewish spirituality. Complete indifference to the world, total abandonment to God, humility, solitude—such were the values and practices propagated, under obvious Sufi influence, by Bahya's very popular and much read *Guidebook to the Duties of the Heart.* Bahya's ascetic piety was kept within bounds by his fidelity to the Jewish Law with its markedly social orientation even in purely religious matters (*e.g.,* the three statutory prayers of the day should be said with a quorum of at least ten adult males; the state of perfection is possible only in marriage, etc.). Its general tendency was genuinely mystical, though of a type very different from that represented by the cabalism originating in Provence and northern Spain in the 13th–14th centuries. (*See* also JEWISH PHILOSOPHY.)

2. Mysticism.—The origins of Jewish mysticism are lost in the past. Perhaps the prophets and their schools of "sons of prophets" were among the first links in the not always continuous chain. The authors of some of the Old Testament pseudepigrapha and apocrypha clearly belonged to groups cultivating mystical and apocalyptic traditions that bore marks of the syncretism of the period. Talmudic traditions from the 1st century A.D. onward bear increasingly clear testimony to the existence of esoteric teachings and practices, cultivated in closed circles by leading rabbis and strongly tinged with features that have come to be termed Gnostic. The purpose of this ecstatic mysticism seems to have been the initiate's experience of the ascension of his soul to the overwhelmingly numinous vision of the divine glory (not God himself), symbolized by the divine throne, after Ezekiel's vision, or chariot (*merkabah*). It was "a mysticism of the *mysterium tremendum*" (G. Scholem) and its practitioners bequeathed to the synagogue prayerbook some of its most impressive hymns.

Merkabah mysticism continued to flourish in Babylonia and the Byzantine empire up to the 7th–8th centuries. Via Italy (9th century) its literature reached Germany, where it contributed to the rise of a particular brand of mystical piety which reached its zenith in the circle of the Devout (*Hasidim*) of Germany. They distinguished between the transcendent, hidden and unknowable God, and his manifestation; *i.e.,* his created *kabhod* ("glory"). Also via Italy, other old mystical lore, largely Gnostic in character, was transmitted to Provence where the decisive form of Jewish mysticism developed. By merging Gnostic ideas with Neoplatonic speculations, the early Cabalists of Spain evolved the classical form of the cabalistic doctrine of the Godhead as a dynamic complex of *Sefirot* ("potencies") emanated from the inaccessible hidden God. The Cabalists insisted that they were orthodox monotheists but that their understanding of the divine unity was more profound and mystical than that of the orthodox. The goal of the early Cabalists was mystical communion (*devekuth*) with God through intense concentration at prayer and the meditation of the mystery of the *Sefirot.* The classical work of Spanish Cabalism is the *Zohar* (composed by Moses de León toward the end of the 13th century), a book which is remarkable for the audacity with which it uses mythical language and uninhibited erotic symbolism in the presentation of its mystical teachings.

In spite of its spread to other countries, Cabala remained limited to a spiritual elite until the 16th century. The expulsion of the Jews from Spain (1492), unlike the terrible massacres perpetrated by the crusaders on their way to the Holy Land, aroused acute messianic longings in the masses and general interest shifted to the cabalistic doctrine of redemption. Safed (Safad) in Galilee became the centre of the great cabalistic revival in the 16th century and the scene of the activity of such men as Joseph Qaro (author of *Shulhan 'Arukh,* the standard code of Jewish law), Moses Cordovero (the most profound speculative thinker of Cabala, whose formula, "God is all reality but not all reality is God," distinguishes cabalistic mysticism from pantheism) and Isaac Luria, known as the Holy Lion. Luria's system, which represents an amazing upsurge of Gnostic mythology, affected Jewish piety for generations to come. The starting point of this system was the doctrine or myth of a primeval catastrophe (the "breaking of the vessels," *shevirat ha-kelim*) after the initial divine act of *tsimtsum* ("retraction"); its central theme was the conception of *tikkun* ("restoration") as the true mystical essence of the history of salvation. In this process of salvation (*i.e.,* of history) Israel co-operates with God, who thus becomes a kind of redeemed redeemer as also known in some Gnostic systems. This notion of a mystical calling to promote the cosmic *tikkun* lent a new sense of urgency to a cabalistic-messianic activism designed to bring about redemption and the advent of the Messiah. (*See* also CABALA.)

The cabalistic revival produced a wave of ascetic piety, new ceremonies, liturgical innovations and a host of mystical meditations and disciplines. After the massacre of countless Jews in 1648 during the rebellion of the Cossack Bohdan Chmielnicki against Polish landowners, the messianic tension exploded in the movement connected with the Turkish Cabalist Sabbatai Zebi (*q.v.*).

Throughout Israel's exile the unending sequence of oppression, persecution, humiliation and massacre had kept alive messianic hope, which in almost every generation had produced messianic movements and messianic pretenders. As a rule, however, these movements were local only and oblivion followed their failure. In the case of the pretended Messiah Sabbatai Zebi, however, the movement conquered almost the whole of Jewry, and when he apostatized to Islam a minority continued to persevere in their faith, justifying it in terms of a paradoxical cabalistic theology. The Messiah (and, according to some, also his followers) had to descend to the sphere of sin in order to fulfill his redeeming mission. Mystical paradox led to antinomianism and to a crisis for both Cabala and Messianism. Rabbinic leadership tended more and more to insist on the study and strict observance of the Law as the only legitimate public expressions of religion. The mystical answer to the Sabbataian debacle was given, in the middle of the 18th century, by the hasidic movement with its stress on mystical piety and the continuous awareness of the presence of God. But both Hasidism (*q.v.*), as developed by the Baal Shem-Tob and his successors, and rabbinic orthodoxy lived a self-enclosed life in a ghetto that was spiritual and cultural as well as political and social and that was growing more and more out of touch with changes in the cultural climate outside the ghetto walls. When the movement for emancipation and enlightenment gathered strength in the second half of the 18th century, it found the religious leadership of Judaism unprepared. (R. J. Z. W.)

V. MODERN PERIOD

1. Enlightenment.—The Jewish Enlightenment movement, in both western (*Aufklärung*) and eastern Europe (*Haskalah*), grew out of the impact on the previously isolated Jews, especially on the intellectuals, of the European Enlightenment and European culture in general. The movement, which aimed at westernization of Jewish thought and practices, started in the second half of the 18th century as a result of emancipation (*see* JEWS: *Modern Period: Period of Emancipation*), and came to an end in western Europe in the first decades of the 19th century, in eastern Europe around 1880.

Western Europe.—The chief spokesman of the west European Jewish Enlightenment was Moses Mendelssohn (*q.v.*), who, in his *Jerusalem, oder über religiöse Macht und Judentum* (1783–87), defined Judaism as a system of ceremonial and ritual laws based on divine revelation, in contradistinction to religious truths (such as the goodness of God or the immortality of the soul) and the moral law, which are based on reason and are universally valid. Such an interpretation of Judaism (reminiscent of Spinoza's definition in his *Tractatus theologico-politicus,* 1670) left the field open for serious consideration, on the part of the modern Jew, of philosophical and cultural factors common to all educated Europeans. Judaism was no longer to be a divisive force; Enlightenment

pointed the way to a common European civilization grounded in the ideals of reason, morality, tolerance and peace. Mendelssohn's insistence on the binding force of the revealed ritual law failed to convince the adherents of Enlightenment; the general effect of the theory of Enlightenment in fact was an ever-stronger secularization of Jewish thinking.

Mendelssohn's translation of the Old Testament into German (the first volume appeared in 1780), the first of its kind, helped the followers of the Enlightenment to spread the use of the correct and elegant German style and to overcome the Judaeo-German idiom (Yiddish, as it later was called), a reminder of the ghetto. In addition, the attention accorded the Bible was intended to counteract the traditional study of the Talmud, the main subject of pre-Enlightenment Jewish education.

The educational aims of Jewish Enlightenment (conceived under the influence of Rousseau's *Émile*) were served by such newly established institutions as the Free school, founded by David Friedländer in Berlin (1778), and the Philanthropin in Frankfurt am Main (1804), in which the traditional training in the classic Hebrew texts was replaced by instruction in modern languages and mathematics, lessons in citizenship, instruction in ethics and good manners and a liberalized introduction to the Bible and the tenets of Judaism.

In the early Enlightenment period, the Hebrew language, purified of its postbiblical stylistic characteristics, was the medium of communication. From 1784 to 1811, the followers of Mendelssohn published *Ha-Me'assef* ("The Gleaner"), the first important modern periodical in Hebrew, which preached brotherhood of man and fought religious fanaticism. It was soon realized, however, that the German language offered greater opportunities than Hebrew did. *Sulamith,* "a periodical for the advancement of culture and humanism in the Jewish nation," patterned after *Ha-Me'assef,* appeared from 1806 to 1848; in 1810 the term "Jewish nation" in its subtitle was replaced by "Israelites." Edited by David Fränkel, this periodical advocated religious, educational and occupational reforms. Some Berlin advocates of Enlightenment, led by Moses Mendelssohn's son Joseph and Isaac Euchel, formed in 1791 the Gesellschaft der Freunde, to "seek the truth, to love the beautiful, to will the good, to do one's best." A synthesis between enlightened Judaism and Europeanism was the objective of the Verein für die Cultur und Wissenschaft der Juden, founded in 1819 in Berlin by the jurist and Hegelian philosopher Eduard Gans, Moses Moser and the historian of Jewish literature Leopold Zunz. According to the *Verein*'s statutes, the Jews were to be "led to the level already attained by the rest of the European world," an objective that, it was believed, could best be served by a scholarly appreciation of Israel's past. The *Verein,* of which Heinrich Heine was a member, published (1822–23) the *Zeitschrift für die Wissenschaft des Judentums,* edited by Zunz. Ill equipped to achieve its aim, the association ceased to exist in 1824, and the following year both Gans and Heine accepted baptism.

After Mendelssohn's death (1786), the Jewish Enlightenment trend was represented by David Friedländer, who, rejecting as out of date the rabbinic teachings and the messianic hope, advocated merging the Jewish group with a dogma-free, rationalist form of Christianity.

Haskalah.—Haskalah, the east European form of the Enlightenment movement, started independently of the Mendelssohnian trend. Its first representatives, rooted in Jewish tradition, promoted modern methods of research and broad scientific orientation. Nachman Krochmal, author of the *More Nebukh ha-Zeman* ("Guide for the Perplexed of the Age," 1851), analyzed critically some aspects of classical Hebrew literature and was the first to outline a philosophy of Jewish history. Solomon Judah Rappoport pioneered in applying critical principles to the study of rabbinic literature and in writing literary biographies of medieval Jewish scholars. A bridge between German Jewish Enlightenment and east European *Haskalah* was formed by the Hebrew annuals *Bikkure ha-Ittim* (1820–31), *Kerem Hemed* (1833–43) and *He-Haluz* (from 1852, irregular).

The wide application and popularization of *Haskalah* was a result of the influence of English and French literature, with its faith in man's progress, and, more directly, of the influence of Moses Mendelssohn. The latter's and his collaborators' Hebrew commentary (*Biur*) on the Bible and the periodical *Ha-Me'assef* were influential in fostering rationalism, humanism, aestheticism, criticism of backwardness, and a quest for "western culture," which found expression in a modernized Hebrew literature. Isaac Baer Levinsohn, "the Russian Mendelssohn," championed secularization of Jewish education and occupational reforms. *Haskalah* followers in the Ukraine attacked the negative aspects of Hasidism. Abraham Mapu, the creator of romantic fiction in modern Hebrew, in his novels *The Love of Zion* and *The Guilt of Samaria* idealized the biblical past; *The Hypocrite* criticized the evils of ghetto existence. Mendele Mokher Sefarim ("Mendele the Itinerant Bookseller," pen name of Sholem Jacob Abramovich) created the classical short story and novel in Yiddish, the language of the masses. *Haskalah's* outstanding poet was Leon Gordon, whose epic, *The Tittle of a Yod,* was a plea for the rights of the Jewish woman; in other writings he advocated freedom from traditionalism, ceremonialism and fanaticism. The growing militancy of the enlightened intellectuals evoked bitter opposition from the orthodox and hasidic groups.

The liberal policy of the first period of Tsar Alexander II brought about a compromise between Hebraism and western culture, an aim that was served by such organizations as the Society for the Promotion of Culture Among the Jews, founded in 1863. But the radicals among the *Haskalah* intellectuals—of whom the nihilist Uri Kovner and the socialist theoretician Aaron Libermann were representative—pressed for complete integration into Russian civilization. Realization that *Haskalah* led to disintegration of Judaism moved Perez Smolenskin to oppose Mendelssohn's philosophy of Judaism; in his periodical *Ha-Shahar* ("The Dawn"; founded 1868) and his *Am Olam* ("The Eternal People") he pleaded for Jewish national regeneration in Palestine. Growing anti-Semitism in Europe, and in Russia the outbreak of pogroms that followed the violent death of Alexander II in 1881, spelled the end of *Haskalah* and gave rise to the proto-Zionist Hibbat Zion ("Love of Zion") movement (*see* ZIONISM: *The Love of Zion Movement*). The painful transition from radical Enlightenment to a renascence of Hebrew culture is best illustrated by Moses Loeb Lilienblum, author of the autobiographical *The Sins of Youth* (1876), the first *confessio* in Hebrew literature, and *The Way of Repentance* (1899).

Viewed as a whole, the Enlightenment movement represents the Jews' response to the challenge of Europe and an attempt to adjust to the "spirit of the times." This accounts for the numerous translations from European literature into Hebrew and for the dependence of many *Haskalah* writers on European models and their feeling of inferiority. The main function of Enlightenment was to serve as a transition from the isolation of traditional Judaism to such movements as religious Reform, Conservatism and nationalism on the one hand, assimilation on the other. (*See* also HEBREW LITERATURE: *Haskalah Period, 1750–1880.*)

2. Hasidism.—The term Hasidism (Hebrew *hasidut*) means piety, loving concern. Hasidic movements have arisen at various periods in Jewish history: the "early *Hasidim*" (*hasidim harishonim*) were pietist brotherhoods in Judaea in the Hellenistic period; the "German *Hasidim*" (*haside Ashkenaz*) were devout, ascetic mystics in the time of the crusades. In the 18th century eastern Europe developed a hasidic movement that popularized elements of classical Jewish mysticism (Cabala), stressed man's awareness of God, ecstatic prayer and joyous singing, and communal brotherhood; it allotted to the rabbi or *zaddik* ("the righteous one") the position of mediator between God and man, minimized the importance of talmudic study and taught that devoutness complements religious observance and that simple faith mitigates the rigid discipline of the Law.

The movement spread among the simple rural people and among those dissatisfied with the rule of the learned and the wealthy; it also attracted men disillusioned after the collapse of the extreme mystical messianic movement of Sabbataianism. There was antagonism not only between Hasidism and the traditional rabbinic leadership, which treated Hasidism as heresy, but also between

Hasidism and *Haskalah,* which considered Hasidism a backward movement and as retarding the process of Enlightenment. However, in the context of modern Judaism, Hasidism appears as a movement of religious renascence; in the philosophy of Martin Buber (*q.v.*), hasidic ideas found their way into western thought. (*See* HASIDISM.)

3. Reform.—*Synagogue Reform in Germany.*—The newly established contact of western European Jews with the thought and way of life of the western world led to a call for modernization of the traditional synagogue worship. This technical phase of religious reform, initiated by laymen, preceded a critical evaluation of Jewish theology by rabbis and religious thinkers. The reforms consisted in the replacement of Hebrew by German as the basic language of liturgy and the introduction of organ and choir, the sermon in German and the confirmation of boys and girls, replacing the traditional Bar Mitzvah (*q.v.*) of boys. The Prussian government, opposed to innovations and aroused by the strong opposition of Jewish Orthodox leaders, ordered the Berlin services of the "new sect" discontinued (1815 and 1823); hence, before resuming activity in Berlin, the reformers made progress in other German centres. In Hamburg a Reform synagogue was established in 1818 (the so-called *Hamburger Tempel*) and a branch service was instituted in Leipzig in 1820. The major change in the liturgy proper was the elimination of references to the coming of a Messiah and the rebuilding of Zion. While the reformers maintained that decorum and the adaptation of worship to a western outlook helped to counteract religious indifference and apostasy, the traditionalists saw in Reform a distortion of the classical teachings; the introduction of the organ was considered particularly objectionable. The issue of a new edition of the Reform prayer book (1841) occasioned heated polemics. By then, however, the governments had come to consider Reform a valid internal development of Judaism, expressive of and concomitant with emancipation. The Hamburg example was followed in England at the West London Synagogue of British Jews (1840).

Other centres of Reform arose in Vienna, Prague, Frankfurt am Main and Berlin. The Frankfurt Verein der Reformfreunde (1842) pressed for radical changes in religious belief and practice; in Berlin, where the prohibition of 1823 was forgotten, the progressive trend led to the establishment of a congregation (1845) that was independent of the communal organization. Institution of Sunday worship, abolition of the segregation of the sexes and the institution of family seating in the synagogue, the practice of worshiping with uncovered heads and without the prescribed prayer shawl were some of the other reforms. As Salo W. Baron has pointed out, Protestant surroundings were conducive to Jewish reform; the intellectual climate in Catholic countries stimulated traditionalism on the one hand and indifference on the other.

Critical evaluation of Jewish religious thought from the standpoint of Reform began with the Judaic scholar and rabbi Abraham Geiger (*q.v.*), according to whom the core of Jewish religion is the prophetic doctrine of a universal knowledge of God, a universal ethic and a belief in an ultimate unification of mankind. Israel's national existence belongs to the past; modern Jewish Reform, in harmony with the liberal trend in the western world, stresses the humanist teachings of the prophets; the idea of Zion and the Hebrew language, if retained today, would obstruct the way to the prophetic goal. More extreme than Geiger was Samuel Holdheim (*q.v.*), who pleaded for a radical abrogation of rabbinic Judaism, with religious faith and ethics as sole authority, and who questioned the meaningfulness of all external ritualistic aspects of religion.

At rabbinical conferences organized by progressive rabbis and held in 1844, 1845 and 1846, attempts were made to formulate standards of doctrine and action; Messianism was interpreted as referring to the mission of Judaism to proclaim the idea of ethical monotheism; the Hebrew language was no longer considered essential to Jewish worship. The movement was compelled to resort to compromises, however, which the traditionally minded considered too radical and the radical reformers considered too timid.

In the second half of the 19th century radical Reform in Germany lost much ground; adjustment of Judaism to modern life was no longer a fighting issue; the assimilated were indifferent to any kind of reform, those committed to Judaism supported the Conservative and the neo-Orthodox trend. The older tenets of Reform were replaced by a more moderate, nonmilitant theory, known as religious Liberalism. In the larger communities Liberal synagogues with organ, choir and a mildly reformed ritual took their place next to the traditional (Conservative) houses of prayer. The Hochschule für die Wissenschaft des Judentums, established in Berlin in 1870 as an independent scholarly institute, served as a seminary for the training of Liberal rabbis; the original faculty included Abraham Geiger. In England the Reform movement led on to the foundation in 1902 of the more radical Jewish Religious union and the opening of the Liberal synagogue in London in 1911. In 1906 a union of Liberal Israelites was organized in France.

In 1912 the Association for Liberal Judaism in Germany attempted the formulation of guiding principles (*Richtlinien*) in which a distinction was made between, on the one hand, eternally valid religious truths and moral laws and, on the other, historically conditioned beliefs and religious forms, which may become subject to change. Reform and Liberalism, which appealed mainly to the well-to-do and the educated, succeeded in counteracting complete assimilation and in retarding intermarriage. The various Reform and Liberal groups established in 1926 a World Union for Progressive Judaism, in which the leading spirits were Claude Montefiore of England and Leo Baeck (*qq.v.*) of Germany.

Builders of Reform in America.—Religious reform activity found a wider field in the United States. The first Reformed Society of Israelites was established in Charleston, S.C., in 1824, following the German pattern of radical Reform, and the post-1840 emigration from Germany led to the formation of new congregations of various shades of Reform. The work of bringing a degree of uniformity into the new organizations was accomplished by Isaac Mayer Wise (*q.v.*), who emigrated to the United States in 1846 and who in 1857 issued a mildly reformed prayer book, *Minhag America* ("American Usage"), and advocated the formation of central institutions of Reform. After a prolonged struggle, Wise saw the establishment of the Union of American Hebrew Congregations (1873), the Hebrew Union college, the rabbinical seminary in Cincinnati, O. (1875), and, finally, the Central Conference of American Rabbis (1889). Wise's prayer book was replaced in 1894 by the more radically revised *Union Prayer Book for Jewish Worship.* His institution of family pews in the synagogue became a feature of Reform services.

David Einhorn and Samuel Hirsch, both German-born and participants in the rabbinical conferences in Germany, provided the theoretical foundation of American Reform. Einhorn, who was also an outspoken opponent of slavery, interpreted the Jewish messianic idea as "expressing the hope for a spiritual rebirth and the union of all men in faith and in love through the agency of Israel." His view of a universalistic Judaism considered the fall of Jerusalem to be a positive factor, facilitating the spreading of the religious spirit. Hirsch, author of *Die Religionsphilosophie der Juden* (1842), defined Judaism as the religion of a priestly nation called upon to proclaim to the world the idea of freedom, as opposed to the religion of paganism, which taught that man, dominated by the compelling laws of nature, must sin. In Jewish thought, God, being free, grants man the power to be free also. The messianic period will see the fulfillment of this universally human ideal.

The first conference of American Reform rabbis, which took place in Philadelphia in 1869, under the chairmanship of Samuel Hirsch, affirmed the universalist, humanist doctrine of Reform Judaism and the new synagogue ritual. A statement of Reform theological teachings was adopted at the Pittsburgh conference in 1885, presided over by the theologian of radical Reform, Kaufmann Kohler. The Bible was recognized as "the record of the consecration of the Jewish people to its mission as the priest of one God" and the Mosaic legislation as a system of training for that mission. However, in this age of "the approaching realization of Israel's messianic hope," the moral laws of the Bible alone were binding. As a religious community Judaism aspired to a "kingdom of truth, justice and peace among all men" (*Jewish Reformer,* Jan. 15, 1886).

Internal developments and the influence of rabbis of east European background led to a modification of the extreme Reform of German-Jewish origin. The conference of Reform rabbis meeting in Columbus, O., in 1937 and outlining a Platform of Guiding Principles, defined Judaism as "the historical religious experience of the Jewish people" and the Torah, "both written and oral," as documenting "Israel's ever-growing consciousness of God and the moral law" (*Yearbook,* Central Conference of American Rabbis, vol. xlvii, p. 97; 1937), thus permitting the reaffirmation of a wider range of values, including Jewish laws and ceremonials. The anti-Zionist stand of classical Reform, repeated at Buffalo in 1917 but never binding all members, also ceased to be characteristic; some prominent Zionist leaders (including Stephen S. Wise and Abba Hillel Silver) have been Reform rabbis.

Stephen S. Wise (*q.v.*) established in 1922 the Jewish Institute of Religion for the training of Reform rabbis and for disseminating "constructive knowledge of Judaism"; in 1950 the institute merged with the Hebrew Union college.

Classical Reform, disavowing all vestiges and symbols of Jewish nationalism, is championed by the minority American Council for Judaism, which considers Judaism to be solely a religious faith and promotes the total integration of Jews into American culture. In its Statement of Principles (1943) it repudiated "any residual, particularistic loyalties of the Jewish people."

4. Conservative Judaism.—The "positive-historical" school of thought, later termed Conservative, arose in Germany as a countermovement to Reform. Zacharias Frankel (*q.v.*), participant in the rabbinical conference of 1845, founded the movement for the conservation of the essential aspects of traditional Judaism while maintaining a measure of freedom in the interpretation of Jewish doctrine; preservation and progress were to be united. Understanding of the historical evolution of Judaism, according to Frankel, necessitates an objective study of the Jewish past along the lines of *Wissenschaft des Judentums,* established in western Europe by Leopold Zunz and further developed by Frankel and Heinrich Graetz, author of the monumental *Geschichte der Juden.* Frankel accepted reforms only if they were justified by the preponderant will of the people, by demonstrated roots in history and by the evidence of objective scholarship. He established the *Monatsschrift für die Geschichte und Wissenschaft des Judentums* (1851–1939) and directed the Jüdisch-theologische Seminar in Breslau, founded in 1854 for the cultivation of the historical approach to Judaism and for the training of Conservative rabbis. A similar but not identical trend was followed by Jews' college, the rabbinical seminary in London (opened in 1856), whose scholars included Israel Abrahams, cofounder with Claude Montefiore of the *Jewish Quarterly Review* (1888), Adolf Büchler and Isidore Epstein. Somewhat later historical scholarship was represented by Alexander Altmann and Cecil Roth.

The United States centre of the Conservative movement, the Jewish Theological Seminary of America, was founded in 1886 in an attempt to counteract the ideology of Reform. But it was Solomon Schechter (*q.v.*), called (1902) from England to reorganize the seminary, who gave the Conservative movement in America its direction. His doctrine of Catholic Israel formulated the unity of present-day Judaism with the Judaism of the past. Cultivation of this continuity makes it possible to sustain divergencies of opinion; absence of a rigid system of hierarchical organization is compensated for by a more valid authority—the consent of the Jewish people through the ages. Ceaseless study is required in order to maintain a total view of the historic tradition and to understand what is vital to Judaism.

This broad platform enabled the Conservative movement to occupy the mediating position between the extremes of Orthodoxy and Reform; to accept the Torah as binding without subscribing to dogmatic legalism; and to understand the Law (*halaka*) as a living force that may undergo organic change.

The Conservative movement in the United States and Canada is represented by the United Synagogue of America (founded in 1913) and by the Rabbinical Assembly of America. Its scholars and thinkers include the Talmudists Louis Ginzberg and Hayim Tchernovitz, the bibliographer Alexander Marx, the talmudic scholars Louis Finkelstein and Saul Lieberman, the medievalists Israel Davidson and Shalom Spiegel and the theologian Abraham J. Heschel. Heschel, whose teaching (*God in Search of Man,* 1955) has been termed neohasidic and who calls his method depth theology, interprets Judaism as living in a holy dimension and as a communion with God through the performance of sacred acts. Life is the partnership of God and man; God is in search of man; faith is a response to God's question. Jacob B. Agus, the main theoretician of the American branch of the movement, in *Guideposts in Modern Judaism* (1954) tried to restore the balance of God, Israel and Torah, basic to classical Judaism but upset by both modern Orthodoxy and Reform. There is a continual polar tension within both religion and nationalism, the blend of which constitutes Judaism. However, central to all aspects of Judaism is God and man's relation to him.

From the Conservative movement branched Reconstructionism, founded by Mordecai M. Kaplan (*q.v.*). Basic to Reconstructionism is the concept of Jewish peoplehood around which revolve its creations, Torah and the God-idea. God is "the force or process that makes for man's salvation." Jewish laws and rituals are to be retained only if they foster loyalty to the Jewish people and contribute to personal self-fulfillment. Kaplan founded (1922) the Society for the Advancement of Judaism, out of which developed the Reconstructionist foundation and the biweekly *Reconstructionist* (1935 ff.).

5. Orthodoxy.—Modern Orthodoxy is the most determined guardian of the body of Jewish classical tradition and of rigid standards of religious observance. As a movement it is the least concerned with the impact of western civilization on the religious and intellectual life of the Jews. However, the growing influence of Hasidism on the one hand and of *Haskalah,* Reform and nonreligious Zionism on the other prompted Orthodox leaders to formulate their aims. Hayyim of Volozhin (Lithuania), a disciple of Elijah ben Solomon, the Vilna *gaon,* and author of *Nefesh ha-Hayyim* ("Spirit of Life"), maintained that the sole means of reaching the transcendent God (God's immanence in the world being beyond human comprehension) is the Word of God as revealed in the Torah, written and oral. Study and observance of the Law have cosmic significance; it provides the spiritual justification for the existence of the universe. This view gave direction to the *yeshiba* of Volozhin, founded in 1803, which became the largest centre of Jewish learning in Russia.

An effort to strengthen inner piety without recourse to the social instruments of Hasidism was made by Israel Lipkin (later called Israel Salanter), founder of the *Musar* (ethical) movement in Lithuania. *Musar* cultivated austere piety; meditation upon the nature of God and the destiny of man; composed self-control and inner tranquility in which "all perfection is included"; fear of God; and loving consideration for one's neighbour—ends that were to be achieved by constant self-examination and a daily period of study of religious-ethical books. The movement penetrated the talmudic academies in Slobodka, Kelm and elsewhere.

In Frankfurt am Main, Samson Raphael Hirsch (*q.v.*) created the pattern of a modern, neo-Orthodox community (*Trennungs-Orthodoxie*) that could withstand the challenge of Reform; his example was followed in Mainz, Darmstadt and Berlin. His program may be interpreted as an attempt to combine strict observance of the Law and Jewish learning with general education and the aesthetic elements of modern culture. The Rabbinerseminar in Berlin, founded in 1873, trained modern Orthodox rabbis and scholars for western European countries.

A blend of Orthodoxy and mysticism is represented by the chief rabbi of mandated Palestine, Abraham Isaac Kook (*q.v.*), author of *Orot ha-Kodesh* ("Lights of Holiness"). Kook taught that man's separation from God is not an objective fact but a consequence of the state of man's "forgetfulness" of his higher existence, a forgetfulness occasioned by Adam's sin. Repentance—to be achieved through Torah—can restore man's original unity with the divine. Kook spiritualized Zionism, maintaining that there was a mystic connection between the soul of the Jews and the Holy Land. His mysticism, though it was derived from Cabala, stressed the inner, creative "currents of holiness" within the substance of

things; it is with their dynamic substratum of existence that the mystic establishes contact in his states of illumination. All who help to "perfect the world" are instruments of this divine current; hence Kook's concept of the Jew and of the mystic included both the ascetic pietist and the atheistic pioneer.

The most eminent advocate of Orthodoxy in America has been the Talmudist Joseph Baer Soloveichik, who reformulated the objective, impersonal character of religious Law (*halaka*) through which the element of eternity is introduced into the realm of time. His doctrine stresses the transcendental character of Torah and denies the relevance of religious emotion. Important centres of United States Orthodoxy are Yeshiva university in New York city, which grew out of a theological seminary founded in 1896, and the Union of Orthodox Jewish Congregations. The rabbis of the Orthodox movement are affiliated with the Rabbinical Council of America (1923), the Union of Orthodox Rabbis of the United States and Canada (1902) or the Rabbinical Alliance of America (1944).

6. Religious Philosophers.—Some Jewish theologians of the modern period must be viewed outside the pattern of religious movements. Ludwig Steinheim, author of *Die Offenbarung nach dem Lehrbegriff der Synagoge* (1835–65), defined religious faith as consisting of the three doctrines of God the creator, man's moral freedom and the immortality of the soul; in contradistinction to Kant, however, he held that these doctrines originate not in moral reason but in an act of divine revelation. Hermann Cohen (*q.v.*) considered religion to be at once the source, the unifying element and the goal of the three cultural processes—logic, ethics and aesthetics. He defined revelation as the origin of man's rational and ethical faculties and saw in Judaism the first but not the only faith that developed a religion based on reason. In *Das Wesen des Judentums* (1905; rev. 1922; Eng. trans., *The Essence of Judaism*, 1948), Leo Baeck (*q.v.*) interpreted Judaism as a religion completely devoid of mythology; revelation, he maintained, is concerned not with the nature of God but with the duty of man. Israel is elected to bear witness to ethical monotheism. Its function as a minority religion is to represent the force of the idea as opposed to power of numbers and worldly success. Franz Rosenzweig (*q.v.*), author of *Der Stern der Erlösung* (1921), understood reality as interaction between God, world and man in processes called creation, revelation and redemption. Revelation, the core category, transforms the pagan cosmos into the historical world and the Kingdom of God. God's love, which man experiences in the ever-renewed process of revelation, awakens in him the faculty to respond and to love in turn. Rosenzweig's Freies Jüdisches Lehrhaus in Frankfurt am Main (1920–26) was a centre of Jewish renascence in western Europe. With Martin Buber, he translated the Old Testament into German.

Martin Buber (*q.v.*) taught that authentic Judaism was to be found only where men acknowledge the presence of God in their lives (*Ich und Du*, 1923; Eng. trans., *I and Thou*, 1937); the Bible is the classical record of the dialogue between God and man. Buber stood in the forefront of the Jewish renascence in western Europe in the 1920s. Together with Leo Baeck, he led the spiritual resistance in the Hitler period, and on religious and humanistic grounds advocated an Israeli-Arab understanding. (*See* also JEWISH PHILOSOPHY: *Modern Jewish Philosophy.*) (N. N. G.)

7. Judaism in the State of Israel.—A new development of Judaism is perceptible in the state of Israel, which is also the spiritual centre of the scattered Jewish people. Restored to their historic home, and having won national independence, Jews there can live Judaism as a whole way of life, a civilization, expressed partly in social institutions based on the Bible, such as the collective village, the *kibbutz*, where everything is shared in common; partly in messianic hopes; and partly in the Hebraic literary renascence. The goal is to realize the ideal of social justice. The religious parties in Israel's political life—the strictly observant Mizrahi, whose name stands for spiritual centre, and the Fundamentalist Agudat Yisrael, who demand a theocratic state—retain for the most part the ideas and outlook of the former European communities. But a section of each of those parties believes in combining socialism with religious observance. A considerable part of the Israeli population, particularly of the younger generation, is not observant of the ritual and is not attracted to the synagogue; for them, work is worship. Martin Buber and the ethical philosopher Hugo Bergman, both Israeli residents, stress the ethical aspects of the Jewish tradition.

Israel has not yet produced a major prophet of the Return, no Zachariah or Micah, but it provides the seed-ground from which such a prophet may spring. If Israel's nationalism outwardly seems secular, beneath the surface a spiritual stirring and a faith in the fulfillment of messianic dreams are working for the integration of the mixed multitude. The head of the state has proclaimed the aim, to shape the nation in the image of the timeless ideal that first found expression in the land of Israel. From the people and the land of Israel, which gave the Bible to humanity, a fresh religious teaching may inspire the Jews and through them be given to mankind.

See also references under "Judaism" in the Index. (No. B.)

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JUDAS (JUDE), **SAINT,** the apostle of Jesus, distinguished in John xiv, 22 as "not Iscariot," in the list of apostles at Luke vi, 16 (and Acts i, 13) as "Judas of James." The latter is interpreted to mean "son of James" in some English versions of the Bible (*e.g.*, Revised Standard and New English), "brother of James" in others (as the Authorized and Douai). The "James" is probably James the Less (*see* JAMES, SAINT, the Less). Judas is probably to be identified with the Thaddaeus (or Lebbaeus, called Thaddaeus) who takes his place in the list of apostles in Mark iii, 18 (Matt. x, 3), but less probably with the Lord's "brother" Judas (Mark vi, 3; Matt. xiii, 55), author or reputed author of the Epistle of Jude. Like Simon (*q.v.*), Judas seems to have come from the party of the Zealots. Legends which first appear in the 4th century credit the pair with missionary work and martyrdom in Persia. Following this tradition, the Western Church has commemorated them together on Oct. 28 since the 8th century, when the series of feasts of apostles was completed in the Romano-Gallican service books. The Greek Orthodox Church celebrates "Judas, Apostle and Brother of the Lord" on June 19, "Thaddaeus the Apostle" on Aug. 21. The devotion to St. Jude as patron of desperate causes, on the theory that this humble and obscure apostle would have great unused powers of intercession, began in France and Germany in the late 18th century.

See also APOSTLE.

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Mensbrugghe, "The Relatives of Our Lord," in *Sobornost*, series 3, no. 11, pp. 483–494 (summer 1952). (E. R. Hy.)

JUDAS ISCARIOT (d. *c.* A.D. 30), the traitor among the 12 apostles chosen by Jesus Christ. His father, Simon, was also called Iscariot (John vi, 71; xiii, 26), a surname which is more probably a corruption of the Latin *sicarius* ("murderer," "assassin") than an indication of family origin. The name *sicarius* would then show the background of Judas' thinking: he (or his father) would have belonged to the most radical group of the anti-Roman ring among the Jews (*see* JEWISH SECTS DURING THE SECOND COMMONWEALTH: *Zealots and Sicarii*). Similarly, another apostle, Simon Zelotes, had been a member of the Zealots. Judas Iscariot held an important position among the apostles, being their treasurer (John xii, 6; xiii, 29). In the lists of the apostles in the three Synoptic Gospels he is the last named (*see* APOSTLE), though certain later Syriac lists give him the sixth place.

Judas' betrayal consisted in his disclosing the whereabouts of Jesus at night, when an arrest in the daytime might easily have caused an uproar among the Passover pilgrims in Jerusalem. He sold the information to the chief priests and elders for 30 pieces of silver. They provided an armed guard which he brought to the garden of Gethsemane, where Jesus went to pray with the other 11 apostles after the Last Supper. There he identified Jesus with a kiss, addressing him as "master." In the Gospels of Matthew and John the betrayal is explained as due to avarice (Matt. xxvi, 14–16; *cf.* John xii, 6); but this motive does not appear in the earlier tradition of Mark, and Luke ascribes it to the entrance of Satan into Judas (Mark xiv, 10–11; Luke xxii, 3–6). The real motive may perhaps be sought in the past of Judas. The Sicarii were filled with an active political messianology, and it is possible that Judas identified Jesus with the secret political Messiah; when he found himself mistaken he handed him over to the authorities.

There are variant traditions about Judas' end. According to Matt. xxvii, 3–10, he repented after seeing Jesus condemned to death, returned the 30 pieces of silver to the chief priests and elders and hanged himself. In Acts i, 18, however, he "bought a field with the reward of his wickedness; and falling headlong he burst open in the middle and all his bowels gushed out." This account must be taken to mean that he threw himself down rather than that he died by accident. In Acts the place where he died was called the place of blood, a point developed in the apocryphal gospels. According to Matthew, the Jewish authorities used the 30 pieces of silver returned by Judas to buy a field, called the Field of Blood, to be a place of burial for foreigners. Both these accounts are clearly developed from a common source which connected the death of Judas with a place of blood. They can perhaps be reconciled by suggesting that Judas took his own life by throwing himself from a rock at the burial place for foreigners called the Field of Blood.

Judas is mentioned in Papias, one of the earliest Christian authors after the New Testament. His character, betrayal and end are described in numerous legends, particularly in Coptic works. In medieval literature, from the 9th-century Old Saxon epic poem *Heliand* to the late passion plays, he is repeatedly described, frequently with the addition of grotesque traits. In the *Golden Legend* he plays the part of Oedipus. In Dante's *Inferno* he appears together with Brutus and Cassius, Julius Caesar's murderers, in the deepest chasm of hell.

In Muslim polemic literature Judas ceases to be a traitor; instead, he is said to have lied to the Jews in order to defend Jesus (who himself was not crucified). The 14th-century cosmographer Mba (al-Dimaski) even maintains that Judas assumed the likeness of Jesus and was crucified in his place. The 10th-century historian al-Tabari of Baghdad describes this as the opinion of some Christians also, which may be true, for in the fragments of the apocryphal Gospel of Judas (2nd century) there is a favourable evaluation of the traitor

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(E. Bl.)

JUDAS TREE (REDBUD), the common name for handsome shrubs or small trees of the genus *Cercis*, of the pea family (Leguminosae). It is a native of southern Europe and Asia Minor but is widely cultivated as an ornamental. In spring its flat, spreading head is covered with a profusion of purplish-pink flowers, which appear before the leaves. The flowers, which have an agreeable acid taste, are sometimes eaten mixed with salad or made into fritters. The Eurasian *C. siliquastrum* tree was frequently figured by the older herbalists. One woodcut by Castor Durante has the figure of Judas Iscariot suspended from one of the branches, illustrating the popular tradition regarding this tree. The American Judas tree or redbud (*C. canadensis*) is found in North America from southern Ontario to eastern Nebraska and southward to Florida, Texas and Mexico, and differs from the European species in its smaller size and pointed leaves. The still smaller Texas redbud (*C. reniformis*), with kidney-shaped leaves, occurs in eastern Texas and adjacent Mexico, and the shrubby California redbud (*C. occidentalis*) is found chiefly in foothills and mountains in the interior parts of the state. The Chinese Judas tree (*C. chinensis*), native to eastern Asia, with large, whitish-margined leaves, is planted as an ornamental shrub.

ROCHE

AMERICAN JUDAS TREE (CERCIS CANADENSIS)

JUDD, CHARLES HUBBARD (1873–1946), U.S. psychologist and educator, a pioneer in the use of scientific methods in the study of educational problems, was born in Bareilly, India, on Feb. 20, 1873. He went to the United States in 1879, graduated from Wesleyan university, Middletown, Conn., and in 1896 secured a Ph.D. degree from the University of Leipzig. He taught philosophy and psychology at several universities and was director of the psychological laboratory at Yale university, 1907–09. In the latter year he became director of the school of education at The University of Chicago where he also was professor and head of the department of education (1909–38) and for a period of time chairman of the department of psychology.

Judd participated in numerous educational surveys, organized and directed many research studies and edited various journals and monographs. Of special significance was the wide influence and leadership he exerted at all levels of education through his writings, addresses and work for national committees and associations. He died at Santa Barbara, Calif., on July 18, 1946.

Among Judd's published works are *Genetic Psychology for Teachers* (1903), *Psychology: General Introduction* (1907), *Psychology of High School Subjects* (1915), *Introduction to the Scientific Study of Education* (1918), *Psychology of Social Institutions* (1926), *Psychology of Secondary Education* (1927), *Education and Social Progress* (1934), *Education as Cultivation of the Higher Mental Processes* (1936) and *Educational Psychology* (1939).
(W. S. Gy.)

JUDE, EPISTLE OF SAINT, one of the catholic Epistles of the New Testament, so-called because it is addressed not to a particular group or to individuals but to Christians in general: "to those who are called, beloved in God the Father and kept for Jesus Christ." It warns against the licentious and blasphemous heretics, whose fate it predicts with examples from the Old Testament, intruding into the Christian communities, whom it exhorted to steadfastness. These heretics cannot be identified with any of the later Gnostic sects.

The author calls himself "Jude . . . brother of James," and the only brothers so named in the New Testament are the James and Jude (or Judas; *see* JUDAS, SAINT) included among the brothers

of Jesus (Mark vi, 3; Matt. xiii, 55). Ascription of the Epistle to this Jude cannot be ruled out, for it is clearly written during the second Christian generation (*cf.* Jude 3, 17), at the earliest between A.D. 70 and 80. Its good Greek and its theological language are not in favour of this ascription but if it is spurious the ascription to a relatively unknown name is hard to explain. For the relationship between this Epistle and II Peter, *see* PETER, EPISTLES OF SAINT. Jude quotes from the Assumption of Moses (Jude 9) and from I Enoch (Jude 14 ff.). Although included in the Muratorian canon (2nd century) and quoted as canonical by Clement of Alexandria and Tertullian (early 3rd century), the Epistle of Jude was classed as "disputed" by Eusebius of Caesarea (early 4th century). It was received into the scriptural canon during the 4th century. *See* also BIBLE. (W. C. v. U.)

JUDGE: *see* JUDICIARY AND COURT OFFICERS.

JUDGE ADVOCATE is, in United States and English jurisdictions, a lawyer appointed by the naval, military or air force authorities to advise courts-martial on the conduct of proceedings before them, to direct such courts in matters of law and to sum up the evidence for their guidance, having in these respects some of the same functions as a judge in criminal proceedings in relation to the jury. He is unlike a civil judge in that, whether or not he holds military rank (he usually does), a military officer is appointed to preside over the court. The main functions of a judge advocate general or, in the royal navy, the judge advocate of the fleet, are to review the proceedings of courts-martial in order to ensure that their conduct has complied with the law, and to advise the service to which he is responsible on all matters connected with courts-martial and with the administration of justice by them.

Judge Advocate General.—The judge advocate general is the chief legal officer, charged with the administration of military justice, of an army or other military establishment.

In the United States, there is a separate judge advocate general for the army, the navy and the air force. Each is a major general or officer of equivalent grade, and must be a qualified attorney with at least eight years of experience in legal duties at the time of appointment. In supervising the administration of military justice, he is assisted by personnel who serve upon courts-martial as law officers (trial judges), counsel for the accused, and trial counsel (prosecutors). Boards of review, in the nature of military appellate tribunals, are appointed by the judge advocate general. As chief attorney for the armed service, the judge advocate general is concerned with such matters as litigation in the civilian courts or claims against the government when military matters are involved. The legal staff of each of the services is under the judge advocate general; the army has a separate judge advocate general's corps of qualified attorneys who also are military officers.

In England, a civilian appointee serves as judge advocate general for the army and air force; he must have at least ten years of legal experience at the time of appointment. England also has a director of army legal services who deals with administration and who is a military officer with the grade of brigadier.

In Canada, there is one judge advocate general for all three services: the army, the navy and the air force. He is a military officer with the grade of brigadier.

Historically, the term "Judge Advocate of the Army" is found in the Articles of War of James II of England, promulgated in 1688; the British Articles of War of 1765 charged the "Judge Advocate General" with responsibility for prosecution in the name of the crown. In America a "Judge Advocate for the Army" was designated for the Continental forces in 1775, but it was not until 1862 that the permanent office of judge advocate general was created.

Judge Advocate of the Fleet.—The judge advocate of the fleet is, in England, a practising barrister appointed by the sovereign, who advises the admiralty on all matters connected with courts-martial and on any important questions respecting administration of justice under the Naval Discipline act. He does not attend courts-martial in order to act as judge advocate, and the Naval Discipline act of 1957, in contradistinction to the act which it repealed, makes no provision for his doing so. Section 55 provides for the fulfillment of the functions of judge advocate at the hearing by an officer especially appointed for the purpose. All proceedings of trials by court-martial of officers and men of the Royal Navy, excepting those where the accused pleads guilty and no evidence is taken, are referred to the judge advocate of the fleet for consideration of the legality of the charges, proceedings, findings and sentence, and he submits a memorandum on each case to the lords commissioners of the admiralty with regard to these points. He has no power to modify a sentence, a power which, like that of quashing a conviction, is reserved to the admiralty, except in the case of a death sentence, which can only be remitted by the crown.

See also COURT-MARTIAL; MILITARY LAW.

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JUDGES, BOOK OF, in the Hebrew Old Testament, is a continuation of the Book of Joshua (which it follows), and purports to cover the history of Israel during the period between the death of Joshua and the birth of Samuel. It is one of the historical books, or Former Prophets, the others being Joshua, I and II Samuel and I and II Kings. The title "Judges" (Hebrew *Shofetim*) derives from the book's designation of the leaders whose achievements it recounts. The reason for this designation may be inferred from the similarity of xii, 7, in which it is stated that "Jephthah judged Israel six years," to x, 1–5 and xii, 8–15, two lists of men who "judged Israel," of whom nothing concrete is recorded beyond the number of their sons and daughters and the cities in which they lived. These lists, it may be assumed, are derived from an official list of those who held the office of "judge of Israel" in the tribal federation which preceded the rise of the monarchy. It may be assumed, further, from xii, 7 that the name of Jephthah was included in this list. Jephthah is also the hero of the story in xi, 1–xii, 6, and the editors (*see* below) responsible for ii, 16 ff., by implication, and explicitly in the case of Samson (xv, 20; xvi, 31), applied the designation "judge" to the heroes of the other stories in the collection.

Contents and Theme.—The book may be outlined as follows (names of judges in italics):

i, 1–26:	conquest of Canaan
i, 27–ii, 5:	theological interpretation
ii, 6–iii, 6:	outline of period covered
iii, 7–11:	story of *Othniel*
iii, 12–30:	story of *Ehud*
iii, 31:	story of *Shamgar*
iv, 1–24:	story of Barak and *Deborah* (battles against Jabin and Sisera)
v, 1–31:	Song of Deborah
vi, 1–viii, 35:	story of *Gideon*
ix, 1–57:	story of Abimelech
x, 1–2:	*Tola*
x, 3–5:	*Jair*
x, 6–xii, 7:	*Jephthah*
xii, 8–10:	*Ibzan*
xii, 11–12:	*Elon*
xii, 13-15:	*Abdon*
xiii, 1–xvi, 31:	story of *Samson*
xvii, 1–xxi, 25:	appendixes
xvii, 1–xviii, 31:	relocation of the Danites and founding of their sanctuary
xix, 1–xxi, 25:	offense of Gibeah

The book opens with an account of the conquest of southern Palestine by the tribes of Judah and Simeon, and of Bethel by the house of Joseph (i, 1–26). A theological interpretation is placed upon the fact that certain districts, enumerated in i, 27–36, remained in the hands of the Canaanites: it was because of Israel's disobedience to Yahweh (ii, 1–5).

This theological interpretation of history is continued in the introductory outline of the period covered in the book (ii, 6–iii, 6), representing Israel's fluctuating fortunes as being due to their repeated lapses into idolatry, which called down upon them the vengeance of Yahweh, who delivered them over to foreign oppression. This elicited repentance, and a judge was raised up by Yahweh to liberate them. So long as the judge lived Israel remained faithful to Yahweh, but as soon as he died the cycle of apostasy, oppression, repentance and liberation began again.

This theme recurs frequently in the chapters which follow (*e.g.*, iii, 12–15; iv, 1–3; vi, 1–10; x, 6–16), and the story of Othniel (iii, 7–11) is little more than an illustration of the working of this hypothetical cycle of events, provided by the editors who imposed this schematic pattern upon the narrative lying before them (*see* further below).

The stories of Ehud (*q.v.*), Barak, Gideon (*q.v.*), Jephthah (*q.v.*) and Samson (*q.v.*) are, on the other hand, based upon local traditions which preserve the memory of historical events. Although in the present form of the narrative these worthies are represented as national leaders, even a cursory examination of the stories themselves makes it clear that, except in the case of Barak, they were in fact tribal heroes and their exploits had little direct effect upon the fortunes of Israel outside their respective tribes.

The story of Ehud the Benjamite (iii, 12–30) is a weaving together of two earlier accounts of how he killed the king of Moab. The story of Barak of Naphtali (ch. iv) is composed of accounts of two separate battles, one against Jabin of Hazor, in which only Zebulon and Naphtali were involved, and the other against Sisera of Harosheth-ha-goiim, in which a number of other tribes participated. It is the latter victory which is commemorated in the so-called Song of Deborah (ch. v), one of the oldest surviving pieces of Hebrew literature (*see* DEBORAH).

The original nucleus of the story of Gideon the Manassite (vi, 1–viii, 35) is preserved in viii, 4–21, telling of his personal exaction of blood-revenge upon two Midianite chieftains who had killed his brothers in a raid on Tabor. An account of this raid must originally have preceded this brief narrative, but it has been dropped in favour of an account of a probably subsequent attempt on the part of the Midianites to settle in Palestine and of how this was prevented by Gideon, the divinely appointed deliverer of the nation (vi, 1–viii, 3). This part of the story represents a fusion of a number of traditions of varying authenticity. The story of the victory of Jephthah the Gileadite over the Ammonites (xi, 1–xii, 6) is the result of a similar process of expansion and conflation; its nucleus also appears to have been an account of a personal feud, still detectable as underlying the pathetic narrative of the sacrifice of his daughter (xi, 30–31, 34–39).

The story of Samson the Danite (xiii–xvi) differs from the foregoing stories in that it nowhere records that he liberated his people from foreign domination but simply recounts a number of exploits which reveal him as a somewhat irresponsible character. Prefixed to this narrative is a story representing his birth as semi-miraculous, the intention of which is to affirm that his career, however dubious, had a significance for Israel. Little that is concrete is recorded of the other six judges, Shamgar (iii, 31) and the five "judges of Israel" (x, 1–5, xii, 8–15) referred to above. Their names were probably included in the record to bring the number up to 12, the number of the tribes of Israel.

The story of Abimelech (*q.v.;* ch. ix) represents him not as a judge but as an unscrupulous adventurer. In this it follows the line of one of the two variant traditions of which it is a conflation. The other tradition, possibly the more authentic, appears to have treated him as a hero who conquered Shechem only to meet his death in an attempt to bring Thebez under Israelite control. The purpose of the tale in its present form and context is to show the kind of thing that went on in the country during the periods of apostasy referred to in ii, 6–iii, 6. The same intent determined the inclusion of the two stories in xvii–xxi, as is indicated by the twice repeated indictment (xvii, 6; xxi, 25) that in those days "every man did what was right in his own eyes." The first story tells of the dubious conduct of one Micah who, having been given an image by his mother, placed it, together with an ephod and teraphim, in a shrine in his house and hired a Levite as his priest. The Levite, however, was persuaded by the Danites migrating northward to accompany them and he became the first priest of the famous sanctuary at Dan and set up Micah's image as its chief cult object (xvii–xviii). This story is like that of Abimelech, a conflation of two traditions, one of which cast no aspersions either upon the sanctuary or upon the priest who founded it, while the other regarded the affair as religiously and morally abhorrent. The other story tells of the shocking incident at Gibeah which resulted in the death of the concubine of a certain Levite, and of the near extermination of the tribe of Benjamin for their refusal to hand over the perpetrators of this outrage for execution by the tribal assembly of Israel (xix–xxi).

Preservation of the Stories.—It may be assumed that the stories of the heroes were preserved among the tribes to which they respectively belonged. Similarly that of Abimelech in its primary form must have been preserved at Shechem and that of the trek of the Danites in the sanctuary at Dan. The provenance of the Gibeah story is more difficult to determine. It may be noted, however, that it implies that the relationship between Gibeah and Jabesh-gilead, reflected in ch. xxi and again in the story of the deliverance of Jabesh-gilead by Saul of Gibeah (I Sam. xi), was morally questionable. The tale, therefore, was possibly a piece of anti-Saul propaganda; if so, it may have been preserved at Bethlehem, the home of the Levite's concubine and the birthplace of Saul's successful rival David.

The stories, originally transmitted independently, may have been put together to form a continuous narrative as early as the reign of David. To the collection, which may not have included all the stories in the present book, was prefixed the account of the conquest contained in ch. i. It was either a continuation of or a supplement to the so-called J document in the Pentateuch (*q.v.*). That the purpose of the collector was to provide an outline history of Israel from the death of Moses to the rise of the monarchy is suggested by his representation of the tribal heroes of the component stories as national leaders. The fact that the stories had been committed to writing would not prevent their further expansion, in variant forms, in the continuing oral tradition, and this new material was added to the narrative from time to time.

Date.—It was possibly during the Jewish exile in Babylon that this expanded narrative was incorporated into a history of Israel which began with the Book of Deuteronomy (perhaps in a less extensive form than it now is), and included also the books of Joshua, Samuel and Kings. The compiler of this history, having inserted such information as he wished to preserve from Judg. i at appropriate points in Joshua (*see* JOSHUA, BOOK OF), continued the narrative of Joshua with Judg. ii, 6 ff., imposing upon the material the schematic pattern of apostasy, oppression, repentance and deliverance referred to above. At a later date ch. i was restored by an editor who connected it with the preceding book of Joshua by inserting the words "after the death of Joshua" in i, 1. He thus represented the campaigns recorded in ch. i as supplementary to those in Joshua, but there can be little doubt that in its original context this account of the conquest knew nothing of the more elaborate, and perhaps less trustworthy, narrative in Joshua. Subsequent editors made further minor additions to the book to bring it to its present form, probably in the 3rd century B.C.

Historical Value.—The value of the book for the reconstruction of the early history of Israel in Palestine is considerable. Ch. i, 1–ii, 5 contains reliable information concerning the settlement of some of the tribes west of the Jordan. The stories of Ehud, Gideon and Jephthah preserve authentic memories of successful resistance to attempts by the Moabites, the Midianites and the Ammonites to force their way into Israelite territory, and from the detailed accounts of the personal exploits of these heroes something may be learned of the culture of the period and of the character of primitive Yahwism. The poem in ch. v celebrating Barak's victory over Sisera is a contemporary document of the highest importance. What factual basis there is to the Samson story it is difficult to say, the material has been so encrusted with legend, some of it deriving from the sun-god myth; it is valuable as an example of this kind of writing. The Abimelech story is certainly founded on fact, whether he was a hero or a mere adventurer. The account of the trek of the Danites and of the founding of their sanctuary has a historical kernel, whatever the authenticity of the details of the narrative. The final story in the book (xix–xxi) may represent a skilful combination of two originally independent traditions, that of the outrage at Gibeah and that of the war of the federation with Benjamin; its interest lies in its representation that it was the business of the federation to punish moral obliquity.

Finally the complex process by which the various local traditions preserved in the book were fused together and given a national significance is of great value historically, for it reflects something of the process by which the tribes of Israel achieved unity. *See* also BIBLE.

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JUDGMENTS AND DECREES. A judgment or decree is an order of a court in a legal proceeding before it, adjudicating the rights of the parties there at issue. At common law the term "decree" more specifically denominated the final order of a court of equity or admiralty or probate and divorce, while "judgment" designated the final order of a court of law; in modern usage, however, the two terms are synonymous. (*See* Rule 54, Federal Rules of Civil Procedure.)

Finality.—A final judgment is usually a prerequisite of review of a court's decision by an appellate court, thus preventing piecemeal and fragmentary appeals on interlocutory rulings. This requirement is one of judicial economy and fairness to both courts and litigants. While a preliminary judicial ruling may seem of importance when rendered, it may become of only academic significance at the termination of the court proceeding. The parties may settle their differences; the party disfavoured by the preliminary ruling may nevertheless be awarded the final judgment; or the facts may be shown at the trial to be wholly different from those the court assumed to exist for purposes of its preliminary ruling. In addition, where review is necessary much judicial effort may be saved by the hearing on one appeal of all objections pressed to the actions taken by the trial court; and it is helpful to the appellate court to be able to view the disputed ruling in the perspective of the entire case. Final judgments include orders completely terminating the action or leaving the parties with only ministerial acts to perform, orders adjudicating one complete claim in a proceeding involving multiple claims where the court finds no just reason to delay entry of judgment as to it, and certain exceptional orders involving matters of lasting significance to the parties where the value of an appeal would be negated if it were postponed to the close of the proceedings.

Effect of a Judgment.—A judgment generally operates to settle finally and authoritatively matters in dispute before a court. Judgments may be classified as *in personam*, *in rem* or *quasi in rem*. An *in personam*, or personal, judgment—the type most commonly rendered by courts—imposes a personal liability or obligation upon one or more persons to one or more other persons. This obligation may be to pay a sum of money, to perform some act or to refrain from doing an act; or the judgment may be for the party moved against, thus declaring unmeritorious the plaintiff's claim for relief. An *in rem* judgment imposes no personal liability on anyone, but adjudicates the interests of all persons in a specific thing or property in the custody of the court or otherwise subject to its jurisdiction. And the designation *quasi in rem* is used to describe a judgment which affects the interests of particular persons, rather than all persons, in a thing or property within the custody or jurisdiction of the court.

Parties to a valid personal judgment may not relitigate between themselves the validity of the claims asserted in the action in which the judgment was rendered or any issue actually litigated in that proceeding and resolved by the judgment. If the judgment upholds a claim asserted by the plaintiff against the defendant, the plaintiff's rights are said to be merged in the judgment. Within the territorial jurisdiction of the issuing court it may be directly enforced by methods discussed below; in other jurisdictions the plaintiff may obtain similar relief without relitigating the merits of his original claim by bringing an action against the defendant on the judgment. Similarly, if the judgment rejects the plaintiff's claim on its merits, it acts as a complete bar to another attempt by the plaintiff to assert that claim even where the plaintiff discovers new arguments or evidence in support of his position. Additionally, whether the judgment rendered is in favour of the plaintiff or the defendant, both parties are bound by its conclusions on all issues actually litigated between them should these same issues again arise between them in any subsequent litigation.

Valid judgments *in rem* and *quasi in rem* also bar relitigation of the interests and claims of interests in a thing or property which they adjudicate. But unless the persons asserting these interests are also personally subject to the jurisdiction of the court, they are not bound in other litigation to the resolution of issues thus made.

Validity.—Under principles of law generally accepted in the western world, and in the United States in large measure required by the federal constitution, a judgment or decree is valid and of legal effect only if the court which issued it had competence to decide the questions of law presented by the case and jurisdiction over the persons or things the judgment purports to affect. At common law, jurisdiction over a person was obtained by personal service of a writ on him by the sheriff. While variations of this basic procedure are still widely used, most jurisdictions by statute have created additional means of acquiring personal jurisdiction. Thus service may often be made personally or by mail outside the state or country in which the court sits. If service by these means is not feasible, the court may obtain personal jurisdiction of these same classes of defendants by publishing a notice of the pending litigation in specified regularly published newspapers for a prescribed period of time. Jurisdiction over property, a necessity to a valid judgment purporting to dispose of the property itself, may be obtained by attachment of the property—accomplished in the case of personal property by seizure of the property by the sheriff or other proper official of the court and in the case of realty by filing a notice of attachment at the appropriate land records office—or by one party depositing the property in the custody of the court. If the court purports to deal with the legal status of the parties before it, as, for example, in an action for divorce, it is generally required that at least one of the parties be a domiciliary of the jurisdiction in which the court is located.

Questions of a court's competence to decide a case turn in most cases on details of the particular state or country's court structure. With the exception of some questions concerning title to real property, the courts of one locality are generally competent to resolve disputes between citizens of another place or arising out of facts or occurrences which took place outside the state or country.

Generally, however, by the laws of the state itself certain of its lesser courts may not hear cases involving more than a fixed sum of money; and often probate, family law and criminal matters are handled exclusively by specialized courts.

A judgment not absolutely void, as is one lacking one of the above requisites to validity, is usually open to attack under proper procedures if the court's jurisdiction was fraudulently obtained or if the judgment was issued through a fraud on the court. Except on direct appeal, however, a judgment may not be attacked on the grounds that the court which issued it misapplied the law or misunderstood the facts. (*See* also CONFLICT OF LAWS.)

Enforcement.—In many instances the successful party to a lawsuit need take no additional measures to enforce its rights under the judgment awarded it, as, for example, where the judgment merely disposes of property in the physical custody of the court or declares the rights of the parties before it, but orders no performance of any act by any of them. Similarly, in many jurisdictions today a judgment may itself operate to transfer title to land, although at common law a court of equity could only order the party who held the title to execute a conveyance of it to the other.

Where a judgment imposes a personal obligation on one party to another, however, the latter may have occasion to resort to a variety of remedies which the law provides for the enforcement of his judgment rights. If the judgment enjoins one party to do some act (other than the payment of money) or to refrain from some course of conduct—the typical equity decree—the court has at its disposal the full range of its powers to punish for contempt, to ensure that its order will be carried out. It may fine

the recalcitrant party a fixed sum or an amount due periodically until he complies with the terms of the judgment, and it may even imprison him for either a limited time or, within broad limits of discretion, until performance is had.

Enforcement of money judgments is a more complex matter, since it is governed by numerous rules of substantive and procedural law developed out of the agelong struggle between creditor and debtor. At common law the judgment creditor could seize his debtor's chattels in satisfaction of the judgment debt by a writ of *fieri facias,* or his chattels and the profits of his land by a writ of *levari facias.* After the Statute of Westminster II in 1285, by a writ of elegit the creditor could take possession of half the debtor's lands until the judgment was satisfied from the profits of the lands or otherwise, and since the Statute of 5 Geo. II, c. 7, lands have been subject to execution for debts on a par with personalty. Additionally, the common-law judgment creditor could avail himself of several ancillary equitable remedies.

Modern means of enforcing money judgments reflect these earlier procedures. The judgment itself when properly docketed operates as a lien on all of the debtor's property and all property which he has transferred away in fraud of his creditors. Unless it is otherwise satisfied, the creditor may instruct the sheriff to levy on this property by a writ of execution and sell the debtor's interest in it at an execution sale. The judgment creditor may also garnish wages or other sums owed his debtor, compelling the debtor's debtors to pay these sums to him in satisfaction of the judgment; and as an outgrowth of earlier equitable remedies, the judgment creditor may set aside conveyances made by the debtor in fraud of his creditors, subpoena and examine the debtor and other persons for the purpose of finding property of the debtor to satisfy the judgment, enjoin actions by third persons inimical to the judgment creditor's interest in the debtor's property, and obtain the appointment of a receiver to manage the property and collect and pay over to the judgment creditor the profits from it. Since the general abolition of imprisonment for debt, the more coercive sanctions used to enforce an affirmative decree are generally no longer available for enforcing monetary judgments. In many jurisdictions, however, a judgment debtor may still be imprisoned for failure to pay alimony or support ordered by the court or even to satisfy a judgment for damages for a tort, or where he has been guilty of fraud or has refused to surrender to his creditors property subject to execution.

In most jurisdictions an unsatisfied judgment will support the above enforcement remedies only for a period of time fixed by statute. After this time has expired the judgment becomes dormant and the judgment lien expires unless resort is had to revival proceedings. The usual means of reviving a judgment at common law was by a writ of *scire facias*—a writ directing the sheriff to make it known (*scire facias*) to the judgment debtor and requiring the latter to show cause why his creditor should not have the advantage of the judgment.

Although today revival proceedings in most jurisdictions are prescribed by statute, generally they follow the basic form of the common-law procedure, with resort to these proceedings itself limited in time.

See also APPEAL; DEBTOR AND CREDITOR LAW; PRACTICE AND PROCEDURE.

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JUDICATURE ACTS: *see* COURT: *England;* PRACTICE AND PROCEDURE.

JUDICIAL ADMINISTRATION: *see* COURT: *United States.*

JUDICIAL REVIEW is the power exerted by the courts of a country to examine the actions of the legislative, executive and administrative arms of government and ensure that such actions conform to the provisions of the nation's constitution. Actions not so conforming are considered unconstitutional, *i.e.,* illegal and of no effect. The institution of judicial review is predicated upon the existence of a written constitution that is also rigid in the sense of being changeable only by some extraordinary process, usually requiring some special legislative or popular (referendal) majorities. Normally, though not invariably, judicial review is associated also with a federal constitution, involving division of legislative powers between a central government and member states or provinces, and with a bill of rights or some other system of fundamental limitations on lawmaking power.

As a constitutional practice judicial review is usually considered as having begun with the assertion by John Marshall, chief justice of the United States, in *Marbury* v. *Madison* in 1803, of the power to invalidate legislation enacted by congress. "It is a proposition too plain to be contested," Marshall then wrote, "that the constitution controls any legislative act repugnant to it; or, that the legislature may alter the constitution by an ordinary act. Between these alternatives there is no middle ground. The constitution is either a superior paramount law, unchangeable by ordinary means, or it is on a level with ordinary legislative acts, and, like other acts, is alterable when the legislature shall please to alter it. . . . It is emphatically the province and duty of the judicial department to say what the law is. . . . So if a law be in opposition to the constitution; if both the law and the constitution apply to a particular case, so that the court must either decide that case conformably to the law, disregarding the constitution; or conformably to the constitution, disregarding the law; the court must determine which of these conflicting rules governs the case. This is of the very essence of judicial duty."

Compelling as Chief Justice Marshall's logic now appears, there was in fact no express warrant for it in the actual text of the constitution. The successful assertion of the power of judicial review in *Marbury* v. *Madison* rested ultimately on the supreme court's own ruling, plus the absence of effective political challenge to it by the Jeffersonians. In fact, as Charles Evans Hughes noted in his Columbia lectures, contemporary criticism of *Marbury* v. *Madison* was directed mainly to those portions of the opinion where the court, by way of obiter dictum, declared that the justices of the peace had a right to receive their commissions. Chief Justice Marshall's expression of views on this point was particularly resented by President Jefferson. As to those parts of the chief justice's opinion that dealt with the function of the court in passing upon the validity of legislation, there was in fact some historical precedent for Marshall's action in the control exercised by the privy council, the highest tribunal of the old British colonial empire, in relation to the American colonies before 1776. To the extent that judicial review existed in the commonwealth countries as part of the working machinery of government of such countries as Canada and Australia, it was merely a historical continuation of the appellate review exercised by the privy council in bygone colonial eras of their history.

A number of the constitutions drafted in Europe and Asia after World War II incorporated judicial review in various forms: France established a constitutional committee of mixed judicial-legislative character; Germany, Italy and Japan provided more directly for special constitutional courts; India and Pakistan set up supreme courts exercising judicial review on the general U.S. and commonwealth pattern. Widespread pressures after World War II for the adoption of judicial review stemmed from a feeling, strongly influenced by U.S. constitutional ideas, that a system of constitutional checks and balances is an essential condition of democratic government. Some observers concluded that the concentration of governmental power in the executive, substantially unchecked by other agencies of government, contributed to the rise of totalitarian regimes in Germany and Japan in the era between World War I and World War II.

United States.—The history of the United States reveals a constantly changing emphasis in the role of the supreme court in relation to the co-ordinate arms of government, and also frequent divisions of opinion among the justices themselves as to the proper

functions of that court in exercising judicial review. There have also been widely changing popular attitudes toward the court and toward its individual members. As a matter of history, the severest blow to the court's public standing as an institution was probably what Charles Evans Hughes characterized as one of the court's great "self-inflicted wounds"—the Dred Scott case (1857; *q.v.*) decided on the eve of the American Civil War. In that case the court ruled that Dred Scott, a Negro, not being a citizen, could not sue in the U.S. courts, and that congress could not prohibit slavery in the territories. The decision was greeted by the anti-slavery papers in the North with derision and contempt, and bitter attacks were made upon the personal character and integrity of the judges who had joined in the opinion. Further, as Paul Freund points out, the supreme court probably had no business, in terms of strict legal procedure, in dealing with the case at all because the facts relied on to create a diversity of citizenship and so allow the case to be brought into a federal court were highly questionable and had apparently been deliberately contrived by the parties to the case. There have been, throughout the court's history, recurrent clashes between the court and executive authority—notably during Pres. Franklin D. Roosevelt's first two terms when a major political crisis arose over the court's invalidation of the main planks of the New Deal legislative program. Immediately after his landslide re-election in 1936, Roosevelt introduced his "court-packing" plan—a proposal for congressional legislation permitting the appointment of additional justices when incumbent members of the court were over 70 years of age. Since the court, as then constituted, was generally divided against the New Deal legislation by a narrow 5–4 vote, the proposed bill would have enabled Roosevelt to secure a pro-New Deal majority on the court bench. However, early in 1937 the supreme court, in a series of major decisions, began to reverse its opposition to the New Deal, the so-called "court revolution" of 1937; and since the "court-packing" plan had encountered considerable public opposition, even among President Roosevelt's strongest supporters in congress, it was allowed to lapse. Within a few years after 1937, most of the judicial opponents of Roosevelt's program had stepped down from the court, and a series of new presidential nominations soon produced a majority that was not disposed to resist the legislative program of the national government. After 1937, the changing majorities on the supreme court did in fact extend a general presumption of constitutionality to congressional legislation; only a handful of legislative measures initiated by the national government, generally only of minor significance, were invalidated by the court.

The disagreements on the supreme court after 1937 (and these disagreements were quite as frequent and as sharp as in the years immediately prior to that year) were over such questions as the proper attitude of the court toward the states and toward the activities of congressional investigatory committees, particularly concerning civil liberties questions. Some of the justices, most prominent among them Justices Hugo L. Black and William O. Douglas, contended that the court should maintain an activist position and protect interests in speech and political activity against any abridgment or limitation, particularly by state or local authority. On the other hand, a rival intellectual position, associated especially with Justice Felix Frankfurter, maintained that the justices should exercise the same general restraint in relation to state or local governmental activity as they had exercised since 1937 in the case of the national government. The Frankfurter view was that the judges should avoid any double standard and should maintain the same attitude of noninvolvement in regard to governmental action trenching on civil liberties as the court majorities after 1937 showed toward legislation trenching on property and economic interests—the doctrine of judicial self-restraint. These main competing philosophies of judicial review are, of course, not nearly so clear-cut and absolute in their application in individual cases coming before the court. Thus, although the court, in its relations to the co-ordinate arms of government, agreed after 1937 on the general principle of upholding legislation of congress, both the activists and the apostles of self-restraint united in striking down the actions of another arm of the national government—the executive—in the decision on Pres. Harry S. Truman's steel industry seizure of 1952. Again, the court was unanimous in its famous 1954 decisions ending racial segregation in the grade schools, both activists and nonactivists uniting behind Chief Justice Earl Warren's official opinion for the court though this involved, on the part of the supporters of self-restraint, a necessary repudiation of state rights in the sense of local, state determination of policy. On the other hand, a clear majority of the court refused to pursue an activist policy in favour of claimed rights of free speech and political association in cases involving the issue of internal security during the "cold war" crisis of the early 1950s. Congressional investigatory committees remained effectively free from control by the supreme court until a group of judicial decisions in the spring of 1957 when the court finally insisted on very narrowly defining the scope of permissible congressional investigations and on reaffirming the fullest availability, to witnesses before congressional committees, of the "privilege against self-incrimination" set out in the fifth amendment to the constitution.

Changing Philosophy of Law.—The disagreements among the justices of the United States supreme court, reflected in the spate of judicial opinions, both specially concurring and dissenting, filed in individual cases, are basically a product of the changing emphases in the U.S. philosophy of law since the close of the 19th century, and in particular of the fairly universal acceptance of pragmatism as the governing philosophy in U.S. constitutional interpretation. The search for an absolute meaning of the words in the constitutional text as the governing test in constitutional interpretation has tended to be abandoned, under the influence of the American legal realists' thesis that such a search is a snare and a delusion, exposing the judges to the danger that they will be governed, anyway, in their ultimate decisions, by what Justice Oliver Wendell Holmes characterized as "inarticulate major premises" (concealed judicial value preferences). Thus the way is open for a conscious judicial approach to value choice and value implementation in the deciding of cases.

In this approach, legal doctrine—the words of the constitution and past judicial decisions on the constitution—is to be treated in a purely instrumental sense, and the principle of *stare decisis* (deference to the binding force of past judicial decisions) must yield to current judicial notions of policy. This judicial viewpoint explains the very free overruling of past court decisions since 1937, for there is as yet no real agreement among the members of the court as to what the correct policy should be in individual cases. The pragmatist approach on the U.S. supreme court is primarily methodological in emphasis; though it would test the validity of particular propositions of law by their consequences in action, when applied, we are given no very adequate criteria for ultimately testing or appraising those consequences.

The proponents of judicial self-restraint would try to immunize the court from the problems of value choice by minimizing the opportunities for the court's ruling on substantive issues, insisting on very strict observance of procedural requirements by the parties to a case before the court will rule on a policy question. The judicial activists, for their part, come out ultimately to favour principles very like the tenets of 19th-century English political liberalism: intrinsically, the activists' position is not very unlike that of the pre-1937 conservative judicial majority on the court, except that, instead of sponsoring economic and property interests that now seem in some fairly general judicial disfavour, they would sponsor interests in speech and political activity—the so-called "preferred position" of the first amendment to the constitution free-speech guarantees. Of course, to the extent that the activists' position would imply that the mere identification of one interest in the complex of interests before the court, as say, an interest in speech, should conclude the judicial inquiry and automatically decide the issue, it has brought the criticism that the activists are ceasing to exercise a balancing function and are retreating from the general, post-1937, pragmatist judicial philosophy into a natural law-type, absolutist position. For, to the extent that legal pragmatism involves the balancing-of-interests approach, the judges' problem in decision making is seen as being the weighing of one or more values against other, competing values; or of deter-

mining how much weight should be given to a particular value, having regard to the particular techniques actually employed by executive or legislative authority to achieve or implement that value in that case: consideration of means used by executive or legislature thereby should shape or condition judicial approval of ends sought to be attained by executive or legislature.

Taking the court as a whole, the majority solution, since 1937, to the dilemma of judicial choice of values has tended to be a purely societal, relativist one—resolve the conflict of interests in any given case by reference to the prevailing attitudes (jural postulates) of the nation—the main thesis of the U.S. school of sociological jurisprudence led by Roscoe Pound. In this particular respect—quite as much as in its frank deference to the views of psychologists as to the effects of segregation in education upon grade-school students—Chief Justice Earl Warren's official opinion of the court in the school-segregation decisions of 1954 has been widely characterized as being "sociological jurisprudence."

Other Countries.—The main differences between the working practice of judicial review in the United States and in other countries are largely to be found in differences in dominant judicial philosophies and in dominant conceptions of the role and responsibilities of the supreme court judge. The experience of the English-speaking countries other than the United States, especially the federal countries—Canada, Australia and the Republic of India—shows, as did the experience of the United States up to 1937, some judicial favouring of economic and property interests accompanied by a firm insistence that the judges' task is a mechanical, value-neutral one, that of interpretation alone. In Canada the judicial invalidation in the 1930s of the so-called "Canadian New Deal," social and economic planning program of the Bennett Conservative government, was effected by the privy council, an imperial (essentially English) judicial tribunal sitting in London, which then had final appellate jurisdiction in relation to Canadian law. (The appeal from Canadian courts to the privy council was formally abolished by the Canadian parliament in 1949, as it was also by India and by most of the other old British dominions.) However, in the opinion of authoritative Canadian commentators, there was no reason to have expected that a purely Canadian tribunal would have decided any other way than the privy council: the invalidation of the Bennett "New Deal," in this sense, would reflect simply an innate judicial conservatism in matters of social and economic policy where they impinge on law, irrespective of national boundaries. In the case of Australia, section 92 of the federal constitution, guaranteeing freedom of "trade, commerce, and intercourse among the States," has been used by the courts as the legal basis not merely for invalidating central marketing schemes for primary products, but also (as in 1949) for invalidating such measures as the Chifley Labor government's nationalization of the private trading banks. In the Republic of India, too, in the years immediately after independence in 1949, a number of central government expropriation and land-control measures were invalidated by the courts; but the central government, taking advantage of the relative ease with which the Indian constitution can be amended on the initiative of the central government, soon moved successfully to correct these decisions by constitutional amendment. It is worth noting that these countries' legal history shows no real exposure to or acceptance of the realist-pragmatist drives prominent in the United States. Of course, the supreme courts of the various commonwealth countries are not merely constitutional courts but above all appellate tribunals for the adjudication of private law matters.

In West Germany the federal constitutional court instituted in 1951 functioned on an active basis, not merely in regard to the more traditional federal-state conflicts but also in the so-called constitutional complaints which may be initiated by private citizens complaining of violations of basic rights guaranteed by the federal constitution of 1949. After some hesitation and caution in its early years, the German court by the close of the 1950s had proceeded almost to a philosophy of judicial activism on the American model: the German court's intervention in a series of elections cases in this era vindicating the rights of certain voters and electors' groups anticipated the U.S. supreme court's decision in *Baker* v. *Carr* in 1962. The German court's decision in 1961 in the *Fernseh* (television) case involved for the first time an unqualified judicial rebuke to the Adenauer government for arbitrary executive action, recalling in some measure Chief Justice Marshall's opinion in *Marbury* v. *Madison*. It also demonstrated a certain influence of American judicial philosophy and ideas on the judicial process generally on German supreme court judges.

Concept of Judicial Function.—These dual (public law and private law) responsibilities, which largely disappeared, so far as the U.S. supreme court was concerned, with the passage of the Judiciary act in 1925 and the incidental procedural changes that converted it into essentially a public law court, have necessitated an executive attention in the commonwealth countries to prior judicial experience or sustained professional practice of law, for purposes of appointments to the bench. The rather restrictive, rigorously "professional" conception of the judicial office that has ensued among members of the supreme courts of those countries is perhaps not surprising. On the other hand, in the case of the U.S. supreme court, strict professional *expertise* has often given way, in the making of judicial appointments, to capacity to handle policy issues: the executive preference for appointing "men of affairs" to the bench in the United States—*e.g.*, such chief justices as William Howard Taft, Charles Evans Hughes, Harlan F. Stone, Fred M. Vinson and Earl Warren—stems, in some measure, from acceptance of the proposition that the criteria for supreme court decision making on such issues as school segregation and the limits of the constitutional guarantee of free speech during the cold war internal security crisis will not be very different from the policy considerations adverted to by members of the executive and legislative arms of government in resolving major political conflicts.

The unusual breadth and range of experience among the members of the U.S. supreme court explain, on the one hand, the vigour with which it has handled great social-political tension issues, and also the occasional popular charges that the court is "political" in its decisions. The answer may well be that, in constitutional law, a precise boundary line between law and politics becomes increasingly difficult or impossible to draw, and that it is the judge who insists on such a necessary dichotomy who is most likely to find (as Holmes in effect charged had been the case with the conservative majority on the court in the years before 1937) that his decision stems from "inarticulate major premises" that, because they are not fully revealed in the judge's own mind, are unlikely to be exposed to the correctives, in a democratic country, of public criticism and discussion. *See* also JURISPRUDENCE; SUPREME COURT OF THE UNITED STATES, THE.

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JUDICIAL TENURE: *see* TENURE, JUDICIAL.

JUDICIARY AND COURT OFFICERS. Despite similarities, Anglo-American judicial systems differ widely in organization and in the titles and functions assigned to different officials. Three basic divisions may be made for consideration of this subject: (1) the U.S. national judicial system, generally referred to as the federal courts; (2) the U.S. state judicial systems, which exist in each of the states as entities distinct from the federal system; and (3) the English courts and judiciary.

U.S. Federal System.—Basically, the federal system is a hierarchy of three levels. At the apex of the national judicial system is the supreme court of the United States. It is made up of nine

judges: the chief justice of the United States and eight associate justices. Their business is primarily to review decisions of state courts and lower federal courts on questions of federal law which are of national importance. Sometimes they hear cases which originate in the supreme court because such cases involve controversies between states, or because an ambassador of a foreign government is involved, but these are rare exercises of their jurisdiction. When it is necessary to hear evidence in these cases of original jurisdiction, the supreme court usually appoints a master, who hears the evidence and makes a report, on the basis of which the court renders a decision.

Each of the justices of the supreme court is authorized to sit in the lower federal courts; originally the justices did go on circuit with the lower courts, but the press of business has long since eliminated the possibility of their exercising this function. It is now an extraordinary event for a justice to sit on a lower court, at least until he retires from the court and when he may be assigned, at his own request, to service in the lower federal courts. A justice will be called upon to act individually, in chambers, on motions from time to time. Otherwise, he will perform his functions as a member of the court.

The other court officers of the highest U.S. tribunal are the clerk, who is charged with the maintenance of the office of the court, the filing of papers, the preparations of orders, etc., and the marshal of the court, who is charged with the responsibility for policing and maintaining the building in which the court sits. Theoretically, the marshal is also charged with the enforcement of the writs and orders of the supreme court, but this is a duty he is seldom called upon to perform. In addition to the staff in the clerk's and marshal's offices, each justice is authorized to have two law clerks, who serve as research staff, a secretary, and a messenger. These, however, are personal staff and do not have any status as court officers.

The second tier of the federal judiciary is made up of the U.S. courts of appeals for the 11 circuits, each circuit comprising a definite geographic area. The officers of these courts are referred to as judges rather than justices, the latter title now being reserved, in the federal system, to members of the supreme court. Usually the judges within each circuit sit in panels of three, but occasionally, because of the importance of the case, the entire membership of the court of appeals for a circuit will sit together. Basically, the work of the courts of appeals is to review judgments entered by the lower federal courts and, as prescribed by statute, to review decisions of administrative agencies. Like the supreme court, each circuit court has a clerk and, in addition, each judge has the services of a bailiff, a law clerk and a secretary.

The trial court level is made up of about 100 district courts, a district being a smaller geographical area within a circuit. Although the number of judges within each district varies widely, each of them usually sits individually and presides over trials or other initial aspects of the litigation process. There is a clerk and a marshal for each district court. The marshal, in addition to his other duties, is in charge of service of process and generally has the powers of a sheriff. The personal staff of each district judge ordinarily, but not necessarily, will include a law clerk, a secretary and a bailiff. Although most of the business of the district courts is the trial, as an original matter, of the cases allocated to the federal courts by congressional legislation, they also function, to a limited extent, as bodies for the review of decisions of certain administrative agencies.

In this latter capacity, and in other extraordinary circumstances, the court will be made up of a circuit judge and two district court judges, sitting without a jury. When these special three-judge panels are convened, review of their decisions is directly by the supreme court rather than by the appropriate circuit court.

The district courts have the service of additional judicial officials. Commissioners for the district courts serve as committing magistrates in criminal cases and are authorized to issue search warrants and arrest warrants. Referees in bankruptcy in each district act as judicial officers in the disposition of bankruptcy cases, subject to review by the district court judges. The trial courts may also make use of referees, masters, assessors, etc., who will hear evidence for the purpose of reporting to the court, or to determine its admissibility in evidence or on depositions.

Outside the regular hierarchy of the federal courts are courts charged with the disposition of cases involving specialized subject matter. These include the court of claims, which entertains suits against the United States, and which also is empowered to review judgments of the district courts in certain cases, where the suit is against the United States; the court of customs and patent appeals, the customs court, and the tax court, whose specialized functions are indicated by their titles.

State Systems.—The system within each state approximates that of the federal government, except insofar as its specialized courts have different functions to perform. The highest state court, which is an appellate court, is usually referred to as the supreme court, though some jurisdictions use different names, *e.g.*, New York and Maryland, which call their high courts the court of appeals. Most states have a two-tier system; *i.e.*, appeals from the trial courts of general jurisdiction are usually taken directly to the supreme court. Again, the names for the trial courts differ widely: in New York, they are called supreme courts and in California, they are called superior courts; in Illinois they are circuit courts.

About one-third of the states have courts of intermediate appeal, and again the names differ so that the court is referred to as the appellate division in New York and the district court of appeals in California.

Just as the names of the courts vary widely, so, too, do the titles of the judicial officers. In most states the high court members are called justices, the presiding officer being known as chief justice; in some of these all judicial personnel are referred to as justices. In others, the lower courts are staffed by judges rather than justices, in the same manner as the federal courts. In still others, as in New York and Maryland, the high court officials are called judges and the lower court title is justice.

Basically, the greatest diversity among the states occurs in their courts of special jurisdiction. Usually, the court charged with the administration of decedent's estates is a separate tribunal. In New York, this is called the surrogate's court and the presiding officer is referred to as a surrogate. In Pennsylvania, it is the orphan's court which performs this function. Usually, however, it is called the probate court. Similarly, special courts are often given jurisdiction over such matters as juvenile offenses and domestic relations problems. In some states, the criminal jurisdiction is separated from the civil, as in some counties of New York and in Pennsylvania. In the former of these the criminal court may be the court of special sessions, the court of general sessions or the county court; in the latter the terminology is court of oyer and terminer and general jail delivery or the court of quarter sessions of the peace.

Generally, the judicial officers of the state courts are known by the titles of their courts, so that a member of the high court will be referred to as a supreme court justice, of a lower court as a circuit judge, etc. In addition, the trial courts of general jurisdiction, especially in the more populated areas, have judicial officers in the nature of masters or referees to whom complicated cases are referred for purposes of taking evidence and reporting to the judge of the court to which they are attached.

In addition to trial courts of general jurisdiction, most states have local courts which entertain minor legal matters or matters peculiar to the locality. Again the names vary widely: there may be municipal courts, magistrates' courts, justices of the peace, etc. No generalization is possible in terms of description of judicial office.

Ordinarily, in the state courts, subsidiary officers are of the same nature as those associated with the federal courts. (P. B. K.)

English System.—The modern system of courts in England is based mainly on the reforms made by the Supreme Court of Judicature act, 1873, though there have been a number of subsequent amendments. The broad features of the system are (1) that civil and criminal cases are kept distinct, although some courts exercise both functions; and (2) that in most cases there is one appeal as of right (though sometimes restricted to questions of law), and a

further appeal only if leave is given.

Civil Cases.—For civil cases the trial courts consist of the high court, the county courts and certain tribunals, with appeals to the court of appeal and to the house of lords. Of the trial courts the most important is the high court, which for convenience is divided into three divisions, namely, the chancery division, the queen's bench division and the probate, divorce and admiralty division; and judges of the last two divisions, sometimes aided by senior queen's counsel, tour the country twice or three times a year, holding assizes. Each division has its own staff of judges (7, 33 and 11 respectively, each known as "Mr. Justice ——"), and specializes in the type of case appropriate to the division. The great majority of cases are tried by a judge sitting alone. Juries are unknown in the chancery division; they are very rare in the probate, divorce and admiralty division; and they are found in the queen's bench division only occasionally, usually where a litigant's reputation is at stake. The jurisdiction of the high court is unlimited and nationwide. County courts are staffed by 76 judges, each known as "His Honour Judge ——." In general, jurisdiction is limited to the area of each particular county court, and to disputes involving not more than £400, though in certain cases concerning land the jurisdiction is wider. The other tribunals from which appeal lies to the court of appeal include the lands tribunal, which has unlimited jurisdiction in many matters concerning the valuation of land; *e.g.*, if it is compulsorily acquired.

The court of appeal normally consists of the master of the rolls and 11 lords justices of appeal, sitting in four divisions of three. The house of lords, sitting in its judicial capacity, usually consists of five of the "law lords." These are the lord chancellor and the nine lords of appeal in ordinary, who are life peers, together with any former lords chancellor and any peers who hold or have held high judicial office. Appeal lies to the house of lords only with the leave of the court of appeal or house of lords.

Criminal Cases.—In criminal matters, there are two distinct lines of appeal, one to the court of criminal appeal and the other to quarter sessions or the queen's bench division, depending upon the court which tried the accused. At assizes, the central criminal court and quarter sessions, from all of which appeal lies to the court of criminal appeal, trial is by judge and jury. The most serious cases are tried at assizes or, in London, at the central criminal court (the "Old Bailey"), staffed by a high court judge and four other judges. Less serious cases are tried at quarter sessions, which are distributed throughout the country and are presided over by legally qualified chairman, deputy chairman and (in some boroughs) recorders; these are usually part-time appointments. In each case there will have been a preliminary hearing by petty sessions, which will record the evidence for the prosecution and, if a *prima facie* case is shown, commit the accused for trial. The court of criminal appeal consists of three judges of the queen's bench division, usually presided over by the lord chief justice, and varying in composition from time to time.

If the accused is tried at petty sessions, trial is by justices of the peace or a magistrate, without a jury; and the maximum sentence of imprisonment is normally six months. Most justices of the peace are unpaid and not legally qualified; a quorum is two. In London and many large cities, however, jurisdiction is exercised by a single legally qualified and paid metropolitan police magistrate or stipendiary magistrate. There are alternative rights of appeal: at quarter sessions there is a right to a complete rehearing, whereas appeal to the queen's bench divisional court (whether direct from petty sessions or from an appeal to quarter sessions) is on a point of law only. In all cases appeal to the house of lords is only on a point of law of general public importance which in the view of the court of criminal appeal or divisional court, or the house of lords, ought to be considered by the house of lords.

Subordinate Officers.—Each of the courts has a staff of subordinate officers who are responsible for a variety of matters, mainly procedural. Thus there are a number of masters, registrars and associates in the high court; each county court has a registrar; and each court of petty sessions has a clerk. In the higher courts these officers perform many independent functions.

See also COURT; APPEAL. (R. E. My.)

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JUDITH, BOOK OF. This book, which is not included in the Hebrew Bible, exists in the Septuagint Greek translation of the lost Hebrew original and in the Vulgate Latin translation made by Jerome from a shorter Aramaic version. It is classed as deuterocanonical by Orthodox and Roman Catholics, and appears in the Protestant Apocrypha (*see* APOCRYPHA, OLD TESTAMENT). As the biblical citations in the Greek version are taken from the Septuagint it is plain that the translator was making a somewhat free adaptation of his original.

The book relates that Nebuchadrezzar, king of Assyria, sent his general Holofernes on an expedition to Syro-Phoenicia. At the siege of Bethulia (a Jewish city, not mentioned elsewhere in the Bible, which has been identified with Bethel or Shechem), an Ammonite general named Achior warned Holofernes of the danger of attacking the Jews, a people supported by God. In the city itself the besieged were commanded by magistrates. A certain widow named Judith ("Jewess"), some of whose ancestors are listed in Num. xxvi, 8, 57 and Neh. xii, 12–21, left the city in pretended flight and foretold to Holofernes that he would be victorious. Invited into his tent, she cut off his head as he lay in drunken sleep and brought it in a bag to Bethulia. A Jewish victory followed.

The book is not historical: Nebuchadrezzar is called king of Assyria (instead of Babylon) and inconsistencies abound. The story is probably a Midrash with apocalyptic tendencies, an impression supported by the many later Hebrew variants of the book. Attempts have been made to find incidents in Jewish history that could have given rise to the narrative. Some scholars suggest the expedition of Artaxerxes III against the Phoenicians in 350 B.C. Others prefer an earlier occasion, for example, a revolt in the reign of Cambyses or of Darius I. A further possibility is the period of the Seleucids, for some of the later Hebrew versions refer to Seleucus and to Jerusalem as the besieged city.

The various Jewish Midrashim connect the story of Judith with the festival of Hanukkah. The Megillat Taanit, a Jewish calendar of the Maccabaean period, gives its date as "Adar 18, the day when Seleucus attacked." The Jewish literature on the theme of Judith shows that the book had a liturgical history similar to that of the Book of Esther. There are reminiscences of the Book of Judith in I Cor. x, 1–10 and in the first Epistle of Clement (lv, 4–5).

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(J. M. P. Sr.)

JUDO: *see* JU-JITSU.

JUDSON, ADONIRAM (1788–1850), U.S. Baptist missionary to Burma, translator of the Burmese Bible and author of a Burmese dictionary, was born at Malden, Mass., on Aug. 9, 1788, the son of the Rev. Adoniram and Abigail (Brown) Judson. After graduating from Brown university in 1807, he studied theology at the newly opened Andover Theological seminary, a hotbed of zeal for evangelism and philanthropy. There, too, were those former Williams college students, led by Samuel J. Mills, who in 1806 had dedicated themselves to foreign missions (*see* MISSIONS). Judson, independently, but influenced by these forces, decided to become a missionary. Encouraged by a few influential pastors and teachers, six Andover students in 1810 presented to the General Association of Massachusetts (Congregational) a petition drafted by Judson, which led to the establishment of the American Board

of Commissioners for Foreign Missions. The new board sent Judson to England to confer about affiliation with the London Missionary society. He was delayed when a French privateer captured his vessel, and growing international tensions on the eve of the War of 1812 made it desirable for the American board to act independently.

The first five missionaries were ordained for service in India at Salem, Mass., on Feb. 6, 1812, and sailed for Calcutta. Judson was accompanied by his bride, Ann (Nancy) Hasseltine (1789–1826). The Judsons, in expectation of meeting the Baptists at Serampur, made a study of baptism and were won to the Baptist viewpoint. They and Luther Rice were immersed and left the American board. Rice returned to the U.S. to rally the Baptist churches; and in 1814 there came into being the organization now called the American Baptist Foreign Mission society.

Opposed by the British East India company, the Judsons left India and in 1813 located at Rangoon, Burma. The missionary mastered the Burmese language and literature and learned Pali, the Buddhist canonical language. Translation and literary work were emphasized. Judson completed the Burmese Bible in 1834. His Burmese-English *Dictionary,* first issued in 1826 but revised repeatedly until the end of his life, continues to be regarded as standard. Judson adapted local customs to evangelism and opened his first public preaching place in 1819. Within two years he baptized 18 converts and founded a Burmese church. He established schools and trained preachers. From his pioneering there arose a Baptist Christian community of Burmese, Karens and other peoples of about 500,000. The British invasion of Burma in 1824 led to the imprisonment of Judson for two years, with extreme torture. The heroism of Ann Judson during that period became a legend. She died a few months later. Judson married second Sarah Hall Boardman (1803–45), widow of a colleague, and third the popular writer Emily Chubbuck (1817–54). He died at sea in the Indian ocean on April 12, 1850.

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JUDSON, EDWARD ZANE CARROLL (1823–1886), U.S. adventurer and writer, known by the pseudonym NED BUNTLINE, was an originator of the so-called dime novels—inexpensive sensation fiction featuring swashbuckling heroes and violence—which were popular during the later decades of the 19th century.

Judson's earlier stories were based on exploits of his own picaresque career. Born in Stamford, N.Y., on March 20, 1823, he began by going to sea as a cabin boy. He rose to the rating of midshipman, but in 1844 left the navy, reputedly to serve in the Seminole War and travel in the west. He contributed stories to the *Knickerbocker Magazine,* and in 1844 established in Cincinnati, O., the short-lived *Ned Buntline's Magazine.* After capturing two fugitives wanted for murder in Kentucky, he went to Nashville, Tenn., and founded a sensational newspaper, *Ned Buntline's Own,* which he transferred to New York after a narrow escape from a lynching while being arraigned for the killing of his supposed mistress' husband. In 1849 he led a riot at the Astor Opera house in New York city and was imprisoned for a year. In 1852 he was again under indictment, this time in St. Louis, Mo., for participation in an election riot. He became an important organizer of the Know-Nothing party (*q.v.*). A member of the Union army during the Civil War, he was dishonourably discharged in 1864. He later met William F. Cody, whom he styled "Buffalo Bill" and portrayed as the hero of a number of his dime novels. In 1871 Judson retired to Stamford, N.Y., where he continued to produce his profitable fiction, and died July 16, 1886.

His hundreds of dime novels and serials included such titles as *The Mysteries and Miseries of New York* (1848); *Ned Buntline's Life Yarn* (1848); *Stella Delorme, or The Comanche's Dream* (1860); *Red Ralph: the Ranger* (1870); *Buffalo Bill's First Trail; or Will Cody, the Pony Express Rider* (1888).

See Jay Monaghan, *The Great Rascal* (1952).

JUEL, NIELS (1629–1697), Danish admiral who raised his country's sea power to unprecedented eminence, was born of a noble family on May 8, 1629, at Christiania. He served his naval apprenticeship under Martin Tromp and Michiel De Ruyter, taking part in all the chief engagements of the Anglo-Dutch War of 1652–54. During a long indisposition at Amsterdam in 1655–56 he acquired an excellent knowledge of shipbuilding. He served during the Swedo-Danish Wars of 1658–60 and was prominent in the defense of Copenhagen against Charles X. During 15 years of peace, Juel, as admiral of the fleet and director of the royal shipyard (Holmen), improved the Danish navy, though he resented the setting of Adelaer (*q.v.*) over him in 1663. On the outbreak of the Skaane War in 1675 he served under Adelaer, but on Adelaer's death in November he was appointed to the supreme command.

Juel introduced the system of naval tactics which consists in cutting off a part of the enemy's force and concentrating the whole attack on it. He first practised this at the battle of Jasmund off Rügen (May 25, 1676) when he broke through the enemy's line in close column and cut off five of their ships. A few days later Cornelis Tromp the younger, with 17 fresh Danish and Dutch ships of the line, superseded Juel in the supreme command.

Juel took a leading part in Tromp's victory off Öland (June 1, 1676), which enabled the Danes to invade Skaane unopposed. On June 1, 1677, Juel defeated the Swedish admiral Erik Sjöblad off Möen; and on July 1, 1677, he won his greatest victory, in the Bay of Kjöge, where, with 25 ships of the line and 1,267 guns, he routed the Swedish admiral Evert Horn with 36 ships of the line and 1,800 guns. For this he was made lieutenant-admiral general. This victory crippled the Swedish navy and gave the Danes a self-confidence which enabled them to keep their Dutch allies in their proper place. In the following year Christian V gave the supreme command to Juel, who with a large fleet blockaded the Swedish ports. After the peace of Lund (Sept. 1679), Juel devoted himself to the development of the fleet. Already vice-president of the admiralty (from 1678), he became president on the death of Henrik Bielke in 1683. Juel died on April 8, 1697.

JUGGERNAUT (JAGANNATH), the form under which the Hindu god Vishnu is worshiped at Puri (Orissa), one of the most famous religious centres of India, and at Ballabhpur, a suburb of Serampur, West Bengal. The name is derived from Sanskrit, *Jagannatha,* "lord of the world." The temple at Puri (*q.v.*), built in the 12th century, stands in an enclosure with about 120 other temples, towering above them with its round-ended tower, which stands 192 ft. high and is crowned with Vishnu's flag and wheel. In the sanctuary roughhewn wooden images represent Jagannath, his brother Balabhadra and Subhadra, his sister. The god is tended with elaborate ceremony, and special servants feed, bathe and clothe him.

Legends indicate that the cult evolved from one centred on an aboriginal fetish; it is said that Jagannath's image was discovered and secretly worshiped by a Savara hillsman, or alternatively that, appearing to King Indrayumna in a dream, the god revealed the whereabouts of the wood from which his image was to be fashioned. Buddhist influence has been detected in the threefold nature of the temple image and in the most important of the numerous yearly festivals, the Rathayatra, which takes place in June or July. The image is placed in a car so heavy that the efforts of hundreds of devotees are required to move it, and dragged through deep sand to the country house of the god. The journey takes several days and thousands of pilgrims participate. Reports of these processions in the past have been much exaggerated. Human sacrifice is abhorrent to Vishnuism and would never be practised in the temple; also no vast numbers were crushed to death in the crowds, although accidents are common and occasionally a frenzied pilgrim attempts to throw himself under the car.

See N. K. Sahu (ed.), *A History of Orissa,* vol. i (1956); L. S. S. O'Malley, "Puri," *Bengal District Gazetteer* (1908).

JUGGLER, a term coming from the Latin *joculare,* "to jest," and used to describe a particular type of entertainer who specializes in balancing and in feats of dexterity in tossing and catching balls, plates, knives, etc. Its French equivalent, *jongleur,* signifies much more than just "juggling." It was applied in medieval times to the wandering minstrels, or troubadours, who went from court to court declaiming epic poetry or singing and composing songs.

At the end of the 14th century, when minstrelsy began to decline, they became *sauteurs,* or tumblers, and kept the populace amused with feats of agility and skill, including legerdemain. Much the same kind of dexterity and nimbleness is required in sleight of hand as in juggling, and books on juggling are still sometimes catalogued in libraries under "legerdemain."

Skill in throwing and catching balls and knives is not a modern innovation. Juggling was practised by the Egyptians, Greeks and Romans, and evidence of it is to be found in sculpture, coins and ancient manuscripts. If some of the records are to be believed, feats of juggling had for centuries been performed that would tax the skill even of a modern Rastelli. Comparison with these ancient records reveals that although juggling has advanced in technical perfection, the underlying principles are still the same. In an early manuscript a bear is shown standing on its hind legs and juggling with three knives, a feat that gave rise among scholars to much skepticism. In the modern Russian circus, Valentin Filatov trained a bear to lie in a *trinka* (a small cradle in which an antipode lies while juggling with his feet) and with its hind legs juggle a flaming torch at a speed few humans could equal.

In the 17th and 18th centuries, the juggler found a living in the fairs, but it was not until the 19th century that he came into his own in the circus and in the music hall. These new fields provided a unique training ground for fresh talent and before long had produced outstanding artists such as Severus Scheffer, Kara, Paul Cinquevalli and Enrico Rastelli, and the greatest of these was Rastelli. Rastelli lived for nothing but his art and he could juggle with ten separate balls, constituting in the juggling world a kind of miracle. Ball juggling is no longer popular because much the same effect can be achieved with three balls by a juggler with a sense of style as with seven or eight balls, which requires enormous concentration and practice. The modern tendency is to be more spectacular. Feats performed in Rastelli's day are now accomplished blindfolded on horseback, on a perch or high wire or, as done by Rudy Horn, on a unicycle. The advent of television gave an impetus to juggling at a time when it looked as though it was on its way out.

See R. Ingalese, *Juggling* (1921). (R. T.-St.)

JUGOSLAVIA: *see* YUGOSLAVIA.

JUGURTHA (*c.* 160–104 B.C.), king of Numidia in north Africa from 118 to 105 B.C. On the death of its greatest ruler, Massinissa, in 148 Numidia was divided between three of his sons, Micipsa, Gulussa and Mastanabal, the first being pre-eminent. Jugurtha was born about 160, an illegitimate son of Mastanabal, and was excluded from any share in the kingdom even after his father and Gulussa had predeceased Micipsa. He became so popular among the Numidians, however, that Micipsa tried to remove his influence by sending him in 134 to assist the Roman general Scipio Aemilianus Africanus at the siege of Numantia. Jugurtha turned the occasion to advantage by establishing good relations with influential members of the Roman senate. In 120, probably through pressure from his Roman friends, he was adopted by Micipsa, on whose death in 118 he shared Numidia with Micipsa's two sons Hiempsal and Adherbal, perhaps even holding the predominant position. Jealousy between the three kings, or Jugurtha's ambition to become sole ruler, soon brought conflicts; Jugurtha had Hiempsal assassinated and then attacked Adherbal. The latter fled for help to Rome (Roman approval of any change in the government of Numidia, a dependent kingdom, was essential); Jugurtha's envoys through bribery and influence obtained a senatorial decree dividing Numidia, Jugurtha taking the western half. Believing that through his influence at Rome he could act as he chose, Jugurtha again (112) attacked Adherbal and, after tricking two Roman embassies with empty assurances, took his capital, Cirta (Constantine), where he massacred a number of Italian immigrants who had fought for Adherbal.

Popular anger in Rome at this action forced the senate to declare war, but in 111 the general L. Calpurnius Bestia signed a very disadvantageous peace with him. Summoned to Rome because of another outburst of popular feeling, Jugurtha finally lost the support of his friends by procuring the assassination of Gulussa's son Massiva, a potential rival, in Rome itself. In the renewed war Jugurtha easily maintained himself against incompetent Roman generals and early in 109 forced the capitulation of a whole army under Aulus Postumius Albinus and dictated the Roman evacuation of Numidia. Antisenatorial feeling at Rome now obtained the disavowal of the terms of capitulation, a special inquiry into the actions of Jugurtha's friends and renewed war. In 109 and 108 the Roman position in Africa improved slightly under Q. Caecilius Metellus, but Jugurtha still held most of his former territory. In 107 there arrived a new consul, Gaius Marius, who owed his election and appointment in Africa to his promise of a speedy end to the war. Yet so successful was Jugurtha's guerrilla warfare that this was only achieved by the treachery of King Bocchus of Mauretania, who, encouraged by Marius' quaestor L. Cornelius Sulla, trapped and handed over his former ally to the Romans early in 105. Jugurtha was executed at Rome the following year. In vigour and resource he was a worthy grandson of Massinissa but lacked his political insight. Misled by signs of corruption in the Roman governing class, he failed to realize that there were limits beyond which Rome's satellite rulers could not go without provoking decisive intervention.

See Sallust, *War With Jugurtha;* S. Gsell, *Histoire ancienne de l'Afrique du nord,* vol. vii, pp. 123–265 (1928). (B. H. Wa.)

JUILLIARD, AUGUSTUS D. (1836–1919), U.S. banker and industrialist who bequeathed the bulk of his large fortune, estimated at many millions of dollars, for the advancement of musical education and opera production in the U.S. Born at sea on April 19, 1836, of French Protestant parents on a journey from France to the U.S., he was brought up in Ohio and became a director of several leading financial institutions. He died in New York city on April 25, 1919. With the support of the Juilliard foundation, established the following year, the Juilliard School of Music was opened in New York city in 1924 and became one of the most important U.S. schools of music. The Juilliard foundation also sponsored the publication of works by U.S. composers.

(N. Sy.)

JU-JITSU, a system of fighting without weapons. The object is to cripple or possibly kill the antagonist. The modern sport of JUDO (*see* below) is derived from it. The origins of ju-jitsu can be found in the distant days of Japanese history. The *Kojiki* (*c.* 8th century) gives an account of a fight to death between two mythical demigods. This fight is claimed by both ju-jitsu and *Sumo* (a Japanese form of wrestling [*q.v.*]), closely linked with Shintō in the past) to be the origin of all barehand fighting and wrestling systems in Japan today. The first recorded account of an organized fighting system is found in the *Konjaku monogatari* (*c.* 13th century) and was known as Yawara. Little is known about it, but it is undoubtedly of the ju-jitsu lineage.

From the middle of the 12th century to about 1600 was an age of warriors and almost continuous warfare between the many clans throughout Japan. The warrior (samurai or *bushi*) was a kept man, whose sole purpose in life was to fight for his lord. The samurai class developed and mastered the many forms of fighting —with the sword, knife, spear, bow and arrows and, lastly, with bare hands, in preparedness for an occasion when the warrior would have to fight without the aid of weapons. The samurai quickly seized upon the system of Zen (*q.v.*) when it was introduced into Japan at the end of the 12th century. The combination of the samurai's professional attitude and the moral, artistic and physical training of Zen was congenial to the development of fencing, calligraphy, archery, painting, poetry, spear fighting, drama, literature, etc. In this era of mental and physical ferment, barehanded fighting was being perfected. An early form was known as *Kumiuchi;* little is known about it except that it consisted of some forms of holds with blows from the hands and feet. The masters of these systems seldom put their methods on paper; the technique was passed on to their pupils, the best of whom in turn opened their own "schools." Secrecy was maintained, as a man's life may have depended upon his skill, and the less chance his opponent had of knowing what form the attack would take, the better were his chances of survival.

Ju-jitsu emerged as such in the 16th century, growing from the

comparatively simple *Kumiuchi*. Ju-jitsu is a name covering many systems of fighting, each "school" having its own jealously kept secret principles and specializing in particular methods against the sword, spear and knife or against another barehanded fighter. The peak of ju-jitsu was in the 17th and 18th centuries, during the period of peace enforced by the Tokugawa family, who forcibly closed off Japan from the rest of the world for about 250 years. It is a strange paradox that such fighting methods did develop during these years of comparative peace. During the middle of the 17th century, some influence came from China in the form of *Kempo*, but it is doubtful whether this greatly influenced the later development of ju-jitsu.

These comparatively tranquil centuries were shattered by the entry into Tokyo bay of U.S. Commodore M. C. Perry in 1854. During the next 50 years Japan underwent a remarkable transformation—from a completely feudal society to an industrial one.

Judo.—In this great upheaval, the samurai were officially abolished as a class, and with them the martial arts, which they alone propagated, tended to disappear. However, a man named Jigorō Kanō, who had studied in several of the ju-jitsu schools, thinking it would be a great loss if all the systems were to die out, founded, in 1882, his own "school," known as Kōdōkan Judo. As well as incorporating some principles and techniques of ju-jitsu, he made use of principles of physical education together with moral instruction. He thus made his system entirely a sport (unlike ju-jitsu, which certainly was not a sport) and, as such, it could be practised by anybody with the maximum of benefit and the minimum risk of injury.

Judo is a very fast, aggressive sport and has numerous and complicated rules (obtainable from Judo associations in various countries). Its techniques can be grouped into: (1) standing techniques (throws); and (2) groundwork techniques (holds, arm locks, and neck locks).

In a contest a win is scored by throwing the opponent (with force, intention and control) so that both his feet leave the mat, or by holding him approximately on his back, under control, for 30 seconds; a submission is obtained either by locking the elbow joint or applying pressure to the sides of the neck by means of the wrists. The duration of a contest is 5–20 minutes, depending upon the status of the match concerned. A judo contest is rather a test of skill than of endurance.

Standards of skill (for both sexes) are shown by the colour of the belt worn. These standards are divided into two main sections: *kyu* (loosely meaning "student") and *dan* ("leader"). *Kyu* and *dan* grades are subdivided again and each stage is represented by a colour. (These colours sometimes vary from country to country, although the classification is the same.) Although there is no set time limit, a rough indication of the time usually taken to reach these various standards follows; it is based on an average practice of two or three times a week. There are six *kyu* grades which are reached over a period of two to four years. The first three *kyus* (6th–4th) take three to nine months. In Japan, these first three grades are white, the remaining three being brown. The U.S. follows the Japanese system. In most countries, including Great Britain, the colours in order of ascending *kyu* from 6th to 1st are white, yellow, orange, green, blue and brown.

BY COURTESY OF MASATO TAMURA

(LEFT) SOMERSAULT OR SACRIFICE THROW: AS OPPONENT RESISTS, HIS ELBOWS ARE GRABBED AND PRESSED TOGETHER; THE LEFT FOOT IS SLID DEEP BETWEEN HIS LEGS AND WRESTLER FALLS ON HIS BACK, PLACES HIS RIGHT FOOT ON OPPONENT'S ABDOMEN AND THROWS HIM OVERHEAD. (RIGHT) DEFENSIVE STRAIGHT ARM LOCK: AS OPPONENT REACHES OR PUSHES, WRESTLER GRABS HIS WRIST, PULLS HIS ELBOW UNDER HIS OWN ARMPIT AND PUTS PRESSURE ON THE ELBOW TO FORCE RELEASE OF WEAPON

Of the 12 *dan* grades, the first five take 10–17 years (the first three, 8–12 years), and the colour is black. The 6th–8th *dans* are either black or red-and-white blocks; the 9th and 10th are red; the remaining two have never yet been achieved.

The sport of judo expanded rapidly. It was adopted by the Japanese ministry of education (in which Kanō held a leading position) for use in all schools' sports programs. All government services (armed forces, police, firemen, etc.) soon followed suit. By the 1930s it was an established part of Japanese sporting life, and to a limited degree had spread to other parts of the world. However, only after World War II did real international expansion take place. By the 1960s virtually every country in the world had its judo association affiliated to the International Judo federation with its headquarters in Tokyo. (The British Judo association was a founder member.) There are world championships as well as many other international competitions at various levels, including the Pan-American games, from 1963, and the Olympic games (for the first time in 1964). The popularity of judo has, to a large extent, rung the death knell of ju-jitsu; only in such systems as *Aikido* and *Karate* can be seen the shadows of the old ju-jitsu methods. (*Aikido* is a system of self-defense founded in the 14th century and now closely linked with judo because of their sometimes very similar basic principles. *Karate* is a system of barehanded, offensive fighting originated in the 6th century and perfected in Okinawa in the 17th. Basically the training entails severe hardening of body extremities by repeatedly striking solid materials; *e.g.*, posts, walls, sand. In this way these toughened parts became weapons which, when applied to one of the vulnerable parts of the body, are capable of maiming an opponent.

The *raison d'être* of ju-jitsu died with the samurai and the need for survival of the individual in close combat; judo takes on the task of satisfying a social need by being a sport in which both body and mind can be exercised to the full.

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JUJUBE. While this name is often applied to variously flavoured confections of gum arabic, gelatin, etc., it belongs properly to the small, spiny trees of two species of *Zizyphus*, of the buckthorn family (Rhamnaceae), and their fruit. The best jujubes are produced by varieties of the common jujube (*Z. jujuba*), the native home of which is thought to be China, where they have been extensively cultivated for at least 4,000 years. This species, reaching to 25 or 30 ft., has alternate three-veined elliptic to ovate leaves one to three inches in length. The small greenish flowers are followed by dark brown, round to oblong fruits the size of small plums, each containing white, crisp flesh and a single large, pointed stone. When processed in sirup the fruits make an excellent confection, much resembling Persian dates—hence the name "Chinese dates" by which they are sometimes known. Jujube still remains one of the five chief fruits of China. Though introduced into the United States in 1837, the jujube attracted little attention until superior varieties were obtained from China about 1906.

The Indian or cottony jujube or *ber* (*Z. mauritiana*) differs botanically from *Z. jujuba* in having leaves that are woolly beneath instead of smooth. The fruit is commonly smaller and of poorer quality. Both species are subtropical in character, thriving in hot, dry climates where winter temperatures do not go below −9.4° C. (15° F.). They are well adapted to cultivation in the southwestern U.S., where they are occasionally seen as dooryard trees.

Jujubes have not been planted commercially to any extent in the U.S., but because of their remarkable resistance to pests they show

promise for exploitation. Propagation is by means of seed, though the named Chinese varieties must be propagated vegetatively. Suckers, root cuttings and grafting are used in China; in California whip grafting on two-year-old rootstocks is recommended. The trees are precocious and prolific in fruiting, rarely failing to yield good crops. (W. Po.; X.)

JUJUY, a province in the extreme northwestern part of Argentina. Area 20,548 sq.mi. Pop. (1960) 239,783. The terrain is rugged although not unattractive and the varying altitudes exhibit a tremendous range in climate, temperature and vegetation. The eastern valleys, at less than 1,000 ft., are warm and humid. In sharp contrast are the treeless wastes of the Puna de Atacama and the cold, dry basins of the north and west at 10,000 ft., ringed by snow-capped peaks, which rise to more than 15,000 ft. in height.

Like the other northwestern Argentine provinces, Jujuy owed its early settlement and prosperity during the 16th and 17th centuries to the Spanish mines of Perú and Bolivia. The city of Jujuy, the provincial capital (pop. [1956 est.] 44,061), was founded in 1593 at the southern limit of the Humahuaca gorge, 4,127 ft. above sea level. The city and surrounding area prospered from the raising of mules and foodstuffs for the mines, and a flourishing trade was carried on across the mountains to Bolivia. The prosperity of the area declined in the 19th century as the focus of the national economy and commerce shifted to the littoral and to Buenos Aires. In the 20th century the province was linked by railroad to Bolivia and an alternate route of the Pan-American highway passed through the province from Bolivia.

At mid-20th century Jujuy was the major producer of minerals in Argentina, supplying most of the national production of zinc, lead, tin, silver and antimony as well as considerable amounts of salt, borates and gold. Efforts had been made to exploit the high-grade iron ore from the Zapla mines and a blast furnace at Palpalá had been completed, but full development was hampered by inadequate coal supplies and transportation facilities. The mountainous and arid terrain is not suited to agriculture and crops are restricted to the eastern valleys. Not much more than a tenth of the total area of the province was under cultivation in the 1960s.

Mules, asses and llamas are used extensively as pack animals and are raised in considerable numbers, as are sheep, goats and cattle. (Js. R. S.)

JUKUN (Jukon), a small tribe living on the upper Benue river in Nigeria, commonly believed to be composed of descendants of Kororofa, one of the most powerful Sudanic kingdoms in the late middle ages. The ruins of a great settlement to the northeast of the tribe's present location, on the south bank of the Benue, are said to be those of the capital of that kingdom, but the claim has not as yet been investigated by archaeologists. It is true, however, that many royal families of Nigerian tribes, such as those of the Nupe and the Igala, trace their ancestry back to this area and to the Jukun royal family.

The population is about 11,000 people who speak six separate dialects of their Kwa language. The tribe is a congeries of many smaller groups, each organized according to different principles, although the polygynous extended family seems to be the dominant social group in all. The characteristic which most marks the Jukun, however, is their complex system of offices which have both a political and a religious aspect. Such a system resembles the political organization of many African states, but the Jukun are a society of princes without subjects. The offices are also part of a priesthood which practises an involved form of religion, marked by a diurnal and annual round of ritual and sacrifice. The king, called the Aka Uku, was—until he became a member of northern Nigeria's house of chiefs in 1947—an almost perfect example of the semidivine priest-king.

See C. K. Meek, *A Sudanese Kingdom* (1931); G. P. Murdock, *Africa: Its Peoples and Their Culture History* (1959). (P. J. B.)

JULIA DOMNA (d. A.D. 217), wife of Septimius Severus (Roman emperor 193–211), was a Syrian, daughter of the hereditary high priest Bassianus at Emesa (Homs in Syria) and elder sister of Julia Maesa (*q.v.*). She gathered about her in Rome a group of philosophers and intellectuals, best known through the writings of Philostratus (*q.v.*), and while in Britain was sufficiently interested to cross-question Caledonian prisoners about their habits and beliefs. After Severus' death the murderous rancour of her two sons Caracalla and Geta culminated in the assassination of the younger by the elder in her presence (212). When Caracalla went to the wars, he left her with a considerable control of civilian administration. On the news of his murder in 217 she is said to have starved to death, either voluntarily or on the orders of the new emperor, Macrinus. (Jn. R. M.)

JULIA MAESA (d. *c.* A.D. 226), sister of Julia Domna (*q.v.*) and daughter of the hereditary high priest at Emesa (Homs) in Syria. She married the senator Julius Avitus, possibly a Gaul, by whom she had two daughters, Soaemias and Mamaea (*see* Julia Mamaea), mothers of the emperors Elagabalus and Alexander Severus respectively. When Caracalla was murdered in 217 and replaced by Macrinus, she induced the Syrian legions to declare Elagabalus (*q.v.*) emperor. But when the effeminate follies of Elagabalus threatened a speedy end to the dynasty she persuaded him to adopt his cousin Alexander. When Elagabalus was murdered, Alexander succeeded him, and Maesa retained a considerable influence till her death, about 226. (Jn. R. M.)

JULIA MAMAEA (?–235), daughter of Julia Maesa (*q.v.*) and niece of Septimius Severus, was the mother of Alexander Severus (Roman emperor 222–235). When Mamaea's nephew Elagabalus persisted in his dangerous folly (*see* Elagabalus), Maesa persuaded him to adopt Alexander as his colleague and heir. When Alexander became emperor on Elagabalus' murder, Mamaea acted as regent for her son, with the advice and control of a council of 16 senators. She dominated the boy, secured the appointment of the jurist Ulpian (*q.v.*) as praetorian prefect, and accompanied the army in the Persian campaign of 232, the failure of which is blamed on her pusillanimous interference. She is condemned by ancient writers for parsimony and excessive interference in small details of government, and was killed with her son by the soldiers in 235. (Jn. R. M.)

JULIAN (Flavius Claudius Julianus) (331–363), commonly called Julian the Apostate, Roman emperor A.D. 361–363, was born at Constantinople, the son of Julius Constantius, a half brother of Constantine the Great, and of Basilina, daughter of a prefect of Egypt. His mother died shortly after he was born, and his father was killed, along with most of the relatives of Constantine, by the troops in Constantinople in 337. His education was well begun by a eunuch called Mardonius, and about 341 he and his half brother Gallus (*q.v.*) were sent to Macellum, a remote estate in Cappadocia, not far from Caesarea (Kayseri), where they received a lonely and strictly Christian education. In 347 their cousin, the emperor Constantius II, allowed them to leave Macellum, and Julian returned to Constantinople. There he continued his education and acquired a tolerable knowledge of Latin, but was soon obliged by the suspicious emperor to retire to Nicomedia (Izmit). In 351 Gallus was elevated to the rank of *Caesar* (for explanation of this title *see* Emperor) and was appointed to rule at Antioch; and it seems to have been about this time, when he was associating with the best-known philosophers of the day, that Julian secretly abandoned Christianity. After the fall of Gallus in 354 Julian was summoned under suspicion to the court at Milan, but the empress Eusebia persuaded Constantius to send him back to the east, and he gladly took up residence at Athens, which was still a great intellectual centre. Among his fellow students there were Gregory of Nazianzus, who later published an attack upon him, and Basil of Caesarea.

In the autumn of 355 he was recalled to Milan, and on Nov. 6 Constantius presented him to the troops and proclaimed him as *Caesar*. After marrying Helena, the sister of Constantius, he set out for Gaul on Dec. 1 in order to repel the barbarian invaders of that country, who had broken across the Rhine frontier on a massive scale after the fall of the usurpers Magnentius and Silvanus. His powers were strictly limited by Constantius and he was escorted over the Alps by only 360 soldiers of poor quality. After wintering at Vienna (Vienne) he joined the main army under Marcellus in Champagne. During the summer the troops recovered Colonia Agrippina (Cologne) and other important centres, but in the following winter the Alamanni besieged Julian in Senones

(Sens). The prince defended himself vigorously, and seems now to have been given full powers of command in Gaul. In 357 he turned toward Alsace, and on Aug. 25 near Argentorate (Strasbourg) he encountered a force of Alamanni said to number 30,000. Julian's own army seems to have numbered no more than 13,000 men, but his victory over the enemy was complete: for the loss of 243 Romans he killed about 6,000 Alamanni. He followed up his victory by a raid across the Rhine and returned to winter in Lutetia (Paris), of which he writes interestingly in one of his books. In 358 he defeated the Franks in what is now Belgium, busied himself with the reconstruction of the cities on the Rhine, and launched a second raid across that river. After wintering again in Paris he arranged in 359 for the transport of grain from Britain to the Rhineland and crossed the Rhine once more. Although some Romans who were well qualified to judge thought that Julian's strategy during his Gallic campaigns was not always above criticism, his victories there were a remarkable achievement, particularly in view of the fact that his education had been of an exclusively literary and philosophical character and had provided him with no practical military knowledge or training whatever. His honest administration of Gaul brought him into conflict with some of his officials; and at the end of 359 Constantius decided to transfer to the east a number of Julian's best troops. It was feared that the emperor was preparing to overthrow Julian as he had already overthrown Gallus. Accordingly, at the beginning of 360 the troops at Paris mutinied and proclaimed Julian as *Augustus*.

After opening fruitless negotiations with Constantius, Julian raided the Franks again and then went up the Rhine to Basel, fortifying the cities as he went, and passed the winter at Vienne. On Jan. 6, 361, he attended a church service, perhaps for the last time. In the early spring he quickly raided the Alamanni once more, and then began a rapid march across Europe to engage the forces of Constantius, who was on the eastern frontier. By October he had reached Naissus (Nis), where he addressed an interesting propaganda letter to the Athenians, which is extant, and shortly afterward heard that Constantius on his way westward had died near Tarsus on Nov. 3. Julian, now sole emperor, reached Constantinople on Dec. 11. A few of Constantius' supporters were put to death, and some were exiled. The life of the palace was greatly simplified and its expenses were reduced. Julian appears to have become openly a pagan while still at Naissus, and he immediately granted freedom of worship to the pagans, while all Christian bishops exiled by Constantius, including Athanasius of Alexandria, were allowed to return to their sees. Although Julian's legislation was extensive, he made no fundamental change in the administration of the empire.

Envious of Alexander the Great, Julian wished for military glory in the east and entered Antioch on July 19, 362. Associating closely with the pagan orator Libanius (*q.v.*), he frequented the temples, multiplied his sacrifices to the gods, but failed to win much popularity with the predominantly Christian citizens. His pamphlet on his complaints against the Antiochenes, the *Misopogon* ("beard hater"), has survived. When he removed the relics of St. Babylas from the sacred grove at Daphne, near Antioch, the Antiochenes replied by burning down the temple of Apollo there (Oct. 22). On Aug. 1, 362, Julian was still recommending religious tolerance. He decided to reorganize the pagan priesthood, appointing a chief priest in each province, and his letters of instruction to these men were most detailed: he wished to equip the pagans with an organization comparable to that of the Christians. He tried to rebuild the Temple at Jerusalem, but an earthquake destroyed the work. Christian reaction to his policy sometimes took on violent forms, and the government eventually replied with a measure of persecution: Christians were forbidden to teach in the schools, certain bishops (including Athanasius) were exiled, taxes were levied on Christian clergy, preference was given to pagans in appointments to high office, etc.

On March 5, 363, Julian left Antioch and invaded the Persian empire at the head of 65,000 men. In June he was across the Tigris and under the walls of Ctesiphon; but the city was impregnable, and on June 16 Julian began the long retreat. The army suffered severely from shortage of supplies and from Persian attacks; and on June 26 the emperor was killed in a skirmish, though it was rumoured at the time that he had been struck down by a Christian in his own army. The story that his last words were "Thou hast conquered, Galilean," is not found until nearly a century after his death. He was buried at Tarsus.

The works of Julian, many of them of great literary merit and most of them revealing his deep love of Hellenic culture, are edited with an English translation by W. C. Wright in the "Loeb Series," three volumes (1913–24). The standard biography is the masterly one by J. Bidez, *La Vie de l'empereur Julien* (1930).

See also references under "Julian" in the Index. (E. A. T.)

JULIAN (incorrectly DAME JULIANA) OF NORWICH (1342–after 1416), English anchoress and mystic, probably a native of Norwich, where she spent the latter part of her life as a recluse at St. Julian's church at Carrow. In 1373, probably while still living at home, she had a serious illness terminated by a series of "imaginative" and "intellectual" visions of the passion of Christ and of the Virgin Mother, followed by interior "words" explaining the significance of the "showings." These experiences were never repeated but Julian would seem to have had further contemplative illumination as to the spiritual meaning of what she had seen. Of all this she wrote (or dictated) two versions, a shorter and a longer, the latter composed 20 or 30 years after the former. Neither the account of the "showings" nor the longer spiritual commentary has any parallel in English religious literature. Ranging, as they do, over the most profound mysteries of the Christian faith, such as the problems of predestination, the foreknowledge of God and the existence of evil, the clarity and the depth of her perception, the precision and accuracy of her theological presentation and the sincerity and beauty of the expression make of Julian's *Revelations* one of the most remarkable documents of medieval religious experience, and reveal a mind and personality of exceptional strength and charm. An English counterpart and contemporary of St. Catherine of Siena and St. Bridget of Sweden, she appears as legatee in several Norwich wills, and there is a description of a visit paid to her by Margery Kempe.

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JULIANA (1909–), queen of the Netherlands from 1948, was born on April 30, 1909, at The Hague, the only child of Queen Wilhelmina and her consort Prince Henry of Mecklenburg-Schwerin. Coming of age in 1927, she entered the council of state and began to study law at Leiden university. On Jan. 7, 1937, she married Prince Bernhard of Lippe-Biesterfeld. Of this marriage four daughters were born, Beatrix (1938), Irene (1939), Margriet (1943) and Marijke (1947).

In World War II, after the German invasion of the Netherlands (May 1940), the royal family took refuge in England. While Prince Bernhard remained with the forces in exile there, Juliana went on to Ottawa. It was in this period that she established a lasting friendship with Pres. and Mrs. Franklin D. Roosevelt.

The royal family returned to the Netherlands in the summer of 1945, on the expulsion of the Germans. Having acted as regent twice during her mother's illness (Oct.–Dec. 1947 and May–Aug. 1948), Juliana became queen on Sept. 6, 1948, after Wilhelmina's abdication. She encouraged the government in the development of welfare services. When the Republic of the United States of Indonesia became sovereign in 1949, a voluntary association between the Netherlands and Indonesia was formed with the queen as its head, but this was dissolved in 1954. On the other hand the transformation in 1954 of the formerly dependent Dutch West Indies (Surinam and the Netherlands Antilles) into self-governing members of the kingdom (*Rijk*) of the Netherlands proved successful. (F. DE J.)

JÜLICH (Fr. JULIERS), a former duchy of the Holy Roman empire, with its nucleus in the town of Jülich (in the modern West German *Land* North Rhine-Westphalia), 16 mi. N.E. of Aachen and 27 mi. W. of Cologne. Its position, dominating the "Coronation road" from the Rhine valley to Aachen, where the German kings used to be crowned, made Jülich important in the middle

ages; and its counts, as supporters of the Hohenstaufen emperors, succeeded in the early 13th century in acquiring almost all the possessions of the Rhenish Palatinate north of the Eifel mountains by a process of inheritance and infeudation. Thus they gained jurisdiction over the imperial city of Aachen and the imperial abbeys of Kornelimünster and Essen (west of the Rhine), as well as the Waldgrafschaft and the districts of Düren and Sinzig (held in pledge from the empire).

William V of Jülich, count from 1328, married Joan, daughter of William III and I of Holland and Hainaut and so became the brother-in-law both of the emperor Louis IV, who raised Jülich to a margraviate in 1336, and of Edward III of England, who made him earl of Cambridge after his mediation of an alliance between England and several German princes at the outbreak of the Hundred Years' War. A key figure in the politics of the Netherlands, he extended his territory northward and in 1356 was made duke of Jülich as William I. He also acquired the hereditary office of marshal of the empire and paved the way for the union, after his death (1361), of Jülich with the duchy of Gelre (*see* GELDERLAND) in 1371 and with Berg and Ravensberg (*see* BERG) in 1423.

The male line of the ducal house became extinct with William IV in 1511. Jülich and Berg then passed to the husband of his heiress Maria, namely John III, duke of Cleves (d. 1539). In Gelre, however, the house of Egmond had already established itself in the 15th century. On Charles of Egmond's death (1538), John's son and future successor William the Rich of Cleves-Jülich-Berg took possession of Gelre; but the marriage alliances that he made (his sister Anne was married to Henry VIII of England, he himself married Jeanne d'Albret, niece of Francis I of France and heiress of Navarre) did not save him from a disastrous war with the emperor Charles V, who made him renounce Gelre and abandon Protestantism at home and Protestant alliances abroad (treaty of Venlo, 1543). The dukes of Cleves-Jülich-Berg were directors of the Netherlands-Westphalian circle (*Kreis*) of the empire.

William the Rich died in 1592 and was succeeded by his son John William. When John William died childless on March 25, 1609, the struggle for the Cleves-Jülich-Berg succession began. The principal claims to inheritance were traced through John William's four sisters: Maria Eleonora's daughter Anna of Prussia was married to the elector of Brandenburg, John Sigismund; the second sister Anna's son was Wolfgang William of Palatinate-Neuburg; Magdalena's son was John II of Palatinate-Zweibrücken; and Sibylla was married to Charles of Burgau, son of the Habsburg archduke Ferdinand of Tirol. Apart from these claims, the elector Christian II of Saxony also advanced pretensions, based on an agreement of 1526 between his predecessor John Frederick and John III of Cleves. Before the emperor Rudolf II could reach a decision, John Sigismund and Wolfgang William came to terms for the joint occupation of the duchies (treaty of Dortmund, June 1609). Rudolf then sent the archduke Leopold to seize Jülich. This led Henry IV of France to promise support for the Protestant "Possessing princes" (John Sigismund and Wolfgang William), who could also rely on help from the Dutch, from the German Protestants and even from England. The assassination of Henry IV (May 1610) averted a major European war; but a French expedition still went to help the Possessing princes in the reduction of Jülich (September). Untroubled in their occupation of the territory, the Possessing princes then became estranged from one another. While John Sigismund adopted Calvinism and had the support of the house of Orange, Wolfgang William became a Catholic and so won the support of Spain. Eventually, however, they agreed on a partition of the government (treaty of Xanten, Nov. 12, 1614): John Sigismund got Cleves-Mark and Ravensberg, Wolfgang William got Jülich-Berg and Ravenstein. The definitive ratification of this partition did not take place till 1666, when it was decided that on the extinction of one line the other would succeed to its share of the inheritance. In 1672 the house of Brandenburg assumed the protectorate over the Protestants in Jülich-Berg and the house of Neuburg that over the Catholics in Cleves-Mark.

The constitution of the estates of Jülich-Berg received its final form between 1672 and 1675. In 1685 Wolfgang William's son Philip William became elector Palatine. Despite the efforts of the kings of Prussia to realize Brandenburg's claim under the treaty of 1666, Jülich-Berg passed to Charles Theodore of Palatinate-Sulzbach (later elector of Bavaria) when Wolfgang William's last grandson died in 1742. Taken by France in the French Revolutionary Wars, Jülich was incorporated in the Prussian Rhine province in 1815. (H. W. D.)

JULIE, GUIRLANDE DE, a collection of about 60 occasional love poems made by the marquis de Montausier and arranged under the names of 30 flowers, presented as a "garland" to Julie d'Angennes, daughter of the marquise de Rambouillet. The whole affair was called by Bishop Huet *"le chef-d'oeuvre de la galanterie."* It certainly had no great poetic merit. The poems are precious and conventional, the wit and the imagery no more than mediocre; the contributors were frequenters of the Rambouillet circle: Jean Desmarets de Saint-Sorlin, Antoine Godeau, Jean Chapelain, Valentin Conrart (whose initial has been taken to stand for Corneille), several members of the Arnauld family. The notable absentee is the one poet the Hôtel could boast, Vincent Voiture.

The project is referred to as early as Sept. 1633 but the date of completion is doubtful. A. Adam thinks that the poems were presented to the lady on New Year's day, 1634. É. Magne prefers the date of May 22, 1641. Certainly in that year a beautiful bound copy was made on vellum by the orthographer, Nicolas Jarry. It bears his name and the date, and is now said to be in the possession of the duchesse d'Uzès. Several poems have been found which seem to have been intended for the *Guirlande* but were not actually included. A printed version appeared in the *Recueil Sercy* of 1653.

The whole affair should be understood as one of the "entertainments" of the Hôtel de Rambouillet (*see* RAMBOUILLET, CATHÉRINE DE VIVONNE, Marquise de) devised to raise the tone and civilize the manners of an idle upper class. Like other such activities it had an Italian model in a *Ghirlanda della contesse Angela Bianca Beccaria,* printed at Genoa in 1595. More likely to be known to Montausier however was a group of sonnets collected by one Adrien de la Morlière under the title of *Guirlande ou chapeau de fleurs à Mme la comtesse de Saint-Pol, duchesse de Fronsac,* of which three editions appeared between 1620 and 1630.

The tone of the *Guirlande de Julie* is set by Chapelain's madrigal for the flower called *"la Couronne Imperiale"* which makes play with Julie's known admiration for Gustavus Adolphus. This had already been exploited by Voiture who had dressed up six men as Swedes bearing the king's portrait to Julie in person.

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JULIUS, the name of three popes.

ST. JULIUS I (d. 352), pope from 337 to 352, was elected successor to Marcus on Feb. 6, 337. In the Arian struggle he was the chief prop of orthodoxy; in 339 he gave refuge at Rome to Athanasius (*q.v.*), who had been deposed and expelled from the see of Alexandria by the Arians. At the Council of Sardica (342 or 343), which he convoked, Julius tried to unite the west against Arianism. The third canon of the same council declared the right of the bishop of Rome to judge cases of rightful possession of episcopal sees, thus enforcing the pope's power in ecclesiastical affairs. In Rome, Julius founded two basilicas now known as the Church of the Twelve Apostles and Sta. Maria in Trastevere. He died on April 12, 352. His feast day is April 12.

Julius' two famous letters are preserved in Athanasius' *Apology Against the Arians.* (E. G. RN.)

JULIUS II (Giuliano della Rovere) (1445–1513) was pope from 1503 to 1513. A Franciscan, made cardinal by his uncle Pope Sixtus IV, Julius was elected on Nov. 1, 1503. He was an energetic military pope who restored papal authority over the estates of the church. He made alliances to defeat the Venetians and to frustrate French ambitions in Italy. Though primarily concerned with restoring the temporal power of the papacy, he was actively interested in missions; he created new bishoprics in the West Indies and sent missionaries to India, Ethiopia and the Congo. A patron

of the arts, he laid the foundation stone of the new St. Peter's in Rome (1506). Through his efforts the papacy again became a European power of the first rank. Julius II died during the night of Feb. 20–21, 1513.

JULIUS III (Giovanni Maria Ciocchi del Monte) (1487–1555), pope from 1550 to 1555, was born at Rome on Sept. 10, 1487. He was elected pope on Feb. 7, 1550. Although a Renaissance prelate, Julius was aware of the urgent need for a reform of the church. He appointed a commission to study general questions of reform, and it recommended resumption of the Council of Trent. Julius tried to check plurality of benefices among the cardinals and to restore monastic discipline. The Collegium Germanicum, founded in 1552 for the training of German priests in Rome under the Jesuits, reflects his interest in combating Protestantism. He died March 23, 1555. (J. A. CT.)

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JULLUNDUR, a city, district and division of Punjab, India. The city lies 229 mi. N.N.W. of Delhi by rail and 93 mi. N.W. of Chandigarh by road. Pop. (1961) 222,569. It is surrounded by several suburbs known as *basties,* and there is a big cantonment three miles to the south. There are nine colleges affiliated to the Punjab university, and several offices of the Punjab government. Jullundur has become an important centre of the sports-goods industry since 1947. It is a railway junction, and is also connected by metaled roads with all the important towns of Punjab. There is an airfield nine miles to the east. Jullundur is an ancient city and was the capital of a Rajput state when Hsüan Tsang, the Chinese Buddhist traveler and scholar, visited it in the 7th century.

JULLUNDUR DISTRICT (area 1,335 sq.mi.; pop. [1961] 1,227,367) stretches from the Sutlej river in the south to the Beas river in the north. It is a flat and very fertile alluvial plain with an average annual rainfall of 25.02 in. The area under cultivation is 80% of the total and of this 56% is irrigated by the Bist Doab canal and wells. The chief crops are wheat, gram and sugar cane. Nakodar (pop. [1961] 14,452), Nawanshahr (14,097), Nurmahal (6,905), Phillaur (11,058) and Kartarpur (12,202) are the other important towns in the district.

JULLUNDUR DIVISION has an area of 17,623 sq.mi. and a population (1961) of 9,031,701. It is the biggest division of Punjab and comprises Jullundur, Hoshiarpur, Kapurthala, Kangra, Ferozepur, Ludhiana, Amritsar and Gurdaspur districts. (O. P. B.)

JULY (Lat. *Iulius*), the seventh month in the modern calendar, with 31 days. In the early Roman calendar it was the fifth month of the year, and as such was called Quintilis. In 44 B.C., the year of his death, it was renamed in honour of Julius Caesar, who was born in this month. As the anniversary of the Declaration of Independence, July 4 is the major national holiday of the United States. (F. R. WN.)

JUMALA, indicating godhead rather than a divine being; the supreme god of the ancient Finns and Lapps, among some tribes called Num or Jilibeambaertje, as protector of the flocks.

JUMET, a town of Belgium, in Hainaut province. Pop. (1961) 28,713. Jumet is a suburb of Charleroi, the large industrial centre of southern Belgium, and lies on the Charleroi-Brussels canal. World famous in the 19th century as a glass centre, Jumet sent glassmakers to the United States, where a similar and now competitive industry was founded. Mechanical construction, coal mines and glass works support the population. Jumet is also known for its *Marche de la Madeleine,* an annual event in which costumed walkers commemorate the passage of Napoleon's troops on their way to Waterloo. (R. M. AN.)

JUMIÈGES, a village of northern France, in the *département* of Seine-Maritime, 17 mi. W. of Rouen by road, is situated on a peninsula formed by a bend of the lower Seine. Pop. (1961) 345. Jumièges was a great Benedictine house, a magnificent example of Norman Romanesque architecture of the middle of the 11th century. The fine façade, flanked by two great towers, 172 ft. high, the walls of the nave and part of the central tower remain. The adjacent church of St. Pierre (14th century) occupies the site of a church of the period of Charlemagne, of which a fragment survives. The abbey was founded in 654 by St. Philibert and, after its destruction by the Normans, was rebuilt in 928 and continued till 1790. Charles VII often resided there with Agnes Sorel, who died in the monastery in 1450, and whose gravestone is preserved in a small museum. (AR. E. S.)

JUMNA (officially YAMUNA; ancient JOMANES), a river of northern India. Rising in the Himalayas in Tehri-Garhwal district, Uttar Pradesh, about 5 mi. N. of the Jamnotri hot springs, in 31° 3′ N. and 78° 30′ E., the stream first flows south, then southwest and afterward due south, receiving several small tributaries in its course. It then turns sharply to the west and is joined by the large Tons river from the north. The Jumna there emerges from the Himalayas into the valley of the Dun, and flows southwest. It then, at the 95th mi. of its course, forces its way through the Siwalik range, and debouches upon the plains of India at Faizabad (Fyzabad) in Saharanpur district. The Eastern Jumna canal (originally constructed between 1718 and 1748, abandoned and then reconstructed in the 19th century) takes its water from the river at this point and irrigates a large area of the Jumna-Ganges (Ganga) doab. From Faizabad the river flows for 65 mi. in a southwesterly direction, receiving the Maskarra stream from the east. Near Bidhauli, in Muzaffarnagar district, it turns due south for 80 mi. to Delhi city, thence southeast for 27 mi. to near Dankaur, receiving the waters of the Hindan river on the east. The Agra canal, which irrigates the county west of the river, takes its water just below Delhi. From a point just northwest of Dankaur to a point about 40 mi. to the south it forms the Punjab-Uttar Pradesh boundary. From Dankaur it resumes its southerly course for 100 mi. to Mahaban near Mathura (Muttra), where it turns east for nearly 200 mi., passing the towns of Agra, Firozabad and Etawah, receiving on its left bank the Karwannadi, and on its right the Banganga (Utanghan). From Etawah it flows 140 mi. S.E. to Hamirpur; being joined by the Sengar on its north bank, and on the south by the great Chambal river (650 mi. long) from the west, and by the Sind.

From Hamirpur the Jumna flows nearly due east, until it enters Allahabad district and passes Allahabad city, below the fort of which it falls into the Ganges. In this last part of its 860-mi. course it receives the waters of the Betwa and the Ken. Where the Jumna and Ganges unite is the Prayaga, "place of sacrifice." (*See* ALLAHABAD.)

The Jumna, after issuing from the hills, has a longer course through Uttar Pradesh than the Ganges, but is not so large nor so important; and above Agra in the hot season it dwindles to a small stream. This is partly caused by the Jumna canals. The traffic on the Jumna has never been large. Its waters are clear and blue, while those of the Ganges are yellow and muddy; the difference between the streams can be discerned for some distance below the point at which they unite. Its banks tend to be higher than those of the Ganges, as it traverses the extreme edge of the alluvial plain of northern India, and in the latter part of its course it almost touches the Bundelkhand offshoots of the Vindhya mountains. The Jumna at its source is 10,849 ft. above sea level; in the next 16 mi. it falls at the rate of 314 ft. in a mile. The catchment area of the river is 121,000 sq.mi.

The Jumna is crossed by railway bridges at Delhi, Mathura, Agra and Allahabad; road bridges are gradually replacing the old bridges of boats and ferries. (L. D. S.)

JUMPING, according to the ancient *Book of Leinster,* was one of the five track and field events of the annual Tailteann games, held at Tailtiu, County Meath, Ire., as early as 1829 B.C. It was also one of the features of the Pentathlon (*q.v.*) when it was introduced at the ancient Olympic games. Through the centuries, three types of competitive jumping evolved: the high jump, the broad (long) jump and the triple jump or hop, step and jump. Some competitions were with hand weights, some from a standing position and some with an unrestricted run. Both jumping with hand weights and standing jumps have passed from the athletic scene and are no longer a part of major track and field competition.

History.—Jumping with a 5-lb. weight in each hand, at Chester,

Eng., on May 8, 1854, J. Howard, with an unrestricted run, leaped 29 ft. 7 in. from a block of wood 1-ft. wide, 2-ft. long, 3-in. thick and raised 4 in. in front.

The greatest all-around standing jumper was perhaps Ray C. Ewry of the New York Athletic club. Confined to a wheel chair when quite young and not expected to walk, Ewry faithfully practised a set of daily exercises he had devised, developing great strength in his legs, body co-ordination, smooth rhythmic movements, a remarkable sense of timing and power that enabled him to spring upward, forward or backward from a standing position. Before he ended his remarkable athletic career he had set an Olympic record for individual victories with a total of eight (1900–08).

The first running high jumper to leap 6 ft. or more was M. J. Brooks (Oxford university)—6 ft. 2½ in. in 1876. George L. Horine of California, changing to a run from the side of the bar, instead of from the front, eventually developed a style which became known as the western roll and in 1912 he raised the record to 6 ft. 7 in. The western roll or its variation, the straddle jump, was employed by all the world record holders after 1914. Finally, on June 29, 1956, Charlie Dumas of California became the first to break the 7-ft. barrier with a leap of 7 ft. ½ in.

F. H. Gooch (Oxford university) was the first intercollegiate running broad-jump champion with a leap of 18 ft. in 1864. J. Lane (Ireland) was the first of the 23-ft. jumpers with 23 ft. 1½ in. (1874), and W. J. M. Newburn, a fellow countryman, passed 24 ft. in 1898. Edwin Gourdin (Harvard university), first of the great Negro jumpers, leaped 25 ft. 3 in. (1921) and Silvio Cator (Haiti) passed the 26-ft. mark in 1928 with 26 ft. ⅛ in. Jesse Owens' record of 26 ft. 8¼ in. endured for 25 years before being broken by Ralph Boston, a fellow American, who jumped 26 ft. 11¼ in. in 1960. The following year Boston became the first jumper to pass the 27-ft. barrier with a leap of 27 ft. ½ in.

In the running hop, step and jump, John Purcell of Ireland raised the record from 42 ft. 10 in. (1884) to 48 ft. 3 in. (1887). Irish-born Daniel F. Ahearn's record of 50 ft. 11 in., set in 1909, stood for 15 years. Thereafter, until Adhemar Ferreira da Silva of Brazil set records of 52 ft. 6¼ in. (1951) and 54 ft. 4 in. (1955), the field was dominated by Japanese athletes, including Naoto Tajima who leaped 52 ft. 5⅞ in. in 1936. In 1960 Joszef Schmidt of Poland passed the 55 ft. barrier and broke the existing record by more than a foot with a triple jump of 55 ft. 10½ in.

Technique.—The most commonly used methods of high jumping are the western roll and a modification of it called the straddle jump. These two methods are preferred because the jumper is lifted in a vertical position and his body passes over the bar parallel to it. To accomplish a western roll the jumper starts approximately 35 ft. from the bar which allows him about six running steps. Approaching the bar at a 45° angle, he takes off on the inside foot and at the same time kicks the outside foot to help lift him in a vertical plane. The take-off leg is brought up to the chest and remains there until the bar is cleared; it is then allowed to drop and the jumper lands on it. The body passes over the bar with the left side down, the left leg tucked tightly and the head in a drooped position.

After the jumper has mastered the western roll the straddle jump is simple, as the mechanics are the same. However, the take-off (left) leg is brought up even with the right leg and kicked behind it. As the body goes over the bar it is face down and the jumper lands on his right foot.

Broad jumping from a running start has four basic parts. Number one is the approach, which starts at a mark determined by the jumper, approximately 100 ft. from the take-off board. He runs at full speed, shortening the last two strides in order to relax and gather himself for the jump. Now he comes to the second part which is the take-off. His take-off foot has landed heel first and, as he pushes off the ball of the same foot, every effort is made to attain height and distance. Part three is the flight. Most commonly used methods are the knee tuck and the hitch kick. Beginners usually find the knee tuck easier to learn. It requires height and speed with the knees brought to the chest in a sitting position. Acquiring height is important and most champions are from four to five feet in the air on their best jumps. The hitch kick is a continuation of the run in the air; each leg kicks downward once in a circular motion; the legs are then brought together for the landing. Landing is the fourth part of broad jumping and the longer the heels can be kept off the ground the longer the jump is. When the heels do land the jumper falls forward, body relaxed and knees bent.

The running hop, step and jump is one of the more complicated events in track and field competition. It begins with a run and a take-off similar to, but more relaxed than, the run which begins a broad jump. At the take-off board the hop is made on one foot and is kept low in order to reduce landing shock. The step is a second leap which lands on the opposite foot and is followed immediately by a full broad jump with the jumper landing on both feet.

Training.—Because jumping strains leg muscles and may tear tendons if the proper technique is not followed, training for jumping events, in large part, consists of jogging, doing calisthenics in order to loosen and tone muscles and concentration on jumping style. Actual jumping for distance or height is kept to a minimum and, under normal circumstances, is attempted no oftener than once a week and never immediately preceding a meet.

For Olympic jumping records *see* OLYMPIC GAMES.

See also TRACK AND FIELD SPORTS.

(H. AR. RN.; D. SR.; E. W. CL.)

JUMPING BEAN, MEXICAN, the popular name of the seeds of certain Mexican shrubs, notably euphorbias of the genus *Sebastiania,* that contain larvae of a small moth, the *Carpocapsa saltitans.* The movements of the larvae, intensified by warmth, give the seeds the familiar jumping movements.

JUMPING HARE (*Pedetes caffer*), not a hare at all, but a large, leaping African rodent, the springhaas of the Afrikaans. It typifies a family by itself, the Pedetidae. About the size of a fox, but kangaroolike in appearance, the animal is buff or gray-brown above and whitish below; the bushy tail is black tipped. The eyes are large and the bristles around the muzzle long. The front limbs are short, the hind ones very long; and although the forefeet have five toes, those of the hind feet have four.

The jumping hare is found in open or mountainous districts. It is nocturnal and dwells in composite burrows excavated and tenanted by several families. When feeding, it progresses on all four legs, but if frightened takes gigantic leaps on the hind pair alone, frequently bounding 20 ft. at a leap. The young generally number three or four and are born in the summer. *See* also RODENT.

(J. E. HL.; X.)

JUMPING MOUSE, any of the small mouselike rodents of the subfamily Zapodinae, found in North America and Eurasia. They are distinguished by their more robust hind limbs and long tail, wide infraorbital foramen in the skull, grooved incisor teeth and usually four cheek-teeth in each jaw. These chiefly nocturnal rodents inhabit grassy meadows and forests, but only rarely are they numerous. They feed on insects, spiders and plant matter. When disturbed they start off with great bounds, eight to ten feet in length, which soon diminish. In spring the nest of grass and leaves is built a few inches above the ground, usually in a clump of shrubs. Jumping mice hibernate in the autumn in underground burrows. There may be two litters of two to nine young in a season. The meadow jumping mouse (*Zapus hudsonius*) is found from Labrador to the mountains of Alabama and northwest to the Alaska peninsula. It has many geographical subspecies, each a slight variant from the type with a rather coarse yellowish-brown pelage and a dark dorsal band. Other species of *Zapus* occur in the western U.S. and along the Pacific coast. The woodland jumping mouse (*Napaeozapus*), of northeastern North America, has one less cheek-tooth in each jaw and a white-tipped tail. *See* also RODENT.

(J. E. HL.; X.)

JUMPING SHREW (ELEPHANT SHREW), a name for the small African mammals of the order Insectivora, family Macroscelididae, of which there are a number of species ranging over the continent. They are small, long-snouted animals, mainly nocturnal, feeding on insects, and with very long metatarsals as an adaptation to their jumping habits. In some the muzzle is much pro-

longed, hence the name elephant shrew. *See* INSECTIVORE.

JUNAGADH, a municipal town and a district in Gujarat, India. The town (pop. [1961] 74,298) lies 57 mi. S.S.W. of Rajkot under the Girnar and Datar hills. It was fortified about 1472 by Mahmud Begara of Gujarat who changed its name to Mustafabad and who also built a mosque, now in ruins. Near the mosque is a cannon 17 ft. long, 7½ ft. round at the breech and 9½ in. in diameter at the muzzle. Places of interest are the Willingdon garden and the dam, the Sakar Bagh, which is now a zoological garden with a museum, the Bahauddin museum, various mosques and the Triveni (confluence of three rivers). Modern buildings include a hospital, an arts college, an orphanage and the Reay gate. The town is well served by rail and road. The old citadel, called the Uparkot, lies to the east of the city and contains many Buddhist caves, the most interesting of which are the Khaprakodia. The famous rock, on which are inscribed the Edicts of Asoka (3rd century B.C.), lies at the foot of the Girnar hill. The peaks of the Girnar, the highest of which is the Gorakhnath (3,666 ft.), are dotted with numerous Jain temples.

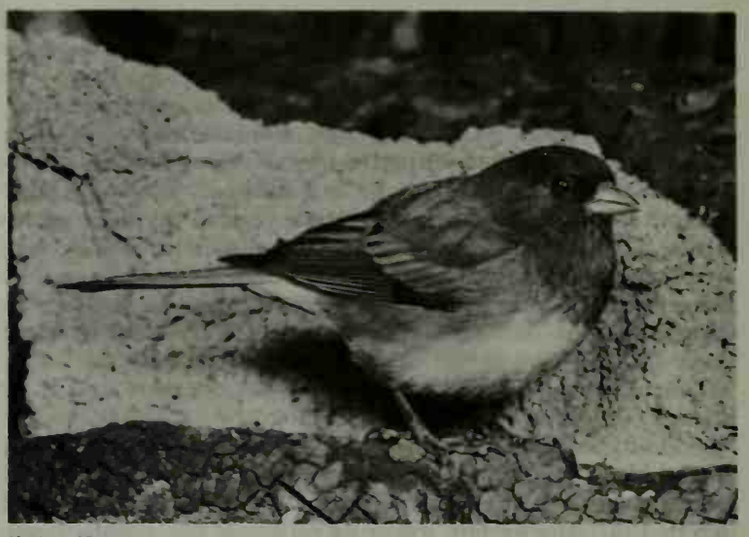
JUNAGADH DISTRICT, previously Sorath, consists of the former Indian states of Junagadh, Porbunder, Bilkha, Manavadar, Bantwa, Mangrol, Manpur, Thunbable, Sardargadh and parts of Gondal, Jetpur and Lakhapadar Thana. Area 4,186 sq.mi.; pop. (1961) 1,245,643. The district, bounded on the south and west by the Arabian sea, is a level plain with the exception of the Girnar group of hills. It also contains the dense Forest of Gir, the only place in India where lions survive and now a natural sanctuary for lions, and the temple of Somnath (*q.v.*). Agricultural products are cotton, wheat, millets and pulses, oilseeds and sugar cane. The district is well supplied with suitable harbours, the chief being Porbunder. (M. R. P.)

JUNCACEAE, the rush family of flowering plants, generally considered as belonging to the monocotyledonous order Liliales. It contains about 350 species, widely distributed in temperate and cold regions and represented in North America and Europe by two out of the eight genera that comprise the whole family—*Juncus,* rush, and *Luzula,* wood rush. They are generally low, perennial herbs, often in wet or damp habitats, with slender leaves grasslike or cylindrical or reduced to membranous sheaths. The small inconspicuous and usually greenish-coloured flowers are generally more or less crowded in terminal or lateral clusters, the form of the cluster varying widely according to the manner of branching and the length of the individual flower stalks. The flowers are bisexual and regular, with the same number and arrangement of parts as the lily family, from which they differ in the inconspicuous membranous character of the petals and sepals, the absence of honey or fragrance, and the brushlike stigmas —adaptations to wind pollination as contrasted with insect pollination, which characterizes the lily family (Liliaceae). The Juncaceae are, in fact, considered by many authors to be a derivative and reduced form of that much more diversified family. Of little economic importance, a few species are used for weaving chair seats, mats or hats. *See* also RUSH. (FK. J. H.)

JOHN H. GERARD

JUNCACEAE FLOWER CLUSTERS (JUNCUS TORREYI)

JUNCO, the common and generic name for several species of small American finches (family Fringillidae) found from the Arctic circle to Central America. They are sparrow-shaped, grayish or brownish birds, with uniformly ashy gray or black heads, white bellies, conspicuous white outer tail feathers and usually pale pinkish bills. They breed to the north or in mountainous regions.



JOHN H. GERARD

SLATE-COLOURED JUNCO (JUNCO HYEMALIS)

The commonest is the slate-coloured junco or snowbird (*J. hyemalis*) of eastern North America. The western or Oregon junco (*J. oreganus*), with dark head and breast (black in the male), brownish back and buffy or pinkish sides, lives in the Rockies and coast ranges; the gray white-winged junco (*J. aikeni*), usually with two white wing bars, ranges in the Black hills and nearby Wyoming and Nebraska; the gray-headed junco (*J. caniceps*), with bright reddish back and ashy gray sides, is found from Wyoming and Nevada to southern New Mexico and Arizona; other species range from the mountains of southern Arizona southward. (G. F. Ss.; X.)

JUNE (Lat. IUNIUS), the sixth month in the modern calendar, with 30 days. The name is possibly connected with that of the great goddess Juno, though many Roman authorities preferred the derivation from *juniores* (*see* MAY). The summer solstice occurs about June 21; with this is connected the Midsummer festival once commonly celebrated in Europe on St. John's Eve (June 23), the chief feature of which was the kindling of a great bonfire. June is traditionally the favourite month for weddings. (F. R. WN.)

JUNEAU, the capital city of Alaska, U.S., since 1906, is on the mainland of Gastineau channel, 873 nautical miles from Seattle, Wash., and sheltered from the Pacific ocean by a 75-mi.-wide belt of islands. Much of the city is built on the delta of Gold creek, with the precipitous 3,756-ft. Mt. Juneau forming a spectacular backdrop. Discovery of placer gold in 1880 caused a small stampede. In 1882 a stamp mill was erected for crushing gold-bearing quartz. Flooding of the great Treadwell mine in 1917 terminated its activities. The Alaska-Juneau mine, world-famous for methods of handling low-grade ore, continued operations until 1944. In 65 years over $150,000,000 in gold was produced in the Juneau area.

In the second half of the 20th century, the combined payrolls of federal, state and local governmental agencies have constituted the city's chief economic mainstay. Over 1,000 commercial fishing boats operate in the area, supplying salmon to a cold-storage plant and several canneries. In 1953 a Sitka spruce plywood mill was opened, with two other mills producing lumber.

Juneau airport has interstate, local and charter air service. Increasing air travel has reduced passenger steamer service to summer cruise ships. Ferry service connects local roads with the Alaska highway via the Haines cutoff.

The area contains nickel-bearing ores and rich deposits of asbestos, limestone and marble. Water-power potential in the vicinity is estimated at 9,800,000,000 kw.hr. annually. The climate is rainy and temperate. Annual rainfall averages about 90 in., although the airport receives 30% less. The January mean temperature is 29.5° F. (about −1° C.); the July mean, 56° F. (13° C.). Winter snowfall seldom accumulates much over a foot in depth. The port is ice-free.

For comparative population figures *see* table in ALASKA: *Population.* (J. E. CL.)

JUNEBERRY, the name given in North America to several species of shrubs and small trees of the genus *Amelanchier,* which produce sweet edible fruits; called also serviceberry, sugarberry and shadbush. Botanically the genus belongs to the rose family (Rosaceae) and is closely allied to the apple. The dwarf Juneberry (*A. alnifolia pumila*), found from western Ontario to British Columbia and south to Michigan, New Mexico and California, is a small shrub, sometimes 10 ft. high, bearing thick roundish leaves, coarsely toothed around the blunt outer end, and white flowers in terminal clusters that appear very early in the spring. The dark purple, sweet fruit, about one-third inch in diameter, was extensively eaten, both fresh and dried, by explorers and trappers in pioneer days and also by the Indians. A few choice varieties with larger fruits are in cultivation.

ROCHE

JUNEBERRY (AMELANCHIER)

Among closely related species in the eastern United States and Canada are the downy-leaved serviceberry or shadbush (*A. canadensis*), a tree 30 to 40 ft. high, with the leaves white-woolly when young and the fruit rather dry and tasteless; and the smooth-leaved serviceberry or Juneberry (*A. laevis*), a similar tree, with the foliage purplish bronze or light green when young and the fruit dark purple, sweet and juicy. They are planted as ornamentals.

JUNG, CARL GUSTAV (1875–1961), Swiss psychologist and psychiatrist, founder of analytic psychology, was born on July 26, 1875, at Basel, the son of a philologist and clergyman. He studied medicine at the University of Basel and continued his psychological studies in Paris under Pierre Janet (*q.v.*). At the University of Zürich he was physician in the psychiatric clinic (1900–09) and lecturer in psychiatry (1905–13).

In 1907 Jung met and thereafter became a most active disciple of Sigmund Freud (*q.v.*). The association ended in 1912 when Jung set forth his own theory of the libido and the unconscious, resulting in his resignation from the International Psychoanalytic society and his founding a new school with A. Maeder in Zürich. Later he was professor of psychology at the Federal Polytechnical university in Zürich (1933–41) and professor of medical psychology at the University of Basel (1943). He died at Küsnacht, Zürich, on June 6, 1961.

The main points in Jung's system, which he termed analytical psychology rather than psychoanalysis, were: (1) His classification of man into introverted and extraverted types, further distinctions resting on the idea that in each person one or more of four primary functions of the mind (*i.e.,* thinking, feeling, sensation and intuition) predominate. (2) His rejection of Freud's theory of the sexual etiology of the psychoneuroses; here, Jung laid stress on analyzing man's immediate conflicts as being more useful in understanding the neuroses than the uncovering of the conflicts of childhood. (3) His emphasis on the will to live rather than the sexual drive, in defining the libido. He drew attention to the possibilities of co-operation between the conscious and the unconscious, the latter being for him that part of the mind which includes both the personal factor (the individual unconscious) and the disposition inherited from ancestors (the collective unconscious).

Jung's works in English translation include: *Psychology of Dementia Praecox* (1909), *The Theory of Psychoanalysis* (1912), *Psychology of the Unconscious* (1916), *Collected Papers on Analytical Psychology* (1916), *Studies in Word Association* (1918), *Psychological Types* (1923), *Contributions to Analytical Psychology* (1928), *Two Essays on Analytical Psychology* (1928), *The Secret of the Golden Flower,* with Richard Wilhelm (1930), *Modern Man in Search of a Soul* (1933), *Psychology and Religion* (1938), *Integration of the Personality* (1939), *Essays on Contemporary Events* (1947) and *Essays on a Science of Mythology,* with C. Kerenyi (1949).

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JUNG, JOHANN HEINRICH (pseudonym HEINRICH STILLING) (1740–1817), German writer, best known for his autobiography, which gives a vivid picture of patriarchal life in an 18th-century pietistic family. He was born at Grund, near Hilchenbach, Westphalia, Sept. 12, 1740. After a time as tailor and teacher like his father, he began to study medicine at Strasbourg where he met Goethe. Goethe was much impressed by him (*see* his *Dichtung und Wahrheit*) and it was he who had published *Heinrich Stillings Jugend* (1777) the first and best part of Jung's autobiography (collected as *Heinrich Stillings Leben,* 5 vol., 1806). This autobiography, with its gentle piety and astonishing simplicity, came to have a remarkably wide influence, as part of the pietistic tide, with its stress on feeling, as opposed to the rationalism of the Enlightenment. In 1772 Jung-Stilling (as he is usually called) settled at Elberfeld as physician and made a name by successful operations for cataract. In 1778 he began to lecture on economics and allied subjects, first in the Kameralschule at Kaiserslautern (moved to Heidelberg in 1784) and in 1787 at Marburg. It is indicative of his growing fame that in 1803 the electoral prince of Baden granted him a pension so that he could live by writing. In 1806 he settled in Karlsruhe, where he died, April 2, 1817 He was married three times and had a large family. Besides his autobiography and economic textbooks, Jung-Stilling wrote mystical-pietistic works and novels, the best-known of them being *Das Heimweh,* an allegorical novel which was translated into many languages.

A complete 14-volume edition of his works was published in 1835–38. His letters were published in 1905 and a second edition in 1924.

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(M. KL.)

JUNG BAHADUR (1816–1877), prime minister and virtual ruler of Nepal during 1846–77, was a great-nephew of a famous military minister, Bhim Sen. As a youth he seems to have been wild, reckless and often in trouble, but even then he showed signs of the courage and ability which so marked him in later life. In 1846 the king was incapable almost to the point of imbecility and the junior rani was plotting to have her lover, Gagan Singh, appointed prime minister and to displace the rightful heir by her own son. Gagan Singh was murdered and in the armed conflict which followed about 30 nobles were killed. Jung Bahadur emerged the victor and before the fighting ceased had been appointed prime minister. The rani, supported this time by the king, thereupon plotted to have him murdered but Jung Bahadur, learning of the plot, banished them both and placed the young prince on the throne. Later Jung was appointed hereditary prime minister and was honoured with the title of Rana. During 1850–51 he visited England and he remained a firm friend of the British to the end of his life; he sent a strong contingent of Gurkhas to their aid during the Indian mutiny (1857–58). He did much to improve the administration of his country and revised the old penal code. Of great ability and determination, he was uneducated and in his later years became suspicious and of an uncertain temper. He died of an illness contracted when tiger shooting in the jungles of the Terai. Although he did his best during his lifetime to abolish suttee, three of his widows immolated themselves on his funeral pyre.

(RI. R. P.)

JUNGFRAU, a well-known Swiss peak (13,642 ft.) dominating the Lauterbrunnen valley above Interlaken. It divides the cantons of Bern and Valais, and is in the Bernese Oberland, two peaks of which (the Finsteraarhorn, 14,022 ft., and the Aletschhorn, 13,763 ft.) surpass it in height. It was first ascended in 1811 by the brothers Meyer, on the eastern or Valais side. It was not until 1865 that Sir George Young and the Rev. H. B. George made the first ascent from the western or Interlaken side. In 1927 an ascent was made by two guides on the south side from

the Rotta. A railway (planned to reach the summit), the highest in Europe, was constructed between 1896 and 1912 to the Jungfraujoch (11,342 ft.) from Scheidegg. The line passes by a tunnel (4.4 mi. long) through the Eiger and Mönch to the Jungfraujoch. An observatory was built in 1925 at the upper terminus of the railway. (A. F. A. M.)

JUNGLE, a tangled wilderness or uncultivated land with an impenetrable cover of brushwood, long grass or other tangled vegetation. Jungles are characteristic of disturbed tropical forests and occur as equivalent secondary vegetation in most forest regions. The popular fancy that all tropical forests are jungles is erroneous, the primary forests being open in their lower strata except where penetration of sunlight is improved locally in clearings or where windfalls open the forest canopy, and along rivers and coasts (*see* RAIN FOREST). Tropical jungles result principally from long-continued practice of migratory or shifting agriculture. The clearing and burning of small plots permits only two or three harvests before depletion of mineral nutrients from the infertile soils and rapid growth of weedy species force abandonment to the incipient jungle. (M. E. B.)

JUNGLE FOWL, the name usually applied to wild members of the genus *Gallus,* from which domestic fowls are derived. *See* FOWL.

JUNGLE WARFARE, a phrase which came into general use during World War II after the successful incursion of the Japanese army into Malaya in 1941 and 1942. Previously, the only campaign fought in close forest country during modern times had been that of the German Gen. Paul von Lettow-Vorbeck against the British in east Africa during World War I. No major power but the Japanese had studied such warfare at all, except academically, although the United States army carried out some jungle training in Panama from 1939.

The Japanese successes in Malaya and Burma showed that the penetration of jungle by troops who were lightly armed and equipped and prepared to live hard was not difficult, and was highly effective against troops depending on ordinary means of supply. The Japanese technique was based on the encirclement of the enemy's positions and the establishment of roadblocks behind them. The defenders were then obliged to concentrate either on clearing the blocks or on fighting their way back to new positions. Only by intelligent anticipation of where the road might be cut could the defense forestall such attacks; but the force with the initiative, not dependent on roads, could always and quickly find some alternative point. The defense of long lines of communication running through jungle would have demanded the use of an astronomical number of men in a wholly unprofitable role.

All this remained true of jungle warfare until the British commander, Maj. Gen. Orde C. Wingate, on his first Burma expedition in 1943, demonstrated the possibilities of substituting air supply for road supply. From then on, land communications lost their importance; supply could be interrupted only by the destruction of air bases or the denial of air routes for transport aircraft. Air superiority thus became as important to jungle warfare as to every other form of ground operation; and the Japanese had already lost it.

Whatever the means of supply, jungle warfare calls for highly specialized techniques and exacts a higher standard of training and leadership at the lowest levels than any other form of fighting. The individual soldier must be tougher, stealthier and more continually alert than his counterpart elsewhere. His encounter with the enemy will be sudden and may be fleeting. He must develop the knowledge and instincts of a native tracker. His equipment must be light and simple, so that he can move without noise or fatigue. He must be able to travel and fight for days without resupply. He is responsible for the maintenance of his own health in conditions where especial assaults will be made upon it.

The difficulties of gaining and disseminating intelligence and of exercising control are greater than usual, and exact a high standard of signals. Unfortunately, the performance of most radio equipment in thick country falls considerably short of its performance elsewhere.

Supply and intelligence are, in fact, the two basic needs of a force engaged in jungle warfare. Provided these can be met, numerical inferiority is not a fatal disability; indeed it is in some ways an advantage. After World War II terrorists in Malaya and Kenya demonstrated against the British what Wingate had shown in 1943–44—that a comparatively small force, lightly equipped, but with these two essential endowments, can elude and occupy the attention of forces many times larger and disposing of all modern means of war. This is especially so when the smaller force enjoys the support of the indigenous population.

On the minor tactics to be pursued in jungle operations, there are several schools of thought. The U.S. forces in the Pacific and the Australians in New Guinea followed methods quite different from those used in the recapture of Burma. For instance, in New Guinea all movement outside a night bivouac was regarded as hostile; in Burma, night bivouacs were regarded as bases from which to make sorties. In Burma, Wingate's tactical teaching differed widely from that of Field Marshal Sir William J. Slim. Wingate trained his troops to move always in single file, as being the least vulnerable formation; to break up into "dispersal groups" if outnumbered, meeting again always at a rendezvous (known to platoon commanders) beyond the enemy positions; and to eschew indiscriminate shooting or retaliatory fire. His principal maxims were: "The answer to noise is silence" and "When in doubt, don't shoot." But Slim employed strategically a device Wingate used tactically: setting up an objective which the enemy must attack, and surrounding the approaches to it with ambushes and other hazards. Thus the classic defeat of the Japanese on the Imphal front in 1944 came about by allowing the Japanese to overreach themselves, by starving them out and by cutting off their retreat. Much the same tactics had been employed during the preceding two years by the Japanese in Arakan, where they held Akyab (which the British felt bound to attack) and commanded every possible approach to it. Every attempt made to capture it was cut into from the landward flank and ended in ignominious withdrawal.

Wingate introduced one other revolutionary element into jungle warfare—an especially intimate offensive air support. It was provided by U.S. bombers and fighters, which were "talked" on to their targets by the troops on the ground, under whose command they belonged. Hitherto, because of the difficulty of identifying targets, it had been deemed impossible to provide air strikes within 1,200 yd. of troops on the ground.

In the extreme north of Burma the quality of Gen. Joseph W. Stilwell's Chinese troops was not such as to enable him, with his small corps of U.S. liaison officers, to develop new techniques, although he was able to use Maj. Gen. Frank D. Merrill's force effectively in a deep penetration role in the operations which resulted in the capture of Myitkyina.

The accepted principles of war are fully applicable to jungle warfare; only the emphasis varies. Any linear conception of warfare is inapplicable; so are long-range weapons other than the air arm. All fighting is at short range and in conditions of extremely short visibility. It is impossible to bring an unwilling enemy to battle, except by denying him supplies and forcing him to fight for them. It follows that the selection of objectives becomes of greater importance than ever.

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JUNÍN, a department in the highlands of central Peru, bounded on the north by Pasco, east by Cuzco, south by Ayacucho and Huancavelica, and west by Lima. Area, 12,492 sq.mi. Pop. (1961) 506,075. The departmental capital is Huancayo (pop. [1961] 46,014); the area of concentrated settlement lies around it and extends northwest to the towns of Jauja and La Oroya. On the eastern slopes around Tarma and around Satipo are zones of pioneer farm settlement that were first developed early in the 20th century, but which continue to suffer from difficult accessibility to markets. The department also includes a thinly settled part of the eastern plains. Its higher part is drained by the headwaters of the Río Mantaro and the Río Perené.

Most of the people in Junín make their living from farming and herding. In the higher areas above the upper limit of crops the

land is used for the grazing of cattle, sheep and alpaca. The high basins (between 10,000 and 14,000 ft.) are used for wheat, barley and potatoes. Lower on the eastern Andean slopes the crops include coffee, cacao, sugar cane, coca and rice. However, the high cost of transportation limits commercial products to those of high value per unit of weight, such as *aguardiente* or sugar brandy. Mines and smelters produce more income than agriculture even though they employ fewer workers. Copper comes from Morococha, cadmium from Cercapuquio. Copper from Cerro de Pasco is refined at La Oroya. The area is connected with Lima by rail and highway. (P. E. J.)

JUNIOR ACHIEVEMENT is an educational organization of the United States and Canada which offers young people of high-school age the opportunity to gain business experience by organizing and operating their own small businesses under the guidance of volunteer advisers from business and industry. The Junior Achievement program was founded by Horace A. Moses of Springfield, Mass., and incorporated in 1926. Its major growth occurred after World War II. In the early 1960s the program operated in more than 250 cities throughout the United States and Canada.

The Junior Achievement company is the basic unit. The boys and girls are its board of directors, labour force and sales staff. In the autumn the youngsters elect a president and other officers, decide on the product the company will make and sell and determine the amount of working capital the firm will need to begin production. They sell capital stock (at 50 cents a share) to parents, friends, teachers and others. No one person can own more than five shares, and every member of the J.A. company must own at least one. Average capitalization is about $100.

When the company has raised its capital, a bank account is opened and raw materials are purchased. The company applies for its J.A. charter, pays rent (usually $3 a month) and buys the small tools it needs. Shop machinery is leased from the Junior Achievement organization by a deposit of capital proportionate to the value of the machinery used.

The company makes its products and sells them. The young businessmen and women decide on the wages they will pay themselves and determine the amount of commissions on sales. Complete books are kept. Average gross sales of a J.A. company are $300. In the spring the companies go out of business. Inventory is sold, all debts are paid, and if the company has been profitable (most of them are) the stockholders receive their investment back along with a liquidation dividend.

Each Junior Achievement company is guided by three adult advisers, and average company membership is 15. The program maintains its national headquarters in New York city. (J. F. L.)

JUNIOR COLLEGE (UNITED STATES), a two-year nondegree-granting institution offering continuing education beyond the high school. Public junior colleges, often known as community colleges, are in many respects an extension of the public-school system providing terminal education (vocational and semiprofessional training) for many students and the first two years of undergraduate college study for others.

See EDUCATION, HISTORY OF.

JUNIOR HIGH SCHOOL (UNITED STATES), usually comprises grades seven, eight and nine. It is intended to serve as a transition from the earlier years of the elementary school to the later years of the secondary school. The commonest plan of school organization in the United States provides for six years of elementary school, three years of junior high school and three years of senior high school.

See EDUCATION, HISTORY OF; SECONDARY EDUCATION.

JUNIPER, the name for about 40 species of *Juniperus,* aromatic, evergreen bushy shrubs or low columnar trees of the cypress family (Cupressaceae). They occur widespread throughout the cooler regions of the northern hemisphere but attain their maximum development in the Mediterranean region, the North Atlantic islands and the eastern United States. The leaves are usually articulated at the base, spreading, sharp-pointed and needlelike in form, destitute of oil glands and arranged in pairs or in whorls of three. In some forms, however, the leaves are minute and scalelike, closely adhering to the branches, only the apex being free, and furnished with an oil gland on the back. Sometimes the same plant produces both kinds of leaves on different branches, or the young plants produce needlelike leaves, while those of the older plants are scalelike. The staminate and carpellate cones are usually produced on separate plants. The mature cone is fleshy, with the succulent scales fused together to form a berrylike structure. The berries are red or purple in colour, varying in size from one-fifth to one-half inch in diameter. They thus differ considerably from the cones of other conifers. The seeds are usually three in number, sometimes as few as one, rarely more than eight, and are marked with large glands containing oil. The genus occurs in a fossil state, four species having been described from Tertiary rocks.

The common juniper (*Juniperus communis*) is a very widely distributed circumpolar plant, occurring in the whole of northern Europe, central and northern Asia to Kamchatka, and eastern and western North America. It grows at considerable elevations in southern Europe, in the Alps, Apennines, Pyrenees and Sierra Nevada (4,000–8,000 ft.). It also grows in Asia Minor, Iran, and at great elevations on the Himalayas. In Great Britain it is usually a shrub with spreading branches, less frequently a low tree.

The *United States Pharmacopoeia* includes oil of juniper as a drug to produce urination. The common juniper is official in the *British Pharmacopoeia.* The wood is very aromatic and is used for ornamental purposes. In Lapland the bark is made into ropes. The fruits are used for flavouring gin (a name derived from Lat. *juniperus,* through Fr. *genièvre*). *J. oxycedrus,* from the Mediterranean district and Madeira, yields cedar oil, which is official in most of the European pharmacopoeias. This oil has been used largely in the preparation of microscope slides, specifically for "clearing" tissue sections.

The savin (*J. sabina*), abundant on the mountains of central Europe, is an irregularly spreading, much-branched shrubby juniper, with scalelike glandular leaves that emit a disagreeable odour when bruised. The plant is poisonous, acting as a powerful local and general stimulant. It was formerly used to stimulate menstruation, to produce sweating and to expel worms.

The Bermuda red cedar (*J. bermudiana*), a tree about 49 or 50 ft. in height, yields a fragrant red wood, which was used for the manufacture of cedar pencils. The tree is still abundant in Bermuda, but the eastern red cedar (*J. virginiana*) of North America is employed instead for pencils and is also used for clothes chests, interior finish, fence posts and telegraph poles. The eastern red cedar, which is native to dry soil from Nova Scotia to North Dakota and south to Georgia and Texas, sometimes attains a height of 100 ft. and a trunk diameter of 5 ft., though usually it is much smaller. The galls produced at the ends of the branches have been used in medicine, and the wood yields cedar camphor and oil of cedarwood. *J. thurifera* is the incense juniper of Spain and Portugal, and *J. phoenicea* from the Mediterranean district also has been burned as incense.

JOHN H. GERARD

BRANCH WITH FRUIT OF EASTERN RED CEDAR (JUNIPERUS VIRGINIANA)

Juniperus drupacea of Asia Minor has large and edible fruits; they are known in the east by the name *habhel.*

In North America about 15 native species of juniper occur, inclusive of the eastern red cedar and the common juniper. Among these are the Rocky Mountain juniper (*J. scopulorum*), which extends from the central Rocky mountains northwestward to British Columbia; the California juniper (*J. californica*), with reddish fruit eaten by the Indians; the

Mexican juniper (*J. mexicana*) of Texas and Mexico, with brown wood; the Sierra juniper (*J. occidentalis*) of the Pacific states; the alligator juniper (*J. pachyphloea*) of the southern Rockies, with a distinctly checkered trunk; the creeping juniper (*J. horizontalis*), found from Nova Scotia to British Columbia, with prostrate branches; and the rare drooping juniper (*J. flaccida*) of the Mexican border, with weeping branches.

Many junipers are extensively grown as ornamentals, especially varieties of the savin, the common juniper and the eastern red cedar. (E. S. Hr.)

JUNÍPERO, FATHER: *see* Serra, Junípero.

JUNIUS, pseudonym of the author of a series of letters contributed to Henry Sampson Woodfall's *Public Advertiser* between Jan. 21, 1769, and Jan. 21, 1772. The *Letters of Junius* proper are those published in Woodfall's authorized edition of 1772, which superseded 28 unauthorized and partial editions. Woodfall's volumes, of which there were more than 70 editions by 1812, comprise a dedication to the English nation and a preface, both by Junius; 42 letters signed by him; 16 by the same writer but signed Philo-Junius; 3 unsigned; and 8 replies, 5 of them by Sir William Draper and 3 by John Horne. There are a further 63 private letters from Junius to H. S. Woodfall, first published in the edition of George Woodfall and Mason Good in 1812, 10 to John Wilkes and 2 to William Pitt, 1st earl of Chatham. The 1812 edition also contained a further 113 miscellaneous letters ascribed to Junius but written under various other pseudonyms. There is little evidence that Junius wrote these and they may be ignored.

Junius' principal aims were to discredit the ministries, first of the duke of Grafton and subsequently of Lord North; to draw attention to the political influence of George III; and to unite the opposition. Grafton had been in effect head of the administration since Chatham's ill-health had forced him, in Feb. 1767, virtually to retire from the cabinet he had formed the previous summer. Junius regarded Grafton and his associates, particularly the duke of Bedford, the earl of Bute and Lord Mansfield, as despicable, both politically and personally, and he attacked them with ferocity. Whether he really achieved anything is debatable. His private letter to Woodfall of Jan. 19, 1773, is a confession of defeat; but he may have increased the political awareness of the public and he may have considerably influenced later polemical journalism.

Although their content is now of little intrinsic interest, the letters have survived on two counts: their style and the unsolved mystery of their authorship. Opinions differ sharply as to Junius' literary stature: certainly reading through the complete letters can be wearying since there is too little stylistic variety, the key is hardly ever changed from that of sustained personal invective, of bitter, merciless sarcasm. But there is also a fine boldness and liveliness, an urgency and often a direct blunt eloquence which still arrest. Among the most penetrating comments on the style were those of S. T. Coleridge: ". . . they are suited to their purpose, and perfect in their kind. They impel to action, not thought . . . they are plain and sensible whenever the author is in the right, and, whether right or wrong, always shrewd and epigrammatic . . . antithetical to excess, sententious, personal, regardless of right or wrong, yet well-skilled to act the part of an honest warm-hearted man." He suggested "perhaps the best way of considering these Letters would be as a kind of satirical poems—the short, and for ever balanced sentences constitute a true metre; and the connection is that of satiric poetry, a witty logic, an association of ideas. . . ." The style can be seen at its best in Letters III, V, XII, XXV, LVIII, and the famous Letter XXXV of Dec. 19, 1769, with its attack on the king. As a result of this letter, Woodfall was prosecuted for seditious libel, but the case failed and he was released on payment of costs.

Part of Junius' effectiveness was undoubtedly his anonymity. "To him that knows his company," remarked Dr. Johnson, "it is not hard to be sarcastic in a mask." But the mask was necessary: its removal would certainly have led to prosecution or worse and accordingly Junius took elaborate precautions, concealing his identity even from Woodfall. "I must be more cautious than ever," he wrote, "I am sure I should not survive a Discovery three days," and he declared, "I am the sole depositary of my secret, and it shall die with me." So it did, and the attempt to disinter it has absorbed much energy. Francesco Cordasco's *Junius Bibliography* (1949) lists more than 500 articles, bibliographies and editions; and some 50 "identifications" have been made, including claims for Edward Gibbon, Edmund Burke, John Wilkes, the earl of Chatham, Lord Chesterfield and Thomas Paine. The majority of identifications belong to the history of eccentricity rather than scholarship, while many of the more serious suggestions were ably demolished by C. W. Dilke in various articles in the *Athenaeum* (1848–60). There is still no trustworthy direct evidence; circumstantial evidence has to depend on such things as the similarity of the candidate's known views and affiliations to those of Junius, his opportunities for obtaining information, his movements from 1769 to 1772 and his handwriting, whether genuine or disguised. Handwriting may be misleading, for "experts" have maintained the identity of Junius' writing with that of at least nine different people.

The chief contender is still Sir Philip Francis (*q.v.*), first suggested by John Taylor in 1816; the case for him is well argued by Sir Leslie Stephen in his article in the *Dictionary of National Biography,* and is supported by A. Ellegård's lexico-statistical analysis, but many of Dilke's cogent objections are still unanswered. C. W. Everett, in his edition of the *Letters* (1927), made out a claim for the earl of Shelburne (1737–1805; later marquess of Lansdowne), who had been in Chatham's cabinet of 1766–68 until he was virtually forced out by Grafton. Again, there are important objections, notably that Shelburne was abroad during the summer of 1771 and could not have had time to reply to Horne's letters against him. Sir David Brewster, who made a collection in the early 19th century of papers by, and relating to, Junius, accepted an earlier identification with Laughlin Macleane (1727–77), who was Shelburne's undersecretary; apparent confirmation of this was discovered in 1949, when Cordasco published a memorandum by Shelburne found in Glasgow: "Let it be known then . . . that my secretary and associate Macleane was 'Junius' and that the secret now is secret no longer." Macleane's political affiliations, however, were such that it is hard to accept this without reservations, and Dilke advanced several powerful arguments against him. The whole controversy, indeed, is so bedeviled with impostures and fabrications of one kind and another that it is perhaps best to return a verdict of insufficient evidence.

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JUNIUS, FRANCISCUS (François du Jon) (1589–1677), who prepared the first edition of the Gothic Codex of Ulfilas, was born at Heidelberg, Ger., and brought up at Leiden. In 1617 he became pastor at Hillegondsberg, but in 1620 went to England, where he became librarian to Thomas Howard, earl of Arundel, and tutor to his son. He remained in England 30 years, devoting himself to the study of Anglo-Saxon and afterward of the cognate old Teutonic languages. In 1651 he returned to Holland and for two years lived in Friesland in order to study the old dialect. In 1675 he returned to England and died in the house of his nephew, Isaac Vossius, on Nov. 19, 1677. He was buried at Windsor in St. George's chapel.

JUNKER, (JOHANN) WILHELM (1840–1892), Russian explorer of the Nile-Congo watershed, was born in Moscow of German parents on April 6, 1840. Early abandoning a medical career, he made brief journeys to Iceland (1869) and Tunis (1873–74). In 1875 he went to Egypt and thence to the Sudan,

where he explored the lower reaches of the Sobat river and the western tributaries of the White Nile in 1876–78.

In 1879 he returned to the Sudan where, during four years in the equatorial regions, part of the time with Emin Pasha (*q.v.*), he made valuable ethnographical observations in the Azande country and established the identity of the Uele and Ubangi rivers. Prevented by the Mahdist uprising from returning to Europe through the Sudan, Junker left the Albert Nile in Jan. 1886, carrying with him Emin's journals, and reached Zanzibar via Tabora in Dec. 1886. He died at St. Petersburg (Leningrad) on Feb. 13, 1892.

Junker wrote *Reisen in Afrika, 1875–86* (1889–91), English translation by A. H. Keane, *Travels in Africa* (1890–92).

(R. L. Hl.)

JUNO, the chief Roman and Latin goddess, closely resembling the Greek Hera (*q.v.*) with whom she is universally identified. Her origin, however, is unclear. Some authorities derive her name from the root of *juvenis,* meaning "marriageable young woman," and others see in her name the same root as that of Jupiter (*q.v.*), of whom she is the female counterpart. Both these aspects are clear in the later development of her worship. She is closely connected with all aspects of the life of women and most particularly the sexual. In her role as female comforter she assumes various epithets: as Pronuba she is bridal attendant; as Interduca she brings the bride to her new home; as Cinxia she is the spirit of the bride's girdle; as Opigena she brings aid to the woman in labour; as Lucina (*q.v.*) she brings the child to light, etc. Individualized, she becomes a female guardian angel: as every man had his *genius* so every woman had her *juno;* thus she represents in a sense the female principle of life. Her close connection with women led to associations with the moon (Juno Covella) and to what is probably an erroneous conjecture in both ancient and modern times that she was originally a moon goddess. Thus she became the deity of the Kalends, or day of the new moon, sacred to her, and she is brought into close relationship with Janus (*q.v.*), who was also worshiped on the Kalends.

ALINARI

STATUE OF JUNO SOSPITA. IN THE VATICAN MUSEUM, ROME

As her cult expanded she assumed wider functions and became, like Hera, the principal female divinity of the state. As Sospita, portrayed as an armed deity, she was invoked all over Latium and particularly at Lanuvium—originally as a saviour of women but eventually as saviour of the state. At Rome under the Etruscan kings she appears as Juno Regina, queen of heaven, as wife of Jupiter, as part of the Capitoline triad with Jupiter and Minerva. Under the same title she was worshiped on the Aventine, traditionally having been established there in 392 by Camillus, who brought her cult statue from Veii after its capture. As Juno Moneta, "the warner," she protected the interests of the Roman state; a story in Plutarch (*Camillus* 27) records that the cackling of her sacred geese saved the Arx on the occasion of the sack of Rome by the Gauls in 390 B.C. A temple of Juno Moneta, which later housed the Roman mint, was built on the Arx in 344 B.C.

Her significant festivals were the Matronalia on March 1 and the Nonae Caprotinae ("Nones of the Wild Fig") on July 7. In the former, matrons met and made offerings at the temple of Juno Lucina on the Esquiline, a cult traditionally introduced by Titus Tatius; in the latter, which took place under a wild fig tree in the Campus Martius, she was worshiped by female slaves in an old fertility rite involving a mock fight and mutual beating (*cf.* Lupercalia; *q.v.*).

In art Juno is represented in various guises depending upon the epithet concerned. Most frequently, however, she is represented in a manner similar to the Greek Hera, *i.e.,* a standing matron of statuesque proportions and severe beauty, occasionally exhibiting military characteristics. *See* also Roman Religion.

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JUNOT, ANDOCHE, Duc d'Abrantès (1771–1813), French general, Napoleon's first aide-de-camp, was born on Oct. 23, 1771, at Bussy-le-Grand in Burgundy, the son of a rich farmer who gave him a good education. Having joined the volunteers of the Côte-d'Or in 1792, Junot was a sergeant at the siege of Toulon in Sept. 1793 when Napoleon Bonaparte asked for a man to write his notes on reconnaissance; Junot's writing was good, and he cheerfully remarked that the shell bursts "gave him sand to dry his ink." On Jan. 17, 1794, he was promoted captain and made aide-de-camp to Bonaparte. Together for the next two years, they shared money from Junot's father when they had none else.

In Italy in 1796, in a cavalry skirmish, Junot received a wound in the head—one of several wounds which in the end gravely affected him. A general in the Egyptian campaign, he inflicted a memorable defeat on the Turks at Nazareth in Syria in April 1799. Even so, he was outdistanced by his rivals Joachim Murat and Auguste Marmont, for he was a man of no more than average ability. After appointment as commandant of Paris, he was sent in 1804 to Arras to train men for the projected expedition against England. In 1805 Napoleon indulged him with an embassy to Lisbon, writing to Joséphine in November after seeing Junot: "I am convinced that the men whom I have formed are incomparably the best." He made Junot governor of Paris in July 1806.

In 1807 Junot took a reserve corps to occupy Portugal; by forced marches through difficult country he reached the Tagus at Abrantes and in November entered Lisbon unopposed (*see* Peninsular War); in April 1808 he was made duc d'Abrantès. But thenceforward nothing went well for him: on Aug. 21, 1808, he lost Portugal in the battle of Vimeiro, trying with a smaller force to outflank Gen. Arthur Wellesley; in 1809 he was superseded in the conduct of the siege of Saragossa; in 1810 he was not given the command of the second army of Portugal; and in 1811, in Portugal again, he received a painful wound on the nose. In 1812 he went to Russia without a corps command, but was then assigned two Westphalian divisions. When in the battle of Smolensk (Aug. 10) these had failed to do what Napoleon expected, the army bulletin blamed Junot's "lack of firmness," and he was refused the honour of entering Moscow. When in 1813 he was sent to be governor of Illyria his mind gave way. He was brought home to his father's house at Montbard and committed suicide on July 29, 1813. (I. D. E.)

JUNOT, LAURE, Duchesse d'Abrantès (1784–1838), the wife of Andoche Junot (*q.v.*) and the author of celebrated memoirs, was born at Montpellier in Languedoc on Nov. 6, 1784. After the Thermidorian reaction of 1794 (*see* French Revolution), her mother, Madame Permon (Julie Comnène), established herself in Paris and began to entertain the prominent officers of state and the army—including Napoleon Bonaparte, whose mother was a close friend of hers. Married to Andoche Junot in 1800, Laure herself had an important place in society as the wife of the commandant of Paris and began to entertain lavishly. Accompanying her husband to Portugal in 1805, she there continued to spend money in order to give a high opinion of French women. After her return to France she rented a house at Neuilly in 1810 and there received many former *émigrés* and foreign visitors who were regarded as suspect by Napoleon. Napoleon in fact, who had always been most generous to the Junots, spoke of Laure as "la petite peste" and, after her husband's death (1813), ordered her to stay out of Paris; however, she persuaded Savary, the minister of police, to let her return. Having intrigued on behalf of the Bourbons, she was able to keep up her way of life under the first Restoration (1814), but the second Restoration saw the collapse of her fortunes, since Louis XVIII was less generous than Napoleon. She then spent much time in Rome till 1831, when she settled at the

Abbaye-aux-Bois, in Paris. There she completed her *Mémoires historiques sur Napoléon, la Révolution, le Consulat, l'Empire et la Restauration* (1831–35), on which her reputation depends—a lively account of her experiences with malicious comments on her contemporaries. She also wrote *Histoires des salons de Paris* (1836–38) and other works. She died in Paris on June 7, 1838.

JUNQUEIRO, ABÍLIO MANUEL GUERRA (1850–1923), Portuguese poet of extraordinary verbal ingenuity, the most outstanding of the realist school in Portuguese poetry, and the poet *par excellence* of the revolution of 1910, was born in Freixo de Espada-à-Cinta, Trás-os-Montes, Sept. 15, 1850, the son of a rich farmer. After early schooling in Oporto he entered Coimbra university to read law (1866), and although at first he attended theology lectures with the intention of entering the priesthood, he graduated in law in 1873. At Coimbra he was one of those responsible for founding the review, *A Folha* (1868), edited by the poet João Penha, which became the organ of the movement that established the Parnassian school of poetry in Portugal. It was through these contacts that Guerra Junqueiro lost his romantic sentimentality and acquired his positivist tendencies, and his verse its marmoreal sonorousness. He had hitherto written verses of an ultraromantic kind, beginning with the collection *Duas Páginas dos Catorze Anos* (1865). Verses he published in *A Folha,* some of which appeared later in *A Morte de Dom João* (1874), the first collection belonging to his realistic, social reformer period, show a completely new outlook, influenced by Victor Hugo's *Les Châtiments.* Before its publication he was already in Lisbon, where he joined a group led by Antero de Quental, the paladin of a revolutionary poetry that gave rise to the movement known as the *Escola Nova,* or "New School," in which he and Guilherme de Azevedo were the outstanding figures.

Guerra Junqueiro became secretary-general to the municipality of Angra do Heroismo in the Azores, and later in Viana do Castelo in northern Portugal, where he married, and was elected to parliament; but, disgusted by politicians, he retired to the country, becoming a farmer, but continuing to write. In 1879 he published *A Musa em Férias,* a collection of poems, followed in 1885 by the anticlerical satire, *A Velhice do Padre Eterno.* In *Os Simples* (1896), a volume influenced by symbolism, his lyrical quality, often overdeclamatory, is at its purest. It was in *Pátria,* however that he gave most vigorous expression to his genius for dramatically pointed satire. This poem was inspired by the misfortunes of Portugal, then faced with the British ultimatum of 1890 in connection with its colonial territories in South Africa at a period when political life under the Braganza dynasty was approaching its nadir. Its popularity was immense, and when the republic was established in 1910 Guerra Junqueiro was appointed envoy in Berne. A blend of eloquence and satire gave his verse a popular appeal that made him a hero of the revolution. His genius for words is certainly impressive, and even a poet of the stature of Antero de Quental could regard his *A Morte de Dom João* as "a vibrant echo of the ideas of our age." In his last years he was converted to the Catholicism he had so irreverently attacked, and thus repudiated a part of his work. He died in Lisbon, July 7, 1923.

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JUNTA, a Spanish word originally meaning a meeting (*juntar,* "to join") but also used, and now almost exclusively, in the sense of (1) a committee or (2) an administrative council or board. The term became increasingly familiar from the 16th century because of its application to the growing number of government consultative committees. The resistance to Napoleon's invasion in 1808 was organized by the *juntas provinciales,* and the general committee chosen from among them to represent the nation was the *junta suprema central.* In all subsequent civil wars or revolutionary disturbances in Spain or Spanish America, similar bodies, elected or self-chosen, have usually been known as juntas. The corrupted form "junto" came into use in English in the 17th century, often in a disparaging sense, of a party united for a political purpose, a faction or cabal. It was particularly applied to the Whig leaders during the reigns of William III and Anne.

JUPITER (IUPPITER, DIESPITER or IOVIS), the chief Roman and Italian god. The first part of his name (root *diu,* "bright") is etymologically identical with the Greek Zeus (*q.v.*), with whom he is identified. Originally he was a sky-god manifesting himself in numerous ways with various epithets. As Lucetius he was the light-bringer (*cf.* such phrases as *sub Iove,* "under the open sky"); as Jupiter Elicius he was, like Zeus, a rain-god particularly propitiated in time of drought; as Fulgur he was god of the thunderbolt, and all places struck by lightning were revered as sacred areas. The ides, or days of the full moon, were sacred to him, and as Sky Father he was worshiped at the Vinalia, the festival of the grape harvest (Aug. 19), at which time his priest (*flamen*) cut the first grapes. The Meditrinalia (Oct. 11), when the new wine was first tasted, was probably also sacred to him. As Jupiter Lapis he was *numen* of the *lapides silices,* which were stones, probably Neolithic tools, kept in his temple on the Capitoline (Livy i, 10) and believed to be thunderbolts. They were used in taking oaths, particularly by the *fetiales* (priests of Jupiter Feretrius), who were in charge of the official ceremonies of declaring war or making treaties on behalf of the Roman state; both publicly and privately oaths were taken *per Iovem lapidem.*

ALINARI

SCULPTURED BUST OF JUPITER. IN THE VATICAN MUSEUM, ROME

As Latiaris he is chief god of the Latins worshiped in an ancient shrine on Mt. Alba by the cities of the Latin league, of which Rome was originally an ordinary member. As Rome's position in the league grew, however, its role in the worship on Mt. Alba became more dominant; in historical times the ritual was in charge of the chief Roman magistrate, and the festival itself (the *feriae Latinae,* an annual event of unfixed date) was a religious occasion of the highest importance to the Roman state. The libation was of milk and the principal sacrifice a pure white heifer that had never experienced the yoke.

In Jupiter may undoubtedly be seen not only the great protecting deity of the race but one, and perhaps the only one, whose worship embodies a distinct moral conception. He is specially concerned with oaths, treaties and leagues, and it was in the presence of his priest that the most ancient and sacred form of marriage (*confarreatio*) took place. The lesser deities, Dius Fidius and Fides (*q.v.*), were, perhaps, originally identical, certainly connected, with him. This connection with the conscience, with the sense of obligation and right dealing, was never quite lost throughout Roman history. In Virgil's great poem, though Jupiter is in many ways as much Greek as Roman, he is still the great protecting deity who keeps the hero in the path of duty (*pietas*) toward gods, state and family.

The Etruscan kings were responsible for the introduction of the cult of Jupiter Optimus Maximus (*i.e.,* "the best and greatest of all Jupiters") shortly before the fall of their monarchy. For him they constructed a huge temple on the Capitoline in the Etruscan style, and this became the centre of his worship at Rome. The temple had three cellae for the celebrated Capitoline triad, Jupiter, Juno and Minerva, a purely Etruscan grouping; in Roman cult Jupiter's associates are Mars and Quirinus (*qq.v.*). The dedication festival of the Capitoline temple fell on Sept. 13, on which day the consuls originally succeeded to office, accompanied by the senate and other magistrates and priests. In fulfillment of a vow made by their predecessors, they offered to the great god a white ox, his favourite sacrifice, and, after rendering thanks for

the preservation of the state during the past year, made the same vow as that by which their predecessors had been bound. Then followed the *epulum Iovis* or feast of Jupiter, in which the three deities seem to have been visibly present in the form of their statues, Jupiter having a couch and each goddess a *sella,* and to have shared the meal with senate and magistrates. In later times this day became the central point of the great Roman games (*ludi Romani*), originally games vowed in honour of the god if he brought a war to a successful issue. When a victorious army returned home the triumphal procession passed to this temple.

Throughout the republic this remained the central Roman cult, and although Augustus' new foundations (Apollo Palatinus and Mars Ultor) were in some sense its rivals, that emperor was far too shrewd to attempt to oust Jupiter Optimus Maximus from his paramount position; he became the protecting deity of the reigning emperor as representing the state, as he had been the protecting deity of the free republic. His worship spread over the whole empire; a capitol modeled on that of Rome was a feature of numerous important towns (*e.g.,* Ostia), and the fact that the Romans chose the name Jupiter, in almost every case, to indicate the chief deity of the subject peoples, proves that they continued to regard him, so long as his worship existed at all, as the god whom they themselves looked upon as greatest. *See* ROMAN RELIGION.

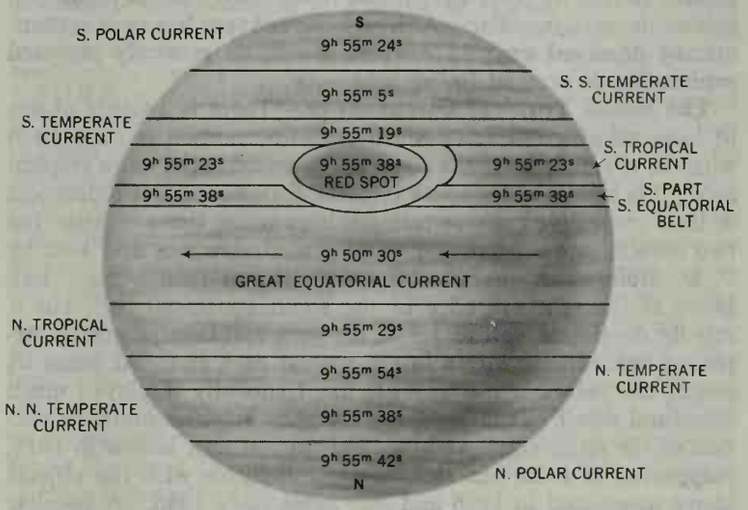
See G. Wissowa, *Religion und Kultus der Römer,* 2nd ed., p. 113 ff. (1912); articles "Iuppiter" in Roscher's *Lexikon;* Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenshaft,* s.v.; Platner-Ashby, *Topographical Dictionary,* s.v. (R. B. Ld.)

JUPITER is the largest of the planets. It revolves round the sun at a mean distance of about 5.2 times that of the Earth, or 483,000,000 mi.; and since its equatorial diameter is about 88,770 mi. it presents a disk which at opposition attains an apparent diameter of from 44 to 50 seconds of arc. The planet requires 4,333 days (11.86 years) to complete a sidereal revolution; and its synodical period, or the mean interval between successive oppositions, is 399 days. Usually, Jupiter is seen as the second brightest planet (after Venus); occasionally Mars comes close enough to appear brighter. Under favourable circumstances Jupiter is bright enough to cast a shadow. Its albedo is high (0.51), which means that it reflects 51% of the sunlight falling upon it. Its stellar magnitude at opposition ranges from -2.1 to -2.5. When viewed telescopically the disk of the planet is seen to be considerably flattened at the poles. The amount of this flattening was determined by micrometrical measurements and theoretically, by H. Struve, from the perturbations of the satellites by the equatorial protuberance of the planet. The probable value is not far from $\frac{1}{15.4}$. The mass of the planet is nearly 320 times that of Earth and since it has more than 1,300 times the volume of the Earth its mean density is rather less than one quarter as great.

Surface Features: Belts and Zones.—A small telescope will show that the planet is marked by parallel dark streaks (belts) separated by bright spaces (zones). The belts were first detected by Nicolas Zucchi and Daniel Bartoli in May 1630. Modern instruments show the belts to vary frequently, particularly at the edges, where dark spots separated by white indentations and rifts are specially liable to occur. Occasionally a belt or portion of a belt will disappear in the course of a few weeks or months while other features develop for a time and then die out. Jupiter is seen from the Earth as enveloped in clouds which are often in a greatly disturbed condition.

The planet's cloudy surface not infrequently displays striking colours. In particular the two belts north and south of the equator periodically vary from very red to brown, neutral gray or even bluish. When one belt attains a maximum of redness the other is colourless or even bluish; between the periods of extreme coloration both belts are moderately red. The cycle has been found to take place in 12.08 years, which is in close agreement with the period of the planet's revolution. Minimum redness has been found to occur shortly after the autumnal equinox of the hemisphere in which the belt is situated, which would seem to indicate a seasonal effect, despite the fact that Jupiter's axis has an inclination of only 3° 7′ to the plane of orbit. The equatorial zone also shows a periodic variation in colour, assuming a dull orange or tawny hue shortly before the aphelion position is reached.

Rotation.—From the motion of a dark spot in the southern hemisphere J. D. Cassini found a rotation period of 9 hr. 56 min. Later he found that a spot near the equator rotated in a period of about 9 hr. 50 min. It was therefore evident that the visible globe of Jupiter does not rotate like a solid body, and subsequent observations revealed that the rotation periods depend on latitude, as shown in the illustration. The shortest period is normally that of points within about ten degrees or so of the equator. Rotation periods vary irregularly from the equator poleward, and the arrangement in the northern hemisphere differs greatly from that in the southern. The illustration shows how irregular the arrangement of the "surface currents" really is. In general these currents are sharply bounded, though occasionally spots are observed which show intermediate periods. Although the figures given may be regarded as fairly reliable average values, the periods deduced each year from the observations are found to exhibit variations, and



JUPITER'S MAIN SURFACE CURRENTS AND THEIR ROTATION PERIODS (NORTH POLE SHOWN AT BOTTOM ACCORDING TO ASTRONOMICAL CUSTOM)

even in the same latitude periods will differ from one longitude to another. In 1928 a series of small black spots on the south component of the south equatorial belt rotated in over 9 hr. 59 min., the longest period yet recorded.

The Red Spot.—Jupiter's great red spot was reported by W. R. Dawes in 1857. After 1878 it was under constant observation and was found to vary greatly in colour, form, intensity and motion. It is situated in the southern hemisphere in approximately latitude $-20°$ and commonly appears as an elliptical shading or an elliptical ring in contact with the northern edge of the south temperate belt, and at various times it has presented curiously pointed ends. It is usually about 30,000 mi. long and about 7,000 or 8,000 mi. wide. It has varied from an intense brick-red to the faintest gray; indeed in some years it has been quite invisible, though its position has still been indicated by its intrusion (hollow) in the southern part of the south equatorial belt. In 1919 and 1927 when the hollow disappeared the spot regained something of its former intensity. In 1927 it also recovered something of its redness.

The established history of the red spot goes back as far as S. H. Schwabe's drawing of the hollow on Sept. 5, 1831. It is speculated that Robert Hooke may have seen indications of the spot in 1664. The long-enduring character of the red spot suggests that it is in the nature of a high plateau rising above the clouds from the "solid" surface of the planet; yet, the large motion of the spot in longitude indicates that it is floating in the atmosphere. The position of markings in longitude upon Jupiter is uncertain since there is no fixed point visible which can be used for reference. Present systems of reference assume a rotation period corresponding to the average rate of motion of the spots. System I applies to the belt 10° N. and S. of the equator, system II to the rest of the planet. The position of the zero meridian is defined (Royal Astronomical society) by the following values of the longitude of the central meridian on 1897 July 14.0 G.M.T.:

System I 47°.31 System II 96°.58

The adopted daily motions of the zero meridian relative to the vernal equinox of Jupiter and the resulting sidereal periods are:

System I	877°.90	$9^h\ 50^m\ 30^s.003$
System II	870.27	9 55 40.632

The tables of the longitudes of the central meridian of Jupiter published in the ephemerides are based on the mean daily synodic rotation during the period when the planet is observable, namely 877°.95 for system I and 870°.30 for system II.

The rotation period for system II about 1890 was formulated as closely representing the motion of the red spot. When Jupiter was in opposition in Dec. 1894, the red spot coincided with the zero meridian. During the next seven years the red spot drifted in a direction opposite to the rotation of the planet, so that by June 1901 it was in longitude 46°. Next year the spot started moving irregularly in the opposite direction, and by 1938 had drifted more than twice around the planet relative to the adopted rotation period for system II. After 1938 it again reversed its direction of motion so that by Nov. 1952 it had fallen nearly half a revolution behind the zero meridian. Although the red spot has been systematically observed since 1878, there is still no generally accepted explanation to account for its behaviour.

The South Tropical Disturbance.—There is another object of long-enduring character which calls for mention in connection with the red spot. Like the latter it is situated in the south tropical zone; it is known as the south tropical disturbance, but differences in their respective rates of rotation have many times brought the two objects into conjunction. The disturbance was first seen by P. B. Molesworth on Feb. 28, 1901. It was then a mere dark hump at the southern edge of the south equatorial belt, but it rapidly developed, spread across the zone and became greatly extended in longitude with a bright spot at each end. At times its length has exceeded 180°, and it has frequently displayed much structural detail. It disappeared together with the southern portion of the south equatorial belt and the red spot hollow in 1919, reappeared in 1920, but again became invisible with the objects above mentioned in 1926 and still again since 1940. A peculiar "circulating current" carrying spots across the south tropical region and back again was observed in 1932–33–34.

Jupiter's Atmosphere.—Hypotheses of the origin of the solar system usually start with the assumption that the planets were formed from the same material as the sun. There is strong evidence that the sun consists mainly of the two lightest elements, hydrogen and helium. Planets of small mass such as the Earth and Mars would not have sufficient gravitational attraction to retain light elements, and their high mean density indicates that they consist mostly of heavy metallic elements. But planets of large mass such as Jupiter and Saturn should have sufficient gravitational attraction to retain even hydrogen and helium, and their low mean density accords with this idea.

Direct evidence of the constitution of the atmospheres of the giant planets can be obtained from the absorption markings in their spectra. As early as 1905 V. M. Slipher had secured good photographs of the spectra of the giant planets in the visible region, and by 1933 their spectra had been photographed in the infrared as far as λ 10,150. Many of the markings agreed in position with those produced by ammonia (NH_3) and methane (CH_4), and the absorption bands in Jupiter corresponded in intensity to those produced by about 30 ft. of ammonia and 0.5 mi. of methane under atmospheric pressure.

Since the observed radiometric surface temperature of Jupiter is −138° C., and since ammonia freezes at −78° C., the presence of so much gaseous ammonia in the atmosphere might not have been anticipated. The most reasonable explanation is that the ammonia gas is sublimated or evaporated directly from the crystals. Under the surface gravity of Jupiter of 2.65 g., the 30 ft. of ammonia would exert a pressure of 1.5 mm. The vapour tension of solid ammonia exerts this pressure at a temperature of −107° C. Also, if there is considerable hydrogen mixed with the ammonia this condition would lower the mean molecular weight of the gas, and the partial pressure of the ammonia would be diminished in the same proportion. If hydrogen is very abundant the temperature could be as low as −123° C. and yet the observed amount of ammonia could be supported. Although this temperature is still slightly above that observed, the agreement is probably as close as can be expected under the circumstances.

Although astronomers had long felt confident that hydrogen (H_2) and helium (He) must be abundant in Jupiter, neither element gives markings in the observable region of Jupiter's spectrum. The first determination of the mean molecular weight of the gases in the atmosphere of a giant planet was obtained on Nov. 20, 1952, by W. A. Baum and A. D. Code from photometric measures on the occultation of a star by Jupiter. As the star sank behind the atmosphere of the planet its light faded principally because of attenuation of the rays as they were refractively spread apart more and more in traversing layers of increasing density in the Jovian stratosphere. The rate of diminution in the light of the star could be calculated from the apparent motion of Jupiter relative to the star, the surface gravity of the planet, the temperature of the stratosphere and the mean molecular weight of the gases. The first two are accurately known. It is possible to estimate the third within narrow limits. Thus the only unknown remaining was the mean molecular weight, which could be determined from the observations.

The procedure consisted in calculating theoretical light curves corresponding to different molecular weights and then comparing them with the light curve observed. The best agreement between theory and observation was obtained for a mean molecular weight of 3.3, a value intermediate between H_2 (mol.wt. 2) and He (mol.wt. 4). A pure methane atmosphere corresponding to a molecular weight of 16 for CH_4 gave a light curve completely at variance with the observations. It appears that hydrogen and helium are so abundant in the Jovian atmosphere that by comparison methane and ammonia are minor constituents.

Hydrogen and helium give no visible evidence of their presence in the atmosphere. The cloud belts which give the disk of the planet its characteristic appearance are believed to consist of ammonia cirrus, while the colours of the cloud belts may be attributable to solutions of metallic sodium in liquid or solid ammonia. Variations in the colour and intensity of the belts are attributed to changes in temperature.

Interior Constitution.—The mean density of Jupiter is about 1.3 times that of water. If the outer layers consist mainly of light elements of low density, then it would seem that matter in the deep interior must consist chiefly of heavy elements of high density, to bring the average for the whole planet above the density of water. For this reason, Jupiter was supposed by R. Wildt (1937) to have a dense central metallic core similar to that of the Earth, surrounded by a thick mantle of ice and overlaid by an atmosphere of highly compressed gases thousands of miles deep.

In 1951 W. H. Ramsey proposed an interesting new model of Jupiter on the assumption that the planet consists mainly of hydrogen. According to this particular model, Jupiter has a core of metallic hydrogen 38,000 mi. in radius which includes 92% of the planet's mass. The remaining 8% is contained in a mantle of solid hydrogen 5,000 mi. thick surrounding the core. The atmosphere is a thin shell of negligible mass overlying the mantle. Other models of Jupiter can be built assuming a mixture of hydrogen and helium in different proportions. Any theory of the interior constitution of the giant planets encounters severe difficulties, and authorities are by no means agreed on the subject.

During January, February and March 1955 a variable 22.2-mc.-per-second radiation was detected with the large Mills Cross antenna of the Carnegie Institution of Washington, located near Seneca, Md., and was established as coming from Jupiter. This was the first recorded instance of radio waves from another planet in our solar system.

Although centres of emission have been detected on the planet at about longitudes 40°, 200° and 320° of system II, the source of emission has not been identified satisfactorily with any markings on the disk of Jupiter (*see* TELESCOPE, RADIO).

The Satellites.—Jupiter is accompanied by 12 known satellites. The four largest were the first bodies in the solar system discovered with the telescope. They are often called the Galilean satellites in honour of Galileo, who observed three of them on Jan. 7, 1610

(Gregorian style calendar), and a fourth on the following Jan. 13. There seems little doubt, however, that Simon Marius, a Dutch astronomer, also observed the satellites at practically the same time and realized their significance. The four large satellites can be observed with a good pair of field glasses, and indeed could be seen by the unaided eye were it not for the glare of Jupiter.

Marius named the satellites Io, Europa, Ganymede and Callisto, in order of their increasing distance from the planet, but his names never were widely used, the common usage being to designate them as I, II, III and IV. In Sept. 1892 E. E. Barnard discovered a fifth satellite which he decided to call V. Since the Galilean satellites are numbered in order of increasing distance from Jupiter, this name implies that V is the most distant, whereas actually it is the nearest to the planet. When the next satellite was discovered in 1904 it was called VI, and the custom has been continued of numbering the satellites in the order of their discovery. Often "Jupiter" or "J" is used as a prefix in designating the satellite, as Jupiter VIII, or J IX.

The orbits of the Galilean satellites are nearly edgewise to us and they appear to oscillate with respect to Jupiter in nearly straight lines passing through the planet's equator. They move so rapidly that their configuration is quite different from night to night. Sometimes one or two of the satellites may be invisible, as happens when a satellite is occulted by the disk of Jupiter or hidden by its shadow. Satellites I, II and III are eclipsed at every revolution but IV occasionally escapes. A satellite may also become invisible, or difficult to see, when in transit across the planet.

As may be seen from the table, the satellites fall into three distinct groups. Thus I, II, III, IV and V revolve at an average distance from Jupiter of 500,000 mi. in the same direction the planet rotates. Satellites VI, VII and X also revolve in the same direction as the planet at an average distance of 7,000,000 mi.

The Satellites of Jupiter

Name	Discoverer	Date	Distance from Jupiter (miles)	Sidereal period (days)	Diameter (miles)
V	E. E. Barnard	1892	112,000	0.4982	150
I (Io)	Galileo and Marius	1610	262,000	1.7691	2,020
II (Europa)	Galileo and Marius	1610	417,000	3.5512	1,790
III (Ganymede)	Galileo and Marius	1610	666,000	7.1546	3,120
IV (Callisto)	Galileo and Marius	1610	1,170,000	16.6890	2,770
VI	C. D. Perrine	1904	7,124,000	250.62	100
X	S. B. Nicholson	1938	7,200,000	254.21	15
VII	C. D. Perrine	1905	7,300,000	260.07	35
XII*	S. B. Nicholson	1951	13,000,000	631	14
XI*	S. B. Nicholson	1938	14,000,000	692.5	19
VIII*	P. Melotte	1908	14,600,000	738.9	35
IX*	S. B. Nicholson	1914	14,700,000	758	17

*Direction of revolution is retrograde. The orbits of the outer satellites are not even approximately elliptic. Because of perturbations by the sun the elements change continually.

Source: *Handbook of the British Astronomical Association* (1956). The diameters of the smaller satellites are from Seth B. Nicholson, "The Satellites of Jupiter," the *Griffith Observer* (May 1952). The diameters of the four large satellites are those given by G. P. Kuiper (ed.), *The Atmospheres of the Earth and Planets* (1951).

But satellites VIII, IX, XI and XII revolve in the opposite direction at an average distance of 15,000,000 mi. The orbits of these four outer satellites are so large that the disturbing force of the sun upon them almost equals the whole gravitational attraction of Jupiter. As a result their motions are enormously perturbed, so that their paths are not even approximately closed curves. These satellites may once have been asteroids that were captured by the combined attractions of the sun and Jupiter. It is possible that under suitable conditions a satellite might escape from Jupiter and revolve around the sun.

With a sufficiently powerful telescope and favourable observing conditions, the Galilean satellites show surface markings that are rather easily seen. Observations at the Pic du Midi observatory, in Basses-Pyrénées *département*, France, in 1941 with a 15-in. refractor revealed markings on the four large satellites as follows: dark poles and dark north-south bands on I; bright poles and dark equatorial spots on II; a white polar cap and dark spots on III; and a bright south polar region and light spots surrounding the north pole of IV. A comparison of the positions of the markings showed that all four satellites revolve around Jupiter with their axes of rotation nearly perpendicular to the planes of their orbits. In each case, the period of revolution of the satellite equals its period of axial rotation. Hence the Galilean satellites always keep the same face turned toward Jupiter, just as our moon always keeps the same face turned toward the Earth.

The first determination of the velocity of light was made from observations of Jupiter's satellites. Ole Roemer, a Danish astronomer working at the Paris observatory about 1676, noted that when the Earth was receding from Jupiter the interval between successive eclipses of satellite I increased by an amount proportional to the increase in distance between the planets. But when the Earth was approaching Jupiter the interval between eclipses decreased by an amount proportional to the decrease in distance. Roemer correctly interpreted this apparent variation in the periodic motion of I as a consequence of the finite velocity of light.

See also references under "Jupiter" in the Index.

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JURA, a frontier *département* of eastern France, was formed in 1790 from the southern portion of Franche-Comté (*q.v.*). It is bounded north by Haute-Saône, northeast by Doubs, east by Switzerland, south by Ain and west by Saône-et-Loire and Côte d'Or. Area 5,055 sq.km. (1,952 sq.mi.). Pop. (1962) 225,682. The *département* extends across a variety of terrains. In the southeast are the parallel limestone ranges of the Jura mountains, reaching 4,905 ft. in the Crêt Pela; at a somewhat lower level, to the northwest, stretches the Jura plateau, deeply trenched by the valleys of the Ain and its tributaries with picturesque gorges. The bold, scarp edge of the plateau, dissected into promontories and outliers, overlooks the fertile plain of the Saône valley, known as Bresse, and in the extreme northwest the *département* extends across the lower Doubs to the Ognon river, above the confluence of these tributaries with the Saône.

The sheltered lowlands, with warm, sunny summers and relatively mild winters, contrast with the wet and snowy Jura, where the winters are long and severe and the farming possibilities are limited. There are extensive forests in the Jura, with conifers at the higher altitudes and deciduous trees, especially beech, lower down. The farming there has a definite pastoral emphasis, and irrigated meadows are a feature of the valleys. Under its cooperative organization, the dairying industry produces large quantities of cheese. In Bresse wheat and maize (corn), with sugar beet and fodder crops, are extensively grown, and the vine is also cultivated, especially along the margin of the Jura plateau, where the re-entrant valleys (*reculées*) of the dissected escarpment multiply the favourable exposures on loamy soils. The vineyards are much reduced in extent since the *Phylloxera* outbreak of the late 19th century.

Mineral resources are not great, though the limestone is quarried in places and salt has long been obtained from Triassic rocks near Salins-les-Bains and Lons-le-Saunier. The population density, however, is increased by widespread manufacturing activity, in rural as well as urban settings, with nail making, light engineering and, especially, skilled precision industries such as gem cutting, making spectacles and optical instruments (especially at Morez), watchmaking, and the manufacture of briar pipes (especially at St. Claude) and other fancy woodenware and plastic ware. These have developed from domestic, winter industries that worked on local materials. Hydroelectric power from the mountain streams has now been extensively developed.

In the north the Doubs valley is a main line of communications, including the Rhône-Rhine canal. Dôle, before 1674 the capital of Franche-Comté, was the birthplace of the scientist Louis Pasteur. The capital of the *département* is Lons-le-Saunier (*q.v.*), at the foot of the Jura plateau, with the abbey church and spectacular caves of Baume-les-Messieurs nearby. Morez, at 2,100 ft. in the Bienne valley, is a thriving winter and summer resort, as well as an industrial centre. The *département* comprises the *arrondissements* of Dôle, Lons-le-Saunier and St. Claude. The last-named is the seat of the diocese to which the *département* corresponds.

Jura belongs to the *académie* and court of appeal of Besançon.

(Ar. E. S.)

JURA, an island of the Inner Hebrides, the fourth largest of the group, on the west coast of Argyll, Scot. Pop. (1951) 258. On the north it is separated from the island of Scarba by the whirlpool of Corrievreckan, caused by the rush of the tides, on the east from the mainland by the Sound of Jura, and on the south and southwest from Islay by the Sound of Islay. Craighouse, the chief village, is connected by steamer with West Loch Tarbert, and at Feolin there is a ferry to Port Askaig in Islay. The island's greatest length is about 27 mi., and the breadth varies from 2 to 8 mi. A chain of hills culminating in the Paps of Jura—Beinn-an-Oir (2,571 ft.), Beinn Siantaidh and Beinn a' Chaolais—runs the whole length of the island, interrupted only by Loch Tarbert, an arm of the sea, which forms an indentation nearly 6 mi. deep and almost cuts the island in two. Cattle and sheep are raised; oats, barley and potatoes are cultivated along the eastern shore, where most of the inhabitants live; and there is some fishing. Afforestation is carried out by the Forestry commission. A ferro-concrete pier was constructed at Craighouse.

JURA MOUNTAINS, a system of ranges between the Rhine and the Rhône, lying mostly in France but crossing into Switzerland in the southeast. The Rhine gorge cuts off the Jura from the Swabian and Franconian ranges to the northeast, and the Rhône gorge separates the Jura from the Dauphiné to the south. The system is 230 km. (143 mi.) long and 61 km. (38 mi.) broad, oblong in shape and raised about 2,500 ft. above the surrounding plains. The Jura forms a compact series of ridges parallel to the direction of the greatest length of the system, crossed by transverse gorges or *cluses*. Its three chief rivers—the Doubs, the Loué and the Ain—flow down the western slope, which is much longer and less steep than the eastern.

The range is mentioned by Caesar, Strabo, Pliny and Ptolemy. Its name, which appears under many forms, *e.g.,* Joux, Jorat, Jorasse, Juriens, is a synonym for a wood or forest. The German name is Leberberg, *Leber* being a provincial word for a hill.

Politically the Jura is French (*départements* of the Doubs, Jura, Ain and in the north a small portion of Alsace) and Swiss (parts of the cantons of Geneva, Vaud, Neuchâtel, Bern, Solothurn and Basel).

Geology.—Geologically the Jura belong to the Alpine system, both having been formed by the same earth movements (*see* Alps). Rock formation ranges from Permian to Pliocene, but the Jurassic formation is the most important. The rocks have been folded into parallel anticlines and synclines running from southwest to northeast, but because of the resistance of the ancient massifs of the central plateau of France on the west and the Vosges-Black Forest on the east, the folds are bunched together at the extremities of the range. The intensity of folding decreases northward, away from the Alps. In the east the structure is complicated by block faulting, the region being known as the Jura tableland (*Jura tabulaire*), while the greater part of the range is known as the folded Jura (*Jura plissé*). In the extreme west the mountains descend steeply to the plain of the Saône, the district being known as the *région du vignoble.* Widespread evidence of intensive glaciation from the Alps in the south is seen in the form of moraines, erratics, striated surfaces, etc. (*see* Glacier).

Outer Topography.—The topography of the Jura may be considered first by a brief survey of its outer slopes.

The northern face dominates on one side the famous *trouée* or trench of Belfort, one of the main geographical centres of Europe from which routes run north down the Rhine to the North sea, southeast to the Danube basin and the Black sea and southwest into France and so to the Mediterranean basin. It is of great strategic importance. On the other side it overhangs the *trouée* of the Black Forest towns on the Rhine (Rheinfelden, Säckingen, Laufenburg and Waldshut). On this north slope two openings offer routes into the interior of the chain—the valley of the Doubs (France) and the valley of the Birs (Switzerland). Belfort, Mulhouse and Basel are the chief towns on this slope.

The eastern and western faces offer many striking parallels. The lakes of Neuchâtel, Biel and Morat were formerly more extensive and filled most of the valleys of the Aare and Saône. Both east and west slopes are pierced by many *cluses,* by which access is gained to the central plateau of Pontarlier, though these are seen more plainly on the east face than on the west. Thus the gorges at the exit from which Lons-le-Saunier, Poligny, Arbois and Salins-les-Bains are built balance those of the Schüss (Suze), of the Val de Ruz, of the Val de Travers and of the Val d'Orbe. Neuchâtel, which commands these eastern gorges, is a great commercial and industrial centre, just as is Besançon on the west. These easy means of communication account for the dialect of Neuchâtel being Burgundian. Mont Chasseron (5,272 ft.), the central point of the eastern face, commands the two great railways which join Neuchâtel and Pontarlier. The Loue river, which drains the west face of this ridge, flows into the Doubs south of Dôle, the only important town of the central portion of the Saône basin. Mont Chasseron is wholly Swiss, as are the lower summits of Chasseral (5,272 ft.), Mont Suchet (5,210 ft.), Aig. de Baulmes (5,128 ft.), Dent de Vaulion (4,875 ft.), Weissenstein (4,580 ft.) and Chaumont (3,871 ft.), the two last-named peaks being probably the best known in the Jura, as they are accessible by road from Solothurn and Neuchâtel, respectively. South of the Orbe valley the east face becomes a rocky wall which is crowned by all the highest summits (the first and second Swiss, the rest French) of the chain—Mont Tendre (5,508 ft.), the Dôle (5,502 ft.), the Reculet (5,633 ft.), the Crêt de la Neige (5,653 ft.) and the Grand Crêt d'Eau (5,328 ft.), the uniformity of level being as striking as on the west edge of the Jura, though there the absolute height is far less. The position of the Dôle is similar to that of the Chasseron, as along the sides of it run the great roads of the Col de St. Cergues (4,042 ft.) and the Col de la Faucille (4,340 ft.), the latter leading through the Vallée des Dappes. The height of these roads shows that they are high passes across the chain rather than through natural depressions.

The southern face is delimited by two great pillars—on the east the Grand Crêt d'Eau and on the west the ridge of Revermont (2,536 ft.) above Bourg; between these a huge bastion (the district of Bugey, the old name for the south Jura) stretches south, forcing the Rhône to make a long detour. On the two sides of this bastion the plains in which Ambérieu and Culoz stand are the meeting points of the routes which cut through the bastion by means of deep gorges. On the eastern side this great wedge is steep and rugged, ending in the Grand Colombier (5,033 ft.) north of Culoz; it sinks on the western side to the valley of the Ain, the district of Bresse and the plateau of Dombes. The junction of the Ain and the Suran at Pont d'Ain on the west balances that of the Valserine and the Rhône at Bellegarde on the east.

The Jura thus dominates on the north one of the great highways of Europe, on the east and west divides the valleys of the Saône and the Aare, and stretches out to the south so as nearly to join hands with the great mass of the Dauphiné Alps. It therefore commands the routes from France into Germany, Switzerland and Italy; hence its enormous historical importance.

Interior Topography.—The interior of the range naturally falls into three divisions, each traversed by one of the three chief rivers—Doubs, Loue and Ain.

The northern division is marked by the east and west ridge of the Lomont, and Mont Terri (2,638 ft.); the defile of the Doubs from St. Ursanne to St. Hippolyte; and the *trouée* of the Black Forest towns. It thus bars access to the central plateau from the north. This division falls again into two distinct portions.

East of the deep gorge of the Doubs below St. Hippolyte it includes the basin of the Birs river, and the plateau between the Doubs and the Aare, on which, at an average height of 2,600 ft., are situated a number of towns, one of the most striking features of the Jura. These include Le Locle and La Chaux de Fonds which are mainly occupied with watchmaking.

West of the *cluse* of the Doubs, the district east of the Dessoubre river, isolated in the interior of the range, is called the Haute Montagne, and is noted for cheese making, curing of hams, sawmilling, etc. Besançon is the chief French centre of the watchmaking industry and is connected with Geneva by a chain of places similarly occupied which fringe the west plateau of the Jura. The part

west of the Dessoubre, or the Moyenne Montagne, a plateau north of the Loue, is agricultural but along its northern edge metal-working and the manufacture of hardware are carried on, particularly at Besançon and Audincourt.

The central division is a basin with no deep gorges and to Pontarlier, its chief town, routes converge from every direction through notches in the rim; hence its strategic and commercial importance. The northeast roads run to Morteau and Le Locle, the northwest to Besançon, the west to Salins-les-Bains, the southwest to Dôle and Lons-le-Saunier, the east to the Swiss plain. The Pontarlier plateau has only slight indentations in it resulting from erosion by the Drugeon river. East of this plateau is the Fort de Joux where two railways from Neuchâtel meet, and west is Salins-les-Bains, the meeting place of the routes from the Col de la Faucille, from Besançon and from the French plain.

The Ain rises on the south edge of this plateau, and in its valley are Nozeroy and Champagnole. The latter is especially important, since the road from it to Geneva traverses one after another the chief valleys which run down into the south Jura and thus commands the routes from the Geneva region; a branch route runs along the Orbe river from Jougne. In the central Jura no less than 15 ridges run parallel to each other, and it is these which force the Loue toward the north and cause its very eccentric course. The cultivation of wormwood for the manufacture of absinthe is centred on Pontarlier.

The southern division is the most complicated of the Jura. The lofty ridge which bounds it to the east forces all its drainage to the west, and the result is a number of valleys of erosion, quite distinct from the *cluses* or fissures of the Doubs and the Loué. Another point of interest is the number of roads which intersect it, despite its extreme irregularity. This is because of the great *cluses* of Nantua and Virieu, which traverse it from east to west. The plateaus west of the Ain are cut through by the valleys of the Valouse and of the Suran and do not possess any considerable towns.

The Ain receives three tributaries from the east: the Bienne, which flows from the fort of Les Rousses by St. Claude, the industrial centre of the south Jura, famous for wooden toys, Septmoncel, a centre for gem cutting, and Morez, a watch and eyeglasses-making centre; the Ognon, which drains the lake of Nantua and which communicates by the *cluse* of the lake of Silan with the Valserine valley and so with the Rhône at Bellegarde, and again with the various routes which meet at Les Rousses, while Culoz is easily gained by the Val Romey and the Séran; the Albarine, connected with Culoz by the *cluse* of Virieu and by the Furan, flowing south, with Belley, the capital of the district of Bugey.

The *cluses* of Nantua and Virieu are both traversed by important railways, and it remains true in modern times that the keys of the south Jura are Lyons and Geneva. (J. I. P.)

JURASSIC SYSTEM, in geology, the succession of rocks deposited during the middle period of the Mesozoic era, succeeding the Triassic, or Trias, and preceding the Cretaceous period. The Jurassic period began about 180,000,000 years ago and lasted about 50,000,000 years, as shown in the accompanying geologic time chart. This article briefly indicates the kinds of life that existed during this period, the faunal realms or provinces and zones having comparable kinds of life, the climate of the period and mountain building and volcanism, and discusses the occurrence of the Jurassic system of rocks in various regions around the world. The sedimentary rocks of the Jurassic are classified largely on the basis of fossils of marine animals. On land, the dinosaurs were the dominant vertebrates and included the huge amphibious *Brontosaurus* and the armoured *Stegosaurus,* which are discussed separately in the article DINOSAUR. An over-all view of the fauna of the time will be found in PALEONTOLOGY, and of the flora, in PALEOBOTANY. These articles also discuss the classification of fossils and their role in correlating rock strata. The geologic processes referred to in this article are discussed and terms are defined in GEOLOGY.

The Jurassic system is named after the Jura mountains of France, Switzerland and the former German duchy of Swabia, but the constituent formations were first studied and named in England, by William Smith (*q.v.*; two works published 1816, 1817). Smith's names are still used in Britain, but for wider use a classification based on paleontological zones has been devised, principally worked out by Albert Oppel. The zones are grouped into stages, which are of wider application and can be traced all over the world. They are named on a system introduced by Alcide Dessalines d'Orbigny in 1850. Each of the stage names is derived from a place and many of them embody indirectly the old formation names of Smith and other early English and French authors, with the suffix–*ian; e.g.,* Portlandian, Oxfordian, Bathonian, Bajocian, Hettangian.

Geologic Time Chart

System and Period	Series and Epoch	Distinctive Records of Life	Began (Millions of Years Ago)
	CENOZOIC ERA		
Quaternary	Recent (last 11,000 years)		
	Pleistocene	Early man	2+
Tertiary	Pliocene	Large carnivores	10
	Miocene	Whales, apes, grazing forms	27
	Oligocene	Large browsing mammals	38
	Eocene	Rise of flowering plants	55
	Paleocene	First placental mammals	65–70
	MESOZOIC ERA		
Cretaceous		Extinction of dinosaurs	130
Jurassic		Dinosaurs' zenith, primitive birds, first small mammals	180
Triassic		Appearance of dinosaurs	225
	PALEOZOIC ERA		
Permian		Reptiles developed, conifers abundant	260
Carboniferous			
Upper (Pennsylvanian)		First reptiles, coal forests	300
Lower (Mississippian)		Sharks abundant	340
Devonian		Amphibians appeared, fishes abundant	405
Silurian		Earliest land plants and animals	435
Ordovician		First primitive fishes	480
Cambrian		Marine invertebrates	550–570
	PRECAMBRIAN TIME		
		Few fossils	more than 3,490

Life of the Period.—Marine faunas are universally distributed. The Mollusca are most numerous and of them the ammonites are of greatest value for zoning because of their short vertical and wide horizontal range, their relative disregard of facies and their rapid evolution. Reptiles were represented by the large marine saurians and by the crocodiles and pterodactyls or winged reptiles (*see* PTEROSAUR). There were also some feathered birds, still toothed like reptiles (*Archaeopteryx* [*q.v.*], etc.). Fresh-water molluscan faunas occur in the last stage in England (Purbeckian), rather earlier in North America (in the Morrison formation, probably Kimeridgian) and on a lesser scale in the Bathonian stage in England and France.

In the Purbeckian rocks of Purbeck in Dorset is a bed with primitive small mammals, and others occur in a thin bed in the Bathonian (Stonesfield slate, near Oxford).

Faunal Realms and Provinces.—These can be recognized, more or less independent of latitude, but they changed profoundly during the period. In Early Jurassic (Lias) all the seas of the world seem to have belonged to one realm. In the middle part of the period (Bajocian), Pacific and Boreal (northern) realms were differentiated and the remainder of the seas formed a third or Tethyan realm. The Boreal and Tethyan realms advanced and retreated several times at the expense of each other's territory. For discussion of faunal realms and their significance, *see* FOSSIL.

Climate of the Period.—No physical or biological traces of glaciation have been found anywhere in Jurassic rocks, but both in east Greenland and in the antarctic near the northern tip of Graham Land are abundant plant remains of temperate forest trees, similar or in part identical with those found in the Jurassic of Yorkshire and Sardinia.

Also, the Boreal faunal realm, which had its headquarters in the area occupied by the present Arctic ocean and periodically spread over the northern parts of the surrounding continents, is not characterized by stunting but supported a normal warm-temperate marine molluscan fauna, which appears to have been subtropical at times, with large bivalves and gigantic ammonites (*e.g.,* the Portlandian fauna of England, northern France and Greenland).

The climate of the Jurassic was therefore probably more uniform than at present, temperate to warm temperate nearly everywhere, and there was probably no glaciation even at the poles.

Mountain Building and Volcanism of the Period.—On the whole the Jurassic was one of the quietest periods, but a mobile belt encircled the Pacific, and in this belt, after prolonged and profound subsidence and deposition, there was at the end of the Jurassic, especially in North America, compression of the geosynclinal sediments (orogeny) with mountain building, erosion and volcanism on a vast scale (the Nevadan orogeny). In the cordilleras of North America and throughout the Andes, from Alaska to Cape Horn, there are great thicknesses of lavas and volcanic ashes as well as injected sheets, sills and dikes of various dates within the Jurassic period. Similar igneous masses probably of Jurassic age are known in the Balkans (Dinaric ranges) of Yugoslavia, Albania and possibly Greece. Mountain-building movements and erosions marked by thick conglomerates of Jurassic age are most firmly dated in the Canadian Rockies and also in the Crimea.

Development in Europe.—In the Jurassic period the site of the Alps was a geosyncline. Over the rest of Europe shallow warm-temperate seas overspread a shelf north of the Alps. The shelf was composed of the denuded and almost leveled remains of the Hercynian mountain range, which had been thrown up toward the end of the Paleozoic era and then largely eroded down in the Permian and Triassic. It was a typical mobile shelf, on which a network of shallow troughs of subsidence allowed the accumulation of up to about 1,000 m. of shallow-water Jurassic rocks of great variety. In northwest Europe the faunas were of warm-temperate or tropical type, with coral reefs flourishing in the Upper Jurassic as far north as Yorkshire and ammonites of mixed Tethyan and Boreal types, though those of the Boreal realm show no signs of particularly cold-water habitat. In northeast Europe the uppermost Upper Jurassic has the faunas of the Volgian province of the Boreal realm (*i.e.*, in Poland and Russia). South of the Alps, on the Iberian, Italian and Balkan peninsulas, the deposits and faunas are those of the Tethys and Tethyan realm. Lithologically the most characteristic sign of this realm is nodular limestone or nodules of hard cement stone or calcite mudstone set in marl (*fausses brèches, Knollenkalk*), with abundant ammonites, especially Phylloceratidae and Lytoceratidae.

In northwest Europe, especially around the Paris basin, in Lower Saxony and southern England, is the *locus classicus* for stratigraphy, where formations, zones and stages were all first recognized and named by the pioneers, Smith, C. L. von Buch, F. A. Quenstedt, D'Orbigny and Oppel. Northward through England these well-subdivided shallow marine formations pass largely into plant-bearing sandstones, the Deltaic series of Yorkshire and Scotland, which cover most of the Middle Jurassic and recur in borings beneath Denmark. The Lower Jurassic remains in ordinary Lias facies in Yorkshire, Scotland and Denmark, but it too grades into sandstones, though with marine ammonitiferous intercalations, in the Baltic region and especially in Skåne, southern Sweden and Bornholm. The Baltic region was a collecting trough in the Jurassic period as in recent times, receiving the products of denudation of the Scandinavian shield of ancient and crystalline rocks. The sea was shallow but warm temperate, populated by the Boreal fauna with southern admixture. The plains of Poland and European Russia were also overspread by shallow shelf seas, containing the fauna of the Boreal realm; but close beneath lay the rigid Russian platform, forming a stable shelf, so that there is a great contrast with the mobile shelf deposits farther west. The Donets, where a trough developed through the Jurassic, was an exception. Another exception in the west was the Spanish Meseta, which, although composed of folded Paleozoic rocks, behaved as a horst, or uplifted block (*see* FAULT), and probably remained above the sea in the Jurassic.

The characteristic deposits of the Alpine geosyncline are a thick monotonous series of dark shales, the *schistes lustrés* or *Bündnerschiefer*, which pass down into the Triassic and up into the Cretaceous. Over the line of central crystalline horsts such as the Aar, and Mont Blanc, more normal and varied deposits were formed, referred to as the Mesozoic sedimentary envelope. As the horsts rose intermittently in anticlinal lines in Jurassic and later times, the envelopes were squeezed and shed off as nappes, of which the principal one forms the range of the High Calcareous Alps. The *schistes lustrés* were also squeezed out as a complicated mass of recumbent folds or nappes (*see* ALPS: *Geology and Structure*). The Prealps beside Lake of Geneva are relics of an envelope nappe, and one of their constituents (*Nappe de la brèche*) consists largely of two vast sheets of breccia, each believed to represent successive submarine slides or slumps, which slid 5 km. southeastward from a rising anticline. In Lias, *i.e.*, Early Jurassic times, there was a ridge of land or shallows, the Vindelician ridge, joining the crystalline horsts of the Black Forest and Bohemian Forest. Against the southern side of this, the Lias of the Alpine geosyncline thins out piecemeal. The margin is also complicated by faulting. The western end of the Alpine geosyncline is traceable in northern Corsica. To the east it may have continued into the northern Carpathians, where the Jurassic is, however, of the highly fossiliferous and variable type found in the northern marginal deposits of the Alps, not *schistes lustrés*. The Carpathian outcrops continue south and east and eventually swing west in the Transylvanian Alps, and the facies grades into the Mediterranean type.

Mediterranean Europe.—The Mediterranean is a survival of the Mesozoic Tethys, and the Jurassic deposits of southern Europe which collected in the Tethys have a peculiar facies, consisting mainly of nodular, hard, compact limestones, the nodules set in marl or uniting to form a solid mass with nodular structure, the *fausse brèche* or *Knollenkalk* referred to above. These may be extremely rich in ammonites, almost to the exclusion of other fossils. A special variety of the nodular limestones and marls is bright red and called *ammonitico rosso*. This occurs in three levels, in the Sinemurian, Toarcian (mainly) and Oxfordian.

The Pyrenees.—These mountains are fundamentally different in structure from the Alps and show no evidence of a Jurassic geosyncline. The rocks resemble those of the lower Rhône valley and Montagne Noire regions of southern France. They occur in two bands along the north and south flanks of the central crystalline range, off which they slid when the range was uplifted in the Cretaceous and Tertiary, with the formation of complicated crumples. It is uncertain whether any of the central range stood above the sea all through the Jurassic. The greatest developments of Tethyan Jurassic in the peninsula occur in the Cantabrian and Iberian mountains of northeast Spain, in the mountains of Andalusia in the south and in southern Portugal. The northwest European or Atlantic facies is thickly developed in Portugal northwest of the Tagus and in a small area in Asturias in Spain, where the succession shows links with that in Dorset on the south coast of England. Sardinia also has Bajocian sandstone with plant remains like those in the Deltaic series of Yorkshire.

Italian Peninsula and Sicily.—Essentially Tethyan Jurassic extends down the Apennines and is strongly developed in Sicily, where the Lower Jurassic consists of thick limestones continuous with the Triassic in the northwest of the island but of Liaslike shales in the east. Taormina is a renowned locality for the ammonites of the Domerian stage (= Upper Pliensbachian = Middle Lias). In the northwest and west the Middle Jurassic and lower part of the Upper Jurassic are condensed and represented by a few feet of beds full of fossils, but the Upper Jurassic swells out again in the nodular Tethyan facies and passes up into similar rock of Cretaceous age.

Balkan Peninsula.—In the Balkan peninsula, especially in Greece, the white nodular limestones of Tethyan facies predominate and are usually poor in fossils, but locally the *ammonitico rosso* occurs, especially in the Toarcian, where it contains many rare and remarkable ammonites of the family Hildoceratidae, subfamily Bouleiceratinae, which have been studied and figured by Carl Renz. In the Dinaric ranges some interbedded igneous rocks may be Jurassic, though most are probably Triassic. In the Balkan mountains the facies are mixed and locally very rich in fossils. Another facies common to Greece and Italy, especially, consists of cherts with *Posidonia*. Dobruja in Rumania and the Villany hills in Hungary are places renowned for extremely rich

Table Showing Typical Rock Successions and Subdivisions of System Into Stages for World-Wide Correlation

	Stages	Southern England	Russia (Volga basin)	Northern Germany (Lower Saxony)	Southern Germany (Swabia)	Jura Mountains	Southern France (Crussol-Ardèche)	Caucasus Mountains	India (Cutch)	United States Pacific border (California)	United States Western interior (Wyoming)
Upper Jurassic	Purbeckian	Purbeck Beds limestone, shale	A Lower Ryazan Beds A Upper Volgian greensand, marl ⊖	3 "Wealden" sandstones 2 1 Serpulite limestone Münder marls		A Upper Tithonian limestones Purbeck Beds limestones of Mont Salève, etc.	A Upper Tithonian limestone (Ardèche) Middle and Lower Tithonian	Tithonian limestones	A Umia ammonite beds green oölite A Upper Katrol shales	Knoxville formation and ⊕ A Franciscan formation	Morrison formation (fresh water)
	Portlandian	A Portland Beds limestone, sands	A Lower Volgian greensand, clay	Einbeckhausen limestone				A		Nevadan	
	Kimeridgian	A Kimeridge Clay	A Middle and Lower Kimeridgian clays	A Gigas beds limestone A Kimeridge clays	Neuburg Beds ζ ε δ	A Lower Tithonian limestones	A limestones	orogeny	A Katrol sandstones	orogeny A Mariposa slate	sandstones shales
	Oxfordian	A Corallian Beds limestone, sands A Oxford Clay	A Oxfordian clays	A Corallian oölite A Heersum clays	A Malm or White Jura γ β α	A limestones with coral reefs marls	A limestones of Crussol A marly limestones	A A marine shales	A Chari group A		A Sundance formation
Middle Jurassic	Callovian	A Kellaways Beds clays A Cornbrash ⊖ limestones	A Callovian clays	A clays	A ζ	A oölite ironstone and limestone ⊖	A marls and dolomite	A much volcanic activity	A Patcham limestones	A Amador group ⊕	A shales sandstones limestones
	Bathonian	A Great Oölite series limestones, etc.	sands	A succession near Hildesheim Fuller's earth	Dogger or Brown Jura ε	A oölite limestone and marls	A limestones ⊖	throughout ⊕	Kuar Bet beds	much volcanic activity	Gypsum Spring formation
	Bajocian	A Inferior Oölite limestones	Bajocian and Toarcian in Donets basin	A Bielefeld succession A clay succession near Hanover	A γ β α	A	A	A		A	A shales limestone
Lower Jurassic	Toarcian	A Upper Lias shales, sands		A	A ζ ε	A clays and oölite ironstone	A ferruginous oölite ⊖	A		A Dunlap formation (western Nevada)	Nugget sandstone (nonmarine)
	Pliensbachian	A Middle Lias shales, ironstone A		A Lias	A Lias or δ γ	A Middle and Lower Lias black marls	A	A shales and sandstones with coals ⊕		Dunlap orogeny A	
	Sinemurian	A Lower Lias shales		A	A Black Jura β	A				A	
	Hettangian	A		A	A α	A				A Sunrise formation (western Nevada)	

Legend: A, Ammonite correlations. ⊕ Very thick deposits. ⊖ Thin but significant deposits. ζ through α, Quenstedt's classical subdivisions of Swabian Jurassic. ~~ Major orogeny. ~~ Strong folding. (N. F. H.)

ammonite faunas of the Oxfordian-Kimeridgian and Callovian, respectively. Hungary also has rich Tethyan Lower Lias faunas.

North Africa.—The Jurassic system stretches in a continuous band from the west coast of Morocco through Algeria and Tunisia, cropping out at the surface over large areas in the Middle Atlas and Tellian Atlas ranges and the high plateaus of the Shotts. The facies is mixed Tethyan and northwest European, but the Upper Jurassic leans heavily toward the Tethyan, consisting largely of big thicknesses of nodular limestones which probably accumulated in at least two geosynclines or major deep troughs. The Oxfordian contains *ammonitico rosso* in Algeria and Tunisia. In southeastern Tunisia and the adjoining western part of Libya there is a different facies, indicating overlap onto the edge of the Saharan plateau. Farther west the Saharan plateau has no Jurassic rocks. They are confined to the folded coastal region of the Atlas ranges, known as Barbary, and the boundary is faulted, the faults partly Jurassic.

East Africa.—Shallow-water Jurassic rocks underlie much of Ethiopia and Somalia, the Kenya coastlands and the coastal region of Tanganyika, where at the extreme top, at Tendaguru, there are thin bone beds of Kimeridgian age containing some of the giant dinosaurs, etc., of the Morrison formation in North America. The marine series in northeast Kenya, Somalia and the Malagasy Republic begins with a thin (usually red) basal Toarcian bed containing the remarkable ammonite genus *Bouleiceras,* which also occurs in Arabia, together with a peculiar fauna of brachiopoda and pelecypoda. This bed oversteps sandstones which are generally without fossils and may cover in different districts the time span Permian–Triassic–Middle Jurassic, or about 100,000,000 years. In Ethiopia the first marine transgression was later—Callovian or even Lower Kimeridgian.

Southern Asia and the Middle East.—In Egypt little Jurassic is known at the surface, but oil borings have shown that it exists within the rift fault on both sides of the Gulf of Suez, and Bathonian is exposed on the west side in two places. The best surface outcrop is at Jebel Maghara, an isolated group of hills which rise out of the sand plains of northern Sinai about 50 mi. E. of Ismailia on the Suez canal. The rocks consist of a thick development of the Bajocian and Bathonian, the Upper Bajocian containing a peculiar ammonite genus, *Ermoceras,* which for many years was known from nowhere else but has since been found in Arabia and Algeria.

Arabia consists in the western part of a crystalline massif, over the extensions of which the Jurassic sea spread from the south and east. From the south it spread over the Aden protectorate and part of Yemen. The Jurassic ancestor of the Persian gulf, with similar shallow-water deposits and corals but also many ammonites, extended across all the eastern part of Arabia to beyond the centre, and the Middle Jurassic rocks crop out as a ridge, or cuesta (*q.v.*), the Jebel Tuwaiq. At the base are sandstones with plants as in Yemen, and the first marine layer is the red bed with peculiar Toarcian ammonites, *Bouleiceras, Nejdia,* etc., as in Somalia, northeast Kenya and Malagasy. The chief escarpment builder there is a thick Callovian limestone with many corals but no reefs. The Oman Jurassic belongs more with that of the Zagros mountains of Iran.

In Asia Minor the Jurassic is represented only by widely separated small patches of rock chiefly of the age of the European Lower and Middle Lias, near Ankara and in the extreme northeast near Bayburt, but there is also some little-known Middle and Upper Jurassic both near Ankara and near the middle of the north coast.

The Jurassic system in the Crimea contains thick conglomerates and suggests unusual instability during deposition. A great development of the Jurassic has been proved (chiefly by geologists of the Anglo-Persian Oil company and its successors) in the Elburz and Zagros ranges. In the Elburz the Lower Jurassic consists of plant-bearing shales of enormous thickness, and a similar development extends to the Pamirs and connects with the Angara series of central Asia. The Elburz Middle and Upper Jurassic consist of a thick limestone mass, similar to the Pamir limestone. A similar development occurs on the central Iranian plateau and extends through the mountains of western Pakistan (Baluchistan and Waziristan) to the Pamirs. *Bouleiceras* occurs again in Baluchistan.

In the Caucasus there is a tremendous development of the Jurassic, exposed on the north and south flanks of an anticlinorium, separated by a central ridge of slates which are probably Paleozoic and Triassic. In a vast development of shales are some horizons with ammonite faunas close to their equivalents in northwest Europe, except that many Phylloceratidae and Lytoceratidae are mixed with them. Notable examples are the Lower, Middle and Upper Bajocian, Lower Callovian and Upper Oxfordian. Just as striking is Lower Bathonian in the Elburz, which has a fauna typical of south England and Engelberg in the Alps, and a typical Middle Callovian fauna near Lake Urmia.

Peninsular India is a crystalline shield, which is continued under the Gangetic alluvium, but in Jurassic times the Indian ocean transgressed from the west over Cutch (Kutch), leaving there an exceptionally full and fossiliferous Jurassic series from Lower Callovian to Tithonian, with wonderful ammonite faunas. Below are the Kuar Bet beds, rich in pelecypoda only, but believed to be Upper Bathonian from similar occurrences in the Attock district in West Pakistan and Malagasy.

Another example of the Cutch type of Jurassic rocks occurs in the Rajputana desert at Jaisalmer, and some of the same formations are recognizable in the Salt range. The rest of the crystalline shield of peninsular India seems not to have been transgressed by any Jurassic sea. It was formerly thought that Jurassic sediments were represented in the Gondwana series (the plant-bearing continental sandstones and shales from which Indian coal is obtained), which collected in inland drainage basins, mostly in Mesozoic times; but study by L. F. Spath of certain rather obscure ammonites which mark a temporary marine invasion in the lower part of the Upper Gondwana seems to show that the ammonites are Cretaceous and that the Jurassic is represented only by a disconformity between the Lower Gondwana with Triassic vertebrate fossils and the Upper with the Cretaceous ammonites.

Himalayas.—In Jurassic times the Tethys sea stretched from Iran and Baluchistan eastward through the Pamirs and Karakorum mountains, and through the Himalayas and southern Tibet to Yunnan in western China to connect, by a way that is still uncertain, with the Pacific ocean, which covered the Indonesian archipelago and New Guinea and Japan. In the Pamirs the succession is much like that in the Elburz, but farther east there is no indication of a Jurassic geosyncline, only of troughs upon a labile shelf within the great mobile belt out of which the highest mountains on earth later arose. In the Spiti and Niti areas of the Himalayas, the thick black Kyoto limestone of Triassic age has yielded some Lower Jurassic fossils in its top part, and on it locally rests a condensed ironshot bed of Callovian age.

Above this are the Spiti shales (90–150 m. thick), containing lines of nodules which may enclose well-preserved ammonites. They are largely of Kimeridgian and Tithonian ages, but the Lower Cretaceous is also represented, and at the base in some places Upper Oxfordian also. No sections have yet yielded a reliable stratigraphical succession, so that the dating of the wealth of remarkable fossils is still mainly conjectural. In the Kiogars the mountain summits consist of white limestone, which is certainly in part and probably all of Tithonian age, resting on and partly incorporated with a sheet of igneous rocks which have all been thrust an unknown distance southwestward out of Tibet. At a lower level occur exotic blocks of various ages, in part Paleozoic, but including red cephalopod limestone of the same age, appearance and date as the Adneth Lower Liassic limestone of the eastern Alps. All these thrust Jurassic rocks are of different facies (known as Tibetan) from the Jurassics of the unshifted foreland and suggest that a geosyncline may have existed farther north in Tibet. (*See* also HIMALAYAS.)

Northern Asia.—In northern Asia the Arctic ocean with its temperate Boreal fauna overspread southward for long distances over the continent, east of the Urals up the valley of the Ob and up the Lena almost to the heart of the continent. The transgression took place at different times. In the Lena valley and the basin

of its tributary the Vilyui river, there is marine Lower Bajocian, and in the valley of the Anabar river farther west of the mouth of the Lena, there is marine Oxfordian and Domerian, the latter with *Amaltheus* and *Phylloceras*. The northeastern peninsula of Asia east of and including the Verkhoyansk arc of mountains was largely submerged in the Jurassic period and received thick deposits, but little is known of them. Probably the Arctic ocean communicated this way with the Pacific near northern Japan.

Eastern Asia.—Japan has a widespread and representative series of marine shale and sandstones and also similar rocks of continental type. The interfingering of the two types affords opportunities for dating, in terms of the universal marine classification, some of the extensive continental formations of the Asiatic mainland, such as the Angara series of central Asia and the coal measures of China.

A representative series of Jurassic ammonites has been collected from Indonesia and the Philippine Islands. The Moluccas are especially rich, but clear sections are lacking and no stratigraphy has been established. In the Moluccas the Upper Oxfordian family Mayaitidae is common, its genera known elsewhere in Niti, Cutch and Kenya coastlands.

New Guinea, New Caledonia and New Zealand are believed to be on a Jurassic geosyncline (the "3Ns arc") marginal to the continental mass of eastern Australia. The majority of Jurassic stages (except Liassic) are represented by ammonites brought down the Fly, Sepik, Strickland and other rivers as pebbles from still unknown outcrops flanking the Central range, and from around Geelvink bay in the northwest. The most fully represented stage is that of the Spiti shales facies. Some of the stages of the Lias are present on the west side of New Caledonia. In New Zealand the representation is much fuller, at exposures in both islands.

Australia.—Australia was mainly continental and in the centre and east has extensive lake deposits with plant remains and evidence of some volcanicity. On the west coast there is, above lake deposits, a thin but richly fossiliferous marine Middle Bajocian limestone, and some marine Upper Jurassic is known in the northwest basin and Dampier Land.

North America.—The only marine Jurassic on the east side of the American continents is in east Greenland. There are also deposits on the arctic slope of northwest Canada and north Alaska and at least two of the Canadian arctic islands. The main North American outcrop then changes to the west coastal region, beginning in south Alaska and continuing in a broad band through the Canadian Rockies and the Pacific coastal mountains of the United States. These deposits are geosynclinal and largely igneous and testify to the greatest tectonic, or faulting and folding, and volcanic activity known in Jurassic times—the Nevadan orogeny at the end of the period and several lesser forerunners earlier in the Jurassic. The Cordilleran geosyncline extended southward through Mexico and Central America, but in eastern Mexico and the Gulf coastal plain of the southern United States the deposits belong to a different province, the ancestral Gulf of Mexico. In the western interior of the United States are widespread stable shelf deposits, especially of the Middle Jurassic (Bajocian and Callovian), richly fossiliferous. The principal outcrops are in Wyoming and the Black hills of Dakota, and at least the Callovian extends under the Great Plains, having been proved in borings in Saskatchewan. The highest Jurassic in the western interior province is the Morrison formation, marls, shales and clays containing a fresh-water and terrestrial fauna—Mollusca and giant dinosaurs. The age is now believed to be Kimeridgian, despite the resemblance of some of its fossils, especially some small mammals, to the Purbeckian. The nearest comparison is with the Tendaguru beds in Tanganyika. In Utah and Colorado the Lower Jurassic is developed as thick sandstones.

South America.—Beginning in the isle of Trinidad and Tobago the Andes were a geosyncline in the Jurassic, enclosed between the Brazilian shield on the east and a line of volcanic islands or shallows along the present Pacific coast. The geosynclinal deposits pass westward into and interfinger with great thicknesses of lavas and volcanic breccias. The Tithonian is well developed in Argentina, as also is the Bajocian.

Cuba has thick Tithonian passing up into Lower Cretaceous and overlying thin Upper Oxfordian, rich in well-preserved ammonites.

Antarctica.—Some marine Upper Jurassic are in Graham Land and thick plant beds in the adjacent islands, but the geology of the mainland is too little known to say what systems are there.

See also references under "Jurassic System" in the Index.

See bibliographies arranged regionally in W. J. Arkell, *Jurassic Geology of the World* (1956). (W. J. A.)

JURAT, in law, is that portion of an affidavit (*q.v.*) that consists of the officer's recital of the date, that the signature was affixed in his presence, that the statement was sworn to before him, evidence of his authority to administer the oath and the impression of the seal of his office.

Under the *ancien régime* in France, the term *jurat* was used to signify municipal officers in several towns of the southwest such as La Rochelle and Bordeaux. The title was also borne by officials corresponding to aldermen in the Cinque Ports, but was later chiefly used as a title of office in the Channel Islands. Two bodies, each consisting of 12 jurats for Jersey and for Guernsey, formed, with the bailiff as presiding judge, the royal court of justice, and were a constituent part of the legislative bodies. (R. E. De.)

JURISDICTION, in general, the limits within which governmental authority, especially of courts, may be exercised. The term is used in public international law (*see* International Law, Public) but is primarily significant in the private law of conflict of laws (*q.v.*) and procedure. The constitution of the United States imposes some elementary restraints upon the legislative power of the states. It also imposes important restraints upon the power of state courts to adjudicate the rights of persons, or the interests of persons in property, when the persons or the property affected are not within the "jurisdiction" of the state and its courts. Anglo-American concepts of jurisdiction have developed along territorial lines—*i.e.*, jurisdiction over a person or thing has been affirmed when the person or thing was within the territorial limits of the state, otherwise not; but in recent decades there has emerged a strong tendency to affirm the jurisdiction of the courts of a state when the state has a legitimate interest in providing a forum and when the defendant has fair notice and can make his defense without undue hardship.

A preliminary question which must be disposed of before the question of jurisdiction over persons and things is reached is whether the court is authorized by the government which created it to try the type of case in question. This is sometimes called the question of jurisdiction "over the subject matter," although, on account of confusion with the concept of jurisdiction over things, this phrase is yielding to the term "competence." Thus an inferior court, established to decide small claims in contract and tort, would be incompetent to award a divorce. In the United States important questions are associated with the jurisdiction, or competence, of the federal courts, which are established for distinctively federal purposes and which exercise great restraint to avoid encroachment on the state courts.

See Court; *see* also references under "Jurisdiction" in the Index. (B. Ce.)

JURISDICTION, SUMMARY: *see* Summary Jurisdiction.

JURISPRUDENCE. This term has never acquired in English the sense it bears in the modern Romance languages. In French, for example, *la jurisprudence* refers to the law laid down in judicial decisions, as contrasted with *la doctrine* or the law to be derived from scholarly writings. The nearest English equivalent of this continental usage is found when the term is used in a way that conveys essentially nothing more than "law" except an overtone of special esteem. Just as an ordinary lawyer is sometimes called a "jurist" with the intention of complimenting him, so "the law of automobiles" is sometimes described as "automobile jurisprudence" in the hope of moving a lowly subject a notch higher on the scale of professional prestige. Even in this somewhat unusual employment, however, the English term, in contrast with Latin usage, means indifferently the law of statutes, of judicial decisions and (to the extent that our practices and attitudes allow) the law to be derived from learned treatises.

The more usual sense of the word in English, and the one with which we are concerned here, is that which makes it roughly equivalent to legal philosophy. Jurisprudence is concerned with the nature of law, its purposes, the means (institutional and conceptual) necessary to effectuate those purposes, the limits of the law's efficacy, the relation of law to justice and morality, and the modes by which law changes and grows historically.

Under the influence of John Austin, the word "jurisprudence" acquired for a time (roughly 1830–1920) a meaning considerably narrower than that just indicated. Though Austin was not indifferent to the principles of good legislation (being an adherent of the utilitarian philosophy and a disciple of Bentham and James Mill) the main object of his *Lectures* was to mark the limits of a study, which he called "jurisprudence," that would describe and analyze law without reference to its goodness or badness. The primary object of his interest was the positive law, the law *that is*, in contrast with the law *that ought to be*. The word jurisprudence has today largely shaken off this restriction, though it still retains, more strongly than the term legal philosophy, the implication of a study not concerned merely with problems of justice and right, but also strongly motivated by an impulse toward analytical clarity about the meaning and function of legal systems generally.

TWO BASIC CONCERNS OF JURISPRUDENCE

Like other branches of philosophy, jurisprudence has its "schools of thought." One objective of the present account will be to sketch briefly the beliefs and methods exemplified by these different schools. It will be useful, however, to begin by dealing directly with two of the most basic problems of jurisprudence. The object will be not to illustrate the attitudes toward these problems typically taken by the various schools but to provide the reader with examples of jurisprudential thought in action. These examples may then serve as a kind of reference point for the later discussion, which will include a treatment of the views historically associated with the various contending schools.

The Analysis of Legal Relations.—One of the basic tools of legal thinking consists in the concept of a legal relation existing between two or more persons. The law is conceived as granting to people rights and liberties, as subjecting them to duties and liabilities, as effecting changes in their relations when certain events occur, as when they enter contracts, commit wrongful acts, come of age, marry or die. The task of legal analysis is to introduce clarity into our conceptions of these relations. In any science it is often the terms that are most familiar that are precisely those most resistant to analysis. This holds with particular force for the commonplace notion of "having a legal right."

Let us take the following three statements each of which uses the word "right" and all of which purport to describe the legal effect of certain acts under a hypothetically assumed system of law. (1) B strikes A without justification. A acquires a "right" to damages against B because of this wrongful act. (2) B threatens A with bodily harm. A strikes B. Because A acted in self-defense he had a "right" to strike B. B gains no claim against A because of A's act. (3) A has three sons. In his last will and testament A leaves all of his property to his youngest son. A's will is effective; his property passes on his death to his youngest son. As the owner of his property A had a "right" to make a legally effective disposition of it.

Reflection on the word "right" in these three statements will soon reveal that the word is used in a different sense in each of them. In the first case "to have a right" means to have a claim, a claim which is the affirmative side of what may be called a "claim-duty" relationship. Because B struck A, A has a claim against B to damages and B has a duty to compensate A for the harm done to him. Curiously, in the second case "right" means absence of claim. A struck B. Normally this would mean that B would have a claim against A. Such a claim does not arise, however, because in the case supposed A acted in justified self-defense. A's "right" to strike B under these circumstances we may call a privilege, which means simply that A was exempt from a duty imposed on persons not in his special position of defending himself.

If we take the symbol $\longrightarrow$ to indicate the claim-duty relation we may illustrate the relationship in the first case thus:

A has a right against B.
$$A \longrightarrow B$$

If we borrow from symbolic logic the sign for negation $\sim$, the second case becomes:

A has a right to strike B.
$$\sim (B \longrightarrow A)$$

This may be read: It is not the case that B has a claim against A, for although A struck B, he did so in self-defense.

What of the third case where A is said to have a "right" to make a legally effective disposition of his property? In this case the word "right" may again be taken as meaning a privilege, that is, as describing the fact that A is under no duty to leave any part of his property to his older sons. But we mean more than that. We mean also that A has the legal capacity to make a disposition of his property "that will stick." Here the word "right" means legal power or capacity, an ability to do an act that will change legal relations. Using the symbol $\longrightarrow\!\!\!\!\prec$ to mean power we may illustrate the third case:

A has a right to leave his property to his youngest son.
$$A \longrightarrow\!\!\!\!\prec YS$$

By executing a proper will, A has the legal capacity to cause the title to his property to vest in his youngest son, YS, on his death. YS is the beneficiary of this power.

Our symbolism suggests at once a fourth case:

$$\sim (A \longrightarrow\!\!\!\!\prec YS)$$

This might describe the relation between A and YS under a legal system by which title to the father's property passes by operation of law to the eldest son despite any contrary expression by the father. Under such a system it would not be the case that the father, A, would have a legal power to leave his property to YS. (Note that we do not have to say that A has a "duty" to leave his property to the eldest son; the property goes to him automatically without any act by A and despite any act intended to prevent this descent.)

It is apparent that in this brief analysis we have not only revealed that the word "right" bears three distinct meanings but we have equipped ourselves with symbols ($\longrightarrow$, $\longrightarrow\!\!\!\!\prec$, $\sim$) that are capable in various combinations of describing a great variety of legal situations. It is also apparent that the shifts in the sense of the word "right" that have been revealed correspond closely to the disputed senses of the word "liberty" in political and economic discussion, namely, liberty as a legally protected claim to noninterference, liberty as mere absence of constraint and liberty as power. It should also be noted that the three senses of "right" share in common the notion of an advantageous legal position. In the first case, A has the advantage of possessing a claim, in the second of being exempt from a duty, in the third of being able to give legally effective expression to a desire.

The Nature of Law.—Disputes about the "nature" of law or about its "true definition" have existed since the time of the ancient Greeks. Indeed, much of the discussion of the ensuing centuries may be regarded as a resumption of arguments first clearly articulated by Plato and Aristotle. There is, however, at least one significant break in continuity. The ancient Greeks were not much concerned with a distinction that has gradually come to seem of capital importance, the distinction, namely, between generally recognized principles of right conduct, on the one hand, and legal rules formally promulgated by the state, on the other. For the Greeks the concept of law embraced almost indifferently enacted rule and established custom.

Since Plato and Aristotle most of the disputes about the meaning of law have also been disputes about the nature of both law and morality and about the relation of the two. There are those, for example, who insist that law and morality share the characteristic that neither is capable of grounding its rules on any standard that can be called objective. What within a given society is legal or moral depends not upon the nature of things or upon the neces-

sary conditions of human association in an organized society but upon an act of recognition or establishment that is essentially arbitrary. According to this view the distinction between law and morality lies not in their grounding but in the mode of their establishment. Morality covers a wide area of informally organized opinion, ranging from generally and deeply held convictions about murder and incest, at the one extreme, to attitudes toward nice points of etiquette, at the other, for example. Law, on the other hand, consists exclusively of those rules that have been enacted or recognized by formally organized social power, rules that are backed by definite sanctions the imposition and interpretation of which are normally entrusted to special officials.

The view that sharply distinguishes law from morality need not, however, be founded on ethical skepticism. That view may be maintained by those who concede, and even firmly insist, that at least some rules of morality are grounded in human nature or in the necessities of an organized society. Those taking this view may also insist that it is a chief desideratum of a good social order that the law be brought into harmony with those moral demands that can be thus established. At the same time they may insist that the question "What is law?" be sharply distinguished from the question "What is right and good?" It is characteristic of laws that they are promulgated officially, are directed toward external actions and are enforced by formal sanctions. Morality addresses itself to the inner forum of conscience. Many rules of morality are not suited to enforcement by what has been called the "rough engine" of the law. When moral rules become legal rules they must be formalized, both in their expression and in their sanction. These essential lines of distinction are lost if we do not sharply distinguish law and morality.

Against these converging lines of argument it may be asserted that a sharp distinction between law and morality is neither possible nor desirable. Such a distinction seems possible only so long as law is treated statically, as if it were a finished body of doctrine ready for frictionless application to any case that may arise. In fact a legal system is a continuous and open-ended process of enactment, interpretation and application. At no point in this process can any antiseptic severance be made between law and generally shared human convictions about right and wrong. Lord Coke observed that in order to interpret a new statute we must ask "what Mischief and Defect" it was designed to correct and "what Remedy the Parliament hath resolved and appointed to cure the Disease of the Commonwealth." This test is as valid today as it was in 1585. It means that before we can understand and apply the rules of a given legal system we must know what the society to which it applies considers as a "Mischief," "Defect" or "Disease." This moral background of the law is a part of the meaning of the law itself.

If this is true of statutes, it is even more plainly true of the rules of common law, which are based on judicial precedents. The common law sets about resolving controversies without explicit legislative direction as to how they should be decided. To some extent its rules may be said to emerge gradually as a sort of by-product of the process of deciding particular cases. In the words of Lord Mansfield, proceeding case by case the common law "works itself pure by rules drawn from the fountain of justice."

Unless we think of a striving toward justice as a part of the concept of law itself, we cannot distinguish between a state where "the rule of law" prevails and a tyranny in which what are miscalled rules of law are mere objects of selfish manipulation by those who control the government. "The rule of law" requires that the source of law itself, the state, respect a lawfulness that is not of its own creation. What a given rule of law means within a particular system depends not merely on its wording but the mode of its interpretation and application. This, in turn, cannot be controlled by legal rules but only by the moral integrity with which legal rules are administered.

At this point the advocates of a sharp distinction between law and morality may interject a reply along the following lines. It is precisely with respect to "the rule of law" that the necessity for the disputed distinction is most urgent. A state where "the rule of law" obtains may be defined as one where the ideal of the law-abiding citizen is and can be realized. The law-abiding citizen is one who is willing to obey laws of which he disapproves. This conduct becomes impossible if he is unable to know clearly what is and what is not law. This requires in turn that the legal order constitute a closed system. If it is at all points open to a variety of moral influences the very meaning of fidelity to law is destroyed. Even the improvement of the law at which the moralist aims becomes impossible. To bring law into conformity with a moral ideal presupposes some process by which a moral desideratum can be given the fixed form of an enacted rule that will make it secure against continued moral argument. If this were not so, the reform of today could be dissipated tomorrow by an unfriendly interpretation masquerading as "enlightened" or "liberal."

Must any answer to the issues raised in this imaginary dialogue be forever left in suspense? Our predicament is not quite so serious. Some resolution of the issues may be achieved by taking two successive steps. First, a closer analysis will reveal that some of the conflicts arise because the disputants are talking about different aspects of the complex problem of the relation of law and morality. This process of disentanglement will, however, leave a residuum of genuine antinomy. The second step then becomes that of clarifying the nature of this permanent element of internal stress. Such a clarification can be valuable even if the only solution it yields is the trite and ancient one of balance.

The distinction between law and morality can touch three different aspects of a legal order: (1) its foundation in public acceptance, (2) the manner in which it is constructed and administered and (3) the ends at which it ultimately aims.

In whatever form the distinction between law and morality is presented, it is generally assumed to be a characteristic of a legal system that it be "established," that is, that it have achieved some measure of obedience within the society it purports to regulate. In this sense it is a truism that the foundations of law are "moral." A legal system cannot lift itself into being by legal fiat. Its security and efficacy must rest on opinions formed outside of it which create an attitude of deference toward its human author (*e.g.*, a royal lawgiver) or a constitutional procedure prescribing the rules for enacting valid law. To say that this acceptance is "moral" means merely that it is antecedent to law. The ground on which it rests need not be elevated; it may proceed from a simple fear of chaos and a conviction that almost any government is better than none. The question may be raised, however, whether there are any principles for legitimating a legal order that have a special claim to rightness. Over human history two have commended themselves: popular approval through elections and the designation of a ruler by fixed rules of succession, generally based on kinship. That neither of these is under all circumstances essential for a relatively stable government is plain not only from the history of the Roman empire but from the example of contemporary Russia.

The "moral" elements in the internal construction and administration of a legal system are more subtle and less generally appreciated. To be sure jurisprudential writers sometimes speak of "legal justice" or "justice according to law," but this is a concept much too vague to reflect adequately the complexities of the problem. Recent developments in the analysis of social phenomena—particularly what is called "the theory of games"—have brought home to us that many relations formerly left largely unanalyzed under such indefinite terms as "power" have in fact a complex structure, a structure that is tacitly respected by participants in a particular relation even though they are imperfectly aware of its precise configuration.

If we start with the notion that law is a form of social power, it is apparent that we are talking about a particular kind of power, a power that seeks to regulate human relations by establishing rules, backed by sanctions, which prescribe certain lines of conduct in certain situations. From this simple starting point a good many implications follow. There must (1) obviously be rules; a system of power manifesting itself in wholly capricious interventions, revealing no pattern or principle, would hardly be the kind of power we call law. Furthermore, the rules enacted must to some minimum degree be (2) promulgated, (3) prospective in operation and (4) understandable. Finally, (5) governmental ac-

tion directed toward rule breakers and rule observers must display some minimum correspondence with the enacted rules.

Stated negatively these implicit limitations mean that we could not describe as law a system of social power (1) with no rules, or where the rules (2) were kept secret from those subject to them, or (3) were always retrospective in operation and had no prospective effect, or (4) were completely unintelligible or (5) were utterly disregarded by all agencies of government.

It is vitally important to realize that these five desiderata, implicit in the concept of law itself, can never be perfectly attained in any system. In many areas of governmental regulation the establishment of anything like a control by rules is hard to attain; *ad hoc* departures from announced principle under the pressure of particular exigencies are a constant symptom of this difficulty. Promulgation is a matter of degree, and it would in fact be foolish to attempt to educate every citizen in the precise meaning of every law that might apply to him. Most legal systems have to resort occasionally to curative laws, retroactively legalizing what was done irregularly, though an unrestricted use of this device could destroy the integrity of the whole legal system. Perfect clarity in the expression of laws is something sought, never achieved. Finally, whether the courts and other agencies of government are in fact applying the rules according to "their true meaning" is a recurrent subject for dispute in all legal systems.

These five desiderata, and the obligations they imply, may be said to constitute the "internal morality of the law." They are moral in the sense that only certain obvious and easily defined departures from them can be effectively proscribed by the law itself. For their observance we must depend primarily on the conscientiousness of those charged with the enactment, interpretation and application of law. Since an utter disregard of any of these desiderata creates a situation that cannot claim to be "law" in any meaningful sense, it follows that the existence of a legal system is always a matter of degree. This conclusion will not seem startling if we recall that all social institutions (being, as they are, dependent for their existence on human effort) exist only because, and insofar as, men do in fact pursue certain objectives conscientiously and effectively.

These considerations are capable of shedding light on the much-disputed question whether there is any meaningful sense in which it can be said of the law of Nazi Germany that it was "not really law at all." It should be recalled that the Hitler regime issued secret or unpublished laws, retroactively converted murderous intraparty purges into lawful executions, and in its treatment of accused persons disregarded in a wholesale manner even the language of its own published statutes. It may be argued with some justice that to say that the Nazi system "was not law at all" obscures the fact that in many areas of human conduct legal rules were conscientiously applied and order was maintained. But it may with equal force be argued that to say that the legal system of Germany in 1936 was "just as much law" as that of Great Britain is to obscure differences that touch not merely the ends of law but its meaningful existence as well.

At the beginning of this discussion we said that the question of the relation of law and morality touches (1) the foundations of law, (2) its internal construction and administration and (3) its ultimate ends. We may describe these last two aspects as relating to the "internal" and "external" morality of the law, the latter term referring to the kind of society that the law attempts to create—what kind of political being it attempts to make of man and what kind of life in common it seeks to create for him.

Reflection will reveal that there is a considerable overlapping among these three aspects of the problem. A legal order finds its essential "moral" foundation in a generally prevailing willingness to obey its commands. But this foundation may be destroyed if there is no integrity in its internal construction and administration. It may equally be destroyed if the ends sought by the legal system are sufficiently odious to the population as a whole.

The interdependence is even more direct between what have here been called the internal and external moralities of law. The internal morality of law relates to its institutional integrity. But much of morality as a whole is a matter of maintaining and perfecting the integrity of institutions and practices that are essential to a peaceful and just society. If the law is to play its part in maintaining sound social institutions generally it must first of all maintain its own integrity.

It is precisely at this point, however, that we encounter a fundamental antinomy in the processes of law making and application. Law cannot be effective unless it respects the forms—actual and emergent—of the life beyond itself that it seeks to regulate. At the same time the law cannot accept inertly the patterns of life that confront it from without. The very notion of regulation implies a tension between the thing regulated and the standard by which it is regulated. Law must accommodate life to itself, but in the process must also accommodate itself to life.

This antinomy presents itself rather obviously when new law is being considered for enactment. Its manifestations are more subtle when enacted law is being interpreted and applied. Interpretation is of necessity, and to a degree generally unappreciated by the layman, a creative act. Interpretation has to do with language, with drawing from the words of the legislator the solution appropriate for the case at hand. The language of legislation is of necessity an offshoot of the language of everyday life. As Ludwig Wittgenstein has remarked, to invent a wholly new language would be to invent a new mode of living. Legislation is as impotent to create a new language, divorced from the ambiguities and tacit value judgments of ordinary speech, as it is to impose on men a wholly new mode of living. Interpretation, instead of being a straight-line projection of law into life, represents, as does enactment, a point of interaction between law and life.

There are, then, two principal points where law and life intersect: in the enactment and in the interpretation of law. It is characteristic of constitutional democracy that it surrounds these two vital points of contact with institutional safeguards, safeguards designed to keep the processes of enactment and interpretation open to public scrutiny and to invest them with procedural guarantees of deliberateness. These institutional safeguards express more profoundly than does the principle of majority rule itself the role western culture has historically assigned to reason. One need not believe that unaided reason can resolve all legal and moral questions to believe in the vital necessity of keeping such questions open to the influence of reason. This tempered faith in reason pervades our legal and political institutions. Without it they would not be what they are. If that faith is ever lost, they will cease to exist in the sense that they exist today. (L. L. F.)

HISTORY

Some reference has already been made to the existence of various schools of jurisprudential thought. The history of legal theory is marked by the movements in thought which correspond to the rise and decline of these schools. But first a preliminary word of explanation is required as to what is signified by the term "school." It represents, broadly speaking, an outlook or a persuasion in thinking, identified neither geographically nor temporally; and there is room for a wide range of opinion within a particular school. In the course of a broad survey it is possible only to touch on the views of one or two writers, at most, who might be regarded as representative of each way of thinking.

Before embarking upon a study of these schools, it will be helpful to clarify certain general ideas about the nature of law. In the first place law in society is concerned not only with how people have been behaving but even more with how they should behave, for it is with reference to the latter that the former can be judged. A good deal of law is therefore prescriptive of human behaviour, not descriptive, which makes it possible to say without contradiction that "X ought not to steal" and at the same time that "X does in fact steal." Secondly, it follows from this that the precepts of the law are purposive. This can frequently be seen in the judicial and certainly in the legislative processes. Whenever a judge has to decide a case which is not covered by any existing rule, and such occasions are commonplace because of the infinite variety of fact situations, he has to create or adapt an appropriate rule with reference to which the conduct of the party before him may be judged. It is true that with reference

to this person the application of such a rule amounts in effect to a retrospective decision as to how he should have behaved, but, more significantly, the decision will serve also as a model for the future. The judiciary can in this way influence the prevailing standards of behaviour. The prescriptive function of legislation, however, is more direct. Society should aspire toward certain standards but the extent to which these aspirations should be allowed to partake of the concept of law is disputed. Finally, it may be remarked that speculation as to the nature of law has assumed in the main three forms: as to the ultimate ends which its prescriptive patterns ought to serve (teleological), as to the function it actually performs in society (functional), and as to the quality which distinguishes "legal" from other types of social prescription (formal).

The Greek and Roman Period.—The development of the Greek city-states induced thinkers to reflect on the nature of the ordering that governed the relations of men. A group of such thinkers of the 5th and 4th centuries B.C., known as the Sophists (*q.v.*), distinguished between *physis* ("nature") and *nomos* ("law"), the former being wise and eternal, the latter arbitrary and born of expediency. Law was thus purely utilitarian, being designed to serve the interests of the strong, according to one variant of this view, or of the weak, according to another. This kind of relativism seems to have been an anticipation of some modern theories, but it was not at that date conducive to social stability. On an alternative approach, appeal was made to the law of nature, which was thought to govern the evolution of natural phenomena. Man, by his faculties of reason and will, has insight into goodness and badness and can develop in either direction; but he ought to devote his powers to developing according to a natural morality. Socrates (*c.* 470–399 B.C.), Plato (428/427–348/347 B.C.) and, after them, Aristotle (384–322 B.C.) asserted the discoverability of immutable standards with reference to which positive law, that is, the law as actually found, might be evaluated.

The work of Aristotle merits special attention, for his work is a landmark in more than one sphere of thought. The ultimate aim, to his way of thinking, was goodness. Communities and laws should seek to realize the good life; *i.e.*, living according to virtue. Laws are patterns of conduct regulating behaviour, but they need to be molded in reason, unclouded by passion, as well as intelligible. He also visualized law as being in a sense a contract, since contracts are binding by virtue of law, and breach of them constitutes breach of the law. But law is much more than a contract, for law should be concerned with virtue. There was a perfect law, which could be discovered and fixed for all time. It embraced citizenship and life in society; slaves could not share in it, but were adjuncts to the citizenship of their superiors in natural virtue. He accordingly justified slavery on the ground that it enabled persons, who by nature were slaves, to be made into such. Nevertheless, virtue demanded that masters should treat them with moderation. It is in his doctrines of justice and equity that he reaches the zenith of his juristic fame, and his views still remain the basis of modern expositions. Justice he divides into universal, or complete virtue, and particular. The latter is subdivided into two kinds. There is first distributive justice, which means equal allocation among equals, unequal allocation among unequals. Thus, equal opportunities should be accorded to all persons who are in this respect on an equal footing. But if one person is more meritorious than another, he should be given, for example, more honour or worthier office than the other in proportion to his ascendancy. The second form of justice is corrective, which is primarily the concern of tribunals and means the redressing of inequalities created by private transactions. Equity is a species of justice and consists of the rectification of the law so as to prevent injustice being done by the application of a generalized rule in a particular situation. It requires adaptation, lenient interpretation and relaxation of the letter of the law as circumstances demand. It will be evident from all this that Aristotle sought to improve the content of the law by appeal to these lofty ideals. Positive law and fidelity to it were important. It should indeed be subjected to critical scrutiny, but the aim should be improvement, not disobedience.

The Stoic school, founded at the beginning of the 3rd century B.C., introduced an innovation. Previous thinkers had made familiar the part played by reason in molding behaviour. The Stoics now asserted that reason was an attribute of all men and not of citizens alone. The state of nature, it was said, was one of harmony, regulated by reason. This had been perverted by selfishness, and the task confronting mankind was now to fashion their laws in such a way as to recover the antique ideal. To live according to reason was to live naturally. The law of nature and morality were identified. Reason, moreover, was common to men in all countries and the law of nature was therefore all-pervading (*see* STOICS).

The era of Roman ascendancy, which superseded the Greek, did not contribute much to theories about law. The enduring monument of the Romans was their wonderful synthesis of practical rules and precepts for the solution of diverse problems, and their system, in modified forms, has lasted until today. One development was the evolution of the *jus gentium* by the magistrates. The civil law of Rome, *jus civile*, was open only to citizens. However, with the expansion of the Roman empire, the affairs of non-Romans began to come before Roman tribunals in increasing measure and the magistrates had to evolve a body of principles which could be applied to non-Romans. These principles, taken from the material supplied by foreign laws and customs, were grounded in the common-sense bases on which successive cases were decided and grew up eventually into the body of law known as the *jus gentium*, which was administered side by side with the *jus civile*. Although the *jus gentium* was not deduced from any general presupposition, it was applied to persons of all races and there was a tendency in later times to identify it, to some extent at least, with natural law. (*See* ROMAN LAW.) Another development of significance was the work of the Christian Fathers, notably St. Augustine (A.D. 354–430). Man fell from a state of nature, in their view, and tended thereafter toward moral death from which the only hope of salvation was Christian grace. The church was the exponent of the law of God and, just as human law could be disregarded if in conflict with divine law, so also might the church interfere with the institutions of positive law. These were the products of reason, which had been devised to meet the situation brought about by the original sin. Positive law was thus the product of sin, but it was also a remedy for the evils of sin.

Jewish Law.—It is not inappropriate at this juncture to interpolate some allusion to Jewish law, which antedates even the Greek, for its contribution to the evolution of juristic thought ought not to be overlooked in any survey. An outstanding feature is the insistence on human rights, which are deduced from the copartnership between men and God in developing the human race toward holiness. This partnership lays stress on duties, and some modern theories which are groping toward the idea of the paramountcy of duties rather than rights might well be compared with this early expression of the idea. The Israelites learned the value of freedom during their enslavement under the Egyptians, which was to them the worst kind of existence. Hence there arose the desire for a society in which Pharaohs had no place, a society owing allegiance to God and governed by His laws. Sovereignty resides in His law which, by virtue of its origin and intrinsic righteousness, cannot be altered by human institutions. But so great was the insistence on freedom that even this law had to be freely accepted by the people. The foundations of modern democracy and possibly the earliest version of the social contract, which played so prominent a part in later European thought, would seem to lie here. The result was the theocracy which is understood to date from the Exodus (*q.v.*) in the 13th century B.C. to the establishment of kingship with the anointing of Saul as king of Israel in 1037 B.C. Its main features were the direct rule of God over the people and the insistence on the independence of the individual. It was because the people were free that the rulership of God had still to be accepted by them, an occurrence possibly hypothetical, which is said to have taken place in the covenant with Abraham, renewed with Isaac and Jacob, and later in the covenant with the people at Sinai. It is also supposed that there was acceptance of *Torah*, a means of guidance and a source of law resulting from

the covenant and divinely inspired. This was developed in later times by judicial interpretation and included teaching, legislation, practices and tradition. Its appeal to the people depended, as stated in Deuteronomy, not merely on its divine origin, but on its wisdom, understanding and righteousness. The leadership of the people by the high priest was the supreme human office during this period. He was not a lawgiver; but it would probably not be unfair to remark that he did tend to become a virtual dictator.

The Jews also developed a natural law for mankind out of the supposed seven commandments for the descendants of Noah. In this way a good deal of the Jewish Bible was open for discussion among Christians in later times whenever a point of natural law was thought to be involved. The foundations on which the law was supposed to rest were lofty and much stress was laid on freedom, independence and equality. The covenant with God was needed because of man's freedom. Independence was the result of his acceptance of God, which obviated dependence on any other human being or institution, not excluding the state. Equality was always very much a part of justice and signified equality before the law, equal redress and retribution. There was also what is known in Hebrew as *hesed,* which is a comprehensive formulation of loving one's neighbour. But equality, be it noted, was of a restricted kind. It did not, for example, exist between women and men, and slavery was recognized.

It has been maintained that, even so, Jewish law entertained a far greater conception of equality and freedom than either the Roman or the English common law. The former, dominated as it was by the idea of power over others, and the latter by feudalism in its early stages, developed, it is said, on accepted bases of inequality, which is why in later times separate jurisdictions began to develop, under the praetors and chancellors respectively, so as to introduce liberality and justice into the law. Jewish law, continues the argument, based as it was on such principles from the beginning, had no need to evolve a dual jurisdiction. But, in the first place, it is arguable that the Pharisees developed their law in opposition to the literal application of biblical texts. Secondly, Jewish law did not have to administer a system on so huge a scale as the Roman or the English, and was not therefore subjected to modifying pressures. Thirdly, the Jews were for long an oppressed minority, and in consequence their system was developed alongside some other. So a sort of duality existed most of the time, which made it unnecessary for Jewish law to play more than the one role. Fourthly, even Jewish law deteriorated in time into technicalities so artificial that it might well appear to some that a separate, ameliorating jurisdiction was indeed overdue. Yet, in spite of all this, the concepts of Jewish law remain a striking contribution to jurisprudence. (*See* also JUDAISM; PENTATEUCH; TALMUD.)

The Medieval Period.—The Holy Roman empire, established in 800, ushered in a semblance of order after the ruin of the preceding four centuries, following the fall of Rome in 476. Stability was the paramount social need. The church was the main centre of learning and it fell to the churchmen to propound a theory of law to suit the needs of the times. The classical philosophy was clearly adaptable, but to have followed the teachings of the heathen philosophers would have detracted from the authority of the church. The solution was to identify the law of nature of the ancients with the law of God, and this was effected by the *Decretum Gratianum* (*c.* 1140). St. Thomas Aquinas (1225–74) worked out the interrelation between the law of God or eternal law, natural law or law revealed to man through the exercise of his reason, divine law revealed through the Scriptures and, lastly, human law which had to conform to reason and thus to the law of God. Law in an all-embracing signification was "nothing else than an ordinance of reason for the common good, made by him who has the care of the community, and promulgated." The Thomist system combines the philosophy of the Greeks, the law of the Romans, the teachings of the Christian Fathers and contemporary pragmatism with consummate power and skill. What, however, is most striking in it is its uncompromising appeal to reason, the law of God itself being declared to be "nothing else than the reason of divine wisdom." Among other interesting features is the union of the need for prescriptive patterns of behaviour, ideals and internal obedience if law is to achieve its objectives. There is also the argument that even an unjust human law may have to be obeyed to avoid social disturbance, as well as the recognition of the growing importance of man-made law.

The Thomist system sought to uphold the authority of the church, which was in a sense the first sovereign and authoritarian "state" in the western post-Roman world. There were, on the other hand, certain secular developments whose influence needs mention. Teutonic law stressed the fact that law belonged to the community—to the folk—and was thereby the common possession of every individual; feudalism, in prescribing duties owed by a vassal, inspired also the idea of right, for no more could be demanded of him than was due. Allied to ideas of Christian equality these left a legacy of freedom, which in later years led to parliamentary government and resistance to arbitrary authority, even of the church itself.

The Renaissance and Reformation.—The result of the gradual breakup of the Holy Roman empire was the replacement of the medieval idea of a united Christendom under the spiritual guidance of the church by theories pertaining to independent national states. Such theories were twofold; one advocated absolute monarchy and national sovereignty, and had an exponent in Machiavelli's *The Prince* (1513). Moral and ethical principles were subordinate to political expediency. On the other hand, there was the far older idea of contract, the compact between the ruled and their rulers. Reflecting these developments and the call of a new age natural law theories assumed a new aspect, designed on the one hand to justify the power of the sovereign, and on the other to safeguard the individual from oppression by an all too powerful sovereign. The general form which the theories assumed was a new version of the social contract. The individual, so it was said, was born into a state of nature, which was happy or unhappy according to the particular version. He then, by exercising natural reason, formed a society by means of a contract with other individuals. The theories varied in detail according to the ends which they sought to fulfil. Hugo Grotius (1583–1645), the Dutch jurist, expounded the social contract theory of the origin of the state to explain the adoption of different forms of government by different societies. Each group, according to him, had liberty to choose the order which it preferred but, once it had chosen it, lost all power to restrain the ruler. This was the way in which absolute power had emerged. The next, and more important, step was to restrain the absolute sovereign in his relations with other such sovereigns, for it was the absence of restraints that precipitated war on such a scale as the Thirty Years' War. Grotius accordingly went on to assert that nations were still in a state of nature and so bound by natural law which, according to Grotius, was independent of God and was based on man's own nature; *i.e.,* man being essentially a sociable being and desiring a peaceful social order. For nations to assert their absolute independence was futile, and the sooner they realized that they, too, should unite to form a society of states the better it would be. It is these doctrines that have earned for Grotius the distinction of being the father of international law.

The Englishman Thomas Hobbes (1588–1679) was less preoccupied with international confusion than with national stability, for he lived through the Civil War in England. In his hands the social contract theory became the vehicle for authoritarianism. The sovereign, whose actions had been authorized by the subject, became absolute, a social leviathan, whose power guaranteed stability, safety and contentment. All that Hobbes was prepared to concede was that the sovereign (who was responsible only to God) should act according to natural law, which consisted of moral injunctions which sovereigns were expected to observe. Apart from this, the individual had no guarantees. Positive law was thus distinguished from natural law, its distinctive feature being the fact that it emanated from sovereign authority. In this respect he was destined to influence John Austin and, even more significantly, he made the form of promulgation rather than content the determining feature of law.

A milder version was forthcoming from John Locke (1632–

1704). The reign of the Stuarts in England had revealed the danger of absolutism to the individual. Locke accordingly maintained that individuals had not surrendered all their rights to the sovereign but only the powers appurtenant to the preservation of law and security. Other rights relating to the integrity of the person and property were retained because they were fundamental. What Locke was seeking to do was to protect the individual from the arbitrary acts of a sovereign, and for this reason his views proved acceptable. Another aspect of his work was his threefold division of governmental powers. Foremost was the legislative power for the creation of rules by which the inalienable rights are judged; secondly, the executive power by which the law is enforced; and thirdly, the "federative" power which concerns the making of war and peace and controls the external relations of the state. Locke thought it advisable to confer the legislative and executive powers on different organs, one reason being that the legislature does not, while the executive does, operate continuously, and another being the danger of entrusting lawmakers with the power to carry out the laws which they themselves make. He did not advocate a similar separation between the executive and "federative" powers, since both are dependent on force. His views had considerable influence, and he was not only hailed as the intellectual champion of the English constitutional revolution of 1688–89 but his ideas also influenced the later American Revolution of 1775–81.

In France the continuing need to protect the individual against an oppressive monarchy found expression in the theories of Charles de Montesquieu (1689–1755) and Jean Jacques Rousseau (1712–1778). The former based his views on an observation of the English constitution. The secret of its success, as he saw it, lay in the fact that power was not concentrated in the hands of an individual or group. Unless power be made to check power, it will be abused; and the guarantee against its abuse lies in establishing mutual checks between the legislative, executive and judicial functions. His doctrine of the "separation of powers" insists on the danger of an absolute union of these functions in one person or body, but does not require their respective allocation to three distinct organs with no interrelation between them. The functions can well be shared as in England, for instance, where the cabinet, which is the executive centre, is an integral part of the legislature and responsible to it; executive departments have legislative functions entrusted to them; justices of the peace perform judicial and executive functions. Montesquieu's doctrine is carried farthest in the constitution of the United States, where the federal legislative power is vested in congress, the federal executive power in the president and his cabinet and the federal judicial power in the supreme court. But a very great deal of interrelationship exists between them which enables the one to act as a check on the other.

Rousseau, however, asserted that the individuals did not surrender their rights to any single sovereign but to society as a whole, and this is their guarantee of freedom and equality. Society, having come into being for this purpose, is expected to restore these rights to its members as civil liberties. Their basis is a moral one. Society and law are thus dependent upon general will, on popular, as distinct from parliamentary, sovereignty. Little wonder that this theory was utilized as the philosophy of the French Revolution.

Transcendental Idealism.—Another line of thought, which also emphasized individual freedom, was of Germanic origin. Immanuel Kant (1724–1804) believed that man partook of two worlds, the "sensible" and the "intelligible." Sensory perception is the avenue to knowledge of the objective world, but all such perception is shaped by given preconceptions. Thus, preconceptions of space, time and causation help to translate one's experience of nature. Further, man is a free agent whose actions are determined by aims and purposes which he is at liberty to select. The ethical basis of action, however, must be accepted a priori. This was formulated as a "categorical imperative," namely, "act in such wise that the maxim of your action can be made the maxim of general action." From this Kant deduced the nature of law. Freedom in law means freedom from arbitrary subjection to another, and law is the complex totality of conditions under which maximum freedom is provided for all. This Kantian ideal of law, be it noted, has nothing to do with law as it is; it is purely an ideal. G. W. F. Hegel (1770–1831) sought to give an abstract evolutionary interpretation to the realization of freedom. History to him was a process of action and reaction between opposites, thesis and antithesis, resulting in their synthesis, the whole broadening gradually toward freedom in society. One aspect of his argumentation might briefly be illustrated. Abstract right is said to be a thesis and morality its antithesis. It happens that when the will of the individual opposes itself to the general will through wrongdoing, the conflict produces morality. The synthesis between abstract right and morality is social ethics. This starts at the level of the family, and when members of the family assume independence society comes into being. Society is then the antithesis of family, the synthesis between them being the state, which combines individual freedom with mutual co-existence. In the institution of the state Hegel found the highest achievement of human endeavour, and to be a member of the state was the supreme objective.

The close of the 18th century witnessed a reaction against natural law theories. For this there were many reasons, but the chief among them was, first, the critical spirit of a scientific age which looked askance at unproven hypotheses. The social contract, in particular, was seen to be palpably false. Secondly, it was felt that deductive reasoning from a priori assumptions was incapable of yielding solutions to the problems of complex societies. Thirdly, pure reason had been a slogan of the French Revolution with all its attendant excesses, the aversion to which reacted against using reason as the exclusive guide to social reform. Fourthly, the conviction was growing that improvement of the law would be more fruitfully approached on a practical basis, and not by appealing to reason. It was needful, above all, to understand existing institutions by means of a thorough analysis of them in order to bring about their improvement. This new climate of opinion came to be known as positivism; *i.e.,* it concerned itself with the law as it stood.

The Analytical School.—One form of positivism is associated with the so-called analytical school, which has dominated British thought for a century. The epithet "analytical" is misleading, for there is no one way in which analysis can be conducted. Its principal characteristic is its insistence on the separation of law as it is from law as it ought to be and the need for a thoroughgoing examination of existing institutions. It thus represents a reaction against the a priorism of the naturalists immediately preceding as well as a feeling of caution that reform should not be undertaken lightly without adequate preparation. Analytical positivism in England was started by Jeremy Bentham (1748–1832). He was mainly a legal reformer and, with this end in view, insisted on the importance of studying the existing law. In this respect he undoubtedly influenced John Austin (1790–1859), the father of English jurisprudence. The latter examined the notions pervading English law. In order to do this he sought, by way of introduction, to delimit his subject by defining positive law as the commands of a sovereign, addressed to political inferiors, which are backed by threats of evil in the event of disobedience. This is the "command" or "imperative" theory of law, originated by Hobbes, which has assured for Austin his place to posterity. What the theory resolves itself into is that prescriptive patterns of conduct become "law" only when they are commanded by a sovereign. The imperative form in which they are expressed, *e.g.,* "you must not steal," should not obscure the fact that they are prescriptive in substance, *i.e.,* "you ought not to steal." Nor would Austin have denied that the content of "legal" prescriptions may well be derived from moral and other such sources; what he would have said is that the label "law" is not to be attached unless a proposition is embodied in a sovereign command.

On all this it may be remarked that the positivist attitude of mind continues to influence thinkers, though the Austinian theory is not accepted in the mid-20th century. For, in the first place, Austin did not allow sufficiently for laws which empower and enable the doing of things. These are in no sense commands. Secondly, it is wholly fictitious to assume that there ever was a sover-

eign who commanded, or was in a position to command, the whole of the law; for he could not have commanded the rules by virtue of which he attained his position and became entitled to command. Thirdly, law is not necessarily commanded. It consists of prescriptions of conduct set out in the form of command, and it is this mode of expression that has propagated the idea of command. As against all this, the analytical habit which Bentham and Austin inspired has been of enduring value. Analysis means little in itself; its value depends on the approach and the subject matter. One may analyze the nature of law as well as its constituent concepts. Austin examined both; the analysis of law was to him but the prologue to the study of legal concepts. These are the tools of a lawyer's equipment. An understanding of their structure and working enhances his skill in their use and opens the way to their improvement. As to how analysis might be conducted, many methods other than that used by Austin can be employed. As will appear, historical, comparative and functional methods of analysis have yielded invaluable results. Such is the influence of the analytical habit; it transcends the limits of any one school.

The Historical School.—Side by side with the Austinian movement there developed on the continent of Europe what is known as historical positivism. It sought to discover the content of legal prescriptions in the past. The background to the work of its principal exponent, Friedrich Karl von Savigny (1779–1861), lies in developments which had begun centuries earlier. The reception of Roman law into Europe had occurred in the 15th and 16th centuries in those countries which lacked a coherent system. Roman law had appeared as a model of order and precision. Yet, the law that had been received was not the Roman original but a version diluted by interpretation at the hands of post-Roman glossators and commentators. The Renaissance fostered a spirit of new learning, and scholars began to return to the original texts and to penetrate behind the accumulated silt of exegesis and comment. Another thread of development lay in the reaction to the Napoleonic era and much that it stood for, notably the idea of codified law. Besides, the conquests of France had kindled a nationalist spirit throughout Europe. When, therefore, a proposal to codify Germanic law was proffered in 1814, Savigny opposed it in an essay which started juristic thought along a new path. To him, the lesson of history was the futility of hasty codification. The essential prerequisite was a deep and far-reaching appreciation of the genius of the particular community. The prescriptive content of the law must accord with the spirit of the people, the *Volksgeist*. A law that was not in conformity with this was doomed. Custom becomes the chief manifestation of law, but as law grows more technical a specialist body of experts, known as lawyers, emerges, whose function it is to reflect the *Volksgeist* in technical matters.

The more serious objections to Savigny's thesis are as follows. In the first place and immediately, the theory conflicted with a national need, namely, the unification of the Germanic states. Far from promoting such union, his theory encouraged separation by indulging a parochial nationalism. Secondly, the *Volksgeist* was itself an unhistorical and unprovable assumption. Besides, it is mere imagination to assume that a judge who decides a technical point of revenue law, for example, is reflecting the *Volksgeist*. Thirdly, Savigny could never explain how, on his theory, an alien system, such as the Roman, had been received so successfully in Europe many centuries later, especially in Germany. Fourthly, pursuit of the elusive *Volksgeist* tended to postpone legislative reform farther and farther. Although his theory has been criticized as discouraging reform, it should be observed that reform was Savigny's ultimate purpose and, moreover, he sought in the *Volksgeist* to uncover the content of contemporary laws. The reformers in Germany could not wait for the historians. At the turn of the century the German civil code was introduced by legislation and has flourished ever since.

Sir Henry Maine (1822–88), the representative in England of the historical school, was a comparative and a historical jurist. He endeavoured to trace a pattern of legal evolution by comparing the development of Roman, early English and Hindu institutions, in all of which he was deeply versed. He drew a distinction between the evolution of "static" and "progressive" societies. Both societies up to a point develop along similar lines, a characteristic feature up to this point being that the condition of the individual is regulated by status; *i.e.*, his condition is determined by law. Whereas "static" societies remain in this state, "progressive" societies develop their laws first through fiction, then equity and finally legislation. In these societies the individual begins to determine for himself his legal condition, in other words, the development from status to contract. Not all Maine's conclusions are accepted in the mid-20th century; but the credit is his for pointing the way to the value of comparative study and the fruitful and harmonious union of legal, historical and anthropological scholarship. Anthropology, in particular, has shed much light on the nature of early institutions. The prescriptive patterns of conduct in primitive communities are now seen not as having been imposed, commanded or enforced by the organized might of society so much as having been accepted as that which is fitting. One line of investigation has suggested that government and law can be traced back to the religious rituals of primitive communities. The tasks and roles that were assigned to those who officiated at such rites provided the framework of what later evolved into governmental structure, while the regulation of the ritual by the leader developed into law as a set of regulations for society. In such studies as these the idea of law as prescriptions of conduct has found fascinating new interpretations. (*See* also LAW, PRIMITIVE.)

By the end of the 19th century the march of events had brought positivism into decline. The Austinian theory could flourish in the serene conditions of Victorian England but proved sterile in the unsettled period that followed. It emphasized too much the question of formal validity of law at the expense of the need for values, which impart to law its vitality and give guidance to both judges and legislators. Historical positivism was too preoccupied with the past to pay much attention to contemporary problems. When, therefore, the national and international scene was convulsed and hosts of new questions began to emerge, positivism was inevitably forced to confess its intellectual poverty.

The Economic Interpretation.—A variant of the historical approach is the economic interpretation of Karl Marx (1818–83) and Friedrich Engels (1820–95). According to this, the content of law was thought to reflect economic conditions. Marx adopted the dialectics of Hegel in seeing the unfolding of history as the recurrent conflict between thesis and antithesis resulting in synthesis. The thesis he identified with capital and the antithesis with labour. The function of law is at first to enable the capitalists to dominate and exploit the workers. The conflict between them reaches a point at which the exploited majority throw off the domination of the minority and establish the proletariat dictatorship. Even at this stage law, the instrument of domination, is needed to eliminate the remnant minority and to usher in the classless society, the synthesis. When this state of affairs has been reached, there will no longer be any domination or exploitation and law will then wither away. Law is thus simply a superstructure on existing economic conditions and, since it was viewed in so sinister a light, neither Marx nor Engels sought to develop a theory about it. In the Soviet Union, where their theories have been in operation longest, it has been found that law as a means of regulating behaviour and adjusting competing interests is indispensable, and all talk of the withering away of law has now disappeared. The experience of the Soviet Union has shown that in a Communist society more emphasis will tend to be placed on "public" as opposed to "private" law, following from public control of industry and enterprise, but law will continue to play an essential role. The point can best be illustrated with reference to ownership. Originally, according to Marx, the individual supplied his own materials and labour wherewith to manufacture a product. He then disposed of it at a profit to himself. When he amassed sufficient wealth in this way he was not only able to supply the materials but to procure the labour of others for the manufacture of goods. The profits accrued not to the labourers but to the owner of the means of production. Such a person, said Marx, comes eventually to wield power and control over people for private advantage. This is unethical, and the remedy is therefore

to vest the ownership of industrial potential in the state. But even when this is accomplished, as it has been in the Soviet Union, it is clear that law is still needed to regulate the relations between the workers and the state and between various state organs in which the control of industrial potential is vested. (*See* also MARXISM.)

A further reason for the continued existence of both law and the state even after the achievement of communism is the capitalist threat from abroad. Indeed, this has been used as a justification for the severity of some measures adopted within the Soviet Union. It is also a clue to the attitude of the Soviet Union toward international law. There is the initial theoretical difficulty as to how the idea of law, which is viewed as the product of an economic structure, could apply as between states with widely differing economic systems. This led at first to confusing attempts to introduce the class concept into international relations, which were replaced by the view that international law is simply an instrument of policy. The result is a highly eclectic selection of principles and interpretations. The Soviet Union rejected the League of Nations as a capitalist instrument, but joined it in the face of the growing German threat in 1934, yet did not support the Universal Declaration of Human Rights adopted by the United Nations in 1948. Similarly, during the Korean War in 1950, the U.S.S.R. found it necessary to reject the definition of aggression which it had insisted on in 1933. Two main developments are worth noting. The first is that with the establishment of a number of Communist states after World War II there is increasing talk of a new "socialist international law." The economic structures of these various countries being more or less similar, the possibility of an international law which is not simply an instrument of policy is more real. Secondly, even in relation to capitalist countries, the policy of "peaceful coexistence," if seriously pursued, should bring about a different attitude toward international law, accentuated perhaps by the realization of the economic and political interdependence of states.

The Sociological School.—The failure of positivist thinking to cope with the problems created by changing conditions was the signal for the rise on the one hand of a social interpretation of the law, on the other of a new form of naturalism. The beginnings of a sociological, or what is better termed a functional, interpretation of law are coeval with analytical positivism, though it did not come into prominence until the decline of the latter. Bentham, hardy individualist though he was, pointed the way. The aim of the law, he insisted, should be to promote maximum individual happiness and minimum of pain, for the happiest society is that which combines the greatest measure of individual contentment; subsistence, abundance, equality and security should be assured. Bentham's utilitarianism may seem crude when compared with more elaborate later analyses, but in it lies the germ of the functional approach.

Rudolf von Jhering (*q.v.*; 1818–92) is sometimes regarded as the father of sociological jurisprudence. His study of Roman law led him to conclude that law was determined by purpose. He ridiculed the "jurisprudence of concepts," by which was meant the mechanical application of rules without regard to the social purposes which they should serve. The immediate purpose of law, as he saw it, is the protection of interests. But the interests of one need to be adjusted according to the competing interests of others; in brief, the paramount social purpose of law is the co-ordination of interests. The securing of individual interests is thus but a means to an end, namely, the ultimate good of society. The 19th century had witnessed a movement away from the rights of the individual and a corresponding concern with his duties to society. The coherence and welfare of the latter assumed increasing importance. To this end it was necessary not only to balance competing interests but also on occasions competing purposes. Coercion, to Jhering, remained the outward characteristic of law, but its content would shift with the varying needs of societies and ages. J. Kohler (1849–1919) perceived that each society should be left to evolve the law that suited its purposes best, but he urged the need for some compromise between the individual and society. The measure of civilization is the degree of its mastery over nature. The function of law is not only to maintain the existing values but to enable the creation of new ones to enhance this dominion. This would be fulfilled if the creators and administrators of law shaped and controlled it according to the needs of society. François Gény (1861–1944) issued a strong challenge to analytical positivism. He convincingly demonstrated that the judicial function is not merely the mechanical application of the law and showed how large is the measure of discretion involved. This is one way in which account is in fact taken of the sociological milieu in which the law has to operate. The letter of the law is far from sufficient; the judge takes account of custom, judicial tradition and, more significantly, "free scientific research." This last comes into play when no other guidance can be found and is governed by considerations of freedom of will, social stability and the balancing of competing interests. From all these theories it is but a step to the views of Roscoe Pound (*q.v.*; 1870–1964), the U.S. jurist who might be regarded as the leading modern sociologist. Jhering, Kohler and Gény all powerfully influenced his work. The task of the lawyers, says Pound, is one of "social engineering"; *i.e.*, to construct a durable society by satisfying the maximum of wants with the minimum of friction. Interests he classified as public, social and individual. (1) Public interests include the interest of the state in the maintenance of its integrity and substance and as the guardian of social interests. (2) Social interests consist of general security, security of institutions, morality, preservation of economic resources, progress and sanctity of life. (3) Individual interests consist of personality, domestic relations and material possessions. The balancing of interests is a recurrent theme in his many writings. (Other writers, following him, have classified them differently, and even in Pound's own work the lists have undergone modification.)

As against all this it should be observed, in the first place, that it is not altogether clear how competing interests are "balanced." It presupposes some yardstick or scale by which the competing interests are measured. Once this has been settled it might then be possible to say that one interest is more important or useful with reference to that particular criterion. What is of importance is thus the criterion and the possibility of establishing a hierarchy of criteria. The mere listing of interests seems quite unimportant. Different writers have presented different lists, but each represents an individual preference. Secondly, even with reference to a given criterion, the weight or importance attached to a particular interest depends on the view of the individual judge; and here opinion can vary immensely. Lastly, the "balancing of interests" can in any case only apply to highly developed societies. In those that are still developing a more pressing need is the creation of interests. On the whole, one might say that the sociologists have done a valuable service in drawing attention to the functional purpose of law and the highly responsible task of the judge. Their work has endorsed overwhelmingly the prescriptive nature of law as a means of regulating behaviour. But beyond that they have hitherto failed to produce an agreed or acceptable theory of values.

20th-Century Natural Law Theories.—The importance of values has inspired a revival of natural law theory, which is very much a feature of the 20th century. This interest has been stimulated, to some extent, by the need to provide some guidance amidst the conflicting ideologies that are sundering the world and also by the need to oppose from the outset the legality of regimes, such as that which prevailed in Nazi Germany, before they can get to the pitch of unleashing cataracts of suffering. Natural law is again an appeal to reason as a criterion, not merely of the validity of the values or purposes adopted by a particular system of law but of the validity of the particular system itself which embodies that set of values or purposes. Furthermore, in accordance with the collectivist tendencies of the age, some of the new natural law theories endeavour to take these into account. Léon Duguit (*q.v.*; 1859–1928), whose doctrines may equally be classed as sociological or natural law, preached that social solidarity and interdependence was the all-important fact of society. Human activity should be directed at ensuring the fulfillment of this social solidarity. Men owe duties to help to promote it, but no one has any right

unless it be the right of doing his duty within the social organism. The validity of laws is to be judged according to social solidarity as the criterion. All this is very far removed from those theories that insisted on fundamental rights.

A more interesting feature of modern natural law is the endeavour to establish evaluative criteria empirically; *i.e.*, deriving them from general social experience. It is true that all such criteria must be expressions of value judgments, but that does not mean that they stem from ideologies or emotions. A dispassionate judgment founded on a study of all the available data and opposing considerations is far removed from confessions of faith or spontaneous reactions. It is reason reflecting on nature, the nature of human societies, that underlies the new natural law; its method is analogous to arriving at scientific hypotheses. The task that confronts its supporters is twofold: to evolve the hypotheses and to win for them a measure of acceptance.

Modern Positivism.—It should not be supposed that amidst these developments positivism has disappeared from the intellectual scene. Though challenged, it remains very much alive in the mid-20th century. The positivists are keenly aware of the function and importance of values, but they continue to insist as strongly as ever that the application of the label "law" should not be dependent on moral criteria.

The "Pure" Theory.—In the theory of Hans Kelsen (1881–) the separation of a theory of law from other value criteria is strongly emphasized. A theory of law, he maintains, should be "pure"; *i.e.*, free from contamination by values of any sort. Moreover, the purpose of a theory of law, as distinct from law itself, is to bring order and symmetry to the latter. He accordingly pictured the legal system as a hierarchic structure in which every proposition is dependent for its validity on another. This is to say that the justification for applying to any rule the epithet "law" lies in some other proposition standing behind it and imparting to it the quality of "law." This other proposition is "law" because of yet another proposition which stands behind it. The regression is traceable in this way to an initial basic assumption, the *Grundnorm,* which derives its own validity from the fact that it has been accepted as "law" by a sufficient minimum number of persons in the community. Every system of law is bottomed in some assumption which varies from system to system but which, whatever it may be, governs the use of the label "law" within it. The efficacy of law, as distinct from its claim to the title of "law," rests on the organized power of the state. But this organization is itself normative in structure. This means that the operation of sanctions, which make law effective, are themselves dependent on the observance of duties by the various persons concerned in applying those sanctions. It can be represented, not by the formula, "If you do X, then sanction Y will be applied," but by the formula, "If you do X, then sanction Y ought to be applied." The operation of the sanction is in no sense inevitable; it depends on the observance of duties imposed on the judge and officials alike. The observance of these is sanctioned in turn by other duties, and so on. For Kelsen the crucial distinction between scientific law and laws of society lies in the normative character of the latter. The laws of science are concerned with behaviour patterns that, as a matter of observation, do inevitably follow; the laws of society are concerned with behaviour patterns that ought to be followed.

American Realism.—A movement which has come to be known as American realism has carried the positivist outlook to extremes by seeking to expel the idea of prescriptions of conduct from the concept of law. Two pioneers whose views had great influence were John Chipman Gray (1839–1915) and Oliver Wendell Holmes (*q.v.;* 1841–1935). To the realists "law" is what judges and officials actually do. Neither judicial decisions nor even enactment are "law" until they have been applied in concrete decisions. The weakness of such a contention is that the concrete decision, which alone is said to be "law," forthwith ceases to be such for the future, since it will be subjected to interpretation and embodied in another decision. Law on this view, in the words of one critic, is forever becoming and never does become. Besides, it is clear that the theory propounds a somewhat unusual meaning of "law" which, in its normal acceptation, is applied to legislation, and in some countries to judicial decisions as well, before they are applied by tribunals. Indeed, a tribunal applies an enactment because it is "law" already. It almost seems as if the realists, seeking for some fixed criterion for law, have only been able to find it in the actual decision of a court. To say that law should aim at precision is one thing, but to say that nothing is "law" which is not fixed and precise has no foundation whatever.

The realists themselves can be divided into two roughly identifiable groups. There are, on the one hand, the "rule skeptics," who reject the hope of achieving certainty through rules of law. They strive instead to discover uniformities in rules evolved from psychology, anthropology, sociology, economics, politics and so forth. On the other hand, there are the "fact skeptics," who reject even this aspiration toward uniformity. They point instead to the uncertainties that surround the very fact-finding process in courts. Witnesses lie with varying degrees of success; they are fallible; judges and juries suffer from human frailties; they receive different impressions of the dramas unfolded before them, an inflexion or a cough may awaken subconscious predilections or prejudices. Eternal verities can never be erected on such a basis. The valuable contribution of this movement has been to unmask the personal and circumstantial factors that enter into the decisional process, and to draw some attention to the actual processes in trial courts, which are so often overlooked.

Scandinavian Realism.—A more acceptable form of contemporary positivism has been developed in the 20th century by some Scandinavian writers. They have inspired a sane, common-sense approach to traditional problems. K. Olivecrona (1897–), while not rejecting the importance of ideas, shows that a good many legal conceptions are no more than ideas and, in particular, he would not dissent from the idea of prescriptive patterns as a means of regulating behaviour. An example of his way of thinking is seen in his treatment of "rights." Many writers have sought to uncover the factual substrate which, it is thought, underlies the notion of "right." Careful analysis reveals that there is no such thing. Thus, proof of a right in a court is accomplished by proof of certain facts or events whose effects are determined by law. The judgment will follow accordingly as the direct result of those facts. Yet, between the facts and the judgment it is usual to interpose the idea of a right and to say that the facts have given rise to the right and that the judgment is based on the right. Ideas like that of "right" are useful as weapons of thought, but attempts to pin them to factual criteria are fruitless. On the other hand, these realists do assert that law brings about a set of social facts, which are based on the application of organized force and that however important values and ideologies may be, law is one thing, value-criteria another. In a similar way that mysterious shadow, the "binding force" of law, that hovers in its wake, has been exorcized by the meaningful question: "Why do people in fact obey the law?" The reasons are manifold and one important element is the psychological reaction of people to precepts addressed to them through certain accepted media, namely the constitutional machinery. The organized power of the state is but one among several factors and not necessarily the foremost in influence.

Conclusion.—The history of juristic speculation about law, prolonged and intense as it has been, is evidence of the enduring interest stimulated by this complex phenomenon. For law, however one views it, is one of the greatest products of the mind. Different thinkers hypostatize different connotations of the word, some accepting it, for their varied purposes, as prescriptive of conduct, others concerning themselves with the observable aspects of social regulation. Even in the sense of prescription, the positivists would insist that a precept should only be called "law" if it has been expressed through some medium accepted as being the criterion of validity. Ethical considerations may underlie and, indeed, may influence the adoption of a precept as "law," but a separation should be maintained between those precepts that are "law" because they display the stamp of formal validity and those that ought to become "law" for ethical reasons. To this the proponents of natural law would advance the objection that a precept is only adopted because it commends itself to the authorities con-

cerned as being what ought to be law. Secondly, no one denies the need for the constant improvement of the law. But improvement is guided by some aim, which can only be determined by systematic thought along natural law lines. Thirdly, it is urged that positivist thinking foments the rise of regimes like that of Nazi Germany, where monstrous indignities and injustices were hallowed as "law" simply by virtue of their having been passed by valid authority. From all this the natural law thinkers argue that the use of the label "law" should not be regulated solely by form but by ethical content as well. An immoral enactment, though formally passed, would not on this view become "law." Some limit should of course be imposed on the lengths to which such a doctrine can be carried, and a minimum ethical content of law has been outlined in the previous section of this article. Besides, even formal criteria of validity are accepted initially because they are thought to guarantee some basic moral requirements. The positivist answer might be, in the first place, that nothing is gained by refusing to call an immoral enactment "law." Secondly, however true it might be that a precept is adopted as "law" because it is moral, it does not follow that a precept that has been adopted does not become "law," or can be deprived of that dignity, because it is immoral. In short, it has still to be shown why "law" must satisfy a substantive as well as a formal criterion. Thirdly, even if a minimum content of natural law principles were agreed, it has still to be settled whose acceptance of them shall be decisive. For as long as the judges and officials concerned with the administration of law in a given society at a given time are ready to accept the form of enactment as the sole criterion of "law," it is pointless for those who are not so involved to maintain that the criterion should also include an ethical content as well. Officials who succeed them may indeed contradict and nullify all that their predecessors have done, but that would not settle the issue; it would only impart to the question of acceptance a temporal slant. The history of jurisprudence has shown that the theories of law are mainly a reflection of the trends and requirements of each age. A theory to satisfy the needs of the present has still to be evolved. *See* also POLITICAL PHILOSOPHY.

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JURJANI, AL-, the name of two Arabic scholars:

ABU BAKR 'ABD-AL-QAHIR IBN 'ABD-AR-RAHMAN AL-JURJANI (d. 1078), Arabic philologist, whose compendium on Arabic grammar, the *Kitab al-'Awamil al-Mi'a* or *Mi'at 'Amil* (edited by T. Erpenius [1617] and frequently in the east), was for long one of the most widely used works on the subject. He is celebrated also for a work on literary criticism and style, *Asrar al-Balagha* (edition in 1891), and for another on the incomparability (*i'jaz*) of the Koran (edition in 1903).

See C. Brockelmann, *Geschicte der arabischen Litteratur,* vol. i, pp. 287–288 (1898), and Supplement, vol. i, pp. 503–504 (1937).

'ALI IBN MOHAMMED AL-JURJANI (1339–1413), philologist and philosopher and author of the *Ta'rifat,* was born near Astarabad (Gurgan) and became professor in Shiraz. When this city was captured by Timur (1387), he was sent by the conqueror to Samarkand, but returned after Timur's death (1404) to Shiraz and remained there until he died in 1413. Of his 31 extant works and commentaries, the best known is the *Ta'rifat,* a short dictionary of technical terms in theology, philosophy, philology, etc. (edited by G. Flügel [1845] and subsequently in many editions).

See C. Brockelmann, *Geschicte der arabischen Litteratur,* vol. ii, p. 216 (1902). (H. A. R. G.)

JURY. A jury is always a body of local laymen officially summoned to answer questions under oath. This is true even of the coroner's jury, which operates outside the judicial system and investigates suspicious deaths. The findings of a coroner's jury, however, have no judicial significance, and such juries were widely abolished in the second half of the 20th century. (*See* CORONER.) In general, juries function only in common law and not in equity proceedings.

The Grand Jury.—In the United States juries are of two principal types: grand and petit. The grand jury is summoned from time to time by a court to inquire into the commission of crimes; it is traditionally composed of 23 persons, in many states and in the federal courts. The grand jury's function is to decide whether there is "probable cause" to believe that a person has committed a crime. Should it so decide, an indictment, a formal accusation of crime, is returned and the accused must stand trial before a petit or trial jury whose duty it is to determine the question of guilt "beyond a reasonable doubt." The purely accusatory function of the grand jury is underscored by these facts: (1) an indictment is no evidence of guilt and may be returned by a simple majority of the grand jurors; (2) the accused has no right to offer evidence or even to be present in the grand jury room; and (3) the refusal of one grand jury to indict does not bar indictment by a subsequent grand jury. In practice, grand juries generally rubber-stamp the wishes of prosecutors; this, together with the cost of the grand jury, has led some states to abolish or seriously restrict its operation. England abolished the grand jury system in 1933, but in the United States the right to a grand jury indictment for serious crimes, though waivable, is constitutionally safeguarded in many states and by the 5th amendment of the U.S. constitution.

History.—The term jury, in ordinary usage, usually signifies only the distinctive mode of trying issues of fact in civil and criminal cases in countries where the English law prevails. The origin of the petit jury is variously attributed to a Scandinavian institution, to Alfred the Great and to a primitive mode of Anglo-Saxon trial known as compurgation. Magna Carta, the famous charter extracted by the English barons from King John in 1215, while long thought to guarantee trial by jury, had nothing to do with it. The jury's real origin lies in the ancient inquisition of Carolingian kings, dating from the 9th century, whereby groups of disinterested neighbours were required to declare under oath information that was used to establish royal rights. This Frankish institution was carried into the duchy of Normandy and thence to England via the Norman Conquest of 1066. It was first employed in England on a grand scale—again solely for the crown's benefit—in 1086.

Until the reign of Henry II (1154–89), however, the use of disinterested neighbours for determining private rights was very occasional. The traditional Anglo-Saxon modes of trial—compurgation, wherein friends of the defendant exonerated him by swearing that he was an honourable man; ordeal, in which the defendant was subjected to various tortures that if successfully endured proved his innocence; and the Norman-introduced trial by battle, in which the contestants fought until one was either killed or surrendered—still prevailed. Henry II, however, sensing the potentialities of judgment by neighbours, made the inquisition the prevailing method of trial in controversies affecting land. Ultimate extension to other types of civil disputes was inevitable.

The development of trial by jury in criminal cases came more slowly, but here, too, Henry took a significant step by requiring, in 1166, that 12 men be present at every county court session to present to his justices the names of persons suspected by them of serious crime—the beginning of the grand jury. The persons named were then sent directly to the ordeal, without the possibility of exoneration by compurgation or trial by battle. In 1215, however, Pope Innocent III forbade the participation of priests in ordeals, thus depriving them of their divine nature. King Henry III ordered the substitution of judgment by neighbours for the ordeal in 1219, and by the end of the 13th century the older methods of trial were largely superseded. Not until the mid-14th century, however, did the grand jury become separate from the petit or trial jury.

Originally, in both civil and criminal cases, jurors passed judgment on the basis of what they themselves had heard or knew, and the use of witnesses developed only gradually. Indeed, the principle that a verdict must be reached solely on evidence presented in court was not established until the end of the 17th century. In 1367 the size of the petit jury was fixed at twelve. Majority verdicts were occasionally accepted by the judges until the end of the 14th century, but thereafter it was required that verdicts be unanimous. English judges, however, went to extreme lengths to coerce unanimity, and it was early established that the jury must go without food while deliberating.

Until the early 17th century, the attaint jury, a body of 24 neighbours sworn to decide whether the petit jury had lied, was the only recourse in civil cases against an unlawful verdict. If the attaint jury did so decide, the petit jury verdict was set aside and the petit jurors forfeited their lands and goods to the king. The attaint jury was also available in criminal cases, and a finding adverse to the petit jurors had the same effect on them as in civil cases but did not affect the petit jury verdict. The attaint jury was gradually abandoned because of the reluctance of attaint jurors to impose the forfeiture penalty and, to fill the vacuum, judges in the early 17th century began to declare new trials in civil cases.

In contrast with U.S. practice, new trials were never ordered in serious criminal cases in England after a jury verdict. English judges, however, sometimes fined and imprisoned jurors who acquitted persons they wished to have convicted. But Bushell's case (1670) established the principle that jurors may not be punished for acquitting even in the face of overwhelming evidence of guilt.

United States.—The jury was widely used in both criminal and civil cases throughout the American colonial period and was revered for its service in impeding the enforcement of unpopular British laws. Most of the pre-1787 state constitutions safeguarded it for both classes of cases, but the U.S. constitution of 1787 guaranteed it in criminal cases only (art. iii), a point repeatedly stressed by opponents of ratification. Indeed, in the state ratification conventions, the absence of a civil jury trial guarantee was thought infinitely more objectionable than the document's failure to mention freedom of speech or of the press, and it was principally reverence for civil jury trial which led to the popular demand for a comprehensive Bill of Rights. The 7th amendment accordingly guaranteed jury trial in all common-law cases where the amount involved exceeds $20, and the 6th amendment reaffirmed the right of jury trial in criminal cases. The basic elements of the English common-law jury trial thus guaranteed are: (1) that the jury should consist of 12 persons; (2) that the trial should be supervised by a judge with power to instruct as to the law and to comment on the evidence; and (3) that the verdict be unanimous. If a jury cannot agree, the result is a "hung jury" and the case must be retried before another jury. State constitutions likewise guarantee trial by jury, universally in criminal cases and virtually so in civil cases. Many states, indeed, deprive the judge of the right to comment on evidence and generally reduce his status to that of a mere umpire. A number of states allow less than unanimous verdicts in civil cases and a few do so in criminal cases. The jury in civil cases may everywhere be waived in favour of trial by judge alone, and many states allow this in criminal cases also, though often insisting, as do the federal courts, that the judge and prosecutor must first give their consent.

The jury selection process varies markedly from state to state and among the various federal courts. There are various age and property qualifications, though the trend is away from the latter. Discrimination in jury selection on account of race, colour or creed, however, is unconstitutional. Educational qualifications are very uncommon. A few states exclude women from jury duty while others allow them to serve or not, as they choose. Most states exempt professional persons of every grade and large classes of government employees. Many other groups, while not exempt, are habitually excused, such as day labourers and small businessmen. Persons summoned to court to serve as jurors are known as veniremen and a group of such persons called for a particular case as a venire (Latin *venire facias*, "to make or cause to come"). Veniremen are subject to examination regarding their qualifications before they are selected as jurors. Such examination is known as the *voir dire* (Old French, "to say the truth"), and is in most courts, in contrast to the English practice, conducted mainly by counsel. Veniremen may be challenged either peremptorily or for cause. A peremptory challenge is one for which no reason need be given, and the number of such challenges is strictly limited.

Functions.—The jury deliberates in private and in reporting its verdict normally makes public only its final decision without any of the argument in support of it. Only rarely may the testimony of jurors as to misconduct in the deliberations be used to impeach a verdict. This arrangement has two important consequences: (1) there is only anecdotal and imperfect knowledge of how juries do behave in reaching their decisions, there being a wide spectrum of opinion among judges and lawyers on the point; (2) the jury has so much freedom in fact that it is not easy to say just what the function of the 20th-century jury is. The conventional statement is that the jury are triers of issues of fact, taking the law as given to them in the judge's instructions. But the actual operation of the system is more subtle, and the jury performs, to some degree at least, a rule-molding as well as a fact-finding function. To many observers, indeed, a chief merit of the jury is this *de facto* power to temper formal legal rules with the equity and common sense of the layman. The jury also relieves judges of the responsibility for making unpopular decisions. It is a safeguard against judicial bias and corruption, so that the popularity of the jury system at any given moment is probably inversely related to popular confidence in the ability and integrity of the judiciary. Finally, the jury provides civic participation by the citizen.

Criticism.—The jury system is the subject of enthusiastic praise and of vigorous criticism. Critics propose a variety of reforms designed to improve the calibre of jury personnel and to increase the trial judge's control over the jury, such as the use of special verdict procedures and the restoration of the judge's power to comment on the evidence.

The future of the jury system is not easy to predict. It did not survive on those parts of the European continent which experimented with it during the 19th century, and in England it is in decline, being virtually nonexistent in civil cases. It was still widely used in the second half of the 20th century however, in both civil and criminal litigation in the United States.

The jury and the common law are sometimes said to be the two distinctive Anglo-American legal institutions. In the second half of the 20th century, however, it was perhaps fair to say that the jury survived as a distinctively U.S. institution rather than an Anglo-American institution.

See also references under "Jury" in the Index.

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JUS GENTIUM: *see* ROMAN LAW.

JUS PRIMAE NOCTIS: *see* DROIT DU SEIGNEUR.

JUS RELICTAE, in Scots law, the wife's common-law right in the movable property of her husband, exigible from him or his executors on the dissolution of the marriage by his divorce or death. The right depends upon the husband's domicile being Scottish. The amount of the right is one-third where there are children of the husband surviving, and one-half where there are no surviving children. The right comes into being on divorce or on survivance and overrides any inconsistent testamentary provisions of the husband. It may, however, be renounced by contract or be discharged by satisfaction. It is subject to alienation of the husband's movable estate during his lifetime or by its conversion into heritage.

Jus relicti is the statutory right of a husband to a share in his wife's movable estate, in the event of her dying, domiciled in Scotland. Its introduction was made necessary by the Married Women's Property act, 1881, which took away the husband's right

to all a wife's property. Owing, presumably, to an oversight of the draftsman of the statute, it is not due to the husband where the marriage is dissolved by the divorce of his wife, but in other respects as regards amount, exclusion, discharge and satisfaction it is subject to the same rules as *jus relictae.*

JUSSERAND, JEAN (ADRIEN ANTOINE) JULES (1855–1932), French scholar and diplomatist, who throughout his career combined literary and political interests, was born in Lyons on Feb. 18, 1855. Soon after entering the consular service in 1876 he presented a doctoral thesis on the early English theatre which attracted the attention of Taine. After holding appointments in London and Paris, he was entrusted with an important fact-finding mission in Tunisia and helped to establish the new protectorate. During the 1885–86 session he lectured on Chaucer at the Collège de France. He returned to London as embassy attaché and then remained for nine years at the Quai d'Orsay. Meanwhile he published an important work on Langland (*Les Anglais au moyen âge. L'épopée mystique de William Langland,* 1893) and the first part of his unfinished but scholarly *Histoire littéraire du peuple anglais* (vol. I 1894; vol. II appeared in 1904). After his marriage (1895) he was appointed minister in Copenhagen and from 1903 to 1925 acquitted himself with great distinction as ambassador in Washington. In 1922 he was one of the two French signatories to the Washington peace treaty limiting naval armament and in 1925 he was elected to the Académie des Sciences Morales. He died in Paris on July 18, 1932. (J. G. Ck.)

JUSSIEU, the name of a French family distinguished for its botanists. The more eminent members, all systematists, are:

Antoine de Jussieu (1686–1758), born at Lyons on July 6, 1686, studied medicine at the University of Montpellier and traveled with his brother Bernard through Spain, Portugal and southern France. In 1708 he went to Paris, where he became director of the Jardin des Plantes. He edited J. P. Tournefort's *Institutiones rei herbariae* (3 vol., 1719), and J. Barrelier's *Plantae per Galliam, Hispaniam, et Italiam observatae,* etc. (1714). He died at Paris on April 22, 1758.

Bernard de Jussieu (1699–1777), younger brother of the above, was born at Lyons on Aug. 17, 1699. He studied medicine at Montpellier, but in 1722 became subdemonstrator of plants in the Jardin du Roi at Paris, arranging the plants in groups that appeared "natural" to him. This work formed the starting point for the famous classification system of his nephew Antoine Laurent. In 1725 Bernard brought out a new edition of Tournefort's *Histoire des plantes qui naissent aux environs de Paris* (2 vol.). Long before Abraham Trembley (1710–84) published his *Histoire des polypes d'eau douce,* Jussieu maintained that these organisms were animals, and not the flowers of marine plants, then the current notion. He died at Paris on Nov. 6, 1777.

Joseph de Jussieu (1704–1779), brother of Antoine and Bernard, was born at Lyons on Sept. 3, 1704. Educated for the medical profession, he accompanied C. M. de la Condamine to Peru in the expedition for measuring an arc of meridian, and remained in South America for 36 years. He introduced the common garden heliotrope (*Heliotropium peruvianum*) into Europe. He died at Paris on April 11, 1779.

Antoine Laurent de Jussieu (1748–1836), nephew of the preceding, was born at Lyons on April 12, 1748. He studied medicine and botany in Paris, and in 1789 issued his *Genera plantarum secundum ordines naturales disposita, juxta methodum in horto regio Parisiensi exaratam,* which formed the basis of modern classification. When the Revolution broke out, he was installed in charge of the hospitals of Paris. From 1770 to 1826 he was professor of botany at the Museum d'Histoire Naturelle. He produced nearly 60 memoirs on botanical topics. He died at Paris on Sept. 17, 1836.

Adrien Laurent Henri de Jussieu (1797–1853), son of Antoine Laurent, was born at Paris on Dec. 23, 1797. He displayed the qualities of his family in his thesis for the M.D., *De Euphorbiacearum generibus medicisque earundem viribus tentamen* (1824). He made valuable contributions to botanical literature on the *Rutaceae, Meliaceae* and *Malpighiaceae,* and wrote *Botanique,* which reached nine editions, and was often translated. He died at Paris on June 29, 1853.

JUSTICE, DEPARTMENT OF: *see* Government Departments: *United States.*

JUSTICE OF THE PEACE, in England, a magistrate appointed by special commission under the great seal to keep the peace within the jurisdiction for which he is appointed. The title is abbreviated to J.P. and is used after the name. Justices for counties are appointed by the crown on the advice of the lord chancellor, with the recommendation of the lord lieutenant of the county. Justices for boroughs having municipal corporations and separate commissions of the peace are appointed by the crown, the lord chancellor adopting the recommendation of the town council, the local advisory committee, or acting independently.

Apart from a small body of professional (stipendiary) magistrates, mainly in London and large towns, J.P.'s are unpaid and have no professional legal qualification. For guidance on law and on the rules of evidence, they rely on their salaried clerk. The latter must be either a barrister of not less than 14 years' standing, or a solicitor of the supreme court, or have served for not less than seven years as clerk to a metropolitan or stipendiary magistrate, or have been attached to a metropolitan magistrate's court.

The jurisdiction of the petty sessional courts, in which the J.P.'s sit, is wide and multifarious, embracing both criminal and civil work, and a number of matters, such as licensing, which are administrative rather than strictly judicial and derive from the period when the justices were often the only properly constituted local authority. The criminal jurisdiction is of two types: (1) committing persons accused of the more serious offenses to trial at higher courts where there is a prima facie case for the prosecution; (2) hearing and determining summarily the less serious charges. Magistrates may not impose a sentence of more than six months' imprisonment. Selected magistrates sit in juvenile courts to deal with matters, by no means exclusively criminal charges, involving young persons under the age of 17, and these courts have special rules (*see* Children's Court). Of the civil jurisdiction, other than that affecting children and young persons, that in matrimonial cases is the most important. (*See* Quarter Sessions, Court of; Magistrates' Courts.)

In the United States, justices of the peace usually are elected, although sometimes they are appointed by executive authority. They constitute the lowest of the state courts, and their maximum award in civil cases is generally limited to about $300; in criminal matters they may try only misdemeanours. Ordinarily they may not impose a jail sentence in criminal cases if the person tried prefers to pay the fine imposed. Other duties and powers commonly include the performance of marriage services, the issuance of warrants for arrest, and the holding of inquests. *See* also Judiciary and Court Officers. (W. T. Ws.)

JUSTICIAR. Unlike all other officers of the central administration in 12th-century England, the justiciar was not a household official. The justiciarship originated in the king's need for a responsible subordinate who could take as wide a view of the affairs of the kingdom as the king himself. A man of unquestionable loyalty, with a specialist's knowledge of administrative detail, was necessary to act as regent when the king was abroad, and on other occasions to take charge of those matters with which the king had no time to deal. Such a man, from the nature of his office, was in a position superior to any household officer.

William I had appointed men to hold authority while he was in Normandy, but their offices had always ended on his return to England. Ranulf Flambard, chaplain to William II, was the first man to hold a position analogous to that of the 12th-century justiciars. He was responsible for the collection of William II's revenue and interested himself in the administration of justice all over the country. In the reign of Henry I, increasing administrative specialization brought more and better-trained officials. Ralph and Richard Basset, father and son, were successively styled *Justiciarius,* with the implication that they held some authoritative position among the royal judges. Richard Basset's seal, bearing the likeness of a knight in armour saving a child from a dragon, shows that he was both a knight and a judge. But Roger, bishop of Salisbury, who was styled *Justiciarius* and *Procurator Angliae,*

held the highest place in the king's service. His fall and that of his powerful kinsmen and the anarchy of Stephen's reign broke the normal development of the administrative offices.

Although at the beginning of his reign Henry II appointed justiciars, apparently to fill the place once held by Roger, their position was very different from his. Instead of one justiciar, Henry appointed two, Robert, earl of Leicester, and Richard de Lucy, both of whom he kept busy with routine work, not at first trusting them with control, even when he was abroad. The chancellor, Thomas Becket, was the chief minister in the earlier years of the reign, and it was not until after his appointment as archbishop and his consequent quarrel with Henry that the justiciar became the greatest man in the kingdom after the king. His supremacy was firmly established during the long official careers of Richard de Lucy (1153–79) and of Ranulf de Glanville (1180–89).

Head of the whole administration, the justiciar found his labours constantly increasing. The volume of judicial work was growing greater every year owing to the popularity of Henry II's reforms. The justiciar presided over the bench of judges at Westminster, organized the judicial circuits, heard difficult pleas, gave his advice to judges on innumerable points of law and himself toured the country to see that the administration was properly conducted. Such work kept him fully occupied when the king was in England. It is not remarkable that although in theory he should have presided over the sessions of the exchequer, he was not always present. When the king was abroad, the justiciar also had to raise money for the king's needs and see that peace was maintained. All the justiciars of the second half of the 12th century on occasion raised forces and took the field, either against rebels such as Count (afterward King) John in 1194, or to preserve the peace of the marches of Wales. Under Richard I the office grew in importance, since the king was continuously out of the country and it fell to successive justiciars to raise his ransom and the large sums needed for his war with France. Important developments in the administration of justice were made in these years, mainly during Archbishop Hubert Walter's period of office (1194–98).

The loss of Normandy in 1204 resulted in the king spending a much greater proportion of his time in England. For the rest of John's reign, therefore, the office lost some of its importance. But it regained its influence during the minority of Henry III. Hubert de Burgh was then the ruler of the country as no justiciar had ever been before; but he was mainly concerned and interested in affairs of state, and he was in fact the last of the great justiciars. His fall (1232) was due to Henry's weariness of his personal domination and to royal jealousy of the supreme great official. The day of the great officer of state governing all departments and controlling the whole administration was past. Stephen of Seagrave, one of the leading judges, was appointed justiciar, but his work was mainly judicial and lasted only until 1234, when the barons secured the fall of the Poitevins, whose support had enabled Henry to rid himself of Hubert de Burgh. During the period of Henry's personal rule no justiciar was appointed. Henry distrusted great officers of state. As his father had done, he heard pleas himself as he toured the land. When the barons took control in 1258 the office was re-established for a time. But the baronial justiciars were temporary, paid and overworked officials, occupied in the administration of justice and the supervision of the routine of government. The office came to an end in 1261. In Sicily and Scotland, countries closely connected with England, similar officials existed in the 12th century. In Scotland there were two justiciars, one for the country to the north and another for that to the south of the Forth. (D. M. S.)

JUSTICIARY, HIGH COURT OF, in Scotland, the supreme criminal court, consisting of the lord justice-general, the lord justice-clerk and 14 lords commissioners of justiciary. Three judges form a quorum, but sometimes five judges sit. When so constituted the high court has power to suspend and to quash the proceedings in the inferior criminal courts on the ground of incompetency or irregularity. The high court has also a statutory jurisdiction to entertain stated cases on points of law from inferior criminal courts. The sittings of the circuit courts of justiciary for the trial of indictments with a jury are presided over by a single judge, but are deemed to be sittings of the high court of justiciary. No other criminal court has power to pronounce sentence of death. Until 1926 the sentences of this court were not subject to suspension or review in any form. But since the Criminal Appeal (Scotland) act of that year, sentences of the justiciary court and of the sheriff and jury court are subject to appeal, but only at the instance of the accused. In either case the appeal lies to the high court of justiciary then sitting as a court of appeal under that act, with a quorum of three judges and with jurisdiction to entertain an appeal on questions of fact and of law. Appeal from this court does not lie to the house of lords, either at common law or under the act of 1926. (A. D. G.)

JUSTIFICATION, in Christian theology, the translation of the Greek *dikaiosis* (Lat. *justificatio*), originally a legal technical term derived from the verb "to call [someone] righteous." The topic and notion of justification became important in the history of the church and of theology from St. Paul onward. In his Epistles to the Galatians and the Romans he asks, against the background of the Pharisees' legalistic piety, how man becomes just before God. He answers that it is not by works, nor even by obeying the commandments (the law of God which is in itself good). Man stands before God not as righteous but as a sinner, who depends entirely on God's grace. It is God who calls sinful man righteous. In human law courts only the innocent man is justified. But in the tribunal of God, before whom all men are sinners, it is precisely the unjust who are declared just by God's merciful verdict. This is no arbitrary pronouncement, but is made with reference to Jesus Christ "who was put to death for our trespasses and raised for our justification" (Rom. iv, 25). In this way sinful man is acquitted from law, sin and death, is reconciled with God and has peace and life in Christ through the Holy Spirit. Thus sinful man is not merely declared just but also made just.

What then is expected of man now that he is declared just? That surrendering himself with empty hands he should accept God's merciful judgment in Christ and place his whole trust in the Lord—in short, that he should have faith. "For we hold that a man is justified by faith apart from works of law" (Rom. iii, 28). The man who has been justified is tempted as before and, therefore, remains dependent on the grace of God. His faith must not be inactive but a "faith working through love" (Gal. v, 6). Man has to authenticate his faith by deeds of love so as to endure to "that day when, according to my gospel, God judges the secrets of men by Jesus Christ" (Rom. ii, 16). A good paraphrase of the doctrine of justification is given in the Epistle to Titus, which is post-Pauline:

> When the goodness and loving kindness of God our Savior appeared, he saved us, not because of deeds done by us in righteousness, but in virtue of his own mercy, by the washing of regeneration and renewal in the Holy Spirit, which he poured out upon us richly through Jesus Christ our Savior, so that we might be justified by his grace and become heirs in hope of eternal life (Tit. iii, 4–7).

The doctrine of justification, which the Greek Church Fathers did not stress very much, revealed its special function as a criterion for theology in Augustine's controversy with the Pelagians against their teaching of ethical self-sanctification by works, and in Luther's struggle against the superficial concept of justification by works current in the late middle ages, a struggle which led to a genuine reappraisal of St. Paul's doctrine of justification. The Council of Trent condemned a certain bias and misinterpretation in the Reformers' understanding of St. Paul, but it is becoming increasingly clear that, as J. H. Newman suspected and as Catholic confrontation with Karl Barth's doctrine of justification has shown, there is no division at the confessional level between the Protestant and Catholic doctrines of justification if both are rightly understood.

See also PAUL, SAINT: *The Christian Thinker: Justification by Faith.*

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gung und Heiligung, 3rd ed. (1930); H. Küng, *Justification. The Doctrine of Karl Barth and a Catholic Reflection* (1964). *See* also bibliographies to articles on the Pauline Epistles. (Hs. K.)

JUSTIN I (450 or 452–527), Byzantine emperor from 518 to 527, was born of Illyrian peasant stock at Bederiana in the western Balkans near Skopje. After a successful military career he rose to be count of the excubitors and patrician. On Anastasius I's death he secured the throne. He attempted to restore order in the capital and in other large cities in the empire by punishing the excesses of the powerful factions and by prohibiting various popular spectacles. His religious policy was marked by the repudiation of Monophysitism and the return to orthodoxy with the consequent re-establishment of relations with Rome, which ended the so-called Acacian schism (484–519). In the east the struggle with Persia, though war did not actually break out until the end of the reign, made it important to retain control of Lazica (Colchis), to secure allies in districts of Mesopotamia and southern Syria and to counter Persian penetration into Arabia by an understanding with Ethiopia. On the northern frontier the Slavs were already crossing the Danube and troubling the Balkan provinces, and it proved impossible to repel them. Throughout his reign Justin, though by no means the nonentity often supposed, had the help of his gifted nephew and successor Justinian I, though he did not formally recognize him as his colleague until April 4, 527, shortly before his death on Aug. 1, 527.

See A. A. Vasiliev, *Justin the First* (1950); E. Stein, *Histoire de Bas-Empire,* vol. ii (1949). (J. M. Hy.)

JUSTIN II (d. 578), Byzantine emperor from 565 to 578, was the nephew and successor of Justinian I. He began by acting with resolution and common sense; he paid state debts, remitted overdue taxes, reduced expenditure and for a time allowed a measure of toleration to the Monophysites. In the Balkans he campaigned against the Avars who were attacking the Danube frontier, and in 571 he came to terms with them. In spite of an alliance with the Franks, he was unable to prevent the Lombards under Alboin from entering Italy in 568, and parts of the country were soon permanently lost to them. But the main feature of his foreign policy (as of his immediate successors, Tiberius, Maurice and Heraclius) was the war with Persia (*see* Persian History), fought mainly to get a foothold in Persarmenia, a vital area for military recruitment now that the Germanic peoples had moved elsewhere. Justin allied with the Turkic peoples in western Asia whose khan was hostile to the Avars and the Persians. In spite of Khosrau's attempts to preserve peace, Justin declared war on Persia in 572, but had little success either in Armenia or in the diocese of the east; and in 574 the empress Sophia, acting on his behalf, entered into peace negotiations. Justin had by now become subject to fits of insanity and he was induced by Sophia to adopt as his son the general Tiberius, conferring on him the title of Caesar in Dec. 574. Justin lived in retirement until his death.

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JUSTIN (Marcus Junianus Justinus) (probably 3rd century A.D.), Roman historian, was the author of an epitome of the *Historiae Philippicae et totius mundi origines et terrae situs* written in the time of Augustus by Pompeius Trogus (*q.v.*). The work of Trogus is lost; only the *prologi,* or tables of contents, have survived. The main theme of Trogus was the history of Macedon and the Hellenistic monarchies, with Parthia; and Justin preserves material which has proved increasingly valuable to students of the Hellenistic world. Although his account is abbreviated, it is elegant, and he allows full space for Trogus' report of a speech of Mithradates (38, 4–7). The book was much used in the middle ages. Of Justin's personal history nothing is known.

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JUSTINIAN I (Flavius Petrus Sabbatius Justinianus, called the Great) (483–565), Byzantine emperor from 527 to 565, was a Latin-speaking Illyrian, born in Taurisium (near Skopje in Macedonia) of peasant stock. The names Petrus Sabbatius are known only from a consular diptych of 521 and were dropped after his accession. Justinianus was a Roman name which he took from his uncle Justin I (*q.v.*), to whom he owed his advancement. Nothing is known of his early life except that he went while still a young man to Constantinople, where his uncle held high military command. He received an excellent education, though it was said that he always spoke Greek with a bad accent. When Justin became emperor in 518, Justinian was a powerful influence in guiding the policy of his elderly and childless uncle. He was legally adopted by Justin and held important offices. In 525 he received the title of Caesar, and on April 4, 527, was made co-emperor with the rank of Augustus. At the same time his wife, Theodora (*q.v.*), who exercised considerable influence over him, was crowned Augusta. On Justin I's death on Aug. 1, 527, Justinian succeeded as sole emperor.

Justinian's Wars.—On the eastern frontier Justinian was involved in war with Persia (*see* Persian History: *Sasanian Empire, c. A.D. 224–651*). When he came to the throne his troops were fighting on the Euphrates against the armies of Kavadh I. After campaigns in which the Byzantine generals, among whom Belisarius was the most distinguished, obtained considerable successes, a truce was made on the death of Kavadh in Sept. 531. His successor, Khosrau I (*q.v.*), came to terms in Sept. 532 and the peace was ratified in 533. The treaty was on the whole favourable to the Byzantines, who lost no territory and whose suzerainty over the key district of Lazica (Colchis; *q.v.*) was recognized by Persia. War broke out again in 540, when Justinian was fully occupied in Italy. Khosrau invaded Syria and destroyed Antioch, while in the north Lazica was taken and Byzantine Armenia attacked. Belisarius was sent to the diocese of the east and the situation was somewhat retrieved by his campaigns in 541 and 542 and those of other Byzantine generals in succeeding years. A five years' truce made in 545 was renewed in 551 and 557. But the Persians refused to restore Lazica and a fierce struggle continued in that mountainous region. Finally a 50 years' truce was negotiated, probably at the end of 561; Byzantium agreed to pay an annual tribute, while the Persians renounced all claim to the small Christian kingdom of Lazica, an important bulwark against northern invaders. Justinian also maintained his eastern provinces intact in spite of the vigorous offensives of the Persian king, so his policy on this front can hardly be described as a failure.

In the west Justinian's policy followed inevitably from his conception of imperial responsibility; he considered it his duty to regain provinces lost to the empire "through indolence" and he could not ignore the trials of Catholics living under Arian rule. Both in Italy and in north Africa he had reason to believe that his help was desired and that political circumstances were favourable to his intervention. In the Vandal kingdom of north Africa Catholics had been subject to persecution, and in 531 there was a disputed succession to the throne, while the Vandals (*q.v.*) were also being threatened by the Moorish tribes of Mauretania and south Numidia. In June 533 Belisarius was sent with an expedition to north Africa. He landed in August without opposition and by March 534 had mastered the kingdom and received the submission of the Vandal ruler Gelimer (*q.v.*). North Africa was reorganized as part of the empire, and now included Sardinia, Corsica, the Balearics and Septem (Ceuta). The prefecture and the *magisterium militum Africae* were both centred in Carthage. In spite of a series of revolts, particularly during 543–548, among the Berber tribes, good government was restored along the north African coast. In 547 Septem was attacked by the Visigoths from Spain. This was followed by a disputed succession and a revolt by the Catholics of Córdoba. In 552 Justinian sent an expedition to support Athanagild, the claimant to the throne, and con-

quered part of southeast Spain, which for purposes of administration was attached to north Africa.

In Italy the Ostrogoth Theodoric, though virtually independent, had ruled as the representative of Constantinople. But his death in 526 without a male heir was followed by anti-Byzantine manifestations. His daughter Amalasuntha appealed to Justinian for help, but she was killed in 535 by the Gothic nationalist party after the death of her young son Athalaric in 534. Justinian then dispatched an army to Italy via Dalmatia and Belisarius with a fleet to attack Sicily, while an embassy was sent to gain the support of the powerful Franks. (For the Italian campaigns of 535–540 *see* BELISARIUS.) After the defeat of the Ostrogothic king Vitiges and the capture of Ravenna in 540, imperial administration was re-established in Italy under the pretorian prefect Athanasius. Rigorous financial exactions and the rapacity of the soldiers made the new regime unpopular. Many of the Ostrogoths had never submitted and after the two short and unfortunate reigns of Ildidad and then Eraric they proclaimed Totila (Baduila) as their king in the autumn of 541. Totila drove out the imperial generals and governors, and Belisarius was sent against him with inadequate forces. City after city was captured by the Ostrogoths until only Ravenna, Otranto and Ancona remained in Byzantine hands. Totila took over the administration of the country, though at the expense of alienating the great landowners. He hoped to come to terms with Justinian, but in 552 a powerful army was sent against him under the eunuch Narses. Totila was defeated by superior numbers and strategy and himself mortally wounded at the battle of Tadinae. Narses entered Rome and soon after defeated Ostrogothic resistance at Mt. Lactarius, south of Vesuvius. Pockets of resistance, fortified by Franks and Alamans who invaded Italy in 553, lingered on until 562, when the Byzantines were in control of the whole of the country. Justinian hoped to restore the social and economic well-being of Italy by a series of measures, the Pragmatic Sanction of 554, but the country was so ravaged by war that this proved impossible during his lifetime and only three years after his death part of the country was lost to the Lombard invaders.

On the northern frontier Justinian faced continual attacks from the Slavs and Bulgars who crossed the Danube and penetrated as far south as the Peloponnese. These raiders did immense damage and in 540 the Bulgars even threatened the suburbs of Constantinople. Imperial fortifications were built and strengthened on the Danube and farther south, but did not avail to keep back the Slavs, who in the succeeding century were to settle in the empire.

Internal Policy.—*Legal Work.*—Justinian's best-known work was as a codifier and legislator. He greatly stimulated legal studies, and he set up a commission under Tribonian which issued the Codex, the Digest and the Institutes. The second edition of the Codex contained Justinian's own laws up to the date of issue (534), and his subsequent legislative work to 565 is known as the Novels (*Novellae constitutiones*). (*See* ROMAN LAW.)

Administrative Policy.—Besides drawing on the services of distinguished architects and jurists, Justinian was admirably served by his ministers. His aims were to root out administrative corruption and above all to increase the revenue. Trade and industry were energetically promoted as an important source of revenue, and it was during Justinian's reign that silkworms were first brought into the country, a valuable contribution to an industry that was a lucrative state monopoly. Administrative changes in the direction of further centralization brought offices under the emperor's direct control; *e.g.*, from 531 onward the financial department of the *sacrum patrimonium* was merged into the *res privata* and administered by court officials not responsible to any minister of state. After 541 the consulate passed out of use except for an occasional imperial office, usually only once in the year following accession. In certain provinces Justinian abolished the division of authority between the civil and military authorities, placing control in the hands of a single man. His able and energetic pretorian prefect John of Cappadocia, until his downfall in 541 due to the machinations of the empress Theodora, tightened up fiscal and administrative policy throughout the empire, forbidding officials to buy or sell offices or to acquire property by purchase or gift during office, and putting an end to city spectacles and even municipal services, thus alienating both the great provincial families and the poor. Public discontent was voiced in Constantinople by the Nika revolt of 532 when the city parties known as the Greens and the Blues burned the church of Hagia Sophia and part of the palace, proclaiming Anastasius I's nephew Hypatius emperor. This rising nearly cost Justinian his throne, but it was finally quelled by the resolute action of Narses and Belisarius.

Justinian's wars, the maintenance of an efficient army and navy, his subsidies to foreign powers and to barbarians were costly. But so was his building program (described in detail in Procopius' *De aedificiis*), which included public works, such as aqueducts and bridges, the rebuilding of whole cities devastated by earthquakes (a recurring and expensive item throughout the reign), as well as essential fortifications and defenses on the extensive frontiers. It also included buildings such as monasteries, orphanages, hostels and churches. Two of his churches, Hagia Sophia and SS. Sergius and Bacchus (called Little Hagia Sophia), still stand in Constantinople (*see* ISTANBUL). In Hagia Sophia, the "great church" or cathedral of the city, his architects achieved one of the finest and most justly famed buildings in the world (*see* BYZANTINE ARCHITECTURE).

Ecclesiastical Policy.—Justinian's ecclesiastical policy was inspired by his sense of imperial responsibility for the promotion of Christianity and the good government of the church and his desire to end doctrinal controversy concerning the nature of Christ. He himself had moreover a strong personal interest in theological problems. Many of his laws deal with religious problems, being either directed against pagans or heretics or concerned with matters of ecclesiastical and monastic discipline. For instance, pagans, heretics and Samaritans were forbidden to teach any subject whatsoever, and, though fully appreciative of the classical heritage, Justinian expelled pagan teachers from the once famous schools of philosophy at Athens, an action directed against paganism rather than Greek philosophy. In 542–543 Justinian took the initiative in condemning the teaching of Origen, which was spreading in monastic circles in Palestine. His edict also anathematized Origen himself and had the support of the episcopate and the pope.

Justinian's main doctrinal problem was the conflict between the orthodox view accepted at the Council of Chalcedon (451) that the divine and human natures coexist in Christ and the Monophysite teaching which emphasized his divine nature (*see* COUNCIL; MONOPHYSITES). Monophysitism was strongly held in Syria and Egypt and was closely allied to growing national feeling and resentment at Byzantine rule. Justinian, whose wife, Theodora, was a strong champion of the Monophysites, did not wish to lose the eastern provinces, but on the other hand any concessions to them would almost certainly alienate Rome and the west. Soon after his accession he tried to win over the Monophysite leaders, treating them with such consideration that Pope Agapetus protested. He made a further attempt at compromise when in 544 he issued an edict condemning parts of the writings of Theodore of Mopsuestia, Theodoret of Cyrrhus and Ibas of Edessa on the ground that these were tainted with Nestorianism, hoping thus to placate the Monophysites who charged the Chalcedonians with Nestorian sympathies. This edict roused an outcry in the west but had some support from the eastern bishops. Pope Vigilius, summoned to Constantinople, knew that if he supported imperial policy he would be repudiated by the west. Finally the Council of Constantinople (553) reaffirmed the Chalcedonian position and condemned the so-called Three Chapters (this originally referred to Justinian's three heads of condemnation, but was later used of the suspect writings). Justinian achieved nothing by the episode of the Three Chapters: he did not conciliate the Monophysites, he enraged Antioch by the attack on its teachers, and he roused Rome particularly by his handling of Pope Vigilius and his attempt to determine doctrinal matters. The decrees of the council were not accepted by Vigilius' successors and there was a schism between Rome and Constantinople lasting until 610.

Toward the end of his reign Justinian withdrew to some extent from public affairs and was occupied with theological problems. He even lapsed into heresy when at the end of 564 he issued an

edict stating that the human body of Christ was incorruptible and impassible (aphthartodocetism). This roused immediate protest and many ecclesiastics refused to subscribe to it, but the matter dropped with the emperor's death. So great were Justinian's claims to control over the church that he is one of the few Byzantine emperors whose policy can be described as "Caesaropapism."

Character and Influence.—In appearance Justinian was somewhat above middle height, with fresh colour in his cheeks; he had an extraordinary power of doing without food and rest, and was called "the emperor who never sleeps." Two mosaic pictures of him exist at Ravenna, one in St. Vitale, the other in St. Apollinare Nuovo. The throne passed to his nephew Justin II, his sister's son, on his death on Nov. 14, 565. Justinian was a man of large views and great ambitions, of wonderful activity of mind and tireless energy. In attempting to restore the bounds of the old Roman empire he looked back, not forward, and his plans were doomed to ultimate failure. But it should not be forgotten that he renewed Byzantine rule and Hellenic influence in parts of Italy for several centuries to come, or that for a half century and more good government was given to north Africa whence salvation for Constantinople in the person of Heraclius was to come in 610. At home his legal work and the magnificent Hagia Sophia have won him enduring fame.

See also references under "Justinian I" in the Index.

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(J. M. HY.)

JUSTINIAN II (RHINOTMETUS) (669–711), Byzantine emperor from 685 to 695 and from 705 to 711, succeeded his father, Constantine IV, at the age of 16. In spite of a despotic and unbalanced temperament, he was is some ways an able ruler who continued the policy of his Heraclian predecessors. At the opening of his reign he made a treaty with the Arabs whereby they paid increased tribute and agreed to a condominium over Cyprus, Armenia and Georgia. In 688/689 he led a successful expedition into Slav-occupied territory in Macedonia and many Slavs were drafted into the army or settled as soldier-farmers in Bithynia and in the Opsikion theme. This policy of resettlement was extended to the Mardaites of the Lebanon who were transplanted to the Peloponnese and to Pamphylia in Asia Minor, and to the Cypriots who were settled near Cyzicus, thus supplying fresh manpower to depopulated areas. Justinian's Cypriot policy provoked the Arabs to a fresh attack on the eastern frontier and in 691/692 the Byzantines were defeated at Sebastopolis and lost control of their Armenian possessions. At home Justinian held the Quinisext council (692) whose disciplinary rulings, intended to supplement the doctrinal canons of the fifth and sixth ecumenical councils, illustrate the survival of pagan customs and folklore and also show the differing customs of the Greek and Latin churches. They were not recognized by the pope. Justinian's ruthless policy, his extravagant building program and the merciless extortion of his two finance officials, Theodotus and Stephen, led to a revolt in 695 when Leontius, governor of the theme of Hellas, was made emperor. Justinian's nose was cut off (hence his nickname Rhinotmetus) and he was banished to Cherson.

Justinian planned to regain his throne and on learning that his rival in Constantinople (since 698 Tiberius II Apsimar) intended to seize him, he fled to the khan of the Khazars with whom the Heraclians had close ties of friendship. He married the khan's sister, reached the Bulgar kingdom, gained the help of their khan Tervel, entered Constantinople and was once more acclaimed emperor (705). His ally Tervel was richly rewarded and his rivals were killed. He was obsessed by a desire for revenge: mass executions took place in Constantinople and while the Arabs were again attacking Asia Minor Justinian organized punitive expeditions to Ravenna and Cherson, both of which had offended him. In Cherson a revolt broke out, supported by the Khazars. An Armenian, Bardanes, was proclaimed emperor (*see* PHILIPPICUS), sailed to Constantinople and took possession of the city. Justinian was killed in Asia Minor; his small son Tiberius, the last of his house, was also killed in Constantinople.

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(J. M. HY.)

JUSTIN MARTYR, SAINT (*c.* 100–*c.* 165), the greatest of the early Christian apologists (*q.v.*), was born of pagan parents at Flavia Neapolis (previously Shechem; now Nablus, in Jordan) in Samaria. Though not a Jew he cannot have failed to be affected by his Jewish surroundings. Trained in philosophy, he became a convert to the Christian faith in Ephesus before 132. Retaining his philosopher's cloak, the distinctive badge of the wandering professional teacher of philosophy, he went from place to place discussing the truths of Christianity in the hope of bringing educated pagans through philosophy to Christ, as he himself had been brought. In Rome he gave lectures in a classroom of his own. One of his opponents, a Cynic named Crescentius, may have played a part in denouncing him to the authorities. He was martyred in Rome under the prefect Rusticus between 163 and 167; the *Acta SS. Justini et sociorum* gives an authentic account of his end. His feast day is April 14.

Justin's only surviving works are his *Apologia,* his so-called second *Apologia* (probably a mere postscript to the other) and his *Dialogus.* Only fragments remain of his book on the resurrection. The *Apologia,* which is addressed to Antoninus Pius, was written in Rome about 150. In the first part Justin defends his fellow believers against the charge of atheism and hostility to the state. He then demonstrates the truth of his religion from the effects of the new faith and from the excellence of its moral teaching, and concludes with a comparison of Christian and pagan doctrines, in which the latter are said to be the work of demons. The main support of his proof of the truth of Christianity is his demonstration that the prophecies of the old dispensation have found their fulfillment in Christianity. A third part shows, from the practices of their religious worship, that the Christians had in truth dedicated themselves to God. There is a vivid description of the method of celebrating the Eucharist and of administering baptism. The book ends with a reference to Hadrian's edict of *c.* 125 in favour of the Christians. In the second *Apologia* Justin uses the occasion of the trial of a Christian recently held in Rome to argue that the innocence of the Christians was proved by the persecutions themselves.

The *Dialogus* is a discussion in which Justin tries to prove the truth of Christianity to a Jew named Trypho. He attempts to demonstrate that a new covenant has superseded the old one, that Jesus is both the Messiah announced by the prophets and the pre-existing Logos through whom God revealed himself in the Scriptures, and that the gentiles have been called to replace Israel as God's chosen people. This book is the first known representative of anti-Jewish theological controversy.

By his recognition of Greek philosophy as a preparation for the truths of the Christian religion, Justin is the first in the long history of those who have tried to reconcile Christian with non-Christian culture. By his doctrine of the *Logos spermatikos* he held that the Logos, who was truly revealed in the incarnation of Christ, had previously been partially revealed as a seed (Gr. *sperma*) sown in all men. Pagan philosophers derived any truth that they taught from this *Logos spermatikos* and from borrowings from the Old Testament. Justin depends on middle Platonism perhaps even more than on Stoicism as regards both terminology and concepts. On the other hand, the millenarianism expressed in his *Dialogus,* where he states that there will be an earthly kingdom of Christ for 1,000 years before the end of time, is related to the Jewish Christian beliefs held by the early church in some parts of Asia Minor.

Justin's works are also of value for the history of the New Testament writings. He knows of no canon of the New Testament; *i.e.,* no fixed and inclusive collection of the apostolic writings. His sources for the teachings of Jesus are the "Memoirs of the Apostles," by which are probably to be understood the Synoptic Gospels (he must have known also the Gospel According to St. John), which, according to his account, were read along with

the prophetic writings at the public services.

The other works attributed to Justin and often printed under his name are not by him. That on the exposition of the true faith was written by Theodoret (*q.v.*) of Cyrrhus in the 5th century. The remainder include philosophical treatises addressed to the Greeks, the refutation of certain Aristotelian propositions and an epistle on Christian conduct. An unsuccessful attempt has been made to ascribe four of these to Diodore of Tarsus.

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JUSTO, AGUSTÍN PEDRO (1876–1943), Argentine general and president, was born in Concepción del Uruguay on Feb. 26, 1876. He was educated in army schools and at the University of Buenos Aires. A member of the Radical party, he held cabinet offices in the 1920s and joined the dissident Anti-Personalist Radicals in 1928. After the conservative revolution of 1930, Justo served briefly as army commander in chief. He became president of Argentina in 1932 after an election controlled by the conservative provisional government; he also had support from the dissident Radicals. As head of a modified dictatorship, he restrained constitutional freedoms and introduced broad economic controls, including price fixing by national commodity control boards. He signed the two Roca-Runciman trade treaties (1933 and 1936), which gave the Argentine landed oligarchy a guaranteed market in Great Britain for their meat production in return for "benevolent treatment" of British capital and imports in Argentina. Supported by the conservative coalition (the Concordance), President Justo manipulated the election of his successor, although there is evidence that toward the end of his administration (1938) he favoured an eventual return of the Radical party to political equality, if not to power. Until his death, Justo remained active in political affairs. He opposed Argentine neutrality in World War II, hoping that his country would support the Allied cause. Justo died in Buenos Aires on Jan. 10, 1943. (T. F. McG.)

JUSTUS, SAINT (d. *c.* 627), fourth archbishop of Canterbury and first bishop of Rochester, was born in Rome. In 601, with Laurentius, Mellitus and others, he was sent by Pope Gregory I to strengthen the mission of St. Augustine in Kent. He was consecrated by Augustine as bishop of Rochester when the see was established in 604. Shortly afterward, Aethelberht, king of Kent, granted him lands around Rochester. The fact that part of the land granted has ever since been known as Priestfield gives some credence to the belief that Justus may have been a secular priest rather than a monk. Justus joined with Mellitus and Laurentius in urging conformity on bishops and abbots in the north. At Aethelberht's death in 616, Justus fled with Mellitus to Gaul in the wake of hostility to Christianity, but they returned the next year when Eadbald, the new king, who had been converted by Laurentius, recalled Justus to his bishopric. He became archbishop of Canterbury in 624 on the death of Mellitus, the third archbishop. Justus received the pallium and a letter from Pope Boniface IV, giving him the power to consecrate bishops, which he exercised in consecrating Romanus as his successor to the bishopric of Rochester. The most important event of Justus' archiepiscopacy was the conversion of the kingdom of Northumbria by Paulinus, whom Justus consecrated as bishop and sent with Ethelburga, sister of the king of Kent, who had married Edwin, the heathen king of Northumbria. Justus probably died on Nov. 10, 627. He was buried at Canterbury in St. Peter's porch, St. Augustine's, with the three archbishops who had preceded him, Augustine, Laurentius and Mellitus. His feast is kept on Nov. 10 in the diocese of Southwark.

The chief sources on Justus are the Venerable Bede's *Historia Ecclesiastica* and the *Anglo-Saxon Chronicle.*

JUSTUS (JODOCUS) OF GHENT (JOOS VAN WASSENHOVE) (*c.* 1440–*c.* 1480/85), a Flemish painter whom G. Vasari and F. Guicciardini called Giusto da Guanto and who has been identified with Joos van Wassenhove, a member of the painters' guild at Antwerp in 1460 and at Ghent in 1464. His name is not mentioned in the records of the guilds after 1469, and it is supposed that he then emigrated to Italy. To his early period in Flanders two pictures have been ascribed: the altarpiece at St. Bavo in Ghent representing the "Crucifixion" and the "Adoration of the Magi" at the Metropolitan museum, New York. In 1474 Justus of Ghent was in Italy, where he painted the "Communion of the Apostles," described by Vasari and now in the Palazzo Ducale at Urbino.

This is the only absolutely authenticated picture by the master. It was painted for the brotherhood of Corpus Christi at the bidding of Federigo da Montefeltro, duke of Urbino, who was introduced into the picture. Vespasiano de Bisticci, his librarian, states that the duke sent to the Netherlands for a capable artist to paint a series of "ancient worthies" for a library recently erected in his palace because he knew no one in Italy who understood how to paint in oil colours. On the basis of stylistic similarities, it is generally accepted that this Flemish artist may be identified with Joos van Wassenhove. Although largely tempered by contact with Italian art and artists, the style and execution of the portraits still give evidence of the Flemish origin and training of their author. Furthermore, they are closely related to both the Ghent "Crucifixion" by Joos and the "Communion of the Apostles" by Giusto da Guanto. There are 28 portraits of "worthies," of which 14 have been reinstated in the palace at Urbino (from the Barberini palace at Rome) and another 14 are at the Louvre in Paris. Some of them, and sometimes even the whole group, have been tentatively ascribed to artists who are supposed to have worked at Urbino at the time; *i.e.,* the Italian painter Melozzo da Forlì and the Spanish painter Pedro Berruguete.

To Justus are also ascribed the "Portrait of Federigo da Montefeltro and his son Guidobaldo" at Urbino and the "Lecture" at Windsor castle. The seven "Liberal Arts," which decorated the ducal palace at Urbino, and of which two are now in the National gallery, London, and another two were once at Berlin but were destroyed in World War II, are ascribed to Justus by some critics and by others to Melozzo da Forlì. They seem to recall Melozzo in their design, but are Flemish in their colour and execution. Justus brought his northern traditions to Italy and there combined them with those of the Italian school. His development was gradual and his later works are difficult to distinguish from those of Italian masters.

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JUTE, the common name of two species of *Corchorus,* annual herbs of the linden family (Tiliaceae), and the fibre derived from these plants. Among the basic raw materials classed as fibres, jute is second only to cotton in world consumption. Its primary use is in fabrics for packaging the wide range of agricultural and industrial commodities that require bags, sacks, packs and wrappings. Wherever bulky, strong fabrics and twines, resistant to stretching, are required, jute is almost universally accepted because of its low cost.

The earliest references to jute were made under the name of *pat,* a term still widely used in modern times in the Indo-Pakistan jute trade. The name jute appears to be derived from *jhot* or *jhout* (Sansk. *jhat*), the vernacular name by which the substance is known in Orissa state, India.

The name jute is also applied to several other fibres, which are used as jute substitutes. These include kenaf or Bimli, *Hibiscus cannabinus;* rama, roselle or Java jute, *H. sabdariffa;* China jute, *Abutilon theophrasti;* aramina or Congo jute, *Urena lobata;* and sida or broom jute, *Sida rhombifolia.*

Botany of the Plant.—The fibre is obtained from *C. capsularis* (white jute) and *C. olitorius* (*tossa* and *daisee*). These species

of *Corchorus* have been grown in Bengal from very remote times for economic purposes, although it has not been confirmed that the genus originated in India. The two species cultivated for jute fibre are similar; they differ in shape of seed pod and slightly in growth habit and fibre characteristics. They grow from 6 to 15 ft. high, with a cylindrical stalk about as thick as a man's finger; when closely spaced for fibre production, the plants branch near the top only. The light green leaves are four to six inches long, about two inches broad and taper to a point; the edges are serrated; the two teeth at the base of the leaf are drawn out into long, bristlelike points. Small yellow flowers are borne singly or in clusters opposite or to one side of the leaves.

The capsules, or seed pods, in the case of *C. capsularis* are globular, rough and ribbed, while in *C. olitorius* they are slender, quill-like cylinders (about two inches long), ribbed but otherwise smooth.

Commercial fibre consists of strands of overlapping fibre cells that average about 2 mm. (0.08 in.) in length and 20 μ (.0008 in.) in diameter and are held together by natural plant gums. These strands surround the woody central part of the stem and are found just under the bark; they are embedded in nonfibrous tissues.

The strands nearest the bark generally run the full length of the stem; other strands become progressively shorter. The fibre filaments appear to be parallel, but a fine network is apparent on close examination.

Cultivation and Cropping.—*Cultivation.*—Both species of jute are cultivated in Pakistan and India, mostly on small farms and mainly for their fibre but also for the leaf, which is used as a potherb. These two countries are the world's principal producers of jute. Pakistan production is in the province of East Bengal. Indian production is mainly in West Bengal, Bihar, Assam, Orissa, Uttar Pradesh and Tripura. Attempts have been made to grow jute in the Americas, Africa and other tropical and subtropical areas. The plant has grown well in some of these areas, as the gulf states of the U.S., but the established cheap production of the fibre in Pakistan and India has generally discouraged extensive production elsewhere. One of the most successful endeavours to grow jute outside India and Pakistan was started in Brazil in 1930.

The successful cultivation of the plant demands a fertile well-drained soil and a hot, moist climate, with at least three or four inches of rain per month. Too much rain at the beginning of the season is detrimental to growth, and a very dry season is disastrous. The climate and soil of the eastern and northern parts of East Bengal are ideal for the growth of the plant.

The seed is sown broadcast. Planting rates average about 12 lb. per acre for white jute and about 8 lb. per acre for *tossa* and *daisee*. Fields are hand-weeded as many as three times and while being weeded are thinned to a uniform stand of about three plants per square foot. The time of sowing extends from March to June, and the harvesting, which depends on the time of sowing and on the weather, is done from the first of July to the middle of October. The crop is said to be ready for harvesting when the flowers begin to fade. If it is cut before then, the fibre is weak; if left until the seed is ripe, the fibre is strong but is coarser and lacks the characteristic lustre. Many cultivators leave the bundles of cut stems in the field for a few days to allow shedding of leaves. The yield per acre naturally depends on the soil, rainfall, farming practices, etc.; however, 1,200 lb. of fibre is considered a good average yield.

After partition in 1947 gave Pakistan about 70% of the jute acreage, India made concerted efforts to increase jute production in adapted areas. Pakistan, on the other hand, regulated its acreage in order to avoid overproduction (see *Jute Industry: History,* below).

Retting.—To release the fibre for stripping, the stems are retted. Retting is usually carried out in pools or streams. The bundles of stems are placed in the water and weighted down so that they are submerged but do not touch the bottom. They are left there from ten days to a month, depending on the type and temperature of the water and the maturity of the plants. Bacterial action breaks down the tissues surrounding the fibres.

Retting is a critical step in the production of good-quality fibre. If the stems are taken from the water too soon, the fibre is difficult to remove and cannot be well cleaned; if they are retted too long, the fibre is weakened and of poor quality.

Stripping.—When regular examination indicates that the fibre can be stripped satisfactorily, the bundles are taken, one or a few at a time, to the bank or to water two to three feet deep for stripping. Several methods of stripping are employed. The stripper's commonest practice is to stand in the water holding a small bundle of stems (about ten plants) in one hand and to beat the root ends with a paddle to loosen the fibre. He then breaks the stems over his knee about a foot from the root end and shakes out the short sections of stem. Next he grasps the loosened portion of the fibres and jerks the strands off the remainder of the stems.

The fibre is washed, to remove foreign matter, by swishing it across the surface of the water. It is then wrung out and hung on poles or lines to dry.

Grading and Baling.—The dried fibre then moves through a series of middlemen to the baling centres, where it is sorted, graded and baled. The characteristics of good-quality jute are strength, cleanliness, length, softness, lustre, uniformity, low percentage of "root" (unseparated barky fibres at the base), a uniform whitish-yellow colour for white jute and a golden-bronze to gray-white colour for *tossa* and *daisee*.

The first grading is usually done at the *kutcha* baling centres. There the jute is sorted as tops, middles, bottoms and cross (X) and so marked along with the species (white, *tossa* or *daisee*) and the area from which it came. The source is as descriptive of quality as the grade itself. After grading, the jute is put into low-compression *kutcha* bales, which weigh from 275 to 325 lb. The jute moves in these *kutcha* bales either to spinning mills in India or Pakistan or to export balers.

Jute for export, and a certain amount of that going to the Indian and Pakistani jute mills, is regraded to make a much closer separation of qualities. For some jute this is the first grading; such jute does not move through *kutcha* baling centres. Before grading, the barky portion of the root ends are cut off and sold separately as butts or cuttings. The cut jute is graded according to the balers' own copyrighted standards, which total from 30 to 70 per baler. The "marks" of each baler roughly correspond to an official standard for *pucca* assortment. In these grades jute is hydraulically pressed into standard 400-lb. *pucca* bales (48 × 20 × 18 in.).

(E. G. N.)

JUTE INDUSTRY

History.—At the time jute became known to the west, in the 18th century, it was in common use in Bengal, where it was spun and woven by hand into a variety of cloths and other articles. Scattered importations of the fibre were made into England, western Europe and America, but it was not until the 19th century was well advanced that serious attention was given to jute as a raw material. In the early stages, progress was retarded because any attempt to combine it with the other bast fibres then in use—hemp and flax—was regarded as an adulteration of those fibres. Thus jute was considered an inferior fibre, and its special attributes were not recognized.

In 1832 experiments were made at Dundee, Scot., which are usually regarded as the first practical efforts to utilize jute as a raw material in the western world. Further impetus was given by a decision of the Netherlands government, about 1838, to replace flax with jute in the manufacture of coffee bags for the East Indies. Thereafter the production of jute goods expanded in and around Dundee and spread to other centres on the European continent and in the United States.

Meanwhile the obvious attractions of the industry in India had not been overlooked. The first power-driven jute mill was started near Calcutta in 1854; but for 20 years thereafter progress was slow, the first important stage of growth taking place in the decade following 1872. Before the outbreak of World War I in 1914, however, the Calcutta industry had expanded until it absorbed more of the jute crop than all the other manufacturing centres of the world together. The bulk of the Indian output took the form

of hessian (burlap) and sacking, the two basic types of jute cloth used for commodity transportation.

The partition of India in 1947 affected the jute industry vitally. While the greater part of the lands previously generally used for jute cultivation were in East Pakistan, the entire manufacturing capacity stayed in India, and immediately became dependent on Pakistan for a large proportion of its raw material. Jute played a prominent role, therefore, in the development of trade relations between the two countries. After partition Pakistan started to build up a jute manufacturing industry, creating a new demand for the fibre and additional competition in the sale of jute products. Other countries found the goal of self-sufficiency in jute goods attractive, and jute manufacture is spread throughout the world.

New factors affecting the world jute industry after World War II caused rapid fluctuations in prices, at times to levels high enough to threaten serious loss of markets to competing methods and materials. This brought about a recognition of the fact that jute is only one of many commodities that may be used in the essential function of packaging and that its place among them depends upon a competitive price level.

Manufacturing Process.—This explanation is intended to be general enough to describe the fundamental operations used throughout the world for converting raw jute fibre into yarn. Essentially the jute yarn manufacturing process is designed to separate the individual fibre filaments; to arrange these filaments in parallel order; to blend them for uniformity of colour, strength and quality; and to twist them into yarns that derive their strength in tension partly from the fibres themselves and partly from the frictional forces between them.

The first step is the selection of jute by kind, mark and grade based on strength, colour, cleanliness, texture and price. This is an involved and skilled decision, fixing the product characteristics that are not generally alterable by subsequent treatment. The succeeding operations are given in order below.

Precarding.—This comprises bale opening, blending, application of oil and water and softening. *Pucca* bales (see *Grading and Baling,* above) are so highly compressed that the jute bundles of which they are composed require loosening by various manual and mechanical bending or kneading actions. The liquid to be added is usually sprayed on while the jute passes either through the softener or the hackle. The softener is a machine of consecutive pairs of fluted rollers that knead the liquid into the fibre as it passes between them. The hackle is a machine that accomplishes similar results by working the jute through moving pins. The action of the hackle also overlaps the jute from bundle to bundle to develop a continuous band of material called a sliver, the weight of which bears a predetermined relationship to its length. The softened bundles, or the hackled sliver, as the case may be, are set aside in a warm, damp atmosphere to complete the permeation of the fibre by the liquids.

Carding.—The breaker card consists of a large cylinder bearing on its surface an array of steel pins. This is accompanied by similar but smaller pinned cylinders so arranged that, as they rotate, the pins interact at predetermined relative speeds. The meshy interlace of the fibre structure, preserved up to this point, is worked around these cylinders, which break it down into smaller and more uniform units. The shortening of the fibres is primarily a result of the reduction of the mesh structure by the pins, and is not achieved to any great extent by direct cutting action on the jute. The card is designed to remove as much as possible of the undesirable plant material that the fibre carries, without undue wastage of the fibre.

Hackle sliver is fed directly into the breaker card; but when bundles of jute from the softener are used, the necessary relationship between length and weight must be established by careful uniform spreading of the bundles on the feed sheet. The fibre leaves the breaker in the form of sliver, which, for transfer to the next process, is put into narrow rolls (laps), piles or cans. A complete carding operation involves the passage of the jute through a second (finisher) card, differing in certain features of construction from the breaker card, in order to effect the degree of cleaning that may be required.

Drafting.—The sliver from the card is passed through two or more drafting (drawing) machines, each of which consists of a moving bed of pins, or a pressure device, through which the sliver is drawn by a pair of rollers. Drafting straightens the fibres and reduces the sliver size. In this operation there is a recombining (doubling) of the slivers, which contributes to the evenness of the product.

Roving.—The roving machine consists of a drafting mechanism combined with a mechanism that inserts a slight twist into the sliver and winds the resulting soft, weak rove on a bobbin in a tensionless condition.

Spinning.—All spinning machines are supplied with either sliver or rove, which must be drafted to size at the point of twisting. Rove is handled without pins and is reduced in size between the two pairs of rollers of appropriately different surface speeds. When sliver is employed in the spinning frame it is drafted either through pins or through various pressure devices. The twist is inserted by high-speed rotating members that have incorporated with them means of winding the yarn onto bobbins.

The count or size of jute yarn and rove is the weight in pounds of a "spyndle," which is a length of 14,400 yd. Individual jute fibres are about 200,000 yd. per pound in size, which indicates that there is an average of 111 fibres in a cross section of eight-pound yarn, a size largely used in weaving hessian.

For jute, all the operations through spinning are unique in the textile industry, and both imagination and experience on the part of the operator are required for good results. Once the yarn has been spun, further operations, such as weaving, knitting, twisting, cording, laying, braiding and sewing, are similar to such operations with yarn of any other fibre. A unit of equipment for spinning jute is usually based upon one breaker card with a capacity from 600 to 1,200 lb. per hour. From 30 to 60 persons would be needed to operate the system, and about 45,000 sq.ft. of space to house it.

A jute farmer can, and sometimes does, conduct all the work from sowing of seed to the making of some crude cord for his own use, but most jute articles in modern commerce may involve the labour of as many as 100 persons, from the farmer at his planting to the ultimate consumer.

Utilization.—Jute is of world-wide and varied use in products performing functions in all walks of agricultural, commercial, household and industrial life. In the orient millions of persons use jute prayer rugs, for example; other millions use jute-backed carpets laid over jute cushions. Jute fabric coverings protect countless commodities in transit, in packages closed and tied with jute twine. Few persons are aware that jute serves unseen in insulated cables that conduct electric current for communications and power. Mining safety is aided by jute brattice cloth partitions and slow-burning jute fuse yarn. Strong, weather-resistant wrappings are made by laminating scrim—a wide-mesh fine-yarn jute fabric—between layers of heavy paper. A type of jute scrim is also used by plasterers. Decorators make draperies and designers fashion sports clothes from dyed burlap. Tailors use jute interlining—woven from high-grade fine yarns—as construction material for men's suit coats and overcoats. Jute is also braided into soles for shoes (in Latin-American countries). Shipping tags and book covers are strengthened by jute fibre in the paper stock.

Most jute, however, is made into fabrics, usually of the plain (over-and-under) weave, and the usage, rather than the construction, becomes the basis of names, such as bagging and sacking. Jute fabrics range in texture from fine hessian, with 16 yarns or more per inch, to heavy bagging (for wrapping cotton bales), with a one-inch or larger mesh and yarns about the size of a man's finger. Hessian (burlap) and sacking (a heavier fabric) are the standard wrapping and bag materials. Hessian cloth is usually made into bags in the consuming countries, whereas sacking is cut and sewed into bags before export from India.

Vegetables, fruits and small grains are shipped and stored in burlap bags, as are flour, sugar, fine seeds and milled animal feeds; bags for the latter must be provided with liners of closer materials. Silk and flax fibres are baled with a protective burlap covering. Sand-filled burlap bags are built into dikes and levees, and troop trenches are lined with them. Bags of jute sacking convey

fibres, grains, vegetable products, ores and minerals. Burlap and sacking bags and wrappers may be used over and over again until they are finally shredded for their fibre content.

Exceptionally wide hessian forms a base for linoleum and the foundation for tufted and hooked rugs. Tarpaulin, a heavy-warp plain jute fabric, provides temporary covering for weather protection. Jute webbing, a closely woven, narrow fabric having great strength and little stretch, confines the springs and cushion material in upholstered furniture. Jute rove and yarn are sold to manufacturers for processing into other products. Electric cable manufacturers use them as a filler and a covering for sensitive wires. The woven carpet industry—a principal consumer—uses jute yarns as backing for rugs and carpets faced with other fibres. Jute backing yarns add weight and stiffness and maintain a firm bond for the pile throughout the life of the rug.

Jute rove is made into square braided piston rod packing and pressure valve stem packings. Oakum, for calking water and soil pipes and window frames, is made from treated jute fibre. Jute tying or wrapping twines are made in many sizes for a wide variety of uses ranging from fine sewing to coarse bundling. With it, for example, paper mills band bundles of paper; printers tie bundles of books, magazines and newspapers; nurserymen bind trees and shrubs; gardeners fasten vines and bunch vegetables; and packers hang meats for curing. Furniture makers confine springs with the twines and use weltcord in cushion edges. Jute rope is manufactured in sizes up to 1½ in. in diameter. In wartime, jute rope proved a vital supplement to abacá and sisal fibres.

See also references under "Jute" in the Index.

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JUTES, a Germanic people who, with the Angles and Saxons, invaded Britain in the 5th century A.D. Unlike the Angles and especially the Saxons (*qq.v.*), they have no recorded history on the continent. Venantius Fortunatus (d. 609) mentions the Jute (*Euthio*) beside the Dane and the Saxon (*Carmina* ix, i, 73) and this supports the assumption that they were the original inhabitants of Jutland. Bede (*Historia ecclesiastica,* i, 15) correspondingly places the Angles between the Jutes and the Saxons. If, as is almost certain, the Jutes are the *Eotens* of the Anglo-Saxon poem *Beowulf,* we find them involved in a feud of Frisians and a branch of the Danes, and an exiled Danish king takes refuge among them. This amounts to considerable evidence that their home was in the Scandinavian area and that they were later absorbed by the Danes in so far as they had not migrated. Hence Old Norse *Jótar* means "Danes of Jutland." The only contrary evidence is a letter of the Frankish king Theudibert I (d. 548) to Justinian (*Monumenta Germaniae historica, epistolae,* vol. iii) mentioning Jutes (*Eucii*) among his subjects, but this suggests merely that some Jutes took part in the Saxon continental expansion.

According to Bede, the Jutes settled in Kent, the Isle of Wight and parts of Hampshire. In Kent their name soon died out, but there are considerable signs in its social structure that its settlers were of a different race from their neighbours (*see* KENT, KINGDOM OF). There is archaeological evidence to confirm Bede's statement that Wight was settled by the same people as Kent, and their presence in Hampshire is confirmed by place name formation. Furthermore the chronicler Florence of Worcester, describing the death of William II in the New Forest, said that it was known as *Ytene,* "Jutland" (B. Thorpe [ed.], *Florentii Wigorniensis chronicon* [1848–49]).

The Kentish dialect of Old English exhibits closer affinity with Frisian than does any other known Old English dialect, but the similarities are of comparatively late date and are due to intercommunication after the conquest of England. Similarly, affinities with the Franks revealed by archaeology and the study of social structure are to be attributed to cultural influences, perhaps strengthened by immigration later than the original settlement.

See R. G. Collingwood and J. N. L. Myres, *Roman Britain and the English Settlements,* 2nd ed. (1937); J. E. A. Jolliffe, *Pre-Feudal England: the Jutes* (1933). (AL. C.)

JUTIAPA, a department in southeastern Guatemala on the border of El Salvador. Its area is 1,243 sq.mi. and its population (1960 est.) was 202,475. Its capital is Jutiapa. The department includes the southeastern part of the volcanic highlands and the Pacific coastal lowland. It is drained by the Río de Paz, which forms the border with El Salvador, and by the tributaries of Lake Güija, which drains into the Río Lempa. Farmers raise maize (corn), beans, rice and hay. Large areas are used to pasture cattle, and there are also plantations of coffee and sugar cane. The Inter-American highway crosses the department. (P. E. J.)

JUTLAND (Dan. JYLLAND), the Chersonese or Cimbric peninsula of ancient geography, a projection of northern Europe forming the continental portion of the kingdom of Denmark and including, in its larger sense, the German province of Schleswig-Holstein. Politically, as the result of the Versailles peace treaty of 1919, Jutland ends southward at Flensborg fjord and includes the islands north of Limfjorden. Its physical features, etc., are treated under DENMARK.

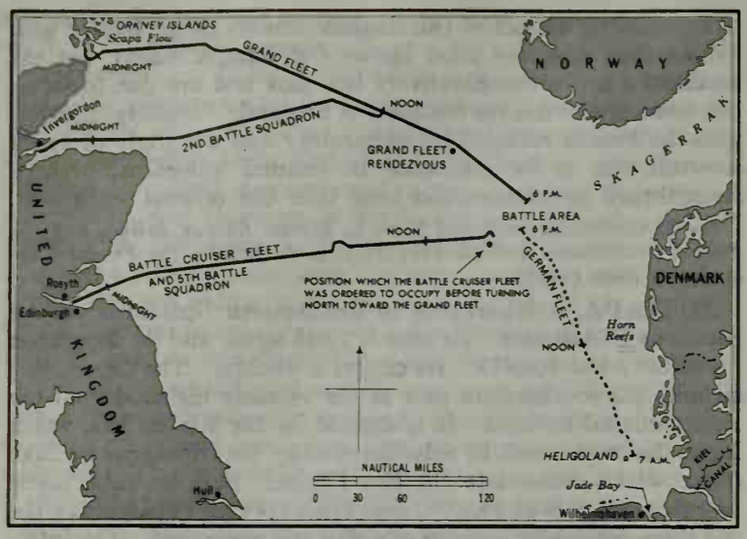
JUTLAND, BATTLE OF, called by the Germans the BATTLE OF THE SKAGERRAK, a battle of World War I, fought on May 31, 1916, in the North sea off the coast of Denmark between the two most powerful battle fleets then known—the British grand fleet and the German high seas fleet.

The encounter had been long prepared for and eagerly awaited by the British, who with their superior force hoped to annihilate the German fleet, yet it was a German plan that brought it about. Adm. Reinhard Scheer, commanding the German high seas fleet, was well aware that Great Britain's ability to prosecute the war was based on naval strength and command of the seas. His own fleet was not powerful enough to challenge this strength while it remained concentrated, but if he could cause dispersion of the grand fleet it might be possible for the high seas fleet to fall upon its separate parts and thus to destroy it piecemeal.

Some of this plan already had been put into execution. During the night of April 24, Lowestoft had been bombarded by the guns of the battle cruiser "Seydlitz," with the result that the British commander in chief, Adm. Sir John Jellicoe, had released the 5th battle squadron from the main base at Scapa Flow, to augment Vice-Adm. Sir David Beatty's battle cruiser fleet at Rosyth. (The 2nd battle squadron was already at Invergordon.) It was Beatty's augmented southern force which Admiral Scheer planned to lure out and destroy before the remainder of the grand fleet could come south from Scapa to its rescue.

The plan was simple. Scouting groups of the high seas fleet consisting of the battle cruisers "Lützow," "Derfflinger," "Seydlitz," "Moltke" and "Von der Tann," accompanied by four light cruisers and under the command of Vice-Adm. Franz Hipper, were to steam north from Wilhelmshaven to a point off the Norwegian coastline. This force would be followed at an interval of about 50 mi. by the battle squadrons of the high seas fleet; and into the 50-mi. gap it was hoped that the southern section of the grand fleet would be lured to its doom, simply by the presence of the scouting group in waters so far from base. At 3:40 P.M. on May 30 the executive signal putting this plan into operation was sent out to all units of the high seas fleet.

Unfortunately for Admiral Scheer, this signal was intercepted by British listening stations, and though its exact details were not completely understood, it was obvious from its wide distribution that a large-scale movement by the high seas fleet was imminent. Jellicoe was informed, and by 10:30 P.M.—before even the German scouting groups had left the Jade basin—the entire British grand fleet was at sea making for a rendezvous near the entrance



POSITIONS OF RIVAL FLEETS AT START OF BATTLE OF JUTLAND

to the Skagerrak, fairly across the planned route of the German fleet. Hipper led his groups to sea at 1:00 A.M. on May 31—the van of a fleet of 100 ships manned by 45,000 officers and men. Though they did not know it, they were to meet 148 ships and 60,000 men in the biggest naval battle of history.

By 1:30 P.M. on May 31 the rival fleets were approaching each other, but each was unaware of the other's presence. Scheer's plan had been rigidly adhered to by the high seas fleet, and Hipper's scouting groups were as yet uncertain whether or not they had successfully lured the British battle cruiser fleet across the North sea.

The British on their part were inclined to believe that another fruitless sweep to find the Germans had taken place and that they would soon return to their respective bases. The call sign of the German flagship was, in fact, still being heard from the Jade basin and Jellicoe—unaware that the transference of this call sign from ship to shore was a normal practice when the high seas fleet put to sea—believed that his antagonists were still there. Beatty's battle cruisers, with the 5th battle squadron in attendance 5 mi. astern, were reaching the eastern limit of their sweep and would soon turn northward to meet Jellicoe's force at the rendezvous point. It was a clear, calm summer day. At 2:15 P.M. the turn commenced, a light cruiser screen spreading out between the heavy ships and the Heligoland Bight.

At this moment was sighted the smoke of a small Danish steamer, the "N. J. Fjord," on the horizon to the east-southeast. Commodore Alexander-Sinclair, commanding the 1st light cruiser squadron aboard the "Galatea," steamed off to investigate, accompanied by the remainder of his squadron. At the same time the "Elbing," on the western flank of the German scouting group, also saw the Danish steamer and turned to examine it. At 2:20 P.M., the cause of their meeting forgotten, both forces were signaling "Enemy in sight," and at 2:28 P.M. the "Galatea" fired the first shots.

This chance meeting was extremely fortunate for the Germans, for Jellicoe's battle squadrons were still 65 mi. to the north. Had the "N. J. Fjord" not attracted so much attention, Hipper's scouting groups would inevitably have led the high seas fleet toward the grand fleet when it was fully concentrated under Jellicoe's command. As it was, the trap was sprung prematurely.

Battle Cruiser Action.—On receipt of the signals from their light cruisers, both Beatty and Hipper turned and raced toward the sound of gunfire, and at 3:20 P.M. the two lines of battle cruisers were in sight of each other, maneuvering for position. At 3:48 P.M., Hipper's flagship "Lützow" opened fire, which was promptly returned, but during the next 20 minutes the British line suffered severely—"Lion," "Princess Royal" and "Tiger" were hit repeatedly, and "Indefatigable," caught by two salvoes from the "Von der Tann," capsized and sank. Then the 5th battle squadron (left behind by the faster battle cruisers) joined the British line, and their heavy guns caused such damage to Hipper's battle cruisers that the German destroyer screen moved in to launch a torpedo attack. At this moment, another British battle cruiser, "Queen Mary," blew up with a shattering explosion, having been hit in a main magazine.

While this action was in progress, Commodore W. E. E. Goodenough's 2nd light cruiser squadron had patrolled to the southward, and at 4:35 P.M. he sighted and reported the presence of the high seas fleet. Beatty immediately withdrew to the northward to lure the enemy toward the grand fleet, the 5th battle squadron covering the withdrawal.

Main Action.—To Jellicoe, Goodenough's signal came as an illuminating surprise, but unfortunately it was not sufficiently detailed. Forty miles still separated him from Beatty's battle cruisers—and how much farther away were the main enemy? Jellicoe's battleships steamed in six columns abeam of each other and must be deployed into line ahead before action; but both the method and the moment of deployment were matters of vital importance, and the admiral could make no decision on them until he knew the enemy's position and course.

At 6 P.M. Beatty's battle cruisers were sighted—now augmented by the 3rd battle cruiser squadron under Rear-Adm. Horace Hood. Visibility, however, rapidly was worsening, and it was 6:14 P.M. before Jellicoe received a reply to his urgent signal "Where is the enemy's battle fleet?" Twenty seconds later he had ordered the grand fleet to deploy on the port wing division, thus giving the British the benefit of what light remained and also cutting the line of Scheer's retreat. It was the most vital decision of the battle—perhaps of World War I—and it was taken not a moment too soon. As the last battleship turned into line, the murk cleared slightly to reveal the leading ships of the high seas fleet heading for the middle of the grand fleet: the entire British broadside could thus be brought to bear on the Germans, who could only reply with the forward guns of their leading ships. For Jellicoe it was a moment of triumph, for Scheer one of unparalleled danger.

Three factors contributed to the extrication of the German ships from the trap: their own excellent construction, the steadiness and discipline of their crews, and the poor quality of the British shells. "Lützow," "Derfflinger" and the battleship "König" led the line and were under broadside fire from ten or more battleships, yet their main armament remained undamaged and fought back to such effect that one of their salvoes fell full on "Invincible" (Hood's flagship) causing an explosion which tore the ship in half and killed all except five of the crew. This success, however, did little to relieve the intense bombardment and the high seas fleet was still pressing forward into the steel trap of the grand fleet. Placing full reliance in the seamanship of his captains, Scheer at 6:36 P.M. ordered a 180-degree turn for all ships together (the last ship becoming the leader), and as the battleships steered away in retreat, torpedo boats draped thick smoke screens across their rear. Miraculously, there were no collisions.

To Jellicoe it was by no means clear what had taken place. Visibility had worsened and smoke lay thick over the seas. By 6:45 P.M. contact with the Germans had been lost and an unnatural silence descended. Yet the grand fleet was still between the high seas fleet and the German ports, and this was the situation which Scheer most dreaded. Then at 6:55 P.M. he ordered another 180-degree turn, possibly in the hope that he would pass astern of the British line. He was mistaken, and a few minutes after 7 P.M. he was in a worse position than the one from which he had just extricated himself: his battle line had become compressed, his leading ships were under merciless bombardment again, and it was obvious that he must once more turn away. At 7:16 P.M., therefore, to cause a diversion and win time, he ordered his battle cruisers and destroyer flotillas virtually to immolate themselves in a massed charge against the British.

This was the crisis of the battle. As the German battle cruisers and destroyers steamed gallantly forward, the battleships astern became confused in their endeavour to turn away. If Jellicoe had ordered the grand fleet forward through the screen of charging battle cruisers at that moment, the fate of the high seas fleet would have been sealed. As it was, fearing and overrating the danger of torpedo attack, he ordered a turn away, and the two lines of battleships steamed apart at more than 20 knots. They did not meet again, and when darkness descended Jellicoe faced

the task of covering Scheer's possible escape routes—direct down to the Jade basin, or across the north of the Horn reef.

Unfortunately, the British admiralty failed to pass to Jellicoe the information that Scheer had requested airship reconnaissance of the area around Horn reef for the following dawn, with the result that the British battleships steamed too far south during the night. Scheer turned again after nightfall and crossed astern of Jellicoe's battle squadrons, resolutely brushing aside the British rear guard of light cruisers and destroyers in a series of sharp actions which caused losses on both sides. He reached the security of the Horn reef minefields at about 3 A.M. on June 1. Just before daylight on June 1 Jellicoe turned his battleships to search again for the high seas fleet, but he was too late.

Result.—The British sustained greater losses than the Germans in both ships and men: three battle cruisers, three cruisers and eight torpedo craft had been sunk against one battleship, one battle cruiser, four light cruisers and five torpedo craft lost by the Germans; 6,274 officers and men had been killed or taken prisoner, against 2,545 officers and men killed in the high seas fleet. The triumphant publication of these figures in the German press gave a world-wide impression that the Royal Navy had suffered a serious reverse. The significant fact, however, is that despite these losses, the grand fleet still dominated the North sea. Throughout the remainder of the war, the high seas fleet ventured only twice out of port, on both occasions to return quickly and ignominiously. When, in Nov. 1918, the fleet was ordered to sea for the last time, a mutiny broke out which presaged the collapse of imperial Germany. Despite its claims of victory at Jutland, the Germany navy had not broken the power of the grand fleet, nor did it evince any desire to try again to do so. *See* also references under "Jutland, Battle of" in the Index. (B. W. E. P.)

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JUTURNA (previously DIUTURNA), an Italian goddess of springs and fountains. Her original home was on the Numicius river near Lavinium, where there was a spring named for her, supposed to possess healing qualities. Her worship was early transferred to Rome, localized by the Lacus Iuturnae near the Temple of Vesta, at which Castor and Pollux, after announcing the victory of Lake Regillus, were said to have washed the sweat from their horses. At the end of the First Punic War, Lutatius Catulus erected a temple in her honour on the Campus Martius, subsequently restored by Augustus.

Juturna was associated with two festivals: the Iuturnalia on Jan. 11, probably a dedication festival of a temple built by Augustus, and celebrated by the college of the *fontani,* workmen employed in the construction and maintenance of aqueducts and fountains; and the Volcanalia on Aug. 23, at which sacrifice was offered to Volcanus, the nymphs and Juturna, as protectors against outbreaks of fire.

In Virgil (*Aeneid,* bk. xii), Juturna appears as the sister of Turnus (probably because of the partial similarity of the names), on whom Jupiter, to console her for the loss of her chastity, bestowed immortality and control of all the lakes and rivers of Latium.

JUVAINI, 'ALA UD-DIN 'ATA-MALIK (1226–1283), Persian historian of the Mongol conquests, was born in 1226 in the district of Juvain (now Jaghatai) to the northwest of Nishapur. His grandfather had been a high court official under the Khwarizm shahs, the antagonists of Genghis Khan in his invasion of the west. His father entered the service of the Mongols and rose to be deputy to their governor in western Asia. He twice visited Mongolia and on the second journey was accompanied by his son. In 1252–53 the latter was again in Mongolia, at the court of the great khan in Karakorum, and it was during this stay in eastern Asia that he began work on his history of the Mongols.

On Juvaini's return to the west he was attached to the staff of the great khan's brother Hulagu, conqueror of Baghdad and founder of a Mongol dynasty in Persia. Juvaini accompanied Hulagu on his campaign against the Ismailians or Assassins of Alamut in northwestern Persia (1256) and also in his march on Baghdad, which resulted in the overthrow of the Abbasid caliphate (1258). In 1260 he was appointed by Hulagu to the governorship of all of the caliph's former territories, a post which he held until 1282, when he was dismissed by Hulagu's son Abaqa. He was reinstated by Abaqa's successor but died within the year in Arran, March 6, 1283.

Juvaini's *Ta'rikh-i-Jahan-Gusha* (Mohammed Qazvini, ed.), three volumes, 1912–37; Eng. trans. by J. A. Boyle, *Juvaini, 'Alā al-Dīn 'Ata Malik: History of the World-Conqueror,* two volumes (1958) is famous in the east both as a literary masterpiece and as the chief authority on the Mongol invasions. (J. A. BL.)

JUVARRA, FILIPPO (1678–1736), Italian architect and stage designer, one of the chief architects of the early 18th century, was born in Messina on March 7, 1678, and died in Madrid on Jan. 31, 1736. The son of a silversmith, Juvarra was trained as an architect in Rome (1703–14), where he proved to be the most adept pupil of the aging Carlo Fontana. Already renowned for his stage designs, he was appointed royal architect to the new king of Sicily (the title acquired in 1713 by the duke of Savoy) and transferred his residence to Turin, the Savoy capital, where he became an immediate success. His fame spread rapidly throughout Europe. In 1719 he was called to Lisbon to design a palace at Mafra for the king of Portugal. Juvarra traveled to England and Paris in 1720 and, in 1735, went to Madrid to design the royal palace for Philip V. While in Turin, he designed his two greatest masterpieces, the royal hunting lodge at Stupinigi (1729) and the church of the Carmine in Turin (1732). Juvarra's extraordinary receptivity, when combined with his personal inventiveness, led to solutions that disclosed both his sophistication and his originality. In his early, more massive buildings, he favoured static, sharply defined spaces (S. Filippo, 1715, Superga, 1717, Palazzo Madama, 1718) composed of traditional elements and airy spaces bathed in a cool, uniform, all-revealing light, that merge one into the other to produce a fluid, elegant, graceful whole (Stupinigi, Carmine and the *scala delle forbici* ["scissors stairs"] in the Palazzo Reale, Turin). His late works rank among the finest examples of the early rococo in Italy.

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JUVENAL (DECIMUS JUNIUS JUVENALIS) (*c.* A.D. 60—after 128), the famous Roman satirist and poet, was perhaps born at Aquinum in central Italy. Reliable information about his life is slight, though various medieval manuscripts of his works have a *Life* of the author prefixed to them. Many of the statements they contain are improbable; most of the rest seem to be deductions from passages in his works, and not derived from any independent source. The material available consists of 13 of these *Lives,* an inscription from Aquinum which may or may not be relevant, three poems addressed to Juvenal by Martial, an allusion, almost certainly to him, in Sidonius Apollinaris and another in John Malalas. The least unreliable of the *Lives* states that Juvenal was the son or ward of a wealthy freedman (it is impossible to tell if this is true or not: if it is, the rancour with which he attacks the whole class in his satires is surprising); that until middle age he practised declamation (which is not improbable); that he published his satires late in life, when they met with great success; and that an actor of the time, annoyed at a passage really aimed at Paris, Domitian's favourite, had the poet banished under the form of a military appointment to Egypt, where he died an octogenarian. The only independent tradition in all this is the reference to his exile. The idea of military service, in Egypt of all places, being used as a cloak for exile does not sound particularly convincing, but the tradition is persistent. The story of military service recalls an inscription found at Aquinum, recording the dedication of an offering to Ceres by a Iunius Iuvenalis, a member of a cohort of Dalmatians, *duovir quinquennalis* (a census officer) and *flamen Divi Vespasiani* (priest of the divine Vespasian). On the question whether this is or is not the poet, opinions differ flatly. Juvenal

certainly does not write like a soldier, nor like a man who has held important offices in a country town.

From the poems of Martial addressed to Juvenal it may be deduced that Juvenal was in Rome in 92 and in 101 or 102. In the seventh epigram, Martial addresses Juvenal as *facundus* ("eloquent"), which, in the absence of any references to his verse, may mean that Juvenal practised declamation or that he had a forensic practice. Sidonius' reference and the reference in Malalas have no further value other than to show that the tradition of his exile was prevalent in the 5th and 6th centuries.

The *Satires* were published at intervals, grouped in books as now, but they were not necessarily written in that order or even at about the same times. Repeatedly there are references to the life (public, literary and private) of Domitian's reign as if it belonged to the present, while the first book was certainly not published until the beginning of Trajan's reign. Juvenal would not be the only man of letters of the period who shunned publication until that tyranny was overpast.

Contents of the Satires.—The first book contains satires 1–5, and belongs to the first years of the 2nd century. It cannot be earlier than 100, and has been dated ten or more years later. Satire 1 is a general introduction. "Why do I write satire?" he asks; "say rather, how could I help it?" His program is given in the famous lines

> *Quidquid agunt homines, votum, timor, ira, voluptas,*
> *Gaudia, discursus, nostri farrago libelli est*

("Our little book is the motley tale of all man's life: his vows, his fears, his anger, his pleasures, joys and journeyings to and fro"). The second satire is an attack on passive male homosexuals. The third is a description of Rome, imitated by Samuel Johnson in his poem on London. Among the many pictures it contains of the discomforts and dangers of the capital, two incidents in Juvenal's best style stand out, a street accident and a nocturnal "hold-up." The remaining two satires are slighter; the fourth tells the story of Domitian's turbot, with a picture of the ghastly crew that surrounded him; the fifth recounts the indignities of the poor at the rich man's table.

Book ii contains only the famous sixth satire of nearly 700 lines, directed against the female sex. The theme is "Why marry, as long as there is still rope to hang oneself with?", illustrated by portraits of every variety of female horror from Messalina to the bluestocking. The allusion to a comet boding disaster to Parthia can be related to Trajan's eastern campaign, and gives 116 as the earliest possible date of the satire.

The third book, satires 7–9, was published early in the reign of Hadrian, though the eighth was probably written earlier. The seventh satire hails the dawn of better days, but laments that literature (unless one is a writer of pantomime) is still an unprofitable profession and rhetoric is in the same plight. The eighth is on the theme *stemmata quid faciunt?* ("Of what avail an ancestral pedigree?"). A man should rely on the distinction of personal virtue, not on the fame of his ancestors. The ninth is a satire in dialogue form in which a catamite complains of the troubles of his profession.

The fourth book cannot be exactly dated. It contains the famous 10th satire, the 11th and the 12th. In the 10th, imitated by Johnson as the *Vanity of Human Wishes,* the various objects of ambition and desire are recounted, with examples of the disasters that have befallen those who have achieved them. The 11th is an invitation to dinner, contrasting Juvenal's simplicity with the fashionable luxury; here he states directly what the abatement of his former tremendous energy and indignation suggest, that he is growing old: *Nostra bibat vernum contracta cuticula solem* ("Let my shriveled skin drink in the spring sunshine"). The 12th, prompted by a thank offering for a friend's escape from shipwreck, is concerned with false and true friendship and with greed.

The fifth book, satires 13–16, can be dated soon after 127. The work is now on a lower level, its tone gentler and its grip less powerful. The 13th satire consoles a friend cheated of some money. The outstanding poem in the book is the 14th, on the power of parental example for good and ill. The 15th is concerned with cruelty and fanaticism in Egypt. Of the last satire, only a fragment of 60 lines has survived, which has as its theme the Roman army and its privileges.

From the change of tone discernible from the 10th satire onward, the increasing prolixity and tendency to abstraction, Otto Ribbeck sought to deduce a double authorship of the *Satires,* but this theory has not gained acceptance.

Influence, Style and Character.—Juvenal had a decisive influence in the history of satire. Before him the satire in Latin literature had been true to its name, a sort of hotchpotch. The term covered equally the mixed verse and prose extravaganza of Petronius and the easy conversational *sermones* of Horace. But Juvenal was the outstanding (as he was the first) example of a truly great tragic satirist. He carried the rhetorical form of satire to the utmost limits of excellence. He was the first in whose work there shows no negligence, but rather an excess of elaboration. His diction is full, even to excess, of meaning, point and emphasis. Juvenal might seek to affiliate his work to Horace, but his real prototype is the poet Lucilius (*q.v.*); with his moralist temper and rhetorical training, Juvenal turned the easy going Latin *satura* into a fixed verse form restricted, practically speaking, to the note of denunciation. There is little humour in Juvenal, and what there is, is grim; there is less kindliness, though the helpless and dependent, the "homesick boy from the Sabine highlands," are sometimes treated more gently than the rest of the world.

Juvenal's most remarkable gift, apart from the blazing indignation with which all his work is suffused, and the terrific power and violence with which it is expressed, is his gift of presentation. The satires are studded with unforgettably vivid single sketches of various kinds: historical vignettes like that of Sejanus, characters hit off in a line or elaborately drawn, and everyday scenes that set the Rome of his day alive; perhaps it would be truer to say, the Rome of his earlier days, for in the characteristic temper of the satirist Juvenal fails to do justice to the improvements, at any rate in public life, that followed the bad times of Domitian.

Juvenal leaves a mixed impression, both as a poet and as a man. In neither capacity is it easy to feel affection for him, or to refuse him respect. His verse is powerful and well-constructed, true Silver Age Latin in its epigrammatic force and point, if often overstrained. It is superb rhetoric nearly always; only seldom, true poetry. Yet Pope himself never enriched a language with so many crisp, clean-cut phrases of the sort that pass inevitably into common use: *nam quis custodiet ipsos Custodes?* ("For who will guard the guards themselves?"); *Mens sana in corpore sano* ("A healthy mind in a healthy body"); *Propter vitam vivendi perdere causas* ("To save one's life, yet lose the worth of life"); *Hoc volo, sic iubeo* ("This is my will, such my order"); *Quis tulerit Gracchos de seditione querentes?* ("Who could bear complaints of revolution from the Gracchi?"); *Nemo repente fuit turpissimus* ("None at one step has reached the depths of infamy"); *Maxima debetur puero reverentia* ("To youth is due the greatest reverence"); *Panem et circenses* ("Bread and circuses"). These are but a few. As the style, so the man; he is harsh but undeniably strong. Swinburne said that Juvenal knew what he hated, and that was tyranny and democracy; but this seems unduly limited. He hated nearly everything he saw, impartially; not only the vice and cruelty of his age, but its luxury, its art, its poetry, even its philosophy. He is a sort of Cato, cut off from public life and forced to express his combative nature in literature. What seem to be his most surprising lapses of judgment, his habit, for example, of placing at the head of a list of appalling crimes what is at worst an error of taste, all this results from his intensely Roman feeling, his hatred of any degeneration from the old Roman standard of manliness and self-respect. He could only see the evil effects of Greek influence, and they blinded him to its humanizing value.

Juvenal is discursive and little concerned with careful planning or preserving due proportion between the parts of his satires; but he has a rich vocabulary and is masterly in his varied use of the hexameter. He had great influence in the middle ages and has been the model for many later satirists.

(W. Y. S.; J. P. P.; G. B. A. F.)

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JUVENILE COURT: *see* CHILDREN'S COURT.

JUVENILE DELINQUENCY. While concern with misbehaviour of the young is at least as ancient as civilization itself, juvenile delinquency is a relatively new and distinctive legal concept, having been "invented" with the establishment of special court procedures for juvenile offenders (*see* CHILDREN'S COURT). Children's, or juvenile, court laws provide that such courts shall handle youngsters within designated age categories who are alleged to have engaged in behaviour specified by the laws as grounds for an adjudication of delinquency. Age ranges covered and behaviour which may bring a child to the attention of the court vary from one jurisdiction to another and over time, within as well as between countries. Violation of criminal statutes is virtually universal as a criterion, but throughout the world there has been a tendency to broaden the responsibility of juvenile courts to include children who are felt to be potentially delinquent or in moral danger. Because juvenile courts were first conceived as a method of helping children, it was perhaps inevitable that many legal codes went far beyond a simple definition of a juvenile delinquent as a child who has broken the criminal law and included, as in much of the U.S., such judgments as "wilful disobedience" and "incorrigibility" and such behaviour as truancy and running away.

"Juvenile delinquent" thus is a precise description of the legal status of a child who has been so adjudicated by the court. By this designation a child is made a ward of the court, subject to its discretion. The term has no such precise meaning with respect to behaviour, since criteria of what behaviour is delinquent vary so greatly.

Juvenile delinquency may be viewed from many different standpoints, each focusing on a different aspect of the problem—the legal, the social, the biological, the psychological and psychiatric, the administrative, the educational, the moral and religious. Opinions on the subject tend to be forcibly held, for it challenges deep and strong convictions and arouses unconscious as well as conscious emotions. In particular there is strong disagreement on the use of punishment or treatment. Considered historically, there has been a marked trend in all countries away from a punitive approach toward a positive attempt to understand the child and his environment and to develop a plan of treatment on this basis. The delinquent population of every society contains a wide range of types of personality. It is common for authorities to distinguish types of delinquent; *i.e.,* between children who are acting like their friends and companions in their own social group on the one hand, and the delinquent whose behaviour arises from some disturbance of personality on the other. Categories such as "adaptive," "environmental" and "pseudo-criminal" have been applied to the first group while "maladaptive," "chronic" and "criminals precoces" have been used to describe the latter.

THE SOCIAL ROLE OF JUVENILE DELINQUENCY

The law and legal processes are important not only in defining delinquency and the delinquent; they are important aspects also of the social role of the term "juvenile delinquent," for the community and for the child so identified. For the community a child's "record" is a way of classifying him, in and outside of the school, among peers and neighbours, as well as in the court and the police station. It has been suggested that an official record is a stigma, and may be a lifelong stigma, among the youngster's more conventional peers, present or future employers and various institutions, but that it may be a mark of prestige within the delinquent gang. For the delinquent, experiences involved in arrest, court appearance and institutionalization are important in relation to the way in which he defines himself. Precise meanings and degree of impact vary from individual to individual. Study of these meanings for delinquents and for various segments of the community is of the utmost importance to an understanding of the processes involved in the causation of delinquency.

The social role of juvenile delinquency is not restricted to those officially classified as delinquent. Many youngsters who are not brought to the attention of legal authorities engage in behaviour that is defined as delinquent, and most delinquent acts go undetected, or unreported. Social scientists, therefore, often study delinquent behaviour of youngsters apart from their official designation as delinquent or nondelinquent. It follows also that delinquency is not an attribute, something which one has or has not, is or is not. Individuals vary greatly in the extent and nature of their involvement in such behaviour. The problem, therefore, is not to distinguish the delinquent from the nondelinquent but to understand the infinite variety of types, sequences and frequency of involvement in delinquent behaviour, how these come about and how they may be controlled. These tasks are simplified by the fact that delinquency is distributed in characteristic ways, rather than randomly throughout the world or within any given society, and by the existence of individual syndromes and forms of group delinquency. Many problems remain among the disciplines regarding interpretations of the "facts" of delinquency, and there are many unresolved questions. A sketch of the major disciplinary perspectives and of some of the findings upon which they base their interpretations follows.

DIMENSIONS OF THE PROBLEM

Understanding and control of juvenile delinquency begins of necessity with problems of measurement. The complete range of data-gathering techniques of police, courts and other institutions, and of the behavioural sciences have been utilized in an attempt to answer such questions as: what are the forms of delinquent behaviour and how are they distributed in society and among various segments of the youthful population; what sorts of youngsters become delinquent in what sorts of ways; what is the effectiveness of various attempts to control delinquency?

Because data are routinely collected as part of the normal procedure of the police, courts and treatment facilities, a great deal more is known about children who come to the attention of these agencies—the "official delinquents"—than is known about those who are not so identified. These data reflect the operation of law enforcement and judicial personnel quite as much as they do the behaviour of children, however, and, while providing crude indices of the latter, are better measures of the degree of public concern with various types of juvenile misbehaviour, within and between different societies and over periods of time.

It is not known precisely how much delinquency there is in any part of the world at the present time or how much there was in the past; hence, comparisons of the incidence of various types of behaviour in different countries or over periods of time are hazardous and interpretation of the statistics of juvenile delinquency is full of pitfalls, to an even greater extent than that of adult crime. Above all there is the problem of the number of delinquent acts which remain unknown to the police—in Great Britain the so-called "dark number"—and which is higher for offenses against property than against the person. Thus changes in rates of delinquency not only reflect changes in juvenile behaviour; they may also reflect changes in the reporting of delinquency and in the detection of the delinquent. English statistics showed an increased use of police cautions as well as a rise in the number of children found guilty by the courts after mid-20th century.

The age limits of juvenile delinquency vary from country to country. The lower limit is generally related to the age of criminal responsibility, in English law fixed at 8 years, although the case for raising this to 12 or 14 has been the subject of considerable discussion. The upper limit varies between 14 and 21, but is generally set at 15, 16, 17 and 18 years. In Europe, North America and Latin America, 18 years is most common. Great Britain has an upper limit of 17 years but strong arguments have also been put forward for special treatment for the older adolescent.

Comparisons as to the amount and type of delinquency between countries or between states as in the U.S. are almost impossible to formulate. In the U.S., for example, there is no uniform system of reporting: different agencies may handle the same delinquent child at various times and the police may arrest boys and girls who never appear in a juvenile court. The main source of English statistical information is the annual criminal statistics and for the U.S. the children's bureau of the department of health, education and welfare. Since 1926 the number of juvenile courts reporting to the bureau has grown steadily, and increased from about 500 in 1950 to about 1,000 by the 1960s.

Delinquency rates are highest in countries which are most advanced technologically and economically. In the United States, for example, about 2% of the child population, aged 10 through 17, annually come to the attention of juvenile courts for cases alleging juvenile delinquency. This figure rises to 3% when traffic offenses are included. The latter figure is misleading, since many juvenile courts do not have jurisdiction over traffic cases. Studies conducted in the U.S. (in Lexington, Ky.; Philadelphia, Pa.; and the state of Minnesota) estimate that from 20% to about one-third of the boys in those areas had or were expected to have police or court records prior to their 18th birthdays.

It is in countries with the highest levels of technical and economic advancement that social change occurs most rapidly, and traditional social roles and institutional controls over child conduct tend to break down. It is not surprising, therefore, to find evidence of sharp increases in delinquency in such rapidly changing new nations as Ghana and Kenya.

Numbers of reported court cases rose sharply during World War II in countries where reasonable records were kept, thus providing further evidence of the relation between delinquency and rapid social change. In some countries, in both Germany and France for example, the end of the war led to a sharp but short-lived decrease in the statistics of delinquency. In the U.S. delinquency continued to increase after 1948, surpassing the peak reached during the war. This increase was more rapid than the increase in the child population (between the ages 10–17). In England and Wales there was a rise during the war years and also during the immediate postwar period. Then came a decline which gave the impression that as the war receded there would be a steady decline toward prewar figures. A further rise in 1955 and in the following years challenged this idea.

Not only the western world, moreover, has been concerned about the rise in delinquency rates. In Japan by the late 1950s as many as 200,000 juvenile cases annually were brought before the family courts, which had been established in 1949. By contrast the number of cases dealt with by Japan's juvenile adjudgment offices annually in the 1920s was about 10,000.

United Nations reports suggest that the level of public concern with the problem has risen to new heights in most countries following the brief decline in cases which was noted immediately following the war. Whether such concern reflects an actual increase in delinquent behaviour is uncertain. It appears likely that new forms of delinquency have developed which are the cause of much public concern. The nature of these will be treated below.

Delinquency rates in modern countries tend to rise during periods of economic prosperity and decline during depressions. Within these countries delinquency rates are highest among persons who are closest to the poverty line, usually identified as "lower class." There is increasing interest, but little evidence, concerning delinquent behaviour by "middle-class" youngsters.

The geographical distribution (ecological variation) of delinquency rates reflects this social class pattern. Several decades of research in many countries find these persistent patterns: delinquency rates are higher in urban than in semiurban areas, and these in turn are higher than in rural areas; within cities, the concentration of delinquency in areas characterized by physical deterioration, poverty, high transiency of residents, high rates of adult crime, suicide and other social problems such as the breakup of conventional family organization has led to the concept of "delinquency areas." Age at first offense is lower in these areas, and recidivism (*q.v.*) is higher. Delinquency areas thus are areas of "slum" or "blight" which have had high rates of delinquency over many years despite complete changes in composition of the resident populations.

Studies have shown that immigrants to a country tend to settle in high delinquency areas and that the children of immigrants typically have high rates of delinquency. As immigrants take on the cultural characteristics of the host country, however, they move to other areas and their delinquency rates decline. Thus, over time delinquency rates of ethnic groups tend to approximate those of the society in which they reside. Similarly, at any given time within ethnic groups, delinquency rates vary a great deal. They are high in delinquency areas and lower in other areas, following the pattern of their resident communities. Some interesting studies in Great Britain have shown that delinquency areas are by no means confined to the old central areas and may also develop in the housing estates generally located on the periphery of cities. The characteristic feature reported by such studies is the close association between the methods of child upbringing in the poorest and socially unaspiring section of the working class and their segregation in certain streets and neighbourhoods through a process of selective mobility.

Patterns of segregation and discrimination against minority racial groups interfere with the over-all pattern described. For many years there have been high rates of juvenile delinquency among urban Negroes in the U.S. The typical pattern has emerged —that is, higher rates in delinquency areas and progressively lower rates the farther from these areas a particular Negro community is located—but unlike many other minority groups, Negroes, denied full access to educational opportunities and better jobs and excluded from housing in white neighbourhoods, have not been able to move out of delinquency areas to more desirable areas. Other more visible minorities in the U.S., such as American Indians and immigrants from Mexico and Puerto Rico, encounter similar problems and have similarly high delinquency rates. These groups have not maintained strong and self-sufficient communities of their own. By contrast, orientals in the U.S. generally have been found to have low delinquency rates, with exceptions conforming to the patterns described.

Young people who come to the attention of the police and courts tend to be in the older age categories covered by the statutes. The peak age for delinquency for both boys and girls is in the years of early and middle adolescence. (In the U.S. this is 16 years for boys and 15 for girls; in England it is 14 for boys and 17 for girls.) As programs for the treatment and prevention of juvenile delinquency have been elaborated, however, younger children become involved to an increasing extent.

Studies of both official and unofficial delinquents agree that boys are involved in delinquency to a greater extent than are girls. The ratio of boys to girls varies for different offenses and from time to time, within a given country and from one country to another. In recent years about five boys have come before U.S. courts to each girl making such an appearance. This is probably the lowest ratio of any country today (in Great Britain and most of Europe the ratio is about 10 to 1) and it represents a considerable decrease from the 50 or 60 to 1 ratios found in the U.S. early in the 20th century. Sex ratios are lower in high delinquency areas and among groups with high rates. Lower sex ratios also are found in countries where the status of males and females is most nearly equal or is in a state of change. Thus in Japan and Turkey, where many social and legal privileges have been extended to women since World War II, marked increases in the proportion of female offenders have been noted.

As regards the types of delinquency, in the U.S. boys tend to come before the court most frequently for offenses against property and girls for "ungovernable behaviour," running away and sex offenses. In Great Britain larceny constitutes the commonest offense for both boys (about 60%) and for girls (about 80%). For breaking and entering, the corresponding figures are about 25% and 10%. But in Britain, as in the U.S., girls appearing before the juvenile courts for sex offenses and similar problems present a difficult problem from the point of view of treatment and prevention. In many countries offenses committed by juveniles constitute a

major part of the criminal statistics: in the U.S. for example, approximately half the total of arrests for burglary, three-fifths for automobile thefts and over two-fifths for larceny are under 18 years old.

United Nations reports suggest that the following patterns of delinquency have become increasingly troublesome in many countries: "theft of vehicles," ranging from scooters and bicycles to motorcycles and automobiles, reported to have increased greatly in Asiatic as well as European and American countries; increases in sex offenses, causing alarm in many countries where traditional sex roles and mores are changing; and widespread increases in vandalism and in the use of intoxicants such as alcohol, marijuana and other drugs.

These and other types of delinquency have occurred increasingly in many countries in collective forms involving crowds and gangs. Examples include England's "teddy boys," France's *blousons noirs*, Italy's *vitelloni*, the *Halbstarke* of Germany, the *Skinnkutte* of Sweden, the "bodgies" and "widgies" (girls) of Australia and New Zealand, *tsotsio* in South Africa, *mambo* boys and girls in Japan, "hooligans" in Poland and Russia, the *tapkaroschi* of Yugoslavia and *Lui-mang* and *Tai-pau* of Formosa.

There is little systematic research to demonstrate the extent or the nature of these types of collective delinquency. Studies indicate that there is much variation in the size, organization, and cohesiveness of gangs and in their behaviour. Available data and informed opinion suggest that most delinquent gangs are loosely structured and not very cohesive. The bulk of their time is spent in nondelinquent activities, in boredom on street corners or in other hangouts. Aggression within the gang, occasional delinquent episodes directed outside the gang, including fights, or rumbles, with other gangs, and using alcohol or drugs for thrills or "kicks" relieve some of this boredom. So do girls, who also serve as accomplices in conflict, theft and sexual delinquencies. "Street corner society" for the adolescent is a courtship system as well as an arena for delinquency.

In a few large cities elaborate conflict gangs are reported, with "nations" of youngsters organized along neighbourhood lines (north side, south side branches of a larger gang) and on a rough age-graded basis (with senior, junior, midget segments). Other gangs, or segments of gangs, may be organized specifically for profit, through planned criminal activities and structures for disposing of stolen goods. Still others, described by other delinquents in the U.S. as the "society of cats," are based upon common participation in esoteric experiences such as use of drugs or homosexuality. The concept of "delinquent subcultures," referring to patterns of delinquent behaviour which become traditional, with supporting values, norms and structures, has been introduced to describe and in part to account for gang forms of delinquency.

Limited evidence suggests that in the U.S. these specialized delinquent subcultures are limited to a few very large cities. Conflict subcultures are more visible and probably more common than the criminal and "cat" cultures. In most cities and towns of the U.S., and in other countries, gangs appear to be versatile, with a strong element of spontaneity involved in delinquent as well as in nondelinquent activity. Most delinquent behaviour, even in conflict gangs, is episodic in character, and rarely do all gang members participate in a given episode.

Other collective forms of delinquency which have attracted special attention, especially in Europe and the U.S., include mass rioting by adolescents in conjunction with the public appearance, in concert or motion pictures, of teen-age "idols," and the "holiday" behaviour of college-age youngsters. Delinquency is not the object of those who participate, except perhaps in the latter instance, in which the lowering of moral restrictions concerning sexual behaviour and drinking is an acknowledged object of many participants. Both types of rioting, however, frequently have resulted in excesses of intoxication and much destruction of property. The principal element of these forms of behaviour appears to be collective excitement such as is involved in crazes and in expressive crowds. Research in Germany has found that the leaders of such crowds are more likely than the followers to have previous records of delinquency. Participation ranges broadly across the social spectrum, however, and the mechanisms by which expressive crowds become transformed into active crowds bent on destruction are not well understood. *See* also PSYCHOLOGY, HISTORY OF: *Collective Psychology*.

CAUSATION

The causation of delinquency, involving the complex interaction of many variables and processes, has been the subject of much research. Psychologists have studied the individual delinquent in an attempt to understand what sorts of young people become delinquent and what developmental processes account for the personality traits correlated with delinquency. Sociologists have taken as their basic data the distribution of delinquency among various segments of the population, and have sought explanations in terms of social systems, their structure and culture, and the relations among component parts. Both psychological and sociological theories typically are concerned with the breakdown of controls over tendencies toward delinquency that are assumed to exist within the individual. The classic psychoanalytic formulation of personality is the basis of this assumption among most current psychological formulations. This theory sees personality as comprised of strong aggressive tendencies (the id) inherent to all mankind, and of controlling mechanisms (the ego, or reality sense, and superego, or conscience) (*see* PSYCHIATRY: *Modern Schools*). When the latter fail to develop, break down or become distorted, delinquent tendencies are allowed expression. Various psychodynamic theories see delinquency as an expression of emotional problems such as insecurity, fear, guilt or anxiety.

Sociological theories have been concerned with the breakdown of social controls over delinquent tendencies. Evidence for such breakdown is seen in high delinquency areas where institutions such as the family, school, church, business community and political institutions fail to function according to conventional standards. Research on social structure and on the institutions and "focal concerns" of lower-class culture has led to new sociological formulations, particularly of gang delinquency and delinquent subcultures.

These theories differ in important ways, but there are basic similarities among them. They see gang life and delinquent subcultures as collective solutions to problems of growing up in lower-class culture. Thus, with respect to the problem-solving character of delinquency they are similar also to psychodynamic theories. The theories differ with respect to the nature of problems giving rise to such solutions. Among students of delinquent gangs Albert K. Cohen sees the delinquent subculture and its variants as collective solutions to status problems experienced by youngsters who, by virture of their socialization in lower-class homes and communities, are inadequately equipped to succeed in middle-class institutions such as the school. Walter B. Miller hypothesizes that for boys the delinquent gang represents an approved (within the lower class) cultural form of coping with masculine identity problems which result from socialization in female-based households. Richard Cloward and Lloyd Ohlin have elaborated a theory of delinquent subcultures based upon the differential availability for lower-class youngsters of legitimate and illegitimate opportunities. In communities where adults who are engaged in criminal enterprises are integrated into the life of the community, they say, controls on adolescent misbehaviour (in terms of that community's standards) will be effective, desirable role models and career opportunities for young people will be found. Delinquency will tend to take the form of criminal subcultures, rational, restrained, directed toward economic gain and legitimation in the eyes of adults. In communities where neither criminal nor conventional elements are well organized, gang delinquency will take the form of the conflict subculture as a protest against a world which denies all opportunities for economic gain and as an alternative system in which the youngsters can achieve status. A third type of pattern, retreatism, is adopted by those who are unsuccessful in either legitimate or illegitimate pursuits. These youngsters adopt drug use or other forms of escape from reality as their solution.

It should be emphasized that these theories have not been systematically documented. Research findings, however, support the

importance imputed to the availability of opportunity, to status concerns and to lower-class culture in creating the milieu of gang delinquency. Detailed study of particular behaviour episodes suggests, however, that the opportunities and the status concerns which precipitate delinquency are those of immediate concern—excitement, status in the gang or as an aspiring young adult—rather than of the abstractions of social structure or culture. Thus, for example, status-maintaining mechanisms within the gang have been found to be important in understanding episodes of delinquency.

DELINQUENCY CONTROL

All of these theories have implications for the rehabilitation of offenders and the prevention of delinquency in the community. Delinquency control may be seen as a network of public and private institutions and individuals, each operating according to some theory, implicit or explicit, of what causes delinquency. The parent, the neighbour, the social agency or school official, and the businessman—whether offended against or cast in the role of referral or treatment agent—defines and makes decisions concerning the youngster apprehended for or suspected of delinquent behaviour. These decisions influence the nature of the experience of the child just as do the decisions of police, courts, probation officers and institutional personnel.

Faced with mounting public concern over juvenile delinquency and the apparent failure of various programs of treatment and prevention, many countries and smaller jurisdictions have experimented with methods of control. (*See* CRIMINOLOGY: *Prevention;* BORSTAL SYSTEM; PROBATION; REFORMATORY.) Notable among these have been attempts to co-ordinate the work of agencies in local communities, to identify gaps in youth services and fill these gaps with new programs. Several methods of both treatment and prevention have recognized the importance of peer groups for the behaviour of youngsters. Group therapy has been widely practised in institutions and in the community as an adjunct of probation. Work with "street corner" gangs has taken a variety of forms, usually involving extension of the services of a social agency by assigning personnel as "street workers" rather than primarily within traditional agency programs and facilities. Neighbourhood youngsters and adults have been organized and in many instances hired to aid in coping with delinquency and other community problems related to youth. "Opportunity theory" (*i.e.,* the theory that many young people lack the opportunity to succeed in conventional, accepted ways) has had a notable impact on youth services, especially in the U.S. where federal support has been extended to local communities on a broad scale to improve educational and economic opportunities. Other programs have been based on a variety of intensive clinical services.

Despite rising public concern and widespread experimentation with techniques of rehabilitation and prevention, youth services in most countries still are extremely limited, the discretion of the juvenile court in most jurisdictions is severely handicapped by the paucity of available alternatives for treatment or protection of children. Supervision within the community (probation from the court, or "after care"—parole—following release from an institution) is handicapped by staffs that are inadequate in numbers and in training; institutions tend to be primarily custodial in nature, with professional personnel limited to diagnostic rather than treatment functions. The problem is aggravated by the fact that society expects more from the court and from treatment programs than treatment and protection of the child. Community demands for protection from the depredations of offenders, and oftentimes for punishment, conflict with the aims of rehabilitation. Increasing willingness since World War II to experiment and to study systematically the nature of delinquency and delinquents and the efficacy of control programs have been the most encouraging developments in delinquency control.

See also references under "Juvenile Delinquency" in the Index.

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For current history and statistics *see* the *Britannica Book of the Year.*

(J. F. SH.; J. C. SR.)

JUVENTAS (Lat. for "youth," later JUVENTUS), in Roman cult the tutelary goddess of young men. *See* HEBE.

JUXON, WILLIAM (1582–1663), archbishop of Canterbury and lord high treasurer, was the last in the medieval tradition of clerical state service. Born probably at Chichester, he was educated at Merchant Taylors' school, London, and St. John's college, Oxford. He studied law at Oxford, but took orders, and held various preferments. In 1621 he succeeded his friend William Laud as president of St. John's college, and later was vice-chancellor of the university. He became chaplain in ordinary to Charles I, was made dean of Worcester in 1627, and in 1632 was nominated bishop of Hereford. He never took up these episcopal duties, as in Oct. 1633 he was consecrated bishop of London in succession to Laud. Two and a half years later Charles, at Laud's suggestion, appointed Juxon lord high treasurer of England, a post last held by a cleric in Henry VII's reign. He resigned the treasurership in May 1641. During the Civil War his advice was often sought by the king, who chose him to minister alone to him on the scaffold. Juxon was deprived of his bishopric in 1649 and retired to his own residence at Little Compton, then in Gloucestershire. At the restoration of Charles II in 1660 he became archbishop of Canterbury.

Juxon aided the work of restoring St. Paul's cathedral, rebuilt the great hall at Lambeth palace and was a benefactor to his college at Oxford. He died on June 4, 1663.

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(G. HU.)

JYVÄSKYLÄ, a town in Keski-Suomi (Central Finland) *lääni* (county), Fin., situated on Lake Jyväsjärvi. Pop. (1960) 39,636. It is a centre of traffic by rail, motor coach, ship and air; the airport is situated at Luonetjärvi, about 12 mi. N. of town. The town is also an important industrial centre, with numerous factories manufacturing paper, plywood and matches. Jyväskylä is the home of the Pedagogical Institute of Jyväskylä, which in 1934 replaced the oldest teachers' college in Finland, founded at Jyväskylä in 1863; the lyceum, the first Finnish-language secondary school in the country, founded in 1858; and several other schools and institutions. It was granted town rights in 1837.

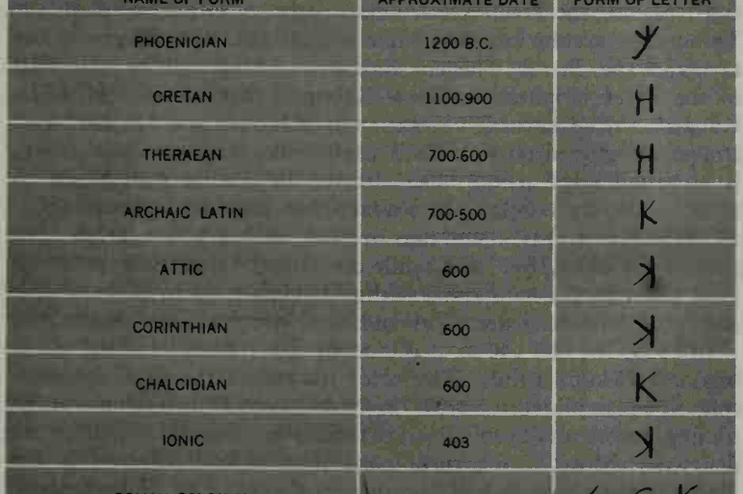
(E.-S. KU.)

K THIS letter, corresponding to Semitic 𐤊 (*kaph*), Greek Κ, K (*kappa*), has changed its shape less perhaps than any other in the history of the alphabet. In chemistry, K is the symbol for potassium (*kalium*). The Semitic form may derive from an earlier sign representing a bent hand. Early Greek forms from the island of Thera ⟨, ⟨, have some resemblance to the Semitic. The Chalcidic, Etruscan and Latin forms were identical K, and the letter has retained its shape until modern times. The minuscule form *k* is but a slight adaptation of the majuscule with the point of junction of three strokes lowered and the lower transverse stroke consequently much shortened and moved to the right. The round form ƙ also appears in handwriting.

The sound represented by the letter throughout its known history until the present day has been the unvoiced velar stop. Its function in the Latin alphabet was usurped by the letter C which, taken over as representing the voiced velar, came under Etruscan influence to represent the unvoiced sound as well. Later the letter G was adapted from C to represent the voiced velar and C stood for the unvoiced only. K now fell into disuse except in official formulas or initials such as in the word *Kalendae*, and as a rare variant spelling in *Karthago* and a very few other words.

In late Latin and the early Romance period the unvoiced velar, represented by C, became palatalized before front vowels, and in the 12th century K was reintroduced as a substitute for C to represent the velar before front vowels, since C did duty for both the velar and palatal in such cases and confusion was thus liable to arise. Thus the English word *cyng*, for example, began to be spelled *kyng*, later *king*.

In modern English orthography *k* is combined with *c* to represent the unvoiced velar, when the sound is final, *e.g.*, *thick, stock, buck*. This is mainly limited to monosyllables, but *attack, haddock, hillock, mattock* and several other words of similar type form a small class of exceptions. For an account of the Germanic consonant shifts involving K, according to Grimm's law, *see* GERMANIC LANGUAGES. *See* also ALPHABET.



THE DEVELOPMENT OF THE LETTER "K" FROM THE PHOENICIAN THROUGH CLASSICAL LATIN TO THE PRESENT FORM

(B. F. C. A.; J. W. P.)

K2 (GODWIN AUSTEN; DAPSANG), the second highest peak in the world and forming part of the Karakoram mountain system (Himalayas) in north Kashmir, is 28,250 ft. above sea level. It was discovered and geodetically measured by Col. T. G. Montgomerie of the Survey of India in 1856. It did not have any local name and the initials K2 are derived from the initial letter of the word Karakoram while the number is the second in the order in which the peaks of that chain of mountains were measured. Later various names were suggested: among the names of persons were Mt. Vaugh, Mt. Albert, Mt. Montgomerie, Mt. Godwin Austen, Mt. Akbar and Mt. Babar; among the names in the local language Chogori, Lamba Pahar, Dapsang.

K2 rises, not entirely isolated, from a base on the Godwin Austen glacier (a tributary of the Baltoro glacier), about 15,000 ft. high. From the geological point of view it consists mainly of metamorphic rock among which gray biotite-muscovite gneisses predominate. Crystalline limestone is also found. The structure is represented by an anticline running south-southwest intersected by a principal fault which passes close to the summit, and by secondary faults.

The first map of K2, scale of 1:25,000, is that of the duke of Spoleto's expedition (1929). A further map on a scale 1:250,000 was made from surveys during 1937–39. The Desio expedition (1954) made a photogrammetric relief map on a scale of 1:12,500.

The history of the climbs of K2 starts in 1902 with the Anglo-Austro-Swiss international expedition's attempt; the expedition was known as the Eckestein-Pfannl-Guillarmod expedition. The climb was on the northeastern crest and the highest point reached was about 18,600 ft. In 1909 it was the Italian expedition's turn, led by the duke of the Abruzzi (*q.v.*), who, having reconnoitred all the slopes (except the northern), chose the southeastern spur (later called the Abruzzi spur) as the route for the ascent. The highest point reached was 20,000 ft. A fresh attempt to climb the mountain was made in 1938 by C. Houston, an American, together with four other Americans, an Englishman and six Sherpas. The Abruzzi spur was faced boldly and a maximum altitude of about 26,000 ft. was reached. The following year K2 was again attacked by a U.S. expedition commanded by F. H. Wiessner, consisting of five of his fellow countrymen, an Englishman and nine Sherpas. Following the same Abruzzi spur route, an altitude of approximately 27,500 ft. was reached. The return journey was saddened by the death of D. Wolfe and three Sherpas.

The next attempt was made in 1953, again the work of C. Houston with six Americans, an Englishman and a Pakistani. Following the same route as in the past the expedition reached the maximum height of about 25,900 ft.; then it was clouded by the loss of A. Gilkey. In 1954 the mountain was attacked by an Italian expedition led by A. Desio; it was planned for a prolonged stay at high altitudes and armed with the most up-to-date climbing equipment. It consisted of four scientists, besides the leader (a geologist), a doctor, a photographer, 11 climbers and a Pakistani. The attack on the mountain, hampered by exceptionally bad weather, was launched along the Abruzzi spur and the summit was reached at 6 P.M. on July 31 by A. Compagnoni and L. Lacedelli. M. Puchoz, one of the guides, died of pneumonia at the second camp.

See K. Mason, *The Abode of Snow* (1955); A. Desio, *The Ascent of K2* (1955). (AR. D.)

KA (more correctly KOI), an ancient Egyptian conception designating a spiritual part of a human being or of a god, as were *bai*, "soul"; *ikh*, "(shining) spirit"; *ran*, "name"; etc. There is still controversy about Ka, chiefly for lack of an Egyptian definition; the usual translation "double" is incorrect. Written by a

hieroglyph of uplifted arms, it seems originally to have designated the protecting divine spirit of a person, and later the personified sum of physical and intellectual qualities constituting an "individuality." It was therefore outwardly identical with the person to whom it belonged and whom it thus also represented. It survived the death of the body and could reside in a picture or statue of a person. (J. Cy.)

KA'BA (Ka'bah) is the small shrine located near the centre of the Great Mosque in Mecca. Muslims everywhere consider it to be the most sacred spot on earth, orient themselves toward it in the five daily prayers, bury their dead facing its meridian and cherish the ambition of visiting it on pilgrimage in accord with the command of God in the Koran. It is thus the central shrine of Islamic faith.

As the name indicates, the Ka'ba is cube-shaped, the dimensions being 40 by 35 by 50 ft. It is constructed of gray stone and marble and oriented so that its corners roughly correspond to the points of the compass. In the northwest wall about seven feet above the ground is a door that is opened only for special ceremonies. The interior contains nothing but the three pillars supporting the roof and a number of suspended silver and gold lamps. During most of the year the Ka'ba is covered with an enormous cloth of black brocade (*kiswa*), woven into which, in gold, are the Muslim witnessing formula, "There is no god but God and Mohammed is his apostle," and verses from the Koran. The covering, renewed every year, is made in Egypt and brought to Mecca with great ceremony by the pilgrim caravan. Around the Ka'ba are some lesser structures, notably the well of Zamzam, thought to be the well that God provided for Hagar, the mother of Ishmael (Arabic Isma'il), in her need.

Located in the eastern corner is the Black Stone (*al-hajar al-aswad*) whose now broken pieces are surrounded by a ring of stone and held together by a heavy silver band. According to popular legend, this stone, which was given to Adam on his fall from paradise, was originally white but has become black by absorbing the sins of the countless thousands of pilgrims who have kissed and touched it. Every Muslim who makes the obligatory pilgrimage is required to walk seven times around the Ka'ba. In this process it is customary to kiss and touch the stone, and forgiveness of sins is believed to come to all who do so.

The early history of the Ka'ba is not well known, but it is certain that it was revered as a sacred sanctuary in the pagan period before the rise of Islam. The Koran (ii, 127) says of Abraham and Ishmael that they "raised the foundations" of the Ka'ba. The exact sense is ambiguous, but Muslim legend has interpreted the phrase to mean that they rebuilt a shrine first erected by Adam of which only the foundations still existed. The Ka'ba has been destroyed, damaged and subsequently rebuilt several times. In 930 the Black Stone itself was carried away by the fanatics of the Karmatian sect and held for almost 20 years for ransom. Early in his prophetic ministry Mohammed seems to have disregarded the Ka'ba, but after his emigration to Medina and his difficulties there with the Jews, he changed the direction of prayer from Jerusalem toward the Ka'ba. When he took Mecca through his successful diplomacy in 630 he caused the pagan idols within and surrounding the sanctuary to be destroyed and had the building cleansed of the pagan pictures covering its interior. The Ka'ba has been the focal point of Muslim piety ever since.

For other ceremonies and duties connected with the pilgrimage, *see* Mecca: *The Pilgrimage*. (C. J. A.)

KABABISH, a tribe (numbering about 70,000 by the 1960s) who lead a nomadic life with camels in the desert scrub of the northern Kordofan province, Sudan. They are generally thought to belong to the large Guhayna stock of Arabs, who were a group in Arabia before the time of Mohammed; but the name Kababish may not be very old, and their origins, in terms of more recent history, seem to be mixed. They have been described as a loose tribal confederation; its composition, since the time of the Turkish occupation in 1821, has undergone a number of changes. The neighbouring Kawahla and Hawawir have close similarities.

During the 19th century the Kababish not only carried trade goods between the Nile and Darfur but also took imposts from caravans on the Darb al Arba'in route which traverses their country. During the Mahdia (*see* Sudan, Republic of the: *History*) a part of the tribe joined the revolution but a strong section, anxious at the loss of trade, sided with the old government and remained out of the khalifa's control. Since the Mahdia, government-recognized leaders (nazirs) of the tribe have been descendants of El Tom Fadlulla, who was originally appointed by Gen. C. G. Gordon in 1881 and later executed during the Mahdia.

The Kababish cultivate very little and depend heavily on their camels, sheep and goats. They congregate toward the end of the dry season in the neighbourhood of Bi'r Sawdiri (Bir Soderi), moving south a little when the first rains fall. Later as the rain progresses they return north and northwest, extending far into the desert toward the Wadi al Malik and beyond. There they graze their animals on *gizzu* grass. Less than 1% have been to school; few seek work outside. Their social organization has similarities with that of other nomadic Arabs. *See* also Arab.

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KABARDINO-BALKAR AUTONOMOUS SOVIET SOCIALIST REPUBLIC (Kabardino-Balkarskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika), in the Russian Soviet Federated Socialist Republic of the U.S.S.R., lies on the northern flank of the Greater Caucasus range. Pop. (1959) 420,115. Area 4,826 sq.mi. It can be divided into three main relief regions. First, in the south is the Greater Caucasus, the crest of which forms the boundary. This is the highest part of the Caucasus, with Mt. Elbrus, 18,481 ft., its highest summit, and Mts. Shkhara, 17,063 ft., Dykh-Tau, 17,070 ft., Koshtan-Tau, 16,899 ft., and Dzhangi-Tau, 16,565 ft. There are many, often extensive, glaciers, from which rise swift-flowing rivers. Below the ice fields are alpine meadows, and below these coniferous forest, chiefly pine, giving way lower still to deciduous forests of beech, with oak, alder, hornbeam, maple, ash and poplar. Secondly, north of the main range are four roughly parallel foothill ranges, each lower to the north, and cut into blocks by the deep gorges of the rivers. These ranges are in deciduous forest, with meadows occupying the wider parts of the valleys. In the north and northeast is the third region, the level Kabardinian plain. Across the plain the Terek river system converges like a giant fan. The largest tributaries are the Cherek, Chegem, Baksan and Malka. The plain west of the Terek is known as Great Kabarda, that to the east, Little Kabarda. The natural vegetation is meadow and feather grass steppe, developed on rich black earth soils, but most of the area is now under the plow. The climate, in general continental, is much varied by relief. The Kabardinian plain is dry, with about 19 in. of rain a year. Summers are hot, with a July average temperature of 24° C. (75° F.), while the January average is −4.5° C. (24° F.). In the mountains rainfall is higher, up to 30 in. a year and more; summers are short and cool, winters more severe.

In 1959, 166,053 (40% of the population) were classified as urban and 254,062 rural. The chief towns are the administrative centre of Nalchik (*q.v.*; 87,617), Prokhladny, Dokshukino and the mining centre of Tyrnyauz. In addition, there are four urban districts. Most of the rural population is concentrated in the Kabardinian plain and in the main valleys. The Kabardinians, who figure largely in the works of M. Y. Lermontov (*q.v.*), are a Caucasian nationality, related to the Cherkess or Circassian ethnic group. Their language is Japhetic and their religion usually Muslim. The 1959 census recorded 204,000 in the entire U.S.S.R. The Balkars are a smaller group (42,000 in the U.S.S.R. in 1959), who were dispersed for a time during and after World War II for alleged collaboration with the Germans. They are Turkic and closely related to the neighbouring Karachai. The Kabardinians, living mostly in the plain, allied themselves with the Russians as early as 1557 and Kabardia formed part of the Terek Cossack district. A Russian fortress was established at Terek town, on the river, and another, in 1818, at Nalchik. Many of the Russians now living in the republic are of Cossack descent. The Balkars

of the high mountains were more fiercely independent and put up a prolonged resistance to Russian incursion. The area was organized as the Kabardinian autonomous *oblast* in 1921 and extended in 1922 through amalgamation with Balkaria to form the Kabardino-Balkar autonomous *oblast* which was constituted as a republic in 1936. After World War II a great effort was made in education, with the help of the Soviet central government, and centred in the state university and pedagogic institute in Nalchik.

Mining occupies a large place in the economy. A wide range of minerals has been found there, but not all are as yet exploited. Tyrnyauz, in the Baksan valley, is one of the main centres of molybdenum and tungsten mining in the U.S.S.R. In the same area gold, tin, andalusite, arsenic and antimony are also found. Ugolny is the focus of a small coal-mining industry, while the Nalchik district provides a range of building materials. Rich mineral deposits were discovered also in the Malka valley, including gold, chromium and nickel. In the extreme northeast of the republic is a small oil field. Engineering is concentrated in Nalchik, which makes oil-drilling equipment, and in Prokhladny. Nalchik also has timber working, furniture making, textile, clothing and shoe industries. Timber cutting is mainly in the Cherek valley. Cement, bricks, glass and chinaware are made in the neighbourhood of Nalchik. In all the towns, except Tyrnyauz, the processing of agricultural products is carried on, particularly fruit canning and preserving and jam making, meat packing and flour milling. Power from a hydroelectric plant on the Baksan, built in 1936, supplies the republic and is transmitted as far as Grozny.

Arable farming is almost entirely concentrated in the Kabardinian plain. Because of the dryness, irrigation is usually necessary and there are a number of projects, supplying water to about 140,000 ac., mostly in Little Kabarda and the lower Baksan valley. Winter wheat, maize (corn), sunflowers and hemp are the main crops. Orchards and gardens are widespread, producing apricots, peaches, pears and apples, and some small vineyards have been established. In the mountains, with their extensive pastures, stock rearing is important, particularly sheep and cattle. In winter the animals move down to steppe pastures on the north Caucasian plains. Pigs are kept in considerable numbers near the largest settlements, while the breeding of Kabardinian horses is still carried on. The main Rostov-Baku railway crosses the northern part of the republic through Prokhladny, whence a branch line runs to Ordzhonikidze, with a feeder to Nalchik. A main road runs southeast from Pyatigorsk to Nalchik and other roads mainly follow the valleys. (R. A. F.)

KABIR (1398?–1518), one of the most remarkable figures in the religious history of India, was born in the family of a Muslim weaver of Benares, presumably in 1398. A thoroughgoing eclectic, the inspirer of a new sect of religion and a mystic poet of a high order, he preached, in the medieval period of stress and tension, the equality before God of all men—whether Hindus or Muslims, whether of high caste or of low. Early in his career he came under the spell of the Hindu ascetic Ramananda, who symbolized for young Kabir the spirit of revolt against orthodox exclusivism and abstruse philosophizing.

Hindus during the 14th and 15th centuries lived under the perpetual shadow of persecution, and religious exploitation of the masses by pandit and mullah had become the order of the day. It was against this background that Kabir, a ruthless critic of externalism and formalism in religion, taught his religion of love, which aimed at an emotional integration of the soul with God. This "simple union" (*sahaja-yoga*) could be achieved by any aspirant, regardless of caste, creed or sex, not through idolatry and caste practices, or ritual and austerities, but through ardent personal devotion.

Kabir died at Maghar in 1518 at the age of 120. His songs, which are written in popular, unsophisticated Hindi, continue to move the masses of Hindus and Muslims in northern India and in Pakistan even to this day.

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KABUKI THEATRE, a popular form of Japanese drama, has remained the chief theatrical outlet of the entire country for almost three centuries. In the late 16th century, when kabuki originated, there was a verb *kabuku* in current usage, which applied to anything unusual or curious. This word also had vaguely indecent overtones and probably because of the notorious conduct of the performers was particularly suited to the new dramatic form. Kabuki is written in modern times with three ideographs arbitrarily assigned to the sounds—*ka* meaning song, *bu* meaning dance and *ki* meaning skill, ability or trick. This rather clearly describes the amalgam of dramatic and musical arts which compose the kabuki theatre.

History.—The creation of the kabuki art form is said to date from 1586, when a certain woman, O Kuni, performed in dried river beds parodies of Buddhist prayers. She assembled around her a troupe of men who danced as women and women who danced as men. O Kuni's kabuki was the first dramatic amusement of any importance designed for the tastes of the common man; the older nō dramas of the 15th century and their ancillary comic interludes, kyōgen, had been for many years the special province of the nobility. Because of its frivolous nature and the immorality which inevitably accrued to O Kuni's kabuki (or woman's kabuki, as it was later called), the government banned it in 1629. Young boys with long forelocks of hair and dressed as women then performed the programs. This was known as wakashū kabuki, and it too, for similar reasons, was soon suppressed. Immediately, older men took over the parts—so irrepressible were the theatrical desires of the people—and it is this form of all-men entertainment (yarō kabuki) which has endured through the centuries down to the present day. With mature men performing all the roles, including those of women, the plays grew in stature and the acting improved in subtlety. Eventually, by the Genroku era (1673–1735, in its broadest sense), kabuki was an established art form and a serious, dramatic presentation of genuinely affecting situations. Kabuki thereafter continued to exert a strong hold over the average man and woman of Japan. Kabuki's position became so strong that there emerged a tradition of hereditary acting families, who worked, and still work, within a strict and disciplined hierarchy.

When the commoners in Japan began to rise economically and socially, kabuki, the people's theatre, afforded a vivid commentary on the life of the day. Actual events were transferred to the stage. The great play cycle *Chushingura* ("Treasury of Royal Retainers") composed in 1748 in 11 long acts by three of the period's leading playwrights, Takeda Izumo, Namiki Senryū (or Sōsuke) and Miyoshi Shōraku, for example, was a more or less faithful dramatization of the famous incident of 1702 in which 47 lordless knights (*rōnin*), after waiting patiently for a year, wreaked their revenge against the man who had enforced the suicide of their lord (*see* FORTY-SEVEN RŌNIN). Similarly, nearly all the "lovers' double suicide" plays of the great playwright Chikamatsu Monzaemon (*q.v.*; 1653–1725), who wrote both for kabuki and the puppet theatre, were based on actual suicide pacts made by some commoner with his beloved.

Most playwrights during the early years of kabuki preferred to write for the puppet theatre, but the kabuki actors were quick to take over their plays. During the Tokugawa era, kabuki also failed to produce any great playwrights, although a number of remarkable actors continued to appear in steady succession. Some of these actors are immortalized in numerous wood-block prints, notably those of Sharaku. In the middle of the 19th century, at about the time the first encroachment from the west was felt, Japan produced a great kabuki playwright, Mokuami Kawatake (1816–1893). He created a new type of play, that of the domestic drama which reflected the lives of special, everyday people of his time—thieves, beggars, masseurs and firemen. Under his influence, the kabuki stage, while retaining the repertoire of the past, shifted into a kind of neorealism. Mokuami was fortunate in having a pair of magnificent actors, Danjūro IX and Kikugoro V, at his disposal. They brought to kabuki an intelligence, diligence and perspicacity which had been absent for some time. Older plays were given fresh interpretations. Some of the traditional illogicalities and anachronisms which characterized the

classical plays were clarified and adjusted to meet the demands of the audiences of the new Japan. By this time, kabuki included a vast repertoire of approximately 500 plays, whose themes ranged through history, domestic tragedy, comedy, pageantry and pure dance.

Modern Character.—Kabuki is a spectacle in which the arts of dance, music, mime, decor and costuming are elaborately blended and set forth in a blazing flamboyance of style and stylization. The Kabuki Za (theatre) in Tokyo, only one of many in the country, seats nearly 3,000 persons. The stage is 90 ft. wide, although the proscenium is only 25 ft. high. The most striking feature of a kabuki theatre is the *hanamichi,* a passageway which runs for 45 ft. (at the Tokyo Kabuki Za) from the stage to the back of the theatre through the audience. On this, many climactic actions and important entries and exits take place. The *hanamichi* may serve, for example, as a forest or mountainous road, as an inlet of water, or sometimes as a street or ceremonial path to the inner courtyards of palaces. Its value in giving a three-dimensional, stereoscopic effect to the theatre and in bringing the audience closer to the actors has been admired and copied in the west. The west, particularly, has claimed that kabuki is the most perfect and complete theatre form still extant anywhere. The preservation of its traditions since its inception, despite a number of vicissitudes and eclectic tendencies in certain respects (see *Kabuki Dances* below) is unique in the history of world theatre.

During World War II, the Japanese government unsuccessfully tried to use kabuki as a propaganda weapon to incite passionate patriotism and to inculcate the virtues of self-sacrifice and loyalty. On the other hand, after the war the occupation authorities, misunderstanding the aesthetic value of this art, banned many plays and for a time hampered the theatre in general. Most of the greatest actors in the grand manner died in the decade following the war. The death of Kichiemon in 1954 at the age of 69 was a final blow to grand kabuki. A new kabuki evolved, molded by younger actors and the tastes of the new audiences, disillusioned by the war and sensitive to the pressures of the outside world. New plays were being written in the second half of the 20th century which, though the situations might be old, were characterized by more reality and modernity than classical kabuki ever permitted. Many of the modern kabuki actors, for financial reasons, appeared in motion pictures or even in modern plays. Although the flavour of antiquity was leaving kabuki, this internationally celebrated art promised to continue, in fragmentary form at least, for generations to come.

Kabuki Dances.—Dance occupies such an important place in kabuki that foreigners frequently refer to this classical form of Japanese theatre as "kabuki dances." The particular style of dancing most characteristic of kabuki consists of restrained, flowing movements for the female roles and bombastic, exaggerated posturings for the men. On occasion, dancers stand stock still, often crossing one eye to add dramatic emphasis, in order to create climactic pauses and to punctuate the broad rhythm of the dance. Sometimes even in straight dramas the acting becomes so stylized and removed from the conventions of ordinary daily actions that it appears more as dancing. Because of the intimate relation between acting and dancing in kabuki, and also since virtually all actors are dancers, it is easy to blend the two. Few opportunities to insert a dance of some sort into any item of the program are missed. Kabuki is an eclectic and acquisitive art, and therefore a wide variety of dances can be assimilated without difficulty. Aside from those dances and dance dramas which are purely kabuki, the spectator can see, to cite a few examples, priestesses performing temple dances, holy men enacting ceremonial dances of longevity, peasants who dance at harvest or planting time, nobles entertaining their lords with court dances or lovers dancing for one another to exhibit their grace. And in some plays, folk dances which have long since disappeared from the actual lives of the people may still be seen on the stage. Each dance, either group or solo, has its own characteristics of movement and style. The patterns can change from a simple, slow moving around the stage to complicated and acrobatic leaps or spins. Nearly all dances are identifiable by an object with which the dancer must dance. It may be a branch of flowers, a cherry blossom baton, a magic wand, a hand towel, a small drum, various masks or even a special hat gaily decorated with flowers. Although certain tense or even tragic moments in the drama may occasion a dance, most dances in kabuki are of a bright and cheerful nature. The gaily lit stage and the gaudy costumes add to this panorama of kabuki dances.

See also MAKE-UP.

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KABUL, the capital of Afghanistan and its largest city, is situated 6,000 ft. above sea level and 180 mi. from Peshawar, Pak. The estimated population (1962) is 226,000, mainly Persian-speaking, though there is a large admixture of Pathans. The city lies in and outside a triangular gorge between two high and steep mountain ranges, the Asmai (6,720 ft.) and Sherdarwaza (7,170 ft.) which, running respectively southeast and northwest, nearly meet a little to the west of the old town, leaving between them a narrow entrance traversed by the Kabul river and the roads from Ghazni and Paghman. On the hills are the remnants of a long mud wall with round towers at short intervals, probably built by the Kabul shahs early in the Muslim invasion. Mentioned in the Vedas as an important town and transport centre, the city owes its age-old pre-eminence to its strategic position. It commands all the passes from the north through the Hindu Kush and from the south through Kandahar and Gardez, and it controls the main approaches, through the Khyber pass, to Pakistan and India.

Kabul, formerly a walled city, is now a contrast of narrow and widened streets, a densely packed mass of flat-roofed houses interrupted by bazaars and fine modern buildings. A large portion of the old city has been rebuilt and is being extended in all directions. The city is divided into four principal parts: (1) the old oriental city, in a shallow depression at the foot of Sherdarwaza hill; (2) Sherpur or Shahr Nau (New City), extending northwest to Kolola-Pushta and Wazirabad; (3) Naway Kabul (New Kabul), which includes Darul Aman (in the Chahardeh valley), Shershah Maina and Ghaznawi Maina; and (4) Shah-i-Shahid, the eastern part.

Kabul contains many interesting buildings and a number of gardens. The buildings include Minar-i-Nejat, erected in 1929 to commemorate the deliverance of the country from Bacha-Saqau ("brigand king"); Chaman-i-Huzuri (royal lawn), where Afghan independence day is celebrated each year; Tapa-i-Maranjan (royal cemetery), centred around the blue-domed tomb of King Nadir Shah; the domed tombs of the amirs Timur Shah and Abdurrahman Khan; Minar-i-Istaqlal (column of independence), erected in 1919 after the termination of the Third Afghan War; the Arg (royal citadel); the palace of Dilkusha; the Salam-Khana (audience hall); and the Darul Aman palace, housing the parliament and the ministries of finance and public works and the University of Kabul. It was at Darul Aman that the king Amanullah Khan hoped to set up his administrative capital, before he lost his throne. Opposite the secretariat (in Darul Aman) is the Kabul museum (1879), rich in archaeological finds. On the top of a rocky hill at the end of the Sherdarwaza range stands the ruined fort of Bala Hissar (high fort), now the seat of the military college founded by Nadir Shah. Formerly the greatest ornament of the city was the large, arcaded and roofed bazaar, Chahar Chatta, the remains of which were pulled down in 1949 to permit the making of new roads.

Babur's garden, containing his tomb, is a popular resort lying near the western extremity of the old city at the base of the Sherdarwaza hill. It is laid out in beautiful terraces; a clear stream waters the flower beds; two chinar trees, souvenirs of Mogul days, stand as sentinels to watch the grave. The royal palace of Chehel Sotun, partly reconstructed in 1956, lies beyond the garden of Babur on the same road. A rock stands in the middle about 100 ft. above the surrounding ground and from it there is a fine view of the Chahardeh valley and the surrounding hills. A highway flanked by poplars leads to the secretariat garden. The Gulbagh (flower

garden), divided into two parts by the Kabul river, lies on the southern extremity of the Chahardeh valley, and beyond is the garden of Rishkhor. The Chahardeh valley also contains other public buildings, among them schools, hospitals, the teachers' training college, government poultry and dairy farms and a large silo and bakery. There also are the medical and scientific faculties of the University of Kabul which form the nucleus of the new university buildings. In the centre of this site stands a monument to the Pan-Islamist Sayyid Jamal Al-din al-Afghani.

When Alexandria-Kapisa, on the bank of the Ghorband river about 40 mi. N. of the city, ceased to exist, Kabul became the principal city of the area, which grew until it became the capital of Afghanistan and the most important centre of industry as well as trade in the country. There are match, leather and tanning factories and cotton-spinning and woolen mills. A hydroelectric plant, at Sarobi, supplies electricity to the city. A large part of the foreign trade of the country passes through Kabul via the Khyber pass. Main roads link the city northward with Mazar-i-Sharif and the U.S.S.R. border at the Amu-Darya, eastward with Peshawar and southwestward with Kandahar. The airport north of the city accommodates the largest planes.

Kabul was invaded by Arabs in 656 but it was many years before the Muslims effected any lasting settlement. Kabul first became a capital when Babur (*q.v.*) made himself master of it in 1504 and he kept it as his headquarters until his invasion of India in 1526. From the time of Babur to that of Nadir Shah (the Persian conqueror), Kabul was the capital of the Kabul province of the Mogul empire. In 1738 it surrendered to Nadir Shah. On the murder of Nadir Shah in 1747, Ahmad Shah, the founder of modern Afghanistan, became king. After his death in 1773, his son, Timur Shah, transferred the capital from Kandahar to Kabul. During the First and Second Afghan Wars it was occupied by the British from 1839 to 1842 and from 1879 to 1880. (*See* also AFGHANISTAN: *History.*)

After the accession of Abdurrahman Khan in 1880 the city underwent great changes. A fortified cantonment at Sherpur (one side of which was represented by the historic Bemaru ridge) took the place of the British earthworks. The amir effected many improvements. He erected a new palace and a durbar hall, built a bridge across the river, laid out Babur's garden and constructed many other public buildings, a factory for the manufacture of small arms and ammunition, and hospitals, dispensaries and bazaars.

KABUL PROVINCE (pop. [1962 est.] 1,632,300), one of the major provinces of Afghanistan, includes the southern half of the plain called Koh-i-Daman and Bagram to the Hindu Kush northward, with the Kohistan or hill country adjoining. Eastward it extends to the border of Nangrahar province at Jagdalak; southward it includes the rich Logar district, and extends to the border of Ghazni; northwestward it includes the Paghman hills and the valley of the upper Helmand river, and so to the Koh-i-Baba. Roughly it embraces a territory of about 18,000 sq.mi., chiefly mountainous. The areas around Kabul city are mainly Tajik, though many Pathans have settled there. The mountainous western half of the province is inhabited by the Hazara people, of Mongol origin. In summer the nomads (Kuchis) from the area of the Pakistan border to the south bring their flocks to graze in the high pastures of the region. The climate is good and bracing. Thunderstorms with lightning and heavy rains are common in spring. Wheat and barley are the staple products of the arable tracts; grasses are also much cultivated and there are plenty of fruits, especially in Koh-i-Daman. This most beautiful valley extends 50 mi. N. of the city of Kabul from which it is separated by a low ridge. The valley played an important role in ancient history. It was a seat of culture in pre-Islamic days and contained flourishing towns such as Alexandria-Kapisa, Houpian, Cartana and Cadrusi.

On a hill 25 mi. N. of Kabul, on the west side of the valley, stands the beautiful little town of Istalif, praised by Babur. Attractive cottage pottery and brightly coloured rugs are made there.

Paghman, picturesquely set in the lap of the range of the same name about 16 mi. W. of Kabul, is known for its banks and other modern buildings and is a popular summer resort. It contains the summer residences of the king and many of his wealthier subjects. Of the many fine gardens there the most famous are those of the court minister above the town and the magnificent terraced garden, constructed by the king and presented by him to the Afghan nation, below it. Halfway between the town and Kabul the Paghman river has been dammed and the reservoir so formed is being developed as a resort. (K. S. AD.; X.)

KABUL RIVER, in Afghanistan and Pakistan, is 435 mi. in length, of which 350 mi. are in Afghanistan (the affluent Logar included). The total catchment area is about 20,000 sq.mi. It rises at the foot of the Unai pass (10,800 ft.) leading over the Sanglakh range, an offshoot of the Hindu Kush. Its basin forms the provinces of Kabul and Parwan, which includes all northern Afghanistan between the Hindu Kush and the Safed Koh ranges. From its source to the city of Kabul the course of the river is only 60 mi., and is often exhausted in summer by irrigation. Half a mile east of Kabul it is joined by the Logar, a much larger river, which rises beyond Ghazni among the slopes of the Gul Koh (14,200 ft.) and drains the rich and picturesque valleys of Logar and Wardak. Below the confluence the Kabul becomes a rapid stream with a great volume of water and gradually absorbs the whole drainage of the Hindu Kush. About 40 mi. below Kabul the Panjshir river joins it; about 5 mi. farther down the river, near Sarobi, a hydroelectric plant has been located; 10 mi. farther the Tagao joins it; 20 mi. from the Tagao junction the united streams of Alingar and Alishang (rivers of Kafiristan); and 20 mi. below that, at Balabagh, the Surkhab from the Safed Koh. Below Jalalabad it is joined by the Kunar (*q.v.*). Thenceforward it passes by deep gorges through the Mohmand hills and, crossing into Pakistan north of the Khyber pass, curves northward until it emerges into the Peshawar plain at Michni. Soon afterward it receives the Swat river from the north and the Bara river from the south, and 40 mi. farther enters the Indus at Attock. From Jalalabad downward the river is navigable by boats or rafts of inflated skins, and is considerably used for purposes of commerce. The Kabul valley provided the route for the invasion of India by Alexander the Great in 330–326 B.C.
(J. P. C. N. H.)

KABYLE, a Berber (*q.v.*) people of Algeria, inhabiting Kabylia, a region stretching from the Mediterranean sea to the southern slopes of the Djurdjura highlands and from Dellys to Cap Aokas. The mountainous central and southern region is called Great Kabylia, the area around Bougie, Little Kabylia. The Kabyle are Mediterranean in type, and are predominantly agricultural. Traditionally the men wear the gandurah (a loosely flowing garment), a woolen burnoose, a woolen skullcap, generally black and white, and a broad-brimmed straw hat. The women wear garments of bright yellow cotton, woven in stripes recalling the serpent motif; a silk scarf covers the hair and they wear heavy silver jewelry, ornamented with coral.

The Kabyles have a remarkable social system: each village is administered by an assembly, or *jema'a* of adult males (those old enough to observe the fast of Ramadan). Before the imposition of French municipal laws in the middle of the 19th century the administration was in the hands of the *amin,* assisted by *itemanen* (sing. *tamen*) answerable for him and elected by the various districts of the village, originally patrilinear clans. A code of customary law *kanun* deals with all questions of property and persons as well as crimes and general offenses. Villages are divided into *sof* (rival clans) which were originally matrimonial moieties. In the past, the tribes of Kabylia grouped themselves into confederations of which the name *Taqbailit* came to denote the entire region. Society is organized into castes, and smiths and butchers are kept at a distance, sometimes even grouped in special villages. The husband's mother enjoys a dominant position in household affairs.

See B. Terhorst, *With the Riff Kabyles* (1926); G. M. Wysner, *Kabyle People* (1945). (J. H. SE.)

KABYLIA (KABYLIE), a region of rugged mountain masses between Algiers and Philippeville in northern Algeria, comprises: (1) the Grande Kabylie (Great Kabylia) or Djurdjura, bounded westward by the Oued Isser and eastward by the Oued Soummam; (2) the Petite Kabylie (Kabylie des Babors or Little Kabylia)

around the Gulf of Bougie; (3) the Kabylie de Collo forming the hinterland of Cape Bougaroun. The Grande Kabylie, separated from the coastal hills by the Sebaou valley containing the Algiers-Bougie road, rises southward in the Jabal Djurdjura, a serrated chain of two lines of crests extending east-west for about 25 mi. Its main peaks are Lalla Kredidja (7,572 ft.), Akouker (7,562 ft.) and Haïzer (6,965 ft.). The annual rainfall is 40–60 in.; snow lies on the highest parts from November to May and Tikjda below Akouker was established as a ski resort. On the massif the Djurdjura and Akfadou national parks (72 sq.mi.) contain wild boar, hyenas, jackals, lynxes, wildcats and some monkeys. Natural woodland, much reduced, includes ash, ilex, chestnut-leaved oak, cork oak and cedar. The landscape is harsh: bare, scree-girt ridges scored by the deep gorges of swirling streams offer sparse seasonal pasture for transhumant flocks. In the Petite Kabylie, traversed by the road southward from Bougie to Sétif through the deep 5 mi. gorge of Chabet Al Akra, the Babor massif rises to its highest peaks in Jabal Babor (6,542 ft.) and Tababor (6,447 ft.). The range is forested with cedars and firs (*Abies numidica*). In the Kabylie de Collo cork oaks give place to oaks on higher ground, reaching about 4,000 ft. in the Jabal Goufi.

In Kabylia and especially in Grande Kabylie the Berber race, language and customs survive in their purest forms. The Berber mountain strongholds were never fully subdued by the Romans, Arabs or Turks and offered desperate resistance to French forces in the 1850s. Fort-National (originally Fort-Napoléon) was established in 1857 to control the region but following the Berber rising in 1871 the work of pacification had to be begun anew. With densities in places exceeding 600 inhabitants per square mile, the Grande Kabylie is one of the most thickly populated parts of Algeria. Settlement is dense on the eastern slopes and the Soummam valley, and many inhabitants dwell in tightly clustered villages, usually on ridges between 2,000 and 4,000 ft. There on the steep slopes in minutely subdivided plots are grown figs, olives, carobs and vines, and beneath the trees (which are often in different ownership from the land) primitive subsistence cultivation is carried on. Poverty is widespread and emigration (especially to France) in search of work was traditional until mid-20th century. Tizi-Ouzou, a railhead 67 mi. E. of Algiers, is the chief town in the Grande Kabylie, with Fort-National 17 mi. S.E. In the Petite Kabylie, which is thinly populated and less well served by communications, the chief centre is Périgotville, 54 mi. S.E. of Bougie. Hydroelectric power stations have been built at Ahzerouftis and Erraguene. In the Kabylie de Collo, cork stripped from the forest trees is shipped from the fishing port of Collo. The main road and railway from Algiers to Constantine skirt the southern edge of Kabylia, with a branch line to Bougie following the Soummam valley. (A. B. M.)

KACHARI, a tribe in Assam belonging to the Bodo (*q.v.*) group, mainly inhabiting the hills between the Brahmaputra river and the border of Bhutan, and numbering about 300,000 in the 1960s. Until the Ahom invasion in 1228 A.D., Kachari kings were established in upper Assam, but, following a succession of defeats by the Ahom, they moved to Dimapur at the foot of the Naga hills (only rows of megalithic stone monuments now remain); they moved to Maibang in the 16th century, and in 1750 to Khaspur in Cachar district. In 1790 the Kachari kings formally embraced Hinduism and were recognized as being of Kshatriya (*q.v.*) caste. The last Kachari king was murdered in 1830, following a Burmese attack, and his kingdom taken over by the East India company.

The Kachari people, centred in western Darrang (Kachari Duars) at the foot of the Bhutan hills, in north Kamrup and North Cachar, have remained a separate ethnic group with Mongolian-type features, speaking a Tibeto-Burman language and retaining their distinctive customs. They are divided into clans named after aspects of nature (heaven, earth and rivers, animals and plants); the clans were probably at one time exogamous. Descent and succession to property is in the male line. They have a tribal religion, with an extensive pantheon of village and household gods. Village elders hold religious offices. The cactuslike euphorbia is held sacred. The dead are buried (sometimes cremated) and the funerary rites reflect a belief in life after death.

Marriage is usually by parental arrangement and involves the payment of a bride price. Such institutions as the community house for bachelors, and many features of their religion, link them with the Naga (*q.v.*) and other hill tribes of Assam, but the growing influence of Hindu ideas and customs works toward assimilation into the caste society of the Assam plains. The Mech in Goalpara district and the Dimasa in North Cachar and Nowgong district also belong to the Kachari tribe. *See* also ASSAM: *History.*

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KACHIN (KAKHYEN), a term of Burmese origin applied to tribal peoples occupying northeast Burma and contiguous areas of India and China. Kachins speak a variety of languages of Tibeto-Burman type and are thereby distinguished as Chingpaw (Jingphaw, Singpho), Atsi, Maru (Naingvaw), Lashi, Nung (Rawang) and Lisu (Yawyin). Total numbers have been estimated at 330,000 (1931 census), the majority being Jinghpaw speakers. Under the British regime (1885–1947) most Kachin territory was specially administered as a frontier region but the Kachin state (*q.v.*) was in the 1960s a distinct semiautonomous unit in the federated Union of Burma.

Traditional Kachin society largely subsisted on the shifting cultivation of hill rice supplemented by the proceeds of banditry and feud warfare. Political authority in most areas lay with petty chieftains who depended upon the support of their immediate patrilineal kinsmen and their affinal relatives. Kachins live in mountainous country at a low population density, but Kachin territory also includes small areas of fertile valley land inhabited by Shan (Tai) and Burmese-speaking populations living at a high density in relatively sophisticated conditions. The total population of these valley people exceeds that of the Kachins and the two groups are economically interdependent. The valley people are Buddhists; the traditional Kachin religion is a form of animistic ancestor cult entailing animal sacrifice. During the British period, Christian missions (Roman Catholic and U.S. Baptist) were active in southern Kachin territory and the governing elite of the modern Kachin state are largely products of mission-school education. With improvement in communications and standards of living and the decay of mission influence, the existing distinctions among Shans, Burmese and Kachins might gradually disappear. Considerable attention from anthropologists has been directed to the Kachin custom of approving marriage with the mother's brother's daughter while prohibiting it with the father's sister's daughter (*see* COUSIN MARRIAGE).

In recent centuries the jade used by Chinese lapidaries has come from mines in western Kachin territory. For this reason successive Chinese governments since the 18th century have claimed suzerainty over the whole of the Kachin area. Agreement on the political frontier between the Burma Kachin state and the People's Republic of China was reported in 1960. Kachin troops form an important element in the Burmese army. *See* also BURMA: *The People;* CHINGPAW.

See E. R. Leach, *Political Systems of Highland Burma: a Study of Kachin Social Structure,* with bibliography (1954); J. H. Telford, "Animism in Kengtung State," *J. Burma Res. Soc.,* vol. 27 (1937). (E. R. L.)

KACHIN STATE (JINGPHAW MUNGDAN), the northernmost state of the Union of Burma, was among those created under the constitution of 1947. It comprises the old British Burmese civil districts of Bhamo and Myitkyina (*qq.v.*), together with the large northern district of Puta-o (*q.v.*). It is bounded on the northwest by India, on the north by Tibet and on the east by China. A considerable part of the frontier remained undemarcated even in the early 1960s when it was being actively disputed by China. There are large areas of forest too remote for economic working. The state capital is Myitkyina, a small railhead town on the right bank of the Irrawaddy. Other towns are Bhamo and Mogaung. The population of the sparsely settled though vast mountainous hinterland is predominantly Kachin, whereas that of the well-populated railway corridor and southern valleys is mainly Shan and Burmese. The state is represented in the union government by

a minister who maintains a small secretariat in Rangoon.
(L. D. S.)

KADAR. The Kadar tribe of south India comprises a few hundred collectors of jungle products residing along the hilly border between Cochin in Kerala state and Coimbatore district in Madras state. Kadars are small, dark, exhibit the common Indo-Australoid features of broad nose and everted lips, and also show in a few individuals a frizzly hair form that suggests Negrito affinities. The genetic origins of this combination of features among the Kadars was a subject for speculation in the 1960s.

In consideration of their simple technology, Kadars have been taken to be survivors of an extremely ancient cultural complex or stage. Their principal tool was the stone-tipped (now iron-tipped) digging stick used for securing edible wild roots. Kadars practise no agriculture and hunt without bow and arrow. They build leaf-thatched shelters and group them loosely, shifting their locations as work requires. As long as their history is known, however, Kadars have served as specialized collectors of honey, wax, sago, cardamom, ginger and umbrella sticks for trade with merchants from the plains. They prefer to eat rice obtained in trade or in wage payment rather than to subsist on foods of their own gathering.

Kadars are generally patrilocal. They are permitted to marry all cross-cousins, preferring marriage with the father's sister's daughter (*see* COUSIN MARRIAGE). Women are secluded for menstruation in special huts. Kadars worship jungle spirits and their own kindly creator couple as well as local forms of the Hindu deities. They speak a dialect of Tamil (*q.v.*).

See O. R. L. W. von Ehrenfels, *Kadar of Cochin* (1952). (M. MA.)

KADDISH (Aramaic QADDISH), the sanctification of the Name of God, a doxology (hymn of praise) recited in the synagogue service. The nucleus of the prayer is the phrase, "Glorified and sanctified be God's great name throughout the world which He has created according to His will. May He establish His kingdom in your lifetime and during your days." The congregation responds: "May His great name be blessed forever to all eternity." The main idea of the prayer goes back to ancient times and is reflected in the Lord's Prayer (*q.v.*) of Christians.

Originally the Kaddish was recited in the rabbinical academies at the conclusion of public study or after the sermon of the preacher. In the course of time it became a regular feature of the synagogue service. The prayer expresses, in addition to the praise of God, the plea for the speedy realization of the messianic age; and since the resurrection of the dead is associated with the coming of the Messiah, Kaddish became in the course of time the prayer of mourners. It is recited by the mourners on the death of parents daily for 11 months, and on the anniversaries of the parents' deaths.

There are longer and shorter forms of the Kaddish.

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(J. M. RL.)

KADESH, a city on the Orontes (Al'Asi) river in Syria, which flourished in the 2nd millennium B.C. Its remains are to be found in present-day Tall Nabi Mand, about 15 mi. S.W. of Homs (*q.v.*). Kadesh occurs for the first time in Egyptian sources when Thutmose III (1504–1450 B.C.) defeated, at Megiddo in Palestine, a Syrian insurrection under the leadership of the prince of Kadesh. Later Thutmose III destroyed the city. During the Hittite drive into Syria under Suppiluliumas (*c.* 1375–35; or 1385–45) Kadesh and its neighbour, Amurru, were reduced to vassalage, and in the ninth year of the Hittite king Mursilis II (*c.* 1335–15; or 1343–13), Kadesh was punished for unfaithfulness.

During the 19th Egyptian dynasty Kadesh occupied a strategic position in the path of Egyptian expansion in Syria. Seti I (1318–04 B.C.) in his second year captured Kadesh, and his stele was found during excavation of the site. Kadesh was the scene of a famous battle in 1299 (or 1291) between Ramses II and the Hittite Muwatallis. Although Ramses claimed victory, the actual result was a truce between the two nations. With the onslaught of the Sea People (*c.* 1200) Kadesh disappears from history.

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KADIYEVKA (called SERGO from 1935 until 1943), a town of Lugansk *oblast* in the Ukrainian Soviet Socialist Republic, U.S.S.R., lies in the northern part of the Donbass or Donets basin on a small tributary of the Lugan, itself a tributary of the Donets, 30 mi. W. of the town of Lugansk. Pop. (1959) 180,205. The town developed in the 19th century as a coal mining settlement and it is now the centre of the most intensive coal mining district of the Donbass, with some of the largest pits. The coal forms the basis of coke-chemical, metallurgical and machine building industries. (R. A. F.)

KADU, a small tribe of uncertain origin that once occupied the area around the Maingthon hill in Upper Burma. Though a few settlements remained in the area between the Katha and Chindwin civil districts, by the 1960s the tribe was dispersed and almost completely assimilated into the surrounding Burmese, the process having been accelerated by extensive recruitment of Kadu into forestry work in the past.

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KADUNA, the capital town of Northern Nigeria region, Africa, is centrally situated in the region and lies at 2,110 ft. in savanna country on the Kaduna river, a principal tributary of the Niger. Pop. (1963) 149,910. Kaduna has no long history. The site was chosen by Lord Lugard for the capital of Nigeria, and building began in 1913. The Northern government moved in from the old capital, Zungeru, in 1917. Rigid control of building has given Kaduna a modern spaciousness possessed only in limited areas by other Nigerian towns. The main street, King George's way, runs south-north for 2 mi. to Lugard hall, the seat of the legislature, a concrete building in simplified Muslim style. Government house, the governor's residence, lies west of the town. All Northern government departments are in Kaduna, which is also the headquarters of the northern military subdistrict and contains the Northern Police Training college.

Kaduna is a main junction of the Nigerian railway system where the main line from Kano in the north branches to Lagos and to Port Harcourt. The town is connected by road to all the principal centres of Northern Nigeria region and to the main roads to the south. The airport, 5 mi. from the town, is used by local services to the chief towns of Nigeria and thus connects with international airlines.

The town was at first solely an administrative capital but has been developed as an industrial and commercial centre. The most notable enterprise is the cotton mill, with a floor area of 4.5 ac. under one roof; other industries include a mineral water (soft drink) factory and furniture making.

The Kaduna river, subject to seasonal flooding, provides ample water for industry, and an industrial and commercial suburb, Kaduna South, has been established on the south bank, linked to Kaduna North by rail and road bridges. (W. H. I.)

KAEMPFER, ENGELBERT (1651–1716), German traveler, "the Humboldt of the 17th century," an invaluable source on contemporary Persia and also on Japan, was born on Sept. 16, 1651, at Lemgo in Westphalia. He studied medicine and natural sciences at the universities of Danzig, Cracow and Königsberg, and then went to Uppsala, where he joined a Swedish trade mission to Russia and Persia. From there he voyaged to Batavia, where in 1690 he joined a Dutch trade mission to Japan. He stayed for two years and succeeded in seeing more of the country and collecting more information than any European before him. In 1694 he returned to Europe and after being granted an M.D. at Leiden settled near his native city. Kaempfer died on Nov. 2, 1716, at Lieme (Westphalia).

Only one of his works, the *Amoenitatum exoticarum* . . . (1712), was published during his lifetime. After his death Sir Hans Sloane

purchased most of his manuscripts and arranged the publication of *The History of Japan* (1727); this work was also translated into French and Dutch. From a manuscript that had remained at Lemgo, *Geschichte und Beschreibung von Japan* was published (1777–79). The last work to be published was *Icones selectae plantarum* . . . (1791). His manuscripts, many still unpublished, are in the British museum, London.

See *Allgemeine Deutsche Biographie,* 15, pp. 62–64 (1882).

(K. A. S.)

KAESŎNG (Song-do; Japanese pronunciation, Kaijo), the capital of the Koryo dynasty ruling Korea for five centuries before 1392, is in North Korea just south of the 38th parallel, 45 mi. N.W. of Seoul. It was a centre for scholars and landlords and for the commercial production of the medicinal herb ginseng, an important export to China.

During the Korean War when Kaesŏng was overrun by the North Korean forces, many temples, tombs and palace remains were destroyed. In 1951 it was chosen as the site of the first truce talks. The city was, reportedly, later rebuilt as an important military supply base.

Pop. (1956 est.) 200,000. (S. McC.)

KAFFA, a province in southwest Ethiopia, extends southward to Lake Rudolf at the mouth of the Omo river, which forms the eastern boundary. Pop. (1959 est.) 1,100,000. Area about 19,000 sq.mi. Much of the province is dissected tableland with an average elevation of 6,000 ft., although higher mountain groups reach 10,000 ft. The southern extremes are lower and drier.

The region was conquered in the 16th century by Muslim invaders under Mohammed Grañ and many of the inhabitants became Muslims. Those in the northwest are mostly Galla. In the centre and east dwell Hamitic Sidama groups and in the south toward the Sudan various Nilotic groups. Of interest to anthropologists is the Kaffa (Kafa) kingdom, the most important Sidama group in the area, consisting of four tribes living between the Gibbe and Omo rivers (*see* also Janjero; Cushitic Peoples). It was formerly ruled by an autocratic king who was held to embody the spirits of the Kaffa people. The kingdom was once surrounded by a ditch and stockade wherever no natural defenses existed. The people are pastoral and practise some agriculture; they keep horses, cattle and civet cats. Kaffa was conquered and included in the Ethiopian empire by Menelik II in 1897–99 and its main centres were christianized, but it remained for several years a principal source of slaves.

The word coffee has sometimes been supposed to have derived from Kaffa, where the plant is indigenous and the altitude and abundant rainfall are ideal for its cultivation. Much of the coffee is wild and is picked seasonally in the forests of the southwest. Most of it passes through Jimma, the administrative and commercial capital. Kaffa is also the source of valuable tropical hardwoods and softwoods. Jimma is linked by road with Addis Ababa and by air services with Addis Ababa and towns in Kaffa and the adjacent provinces.

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(G. C. L.; G. W. B. H.)

KAFFIR (Kafir): *see* Xhosa.

KAFFIR BREAD (Bread Palm), the popular name for several species of *Encephalartos,* cycads (palmlike gymnosperms; *q.v.*) native of southern Africa. The names are derived from a breadlike foodstuff prepared from the mealy, starchy centre of the stem and perhaps also from the seeds, which have fleshy coverings. The trees, reaching nearly 20 ft. in height, have very stiff, spreading pinnate leaves 3 to 4 ft. long and recurving at the tip. Several species of *Encephalartos* form handsome greenhouse and conservatory plants.

KAFFIR WARS, a name commonly given to clashes between the Xhosa branch of the Bantu people and white settlers in the eastern frontier region of Cape colony, South Africa. ("Kaffir," from the Arabic *kafir,* an "infidel," is no longer used to describe African or Bantu people.) These hostilities are now regarded less as individual wars than as acute episodes in a century of continual friction between land-hungry white farmers and Bantu pastoralists, each side having its own customs of land ownership and tenure (*see* Cape of Good Hope: *History*).

White settlers, mainly cattle farmers migrating eastward in the 1770s from the older and more developed areas, met the Xhosa vanguard near the Great Fish river, which, despite its defects, was proclaimed the eastern frontier of the colony in 1778 by Gov. Joachim van Plattenberg. The expulsion of the tribesmen from the colony in the following year and Xhosa reprisals upon the colonists' cattle led to the first Kaffir war (1779), followed by a second war in 1789 and a third in 1799. When the British occupied the Cape in 1795 they inherited from the Dutch the Fish river boundary which lasted, with minor modifications, until 1847 when it was superseded by the boundary of the Keiskama river. The British also continued the attempt to check Bantu penetration into the colony. The colonial authorities stubbornly refused to acknowledge the presence of these immigrants, denying them any legal status although many no longer had any home outside the colony.

Despite an unprecedented display of force by the governor, Sir John Cradock, in the fourth war (1812), the establishment of military posts just inside the frontier and the innovation of a neutral belt after the fifth war (1819), permanent peace eluded the frontier region. Its troubles preoccupied several Cape governors, including Sir Benjamin D'Urban (1834–38) and Sir Harry Smith (1847–52). The sixth Kaffir war (1834–35), following a severe drought in Kaffirland, saw the most serious invasion yet by the Xhosa. D'Urban's original and short-lived postwar settlement included the expulsion of the tribes beyond the Kei river and the annexation of the region between Keiskama and the Kei as the province of Queen Adelaide. The seventh war occurred in 1846. Sir Harry Smith was recalled in 1852 as a result of the costly eighth war (1850–53), which had been provoked in part by his diminution of the chieftains' powers in the former province of Queen Adelaide. This territory he had re-annexed in 1847 as British Kaffraria. The relatively quiescent state of the frontier during the two decades before the Kaffir war of 1877–78 may be partially ascribed to the national suicide of the Xhosa in 1857 when the frontier tribesmen slaughtered their cattle and destroyed their corn, a phenomenon itself the product of the wars which had disrupted tribal life considerably. European firearms were more extensively used by the tribesmen in the war of 1877–78 than previously and, by an act of the Cape parliament in 1878, the tribes were disarmed. Tension on the frontier was eliminated by the annexation of native areas hitherto beyond colonial jurisdiction and by the more rapid extension of civilization among the tribes.

The Kaffir wars were perhaps only peaks, produced by especially exacerbating causes, ranging from drought to precipitate attempts on the part of European administrators to diminish the powers of the tribal chiefs. The scale and military significance of the wars were probably exaggerated by earlier writers, and there has been a tendency to dwell on the thieving propensities of the Xhosa as the principal cause of these wars. Contemporary European opinion in the Cape almost always exaggerated the number of cattle possessed by the tribes on the eastern frontier while failing to appreciate the overpopulation and land shortage in the Bantu areas beyond the frontier. European administrators who pursued a vigorous policy of attempting to expel the tribesmen from the colony usually failed to realize that their efforts might only aggravate the congestion and provide the occasion of another frontier violation. (L. M. Y.)

KAFFRARIA, the name formerly given to the eastern borderland of Cape colony (the modern Cape of Good Hope province in the Republic of South Africa), means the land of the Kaffirs but retains only historical significance. In 1806 the colony's eastern boundary was the Great Fish river, but frequent incursions by the Kaffirs (or Xhosa; *q.v.*) led in 1819 to the shifting of the boundary eastward to the Keiskama river and in 1835 to its extension to the Great Kei river. In the mid-19th century Kaffraria was the name used for the Kaffir territory beyond the Great Kei, while British Kaffraria was the crown colony established in 1853 between that river on the east and the Keiskama and Klipplaats

rivers to the west and north. British Kaffraria was annexed to Cape colony in 1865. Kaffraria proper, comprising East Griqualand, Tembuland and Pondoland, was included in the Transkeian territories annexed to Cape colony during the period 1879–94. *See* also CAPE OF GOOD HOPE: *History;* KAFFIR WARS; TRANSKEI. (J. H. WN.)

KAFIR (KAFIR CORN), any of several varieties of the grain sorghums, extensively cultivated in tropical and subtropical countries, where the grain, made into bread, forms an important article of diet. In the warmer parts of the U.S., kafir, as well as other types of sorghum, is an important forage grass. *See* SORGHUM.

KAFIRISTAN: *see* NANGRAHAR; NURISTAN.

KAFKA, FRANZ (1883–1924), German writer, notable for the haunting, nightmarish quality of his work, which symbolized the frustrations and fears of the age. Although they made little stir when first published, his highly original novels found a wide public in Germany and abroad after World War II. Born in Prague on July 3, 1883, in a Jewish middle-class family, his early life was overshadowed by the dominating personality of his father. After taking a law degree at Prague university he worked in an insurance firm since it appeared to him that to earn his living as a journalist would compromise his integrity as a writer. His high standards and extreme sensitivity did not allow him to take life easily. He endured spiritual anguish in his attempts to escape from the dominance of his father, to ward off the claims of his office work over his writings, to establish harmonious relations with his fiancée (to whom he was twice engaged during the years 1912–17) and to carry on a love affair with Milena Jesenska (*Briefe an Milena,* 1935; Eng. trans., 1953). In 1917 tuberculosis forced him to enter various sanatoriums. In 1922 he left Prague to live as an independent writer in Berlin where he found some measure of happiness in his companionship with Dora Dymant until his death of tuberculosis in a sanatorium near Vienna on June 3, 1924.

Only a few of his writings were published in his lifetime; among them were *Betrachtung* (1913), *Das Urteil* (1916), *Die Verwandlung* (1916; Eng. trans., *Metamorphosis,* 1937), *In der Strafkolonie* (1919; Eng. trans., *The Penal Colony,* 1948) and *Ein Landarzt* (1920; Eng. trans., *The Country Doctor,* 1940). Prompted by misgivings about his literary work he instructed his friend and literary executor Max Brod (*q.v.*) to burn his unpublished papers. Fortunately Brod, who had earlier warned Kafka that he could not undertake such a commission, disregarded the injunction and published the three novels *Der Prozess* (1925; Eng. trans., *The Trial,* 1937), *Das Schloss* (1926; Eng. trans., *The Castle,* 1930) and *Amerika* (1927; Eng. trans. 1938), as well as many short sketches, aphorisms and diaries.

Kafka's work deals with the experience of man in an unintelligible universe, hopelessly attempting to come to terms with a remote, incomprehensible and absolute power. In *Der Prozess* the hero is unable to find out anything about the court which is to try him or the trial which he is to stand; in *Das Schloss,* the owner of the castle, who is to determine his destiny, is equally unknown and unreachable. The lucidity and conciseness of his language contrast sharply with the obscurity of his imagery. This contrast reflects the dualism of the two worlds which exist side by side, the world of ordinary everyday experience and the world of absurd, fantastic events. They are fused into one world because Kafka's hero accepts the existence of both, although he scrutinizes them with his intellect, searching in vain to comprehend the justice and security of existence. This search leaves him with a sense of guilt and isolation. He protests against his predicament, but it is never clear whether the powers that appear to rule his fate have right on their side. The keynote of Kafka's work is thus ambiguity. His range is restricted, for he is obsessed with his own distorted vision, but this limitation of imaginative power is compensated for by its intensity.

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KAFR ASH SHAYKH: *see* GHARBIYAH, AL AND KAFR ASH SHAYKH.

KAGANOVICH, LAZAR MOISEEVICH (1893–?). Soviet Communist leader, builder of Moscow's underground railway, was born on Nov. 22, (new style), 1893, of Jewish parents in the Ukrainian village of Kabany, near Kiev. After a brief period of schooling he became a shoemaker. He joined the Communist Party in 1911 and spent several years organizing the industrial workers of the Ukraine. The Revolution of 1917 found him in Yuzovka (later Donetsk). He worked as party organizer in Saratov, Petrograd, Gomel, Mogilev, Nizhni Novgorod (Gorki), Voronezh, and, from 1920, in Tashkent, where he was enforcing Soviet rule in Turkistan. In 1925 he was appointed by Stalin to be first secretary of the Ukrainian Communist Party, and in 1926 he became a candidate member of the Politburo of the All-Union Communist Party. In 1930 he was raised to full membership and made secretary of the Moscow region. There he worked efficiently for the construction of the city's underground railway. Regarded as a forceful administrator, he was appointed people's commissar of transport (1935), heavy industry (1937), fuel industry (1939), and petroleum industry (1939). He became a deputy premier in 1938 and a member of Stalin's State Defense Committee in World War II. During and after the war, until Stalin's death in 1953, Kaganovich was mainly concerned with industrial affairs. After Stalin's death he remained a member of the Party Presidium (formerly Politburo) and was made a first deputy premier. In June 1957, however, he was declared to have belonged to the Malenkov-Molotov opposition to N. S. Khrushchev and was expelled from all government and party offices. He was reported to have been appointed to a minor administrative post. A Western journalist reported in 1963 that he had been shown Kaganovich's grave, but the death was not announced. In April 1964 Kaganovich was officially mentioned as having been expelled (some time earlier) from the Communist Party itself. (D. FD.)

KAGAWA, a *ken* (prefecture) in the northeast of Shikoku Island in south Japan. Area 718 sq.mi., including the offshore island of Shōdo-shima. Pop. (1965) 900,833. The capital is Takamatsu, the chief port on Shikoku for communication with Honshū. The climate is warm with low precipitation. Agriculture, supporting 50% of the population, is highly efficient and extremely intensive. Rice, and barley and wheat, grown as second crops, are the chief products. Mandarin oranges are grown extensively in the south and Shōdo-shima is noted for its olives. Lacquer, work gloves, and fans are leading industries. Forty percent of Japan's salt production comes from Kagawa. The Kotohira shrine and the Gentsuji temple attract many pilgrims. (R. B. H.)

KAGAWA TOYOHIKO (1888–1960), Japanese Christian social reformer, writer and evangelist, who devoted his life to improving labour conditions in Japan, was born in Kōbe on July 10, 1888. At the age of 15 he became a Christian and was disowned by his family. He studied at the Kōbe Presbyterian Theological College (1905–08), after which he attended Princeton (N.J.) Theological Seminary and Princeton University (1914–16). In 1909 he had gone to live in one of Japan's worst slums, an experience which provided much of the material for his writings.

His life in the slums, together with his Christian faith, made him a social reformer. By his newspaper articles, books, and speeches he focused attention upon the conditions under which millions of Japanese lived. After a breakdown in health he spent a year recuperating in a fisherman's cottage, where he learned how rural workers lived. He started rural cooperatives, labour unions (the first in 1912), and a labour college. After the Yokohama earthquake in 1923 he was invited by the government to help in relief and reconstruction work and became head of the Tokyo Social Bureau. He started milk depots, children's clinics, and pawnshops. Much of this work he financed from the proceeds of his writings.

Kagawa began to preach as soon as he became a Christian. Later he conducted special early morning services for workers on their way to work. He carried through great evangelistic campaigns in the big cities and often visited other countries, including England (1949–50), for the same purpose. In 1930 he launched the Kingdom of God movement to further conversions to Christianity.

Kagawa's pacifism and international contacts made him suspect. He founded the National Anti-War League in 1928 and in 1940 was arrested and imprisoned for apologizing to China for Japan's attack. In 1941 he was one of the group that went to the U.S. in the hope of averting war. After the war he led the movement for democracy in Japan. He died in Tokyo on April 23, 1960.

Kagawa wrote more than 150 books, among them several novels such as *Before the Dawn* (1924), sociological studies and religious books such as *Love, the Law of Life* (1929). He translated the works of Albert Schweitzer and studied the lives of Western mystics such as George Fox, John Wesley and Madame Guyon.

See W. Axling, *Kagawa* (1932); J. M. Trout, *Kagawa, Japanese Prophet* (1959). (A. M. Ch.)

KAGERA, a river of eastern equatorial Africa, is the most remote headstream of the Nile (*q.v.*) and the largest tributary of Lake Victoria. Its two main branches, the Niavarongo (Nyawarongo) and the Ruvuvu, are fed by streams rising in the highlands east of Lakes Kivu and Tanganyika. The remotest source, the Luvironza, rises 510 mi. from the mouth and joins the Ruvuvu near Kitega. The basin is mountainous, with many lakes and swamps, and lies chiefly in Rwanda at an elevation exceeding 4,000 ft.; it includes the Kagera National park of 970 sq.mi. In its middle course northward the Kagera is the boundary between Rwanda and Tanganyika. Turning east in about latitude 1° S., it forms the boundary for some distance between Tanganyika and Uganda. Its sinuosity and rapidity (up to 3 knots during the rains) impede navigation. The only port, Kyaka, 83 mi. from Lake Victoria, is served by a shallow-draft cargo steamer. Hydroelectric potentialities exist in the falls below the Ruvuvu-Niavarongo confluence. The Kagera was discovered in 1862 by J. H. Speke and explored in 1892–93 by the Austrian Oskar Baumann. (H. E. Ht.)

KAGOSHIMA, Japanese prefecture in southernmost Kyushu, includes the Amami Islands, Tanegashima, Yakushima and other offshore islands. Kagoshima is the most agricultural Japanese prefecture and produces mainly subsistence crops (dry grains and sweet potatoes) on dry fields. Retarding factors are its rough topography, volcanic ash soil and relative isolation from markets. Forestry, based on rich interior forests, and coastal fishing are also important. Industry is limited to foodstuffs processing, wood working and traditional handicrafts, such as bamboo and Satsuma pottery. Two volcanic peaks, Mt. Sakurajima in Kagoshima bay and Mt. Kirishima in the interior, attract many tourists. Pop. (1965) 1,853,517; area 3,529 sq.mi. (J. D. Ee.)

KAGOSHIMA, largest city and capital of Kagoshima prefecture, Kyushu, Japan, is on the west coast of Kagoshima bay within sight of the towering cone of Mt. Sakurajima, an active volcano. Kagoshima won its greatest fame as the feudal period castle town of the powerful Shimazu clan. It was the birthplace of such famous Restoration leaders as Saigo Takamori and Okubo Toshimichi. Once the leading Kyushu city, it is strictly an administrative and commercial centre for a poor agricultural and fishing hinterland. Kagoshima's port handles coastal shipping and provides steamer service to such offshore islands as Tanegashima and Yakushima. Pop. (1965) 328,444. (J. D. Ee.)

KAHLE, PAUL ERNEST (1875–1964), German authority on the Masoretic text of the Hebrew Bible, was born in Hohenstein, Prussia, on Jan. 21, 1875, and educated at the universities of Marburg, Halle and Berlin. After serving as German pastor in Cairo (1903–08) and as an assistant at the German Archaeological institute, Jerusalem (1909–10), he lectured in oriental languages at Halle (1909–14) and Giessen (1914–23) before becoming professor and director of the Oriental institute at the University of Bonn (1929–39). Loyalty to their Jewish friends compelled Kahle and his wife, Marie (*née* Gisevius; d. 1948), to leave Nazi Germany for England in 1939 and take up residence at Cambridge and later Oxford. He moved to Düsseldorf in 1963 and died in Bonn on Sept. 24, 1964. Of Kahle's numerous scholarly publications the most significant are *Masoreten des Ostens* (1913), *Masoreten des Westens* (2 vol., 1927–30), *The Cairo Geniza*, Schweich lectures of the British academy (1941, published 1947; 2nd ed., 1959) and the preparation of the Masoretic text for the standard edition of the Hebrew Bible by R. Kittel (1937). By investigating ancient manuscripts found mainly in the Cairo Geniza Kahle threw valuable light on the complexities of the textual transmission of the Hebrew Bible. He demonstrated the importance of the prior Palestinian and Babylonian systems of vocalization in determining the changes introduced to the pronunciation of Hebrew by the Masoretes of Tiberias, whose system has assumed complete domination since the 9th century. (D. Pa.)

KAHN, GUSTAVE (1859–1936), French poet and theorist of *vers libre*, was born at Metz on Dec. 21, 1859. He studied at the École des Chartes and the École des Langues orientales, and spent four years in north Africa, returning to Paris in 1885. He was involved with the literary reviews which publicized the poetic doctrines of Mallarmé, especially *La Vogue, Le Symboliste* and *La Revue indépendante*, of which he became one of the editors in 1888. With Catulle Mendès (*q.v.*), he arranged at the Odéon, the Théâtre Antoine and the Théâtre Sarah Bernhardt matinée performances of plays by the younger poets.

Kahn claimed to be the inventor of *vers libre* and explained his views in a preface to the *Premiers Poèmes* (publ. 1897 and including the earlier volumes *Les Palais nomades*, 1887; *Chansons d'amant*, 1891; and *Domaine de fée*, 1895). Who invented this verse form cannot be established with certainty (Jules Laforgue *q.v.*, also used it at about the same time); but Kahn is without doubt its first and most persuasive advocate. He broke with the dominating tradition of the alexandrine and sought to make rhythm dependant on the movement of the poet's thought rather than on the traditional rules of prosody. His poems are successful in capturing subtle accords in the minor key with a changing, musical rhythm. In accordance with his belief that poets should also be critics, he produced a considerable amount of critical writing, the most valuable being a highly personal contribution to the history of French poetry, *Symbolistes et Décadents* (1902). He also wrote six novels, a good example being *L'Adultère sentimentale* (1902).

See also Free Verse.

See A.-F. Hérold, "Gustave Kahn," in *Mercure de France*, vol. 272, pp. 253–264 (1936); P. Mansell Jones, *The Background of Modern French Poetry* (1951). (Ga. R.)

KAIBARA EKKEN (or Ekiken; real name Atsunobu) (1630–1714), Japanese Confucianist scholar of the early Tokugawa Period, a popular educator who brought Confucian ethics into the homes of ordinary Japanese people, and also a scientific investigator, in the spirit of Neo-Confucian inquiry; he has been called the father of Japanese phytology. Ekken was born in Fukuoka prefecture on Nov. 14, 1630, the fifth son of a retainer of Kuroda, lord of Fukuoka. He was in the service of Kuroda Tadayuki till he incurred his lord's displeasure and was dismissed in 1650. He then went to Nagasaki and to Edo, where he met Hayashi Gahō, a Chu Hsi Confucianist and Official Scholar of the shogunate. In 1656 he was employed by the next lord of Fukuoka, who sent him in 1657 to Kyoto to study under Yamazaki Ansai (*q.v.*) and Kinoshita Jun-an. There he also formed close friendships with the Chu Hsi Confucianists Nakamura Tekisai, Yonekawa Sōken, and Mukai Genshō, the latter also a scientist. Association with these scholars helped him to establish his position as a Chu Hsi Confucianist. Thereafter Ekken migrated back and forth between Fukuoka, Edo, and Kyoto, serving in Fukuoka and Edo as tutor to the clan lord and his heir and carrying out clan business, and in Kyoto lecturing on Confucian literature.

Between 1665 and his death on Aug. 27, 1714, Ekken wrote about 100 books, among the best known of which are *Shinshi-roku* ("Sincere Contemplation on Confucianism"), the so-called *Ekken Jukkun* ("Ekken's Ten Popular Lessons"), and *Yamato Honzō* ("A Study of Japanese Plants"). Others include historical books, travel books, books on health, and rules for the conduct of women. In his later years he took issue with Chu Hsi, in *Taigi-roku* ("Great Doubts"), over Chu Hsi's dualistic separation of principle (*li;*

Japanese *ri*) and material force (*ch'i;* Japanese *ki*); but he never went beyond the bounds of Chu Hsi Confucianism. (*See* CHU HSI; CONFUCIANISM: *Neo-Confucianism.*)

Ekken's wife, Tōken, to whom he was happily though childlessly married for 45 years and who accompanied him on some of his travels, was also a scholar as well as a calligrapher and poet. It has been suggested that she was the real author of some of his books.

See also JAPANESE PHILOSOPHY: *Philosophy Before the Modern Period: Search for a New Universal Principle.*

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KAIETEUR FALLS, on the Potaro river, Guyana, are among the world's grandest falls. There is a sheer drop of 741 ft. over the edge of a sandstone plateau, in which the falls have eroded a five-mile-long gorge descending another 81 ft. At the top of the falls the river, which is perennial, is 300–350 ft. wide. The falls were discovered by C. Barrington Brown, a geologist, in 1870. The area has been designated a national park. The falls are usually visited by chartered aircraft from Georgetown, but a road and river expedition taking seven to nine days is possible. (G. LN.)

K'AI-FENG, one of the oldest cities of China, was formerly the capital of Honan province. Pop. (1958 est.) 318,000. It is on the south bank of the Yellow river about 150 mi. east of where the river emerges from the narrow gorges and about the same distance west of the Grand canal. K'ai-feng faces the Yellow river corridor in the west leading to Wei Ho valley, China's early heartland, and to central Asia beyond. Its significance as a gate city for western influences is shown by the large Muslim element in its population and the location of an early Jewish colony which Chinese records indicate built a synagogue there in A.D. 1183 and renovated in 1488. The colony persisted almost down to the 20th century. K'ai-feng's position halfway between the Shantung and the Honan hills also placed it on the natural route between the Hopeh plain and the Yangtze valley. Its nodal situation favoured its choice as the capital of China for about 200 years during the Five Dynasties (A.D. 907–960) and the Northern Sung (960–1126) when it was known as Pien-liang. Later, K'ai-feng was the centre of imperial road systems and on the main highway running from Peking to Hankow and Kuei-lin in the south.

While often endangered by Yellow river floods, its position on the upper part of the river levee is bolstered by dikes, and it lies west of where most of the historic levee-breaches have occurred. The importance of K'ai-feng diminished with the silting of former waterway connections with southeast Kiangsu, and with the development of the two north-south railroads that bypass it to the east and west, although it is advantageously connected to these by the east-west Lung-hai line terminating at the port of Lien-yun. Its eclipse was hastened by the rise of Chengchow, provincial capital since 1955, as the industrial and transportation hub of Honan. Japanese forces held the city 1938–45. It was occupied by Communist Chinese forces in 1948. It is the seat of Honan Medical college and has a provincial library and a museum. Its industries include textile and flour mills, oil-pressing plants and match and machinery works. (H. J. Ws.)

KAI (EWAB) **ISLANDS,** a group of islands of the Moluccas, Indonesia, on a ridge in the Banda sea that extends southeastward from Ceram to the Tanimbar Islands. Separated by deep water from the Banda Isles to the west and the Aru group to the east, they lie between 5° and 6° 5′ S. lat. and 131° 50′ and 133° 15′ E. long. The group includes Great Kai (Nuhu Tjut), Little Kai (Nuhu Roa and Kai Dula), the Kur group and the Tayando group.

The principal island is Great Kai, which is long (64 mi.) and narrow, of Tertiary formation, and very mountainous, with heights rising to nearly 3,000 ft. The mountains run down the centre of the island, and the coast is high, with steep cliffs. Kai Dula has low hills in the south and northwest, but the other islands are, comparatively, without high ground. Most of them are encircled by shoals, and all are covered with dense forest from which excellent timber is obtained. All the islands except Great Kai are of Post-Tertiary coralline limestone. The area of the whole group is 572 sq.mi., and the estimated population in 1957 was 39,660.

The native inhabitants of these islands were described by A. R. Wallace in 1890 as typical black Papuans, but since his visit to Kai there has been considerable intermarriage with persons of Malayan stock. Originally pagans, the people today are largely Christian, the result of missionary work. There are also many Muslims. Though the old customs are tending to disappear, the islanders' three-level social structure may still be seen: *melmel,* an upper class, which appears to have come to Kai from the west; *rinrin,* made subject by the *melmel;* and *iri,* the descendants of slaves brought from New Guinea. The old form of marriage is endogamic. The society is communal in organization, untilled land being owned by the village and cultivated ground by the individual as long as he tills it. Right to land is never alienated, so that a stranger cannot own it unless he marries into the community. Houses are built very simply, of bamboo and atap, sometimes on piles; and where the people are pagan there is a holy stone in the midst of a number of houses, as well as stone and wooden images, the "protectors" of the village.

At Banda Elat on the eastern side of Great Kai, midway along the coast, and also at Banda Eli in the north, there is a community of the original inhabitants of the Banda Islands, who were expelled from there by the Dutch in the time of Jan Pieterszoon Coen and who have retained the Bandanese language, now unknown in Banda, and the Bandanese customs. They are Muslims and good smiths and potters. Racially they appear to be Malayan-Papuan, but it is unlikely that there has been no admixture of other stock.

The flora of the Kai Islands includes the fig and the ironwood tree, various palms (sago, areng, coconut) and mangrove. In the forests orchids and arboreal lilies and screw pines abound. The bananalike plantain, yams, maize (corn), rice and tobacco are cultivated. Fishing and hunting add to the native diet, which consists mainly of sago. The native fauna comprises a wild pig and a small pouched mammal called cuscus, a small green lizard, a rare species of pigeon, red lories, a number of rare species of butterfly and several unusual beetles. There are many kinds of fish and trepang (bêche-de-mer) and tortoise are found in great numbers on the reefs. Practically the only trade is in copra, timber, trepang and tortoiseshell. Roads are confined to the immediate vicinity of Langgur and the ports Tual (administrative centre) and Elat, all of which are regularly visited by steamships.

(E. E. L.; J. O. M. B.)

KAILAS RANGE, elevation 22,027 ft., is one of the highest mountain ranges in western Tibet, from which three large rivers in India, the Indus, Sutlej, and Brahmaputra (*qq.v.*), take their rise. Mt. Kailas is known as Kang (or Gang) Rimpoche to the Tibetans, Siva's paradise to the Hindus; it is also identified in Buddhist cosmography with Mt. Sumeru, the cosmic centre around which the world rotates. To the south of the Kailas Range lies Lake Manasarowar, generally recognized as the highest body of fresh water in the world. Mt. Kailas with its majestic snowy peaks and Lake Manasarowar with its crystal clear turquoise water are holy places to the Tibetans and Indians alike. In 1949 an Indian delegation scattered some of Gandhi's ashes into the placid sacred fold of Lake Manasarowar. (T.-L. S.)

KAIRA, a town and district of Gujarat, India. The town, headquarters of the district, lies 20 mi. S.W. of Ahmedabad on the main Bombay-Ahmedabad railway line. Pop. (1961) 9,641. The antiquity of Kaira is proved by the evidence that copperplate grants were known as early as the 5th century A.D. Early in the 18th century the town passed to the Babi family; it was taken by the Marathas in 1763 and handed over to the British in 1803.

KAIRA DISTRICT (area 2,621 sq.mi., pop. [1961] 1,977,540) forms, except for hills in the north, south and southeast, one unbroken plain sloping gently toward the southwest. In the north and northeast are patches of riceland broken by tracts of low scrub. The fertile and highly cultivated centre merges to the west into a bare though well-cultivated tract of riceland which grows more barren and open to the south till it reaches the maritime belt along the Gulf of Cambay. Antelope, gazelle and many game birds are

common. The chief rivers are the Mahi and the Sabarmati. The Mahi is impracticable for either navigation or irrigation, but the waters of the Sabarmati are largely utilized for irrigation, as are those of the smaller Khavi. The chief crops are bajri (pearl millet), rice, pulses, jowar (sorghum), wheat and cotton; industries include cotton textiles, printing, dyeing, and glass manufacture, but the district is particularly noted as a co-operative milk-producing centre. It is served by the Western railway. A number of former Gujarat states were incorporated in the district in 1947. The places of interest include an underground temple of Mahadeo and a fine Jain temple at Kapadvanj. (M. R. P.)

KAIROUAN (KAIRWAN; QAIRWAN), one of the holy cities of Islam and famous for its Great Mosque, lies in Tunisia 38 mi. W.S.W. of Sousse by rail and 97 mi. S. of Tunis by road. It is the administrative headquarters of Kairouan governorate. Pop. (1956 census) 33,968 (commune).

Kairouan lies in a semidesert alluvial plain which is irregularly inundated by floods of the Marguellil and Zerud wadies. Its unfavourable situation and some of its functions can be explained only by its history. According to tradition it was founded in A.D. 670 by the Arab conqueror Okba ibn Nafi' (but more probably by Moawiya ibn Hodeij) as an advance camp, on the site of the Byzantine fortress of Kamounia. From this camp was launched the offensive that ended with the political and religious subjugation of the Maghreb (northwest Africa). Kairouan was chosen as the capital by the first Aghlabid ruler in about A.D. 800, and despite the rivalry of Mahdia continued as capital under the Fatimid and Zeirid dynasties in the 10th and 11th centuries. It thus became a great Muslim centre—at once political, with its court and princely residences; economic, with its industries, lively sooks (markets), converging routeways and active commerce with the port of Susah (*q.v.*); and religious and intellectual, with its magnificent mosque and the teaching given there. But as a result of the Bedouin incursions of the 11th century, the decline of steppe cultivation in favour of nomadic pastoral life and the advent of Tunis as capital, Kairouan declined into an isolated market town for nomads. However, the prestige of its past left it with a governor and with the benevolence of several rulers, notably the bey Hussein ben Ali, who in 1706–12 restored its walls and monuments. Its population was about 15,000 at the beginning of the French protectorate (1881–1955), during which period Kairouan played an unimportant part despite the favourable conditions for urban life. It is an agricultural market for the cereals irrigated by the wadies and for livestock raised in the surrounding country; it has important manufactures of carpets but its other handicrafts (copperware, leatherwork) have declined. Kairouan's glorious past makes it a centre of pilgrimage for educated Muslims who visit the Great Mosque and for local people who pray at the tomb of Sidi Sahab.

The *medina* forming the old town occupies the northeastern part of the city and is surrounded by a crenelated brick wall enclosing about 75 ac. In the northeast of this part is the great mosque. It is not the building founded by Okba but its older portions date from Aghlabid times. The prayer chamber, whose roof is supported by about 200 columns (mostly taken from Roman or Byzantine buildings), opens onto a vast courtyard paved with marble slabs and surrounded by a pillared double gallery; at the north end a massive square minaret with domed top rises to 115 ft. and commands a fine view. Just outside the city to the northwest is the *zaouia* (religious college) of Sidi Sahab, containing the tomb of one of the companions (Arabic *sahab*) of Mohammed who was buried with three hairs from the Prophet's beard in a pouch on his breast. Nearby, beside the Tunis road, is the Aghlabid reservoir, an open circular pool 420 ft. across dating from the 9th century. The former European quarter is in the southern part of the city.

KAIROUAN GOVERNORATE with a population of about 220,700 in 1960 and an area of 2,714 sq.mi. comprises the *délégations* (administrative districts) of Hadjeb-el-Aioun, Haffouz, Kairouan, Sbikha, Ousseltia, Sidi-Ali-Nasrallah and Sidi-Amor-bou-Adjela. It extends southward over the Basse steppe, the country of the former Zlass nomads who live by cultivating cereals and olives and raising livestock. To the west it stretches into the foothills of the Dorsal range over the Ousseltia plain. (J.-J. Ds.)

KAISER, GEORG (1878–1945), the leading figure of German Expressionist drama, was born at Magdeburg, Nov. 25, 1878. He went to Argentina as a clerk, but ill-health forced him to return to Germany. During his long convalescence he wrote his first plays, mainly satirical comedies which attracted little attention. His first real success was *Die Bürger von Calais* (1914), in which he revealed his outstanding gift for constructing a close-knit drama, expressed in trenchant and impassioned language. This was followed by a series of plays, mainly on social themes, which established his position as a leader of the Expressionist movement: *Von Morgens bis Mitternachts* (1916; English translation, *From Morn to Midnight*, 1922), *Die Koralle* (1917; English translation, *The Coral*, 1931), *Gas I* and *Gas II* (1918 and 1920; English translation, 1924), *Hölle, Weg, Erde* (1919), *Nebeneinander* (1923), *Zweimal Oliver* (1926). The last of this series of plays was *Der Silbersee* (1933). In all he showed man in deadly conflict with the modern world of money and machines. His later plays are more intimate, embodying a deep experience of love: *Oktobertag* (1928, English translation, *The Phantom Lover*, 1928), *Der Gärtner von Toulouse* (1938), *Alain und Elise* (1940) and others. In 1938, after the Nazis had banned his plays, Kaiser went into exile in Switzerland where he continued his amazing output until his death at Ascona, June 4, 1945. His last work was a mythological trilogy, *Zweimal Amphitryon, Pygmalion* and *Bellerophon* (published 1948). Besides about 60 plays, Kaiser wrote two novels—*Es ist genug* (1932) and *Villa Aurea* (1940; English translation, *A Villa in Sicily*, 1939) —and some poetry.

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KAISERSLAUTERN, a city of Germany which after partition of the nation following World War II was in the *Land* (state) of Rhineland-Palatinate of the Federal Republic of Germany, is 69 km. (43 mi.) N.W. of Karlsruhe. Pop. (1961) 86,259. Kaiserslautern takes its name from the stream Lauter and from the emperor (kaiser) Frederick Barbarossa, who built a castle there in 1152–58, after a royal residence had already existed in Carolingian times. It became an imperial city in 1276, a palatinate in 1357 and was later a residence of the counts palatine. An early centre of the Reformation, in 1848–49 Kaiserslautern was the focal point of the Palatinate democratic revolution. Around 1900 the city developed into one of the biggest industrial centres of the Palatinate with ironworks, cotton mills, a foundry for sanitary castings and pipes, and a sewing-machine factory. Schools of all kinds, a theatre, concerts, museums, adults' evening schools and libraries made Kaiserslautern a cultural centre. It has a good situation in the centre of the Palatinate with lakes and camping sites. The autobahn, the Paris-Warsaw railway and many highways connect the city with other parts of Europe. (O. MU.)

KAKINADA (formerly COCANADA), a town, headquarters of East Godavari district, Andhra Pradesh, India, lies on the coast in the extreme northeast of the Godavari delta, about 300 mi. N.N.E. of Madras. Pop. (1961) 122,865. Kakinada became a municipality in 1866. The main road crosses a small tidal river and connects the town with its suburb Jagannadhapuram. There are colleges of arts and science, engineering, and medicine affiliated to the Andhra university. The arts and science college (1884), an orphanage (1909) and a Brahmo Upasana Mandir (temple) were all founded by the Pithapuram zamindars. An educational trust provides scholarships for higher education abroad. The Canadian Baptist mission started educational and philanthropic work in the town about 1869.

The roadstead in Kakinada bay is protected but shallow, so that steamers have to anchor seven miles out. The town is connected by a branch line with Samalkot on the Southern railway, and by the Kakinada canal with the canal system of the Godavari delta at Dhavileswaram. The main exports are rice, oilseeds, tobacco and cotton. The town contains textile, rice and oil mills, and motor vehicle works.

Jagannadhapuram, a Dutch settlement established in 1628 and

acquired by the English in 1825, was destroyed in 1839 by a tidal wave. (B. S. R.)

KAKINOMOTO NO HITOMARO (fl. *c.* 680–710), venerated by the Japanese since earliest times as one of their greatest poets, was also Japan's first great literary figure. Among his surviving works are poems in the two major Japanese poetic forms of his day—*tanka* and *chōka* (*see* JAPANESE LITERATURE)—and probably also *sedōka* ("head-turning poem," consisting of two tercets of 5, 7, 7 syllables), a relatively minor song form that seems to have been adapted to literary purposes by Hitomaro and that barely survived him. All of the poems accepted as indisputably his (some 61 *tanka* and 16 *chōka*), as well as a large number of others attributed to him, are to be found in the *Manyōshū* (*c.* 759), the first and largest of Japan's anthologies of native poetry. These poems, together with notes by the compilers, are the chief source for information on his life, about which very little is known. He is believed to have been born and reared near Nara. He entered the service of the court in a minor capacity, serving successively two imperial princes, and imperial activities are celebrated in some of his most famous poems. In 702 he accompanied the emperor and empress dowager on a journey to the Kii Peninsula, where the imperial family maintained a lodge at a famous beauty spot celebrated by Hitomaro in one of his poems. Later he became a provincial official, and he is believed to have died in Iwami province. He seems to have had at least two wives.

Standing on the threshold of Japan's emergence from a preliterate to a literate, civilized society, Hitomaro achieved in his poems a splendid balance between the homely qualities of primitive song and the more sophisticated interests and literary techniques of a new age. Inheriting the stiff techniques, plain imagery, and restricted range and subject matter—the traditional "word-hoard"—of preliterate song, he added new subjects, modes, and concerns, new rhetorical and other structural techniques (some of which may have been adapted from Chinese poetry), and a new seriousness and importance of treatment and tone. Many of his longer poems are introduced by a kind of "overture," relating the present with the divine past of the Japanese land and people and providing a solemn prologue for elevated treatment of public subjects. All of his poems are suffused with a deep personal lyricism and with a broad humanity and sense of identity with his fellowman. A consummate craftsman, he gave formal structure and cohesion to his longer poems with unequaled skill, controlling and stiffening the fluid character of the language with complex rhetorical techniques, including contiguous and noncontiguous parallelism between lines and larger units, echoings of sound and sense in different parts of the poem, and patterns of natural imagery used (often with gentle irony) as metaphor and symbol. Outstanding among his works are his poem on the ruined capital at Ōmi, his celebration of Prince Karu's journey to the plains of Aki, two poems each on the death of his first wife and on parting from his second, his lament on the death of Prince Takechi, and his poem composed on finding the body of a man on the island of Samine. His work may be read in English translation in *The Manyōshū: 1,000 poems,* in an edition published in 1940 and reissued in 1965.

See Robert H. Brower and Earl Miner, *Japanese Court Poetry* (1961). (Ro. H. B.)

KAKWA: *see* BARI.

KALA AZAR, from the Hindu meaning "black fever," a highly fatal infectious disease, leishmaniasis of the deep organs of the body, caused by the parasitic microorganism *Leishmania donovani,* and endemic in various parts of Asia, Africa, the Mediterranean area and South America. *See* LEISHMANIASIS.

KALAHANDI, an administrative district in Orissa, India, was formed in 1949 by uniting the Nawapara subdivision of the old Sambalpur district with the former princely state of Kalahandi. Area 5,099 sq.mi. Pop. (1961) 1,009,654. The entire district is generally hilly and undulating. A fertile plain area extends from Bhawanipatna to Junagadh in the west, and thence toward the south as far as the Koraput district border. The main rivers are the Indravati, a tributary of the Godavari, and the Tel, a tributary of the Mahanadi. Irrigation facilities make possible fairly extensive cultivation of rice, wheat, pulses, and tobacco. Many of the 3,028 villages are large and prosperous. The forests of Nawapara yield valuable timber and the district is rich in unexploited minerals (manganese, graphite, bauxite, etc.). The Raipur-Vizianagram railway passes through the north of the district.

Bhawanipatna, the district headquarters (pop. [1961] 14,300), contains the palace of the maharaja. In the district are Belkhandi, a site of archaeological interest, and Gudahandi, with cave paintings which are probably prehistoric. (MA. M.; N. K. S.)

KALAHARI DESERT, a region of southern Africa, lies mainly between 20° and 28° S and 19° and 24° E and covers more than 100,000 sq.mi. The name is applied mainly to the western part of Botswana but also to parts of South West Africa and of the Cape of Good Hope Province of the Republic of South Africa. Very little of it is a desert in the full sense, the annual rainfall varying from 20 in. in the northeast to 5 in. in the southwest. Its elevation is fairly uniform at about 3,000 ft., the lowest part being the large Makarikari Pan which is salt and receives the overflow from the Okovango River to the north. Reddish sand overlying very old rocks quickly absorbs any rain, so there are practically no surface streams that flow for more than a day or two. The vegetation varies with the rainfall from forest to low thorn scrub, but grass grows everywhere in the rainy season. Much of the grass is good feed for animals, and consequently most of the game animals of southern Africa, including elephant, may be found in the Kalahari, especially in the rainy season. In the southwest the Kalahari Gemsbok National Park, partly in Cape Province and partly in Botswana, covers about 8,000 sq.mi.

Bantu tribes dwell on the outskirts of the region, but the only true inhabitants of the central Kalahari are the Bushmen. Readily recognized by their small stature, Mongoloid features, and yellowish skin, they are nomads who live by their skill in hunting. (*See* BUSHMAN.) David Livingstone and William C. Oswell first crossed the Kalahari in 1849 to find Lake Ngami. In 1878–79 a large party of Boers trekked across but with great loss of life. In modern times motor transport made the region much more accessible. *See* also BOTSWANA.

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KALAKH (KALHU): *see* NIMRUD.

KALAMATA (Gr. KALAMAI), capital of the *nomos* (department) of Messenia (Messinia) in southwestern Greece, stands on the Nedon River about 2 km. (1 mi.) inland from the Gulf of Kalamata and 137 km. (85 mi.) SSE of Patras. Pop. (1961) 38,211. It is the seat of the metropolitan bishop of Messenia, and has a court. There are Byzantine churches of the 10th to 12th centuries. The harbour serves as a port for cargo and passenger ships. The manufacture of silk, for long a local industry, is still practised, and Kalamata is the principal market for the olives, currants, and other fruit crops of the Messenian Plain. The site has been identified with the Homeric and classical Pherae, but Kalamata was of no importance until the Middle Ages. In 1208, after the Fourth Crusade, it became a fief of the Villehardouin family, whose castle, with a Venetian wall and other additions of the 17th century, stands on a hill behind the town. The Venetians captured it in 1685; in 1770 and again in 1821 it was the revolutionary headquarters in the Morea; in 1825 it was sacked by Ibrahim Pasha. In 1941 it was one of the evacuation points for the British forces in Greece. (D. M. N.)

KALAMAZOO, a city of Michigan, U.S., the seat of Kalamazoo County, is located midway between Detroit and Chicago, about 70 mi. SW of Lansing on the Kalamazoo River at its confluence with Portage Creek. The river was easily forded at that point, and English and American fur traders maintained a post near the ford before the first settler, Titus Bronson, built his cabin in 1829. The growth of the town was stimulated when a government land office was established in 1834. Kalamazoo was incorporated as a village in 1843 and as a city in 1884. Paper manufacturing, begun in 1867, became the city's largest industry. Other manufactures include pharmaceuticals, fishing tackle, taxicabs, machine tools, auto trailers, musical instruments, ventilating systems, and

truck transmissions. Kalamazoo celery, first grown by the city's Dutch settlers, is famous. Educational facilities include Kalamazoo College, a coeducational college chartered in 1833 and related to the Baptist Church; Western Michigan University, founded in 1903; and Nazareth College, a Roman Catholic college for women, established in 1924. The city has a civic theatre, an art centre, a symphony orchestra, a library, and a museum. Kalamazoo was selected in 1957 by the United States Information Agency as the typical American city and was portrayed in exhibits shown in Great Britain and Germany. Since 1918 the city has had a council-manager form of government.

Pop. (1960) city 82,089; standard metropolitan statistical area (Kalamazoo County) 169,712. (For comparative population figures *see* table in MICHIGAN: *Population.*) The population of the city increased by 25,000 between 1950 and 1960, partly as the result of annexations in the mid-1950s which more than doubled its area. The name Kalamazoo is an Indian term, said to mean "boiling pot," from the bubbling springs Indians discovered in the river there. (W. F. DU.)

KALAT, a town, district, and division of West Pakistan. The town, formerly the capital of the princely state of Kalat and now the headquarters of the district and division, lies about 88 mi. S of Quetta. Pop. (1961) 5,321. It is known locally as Kalat-i-Baluch, to distinguish it from Kalat-i-Ghilzai in Afghanistan, and Kalat-i-Sewa, after its legendary founder. The town, situated in a valley surrounded by mountains, is walled, with four gates, one in each wall. It has four main roads. Before the destructive earthquake of 1935 the town was within the fort, containing the palace of the khans of Kalat which was called Miri (citadel). It was then moved to its present site. The spectacular palace of Khan-i-Kalat and a high school for boys lie to the southeast; the civil hospital and the girls' school, formerly called Bazm-i-Adab, are to the north, outside the town. A metaled road connects Kalat with Quetta, and others link it with Karachi and Pasni.

Kalat fell into the hands of the Mirwaris about the 15th century, after which it remained the capital of the Ahmadzai khans of the Mirwar clan, who originally emigrated from Oman to the Kolwa valley of Makran. It was occupied by the British in 1839 but returned to the khan in 1842. Kalat was the headquarters of the Baluch confederacy, of the British agent subordinate to the Baluchistan commissioner and finally of the Baluchistan States union in 1952–55.

KALAT DISTRICT comprises four subdivisions, Kalat Niabat, Sarawan, Jhalawan, and Kachhi, and has a population (1961) of 341,420. Area 30,931 sq.mi. Most of the district is mountainous, the ranges being intersected here and there by long narrow valleys. The climate varies in different areas, Kachhi being one of the hottest parts of Pakistan. Round Kalat the temperature in summer is moderate but in winter severe cold accompanied by snow is experienced. The district depends largely on flood cultivation but in the north precipitation is adequate; in the south most of the rain falls in summer. Water for irrigation is obtained from *kareze* (underground water channels) and from springs and rivers. Wheat, jowar, and fruits are the chief agricultural products. An excellent breed of cattle comes from Nari in Kachhi, and Sarawan and Kachhi produce the best horses in Baluchistan. The district is believed to be rich in minerals. Coal is mined in the area round Degari, at Dasht in Sarawan. Ferrous sulfate is found in Jhalawan and iron ore and sulfur are produced at Shoran.

Khuzdar (Hozdar), the former capital of the state, is about 50 mi. S of Kalat and is the centre of communication. Several valleys in the district are wide and fertile, full of thriving villages and strikingly picturesque. Mastung Valley was being developed in the 1960s. The people live in huts and tents in small villages. Fine embroidery, and the making of pile carpets, leather goods, palm bags, and mats are the main occupations.

The early history of the princely state is bound up with that of Baluchistan (*q.v.*) as a whole. After being held by Sind, by the Arabs, Ghaznivids, Ghorids, and Mongols, it was returned to Sind in the days of the Sumras and Sammas (*see* SIND; THATTA). It then fell into Mogul hands and although the Ahmadzai khans reached the zenith of their power in the 18th century, they were subject to the suzerainty of Delhi or Kandahar. After the First Afghan War, Kalat came under the control of the British. During the 19th and 20th centuries the area under the khan's governance was progressively reduced. The state acceded to Pakistan on March 31, 1948. In April 1952 the rulers of Kalat, Makran, Kharan, and Las Bela formed an entity called the Baluchistan States Union, the position of which was analogous to a governor's province. The states unions merged in the new province of West Pakistan in Oct. 1955 and Kalat state became the district of Kalat though some areas were transferred to other districts.

KALAT DIVISION (72,944 sq.mi.; pop. [1961] 530,893) comprises, in addition to Kalat district, the former princely states of Kharan and Makran (*qq.v.*), now districts with populations (1961) of 42,483 and 146,990 respectively. (K. S. AD.)

KALB, JOHANN (BARON DE KALB) (1721–1780), American Revolutionary War general, was born June 29, 1721, at Hüttendorf, Ger., of peasant antecedents. Schooled at Kriegenbronn, he left home at the age of 16 to become a waiter or butler. In 1743 he was a lieutenant in Count Loewendal's German regiment of French infantry, calling himself Jean de Kalb. A major by 1756, he served France ably in the War of the Austrian Succession and with gallantry as well as distinction in the Seven Years' War. His marriage in 1764 brought him a comfortable fortune. In 1768, as a secret agent for the duc de Choiseul, he visited America to ascertain the attitude of the colonies toward Great Britain. He was promised a major generalship in 1775 by Silas Deane, American commissioner to France. He reached Philadelphia in July, 1777. Eventually Congress appointed him to the rank of major general and he became a strong admirer of General Washington. Early in 1778, known as Baron de Kalb or General de Kalb, he was appointed second in command to the marquis de Lafayette on an abortive expedition against Canada, which was abandoned at Albany, N.Y.

In April 1780, Kalb was ordered from Morristown, N.J., to the relief of Charleston, S.C., but the city fell to the British while he was marching south. At Deep River (Buffalo Ford), N.C., he was joined in July by Gen. Horatio Gates, commander of the southern department. Their army consisted almost solely of raw militia. Kalb urged an immediate attack, but Gates waited until the British forces knew of his presence and then on Aug. 14 marched against them at Camden, S.C. When battle was joined on Aug. 16, the British drove the panic-stricken militia, as well as Gates, from the field. Enveloped, overwhelmed, unhorsed, and wounded 11 times, Kalb continued the fight until he was taken prisoner. On Aug. 19, at Camden, he died of his wounds. (G. C. G.)

KALEIDOSCOPE, a simple optical instrument, using usually only two inclined mirrors, invented in about 1816 (patented 1817) by Sir David Brewster for producing attractive symmetrical and geometrical patterns and designs. Although extensively sold as an amusing toy, it has real value for the pattern designer and offers an admirable illustration of the image-forming properties of combined inclined mirrors. If an object A (in fig. 1) is placed between two mirrors M_1 and M_2 which are inclined at right angles it forms images B in M_1 and C in M_2. But B is now effectively an object to M_2 and this leads to an image D. In like manner C produces an image in M_1 which coincides with D. There are effectively four symmetrically placed objects A, B, C, D located at the corners of a rectangle.

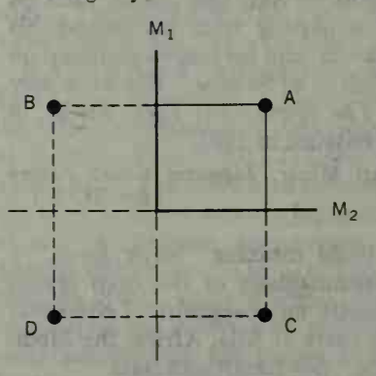

FIG. 1.—KALEIDOSCOPIC 90° MIRRORS ARRANGEMENT (*see* TEXT)

Symmetrical patterns will always be formed by two touching inclined mirrors if the angle between them is $180°/n$, where n can be 2, 3, 4, 5, 6 . . . etc. A value commonly adopted for n is 3, the mirrors being inclined at 60°. This leads to a hexagonally symmetrical pattern (fig. 2). The object A produces five other regularly placed images. The two marked I are each produced by a single reflection. The two marked II arise each from a double reflection, and that marked III is the superposition of the two sepa-

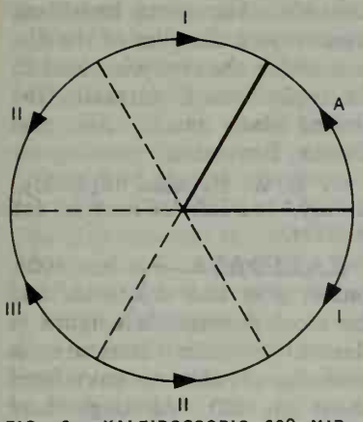

FIG. 2.—KALEIDOSCOPIC 60° MIRRORS ARRANGEMENT (*see* TEXT)

rate images each produced by three reflections. The light intensity falls off appreciably for successive multiple reflections, hence the images in the six sectors, while geometrically the same, are not equally bright. This is particularly observable in the sector containing III. Only if the angular setting of the mirrors is close to 60° will the two images making up III adequately superpose.

A simple kaleidoscope consists of two thin wedge-shaped glass strips (fig. 3) (or a single sheet of bright aluminum bent to shape) inclined so that QPR is 60°, and touching along a common edge PS. The length may be 8 in. The mirrors are enclosed in a tube having at the right a viewing eyehole. The eye must be placed at S quite close to the common edge, otherwise symmetry is lost. At the left side, and as close as possible to the plane QPR, is a thin flat disklike box which can be rotated. This is made up from two glass disks, that on the left being ground to act as a diffusing screen. In this box are small pieces of coloured tinsel, glass or beads, but not too many, as there is a sixfold multiplication. When turned or tapped these objects tumble into some arbitrary grouping and a beautiful symmetrical hexagonal pattern appears when the diffusing screen is held up to a bright source, or to skylight. The number of combinations is effectively without limit, and this is a lasting charm of the device, giving endless interest and amusement. Most kaleidoscopes do not offer the facility of changing the box contents, although this would be a real advantage.

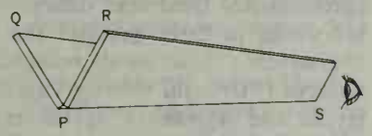

FIG. 3.—SIMPLE KALEIDOSCOPE (*see* TEXT)

As the angle of incidence of the light on the mirrors is high, the reflectivity is also high, for even an unsilvered glass surface has very high reflectivity when light is incident near to grazing incidence. This levels up the intensity differences in the different sectors. The object box can be dispensed with and as an alternative an image of a distant object can be thrown on QPR with a lens, an eyepiece at S being then advantageous. Kaleidoscopes have been designed in which the angle between the mirrors is variable at will, but these are only of academic interest.

While the common kaleidoscope only has two mirrors, symmetrical patterns can also be produced with three and with four mirrors (but not with more than four). The three mirrors must form a closed triangle selecting one of the three following: (1) 60° equilateral; (2) right-angle plus 60° and 30°; (3) right-angle, isosceles, base 45°. With four mirrors, a closed rectangle (or square) is essential. (S. TY.)

KALERGIS, DIMITRIOS (1803–1867), Greek patriot and statesman, prominent in the early years of the monarchy, was born in Crete. He studied in St. Petersburg and Vienna and, on returning to Greece, took part in the War of Greek Independence. In March 1825 he and Giacinto Provana di Collegno, the Piedmontese philhellene, were entrusted with the defense of New Navarino against Ibrahim Pasha. After the loss of that stronghold he joined the army led by Georgios Karaïskakis. He was taken prisoner at Phaleron in May 1827 and would have been executed but for the payment of a large ransom. He became aide-de-camp to the French philhellene, Col. Baron Charles Fabvier, and afterward to Count I. A. Kapodistrias. Antagonistic to the rule of King Otho, he nevertheless helped to save the dynasty in 1843. At the same time, as leader of the cavalry, he played a decisive part in ridding Greece of Otho's Bavarian entourage and in establishing a constitution (*see* GREECE: *History*). Appointed military commander in Athens, he was driven into exile when the ministry of Alexandros Mavrokordatos fell in 1845. He went to London, where he became friendly with Louis Napoleon. In 1848 he landed on the Greek coast to instigate a revolution. He was captured but soon released. He went to Paris in 1853 but at the instance of the western powers was recalled and appointed minister (1854) in the Mavrokordatos cabinet. Disliked by King Otho, he was forced to resign in Oct. 1855. Never without influence, he was appointed in 1861 minister plenipotentiary in Paris and took part in the negotiations leading to the accession of Prince George of Denmark to the Greek throne in 1862. He died in Athens on Jan. 24, 1867. (D. DN.)

KALEVALA, the name of the Finnish national epic compiled by the scholar Elias Lönnrot (*q.v.*) from old Finnish ballads, lyrical songs and incantations memorized and handed down by word of mouth by the bards and ordinary people for generations. The word Kalevala is a poetical name for Finland in the epic and means "land of heroes," the dwelling place of the poem's chief characters, called the "sons of Kaleva." Among the chief characters is the old and wise Väinämöinen of supernatural origin, a more powerful seer than all the others, leader of the inhabitants of Kalevala and an incomparable singer and player of the kantele, the Finnish harplike stringed instrument. The others are the skilled smith Ilmarinen who is said to be one of those who forged the "lids of heaven" when the world was created; Lemminkäinen, the carefree adventurer-warrior and charmer of women; and Louhi, the female ruler of Pohjola, a land in the north, the counterpower of Kalevala. The most important secondary episode deals with Kullervo, the mighty hero, the Hamlet of the *Kalevala* forced by fate to be a slave from his childhood, and his resulting tragic destiny.

Among the main themes of the poem are the adventurous journeys of Väinämöinen, Ilmarinen and Lemminkäinen to Pohjola to woo the daughter of Louhi, famed for her beauty. In this connection is the episode of the forging of the miraculous Sampo, bringer of happiness and prosperity, by Ilmarinen as a special task, and its recovery for the people of Kalevala. The Sampo can be taken as the symbol of man's spiritual and material advancement.

The *Kalevala* depicts the conditions and ideas of the pre-Christian period, although the last canto seems to predict paganism giving way for Christianity: the maid Marjatta gives birth to a son who is baptized king of Karelia; Väinämöinen makes way for him, departing from Finland forever, leaving his instrument and songs.

The poem is written in octosyllabic trochees and dactyls, the so-called Kalevala metre; it uses alliteration, parallelism and repetition. It has been the subject matter and source of inspiration for many outstanding works of art, among them the paintings of Akseli Gallén-Kallela and the compositions of Jean Sibelius. The poem has been translated into 20 languages, including English (W. F. Kirby, 1907); German (A. Schiefner, 1852; rev. ed. by M. Buber, 1921); Russian (L. P. Bielski, 1889); Hungarian (B. Vikár, 1909); French (J. L. Perret, 1931); Rumanian (I. Vesper, 1959); Italian (P. E. Pavolini, 1910); and Japanese (K. Morimoto, 1937). Longfellow borrowed the metre of his *Hiawatha* from a German translation of the *Kalevala* in the original metre and imitates the style and matter of the Finnish epic very closely.

The first edition of the *Kalevala,* published by Lönnrot in 1835, contained 32 cantos. In 1849 an enlarged edition of 50 cantos was published. The treasure of folk songs in the *Kalevala* was published, with poems collected later, in a scholarly work, *Suomen Kansan Vanhat Runot,* 33 vol. (1908–48).

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KALGAN (CHANG-CHIA-K'OU, former WAN-CH'UAN), an important Chinese depot and gateway to Mongolia, as its Mongolian name (halga: gate) signifies, in Hopeh province on the inner Mongolian fringe where the Great Wall crosses the Yang Ho, a headstream of the Yung-ting Ho flowing past Peking. The city has Mongol and Chinese sections; pop. (1958 est.) 480,000. It lies at an altitude of 2,800 ft. on the extremity of a rich loess plain. Under the Ming and Manchu dynasties Kalgan was a centre of great commercial and military importance and had been formerly included within the metropolitan province of Hopeh. In 1914 Kalgan be-

came the capital of the administrative district of Chahar which in 1928 was raised to provincial status. It became connected to Peking by a railroad in 1909. From Kalgan as many as 100,000 camels were used in carrying tea to Siberia; an estimated 1,200,000 camels and 300,000 bullock wagons were employed in the inland caravan trade. Kalgan has been long the market centre for Mongolia's wool and for the fur trade and has numerous fur-processing plants. Hides and skins from Mongolia also are collected for export southeastward on the railroad.

After 1933 the Japanese began their infiltration into Chahar and at the outbreak of war in 1937, captured Kalgan. After World War II the city was held briefly by the Chinese Nationalists and in 1947 had a population of 151,000. It was captured by the Chinese Communists in 1948 and in 1950 was made the capital of the Inner Mongolian autonomous region. However, in the reorganization of Nov. 1952, Chahar was absorbed into an enlarged Hopeh province. Kalgan has both rail and highway connections westward with the important heavy industry complexes of Pao-T'ou in Inner Mongolia and Ta-T'ung and T'ai-yuan in Shansi province. The railroad also connects with the Trans-Mongolian line to Ulan Bator, while the extension west of Paotou leads to Lanchow in Kansu. A bus service links Kalgan with Silinhot, capital of the Silingol league in Inner Mongolia. Situated in the Hopeh cotton-growing region, the city is a rising textile centre with a cotton mill having 95,000 spindles and 2,400 looms. Kalgan is connected to the Hopeh high-tension electric grid which is supplied mainly by thermal plants and also in part by the Kwanting hydroelectric station at the Yungting river dam. (H. J. Ws.)

KALGOORLIE, a town of Western Australia, at the centre of the Kalgoorlie district in the East Coolgardie gold fields, is 375 mi. E.N.E. of Perth and 24 mi. E.N.E. of Coolgardie. It adjoins the town of Boulder through the Kalgoorlie Shire (formerly Road Board) area. Population: Kalgoorlie urban area (1961) 21,773, including Kalgoorlie (1961) 9,696, Boulder and Kalgoorlie Shire. It is on the Western Australia railway system, connecting with Leonora; and Perth and Esperance, through Coolgardie; and it is the western terminus of the Trans-Australian railway connecting with Port Augusta and Port Pirie in South Australia. The airport is 1 mi. W. of Boulder. The name is from that of an indigenous shrub called galgurli, kalgurli or colgoola.

Gold was first discovered in the area in 1887–88 and the town became the centre of the gold rushes of 1892–94. By 1900 the population was about 30,000; it has fluctuated since with the prosperity of mining, averaging about 25,000. The climate is arid with annual rainfall averaging less than 10 in. and water shortages proved to be a major difficulty. The Goldfield Water Supply system, which began operation in 1903, brings water from the Mundaring weir on the Helena river, 15 mi. E. of Perth, a lift of about 1,000 ft. and a frictional lift of about 2,000 ft. The gold fields experienced a meteoric rise: before Christmas of 1893 more than 100 gold leases (which made up the Golden Mile) were registered. Decline of gold production was first noted in 1903, the year of maximum production, and was serious from 1920 to 1929. Subsequent improvements in the price of gold and the introduction of modern mining and processing methods resulted in general stabilization. (*See* AUSTRALIA: *The Economy: Mining.*)

Kalgoorlie is the seat of an Anglican diocese. It has a large district hospital (begun 1894), a hospital of the Order of St. John of God (opened 1897, rebuilt 1961), a Christian Brothers college and a government high school. The Western Australia School of Mines is located in Kalgoorlie. (G. S. Co.)

KALI, in late epic Hindu mythology a form of Uma, the consort and *shakti* (manifestation of creative energy) of Shiva. Her worship appears to be an extension of the widespread mother-goddess cult (*see* HINDUISM: *Gods;* SHAKTISM), especially in the aspect of a goddess of disease (*Shitala,* smallpox). She is usually represented as black, with bloody hands, eyes, teeth and tongue. As a destroyer she carries or wears a skull or skulls, and often has a girdle of snakes; she partly coincides with Durga, in post-epic mythology partly with Camunda, and is frequently associated with snake worship. Her shrines are numerous, many small and rude where she is identified with Shitala, some larger, as at Kalighat near Calcutta. Her more beneficent aspects (as a dispeller of the disease which she controls) lead to the euphemism Bhadrakali, "the blessed dark one." *See* also DURGA; LAKSHMI.

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KALI (CAMUNDA) FROM MADRAS PRESIDENCY; CAST COPPER, NOW IN VICTORIA AND ALBERT MUSEUM, LONDON

See E. W. Hopkins, "Epic Mythology," in *Bühler's Grundriss,* vol. iii (1915).

KALIDASA (fl. *c.* A.D. 400), Indian poet and dramatist, and the most distinguished figure in classical Sanskrit literature, is generally assumed to have lived about A.D. 400. Although there is no definite proof for this date, evidence exists for placing Kalidasa later than the 2nd century A.D. and definitely before A.D. 634, so that many authorities regard the prosperous and brilliant court of the emperor Chandra Gupta II (*c.* A.D. 376–*c.* 414) at Ujjain as the most likely background for his poetic genius.

The almost uniform mastery shown in Kalidasa's work makes chronological treatment difficult, and it is convenient to deal with his works in three groups: the plays *Shakuntala* or *Abhijnana-shakuntala* ("Shakuntala recognized by a ring-token"), *Vikramorvashiya* ("Urvashi won by Valour") and *Malavikagnimitra* ("Malavika and Agnimitra"); the epics *Raghu-vamsha* ("Lineage of Raghu") and the *Kumara-sambhava* ("Birth of Kumara, the war-god"); and the poems *Megha-duta* ("Cloud Messenger") and *Ritu-samhara* ("Cycle of the Seasons").

The Plays.—A translation of *Shakuntala* by Sir William Jones appeared in 1789, followed two years later by a German version which made considerable impact, drawing high praise from Goethe. Since then, numerous editions and translations of Kalidasa's works have appeared, both in India and the west, including, in 1842, the work of Otto von Böhtlingk (*q.v.*) on an older recension of *Shakuntala. Shakuntala,* adapted from an episode in the *Mahabharata* (*q.v.*), relates how King Dushyanta, while hunting, falls in love with a girl from a forest hermitage. Though marriage at first appears unsuitable, the king learns that Shakuntala is the daughter of the great warrior sage Vishvamitra and the celestial maiden Menaka. Kanva, head of the hermitage, is her foster father. Shakuntala incurs the wrath of an irritable sage, who dooms her to be forgotten by her lover but remembered through his ring. After their marriage Dushyanta returns to his kingdom, and when Shakuntala arrives at his court, he fails to recognize her, though he treats her kindly. When all else fails, Shakuntala seeks to show the ring he once gave her, but it has been lost while she was bathing. Sorrowing, she is borne off to heaven by her mother. Later the ring is recovered by a fisherman, and when Dushyanta sees it, the memory of Shakuntala awakens. While he laments, the charioteer of the god Indra (*q.v.*) appears, with a request for help in subduing the demons. The seventh and last act shows Dushyanta driving in a chariot to the mountains of heaven where he finds a young boy playing with a lion cub. Without realizing that the boy is his own son, he befriends him and, meeting Shakuntala soon afterward, is happily reunited to her.

The legend dramatized in *Vikramorvashiya,* a five-act play, is one already briefly referred to in the Rigveda (*see* SANSKRIT LITERATURE). King Pururavas hears that the celestial maiden Urvashi has been carried off by demons; he rescues her and is captivated by her beauty, but Urvashi is summoned by Indra and the lovers are separated. In the second act Urvashi has a brief meeting with Pururavas, but his queen discovers a letter she has written and refuses to be appeased. Act III reveals Urvashi incurring a curse which is to separate her from Pururavas once he sees the face of their child. Act IV, which is mainly lyrical, shows the lovers wandering near Mt. Kailasa where Urvashi, entering the forbidden grove of Kumara, is transformed into a tree vine. Pururavas searches for her, beseeching trees and forest creatures to tell

him where she may be found. A voice from heaven directs him, and when he embraces the vine, it is transformed into Urvashi again. Some years elapse between this and the fifth act, when Pururavas by chance encounters his son Ayus, whom Urvashi has borne secretly and entrusted to a hermitage. Urvashi perforce returns to heaven where Indra, remembering Pururavas's aid in vanquishing the demons, permits her to return to her husband.

The third play, *Malavikagnimitra,* quite different in character, relates the court life of an Indian prince, an actual historical figure. The play concerns his love for one of his queen's attendants, happily concluded through the revelation that Malavika is a princess of Vidarbha, and fit to be the wife of a king.

Kalidasa's chief appeal as a playwright lies in his depth of tenderness, and his treatment of love is invariably delicate without being weakly sentimental, though the scene of Pururavas' madness, when he loses Urvashi, has drawn censure from some Indian writers on poetics. Of the three plays *Shakuntala* is undoubtedly the most effective; the hero is revealed not only as a lover but as a conscientious and kindly ruler, whereas Pururavas, though majestic in his transports of passion, is scarcely shown in any other aspect, and Agnimitra is little more than a typical courtly lover. The same fullness of characterization is shown in the portrayal of Shakuntala. Her development from an impetuous young girl to a mature woman and her acceptance of responsibility for her actions form a convincing study. Though accidents of fate play a large part in the development of the plot they are used to quicken the reactions of the characters; fate does not solve problems, but rather sets further development afoot.

The Poems.—The *Raghu-vamsha,* in 19 cantos, traces the fortunes of the Ikshvaku dynasty. The figure of Raghu, with his father Dilipa and his son Aja, dominates the earlier part, while in cantos X–XVII the story of Rama, his father Dasharatha (Aja's son) and his son Kusha, is the central theme. The last two cantos give a shadowy treatment of 24 further descendants of the Ikshvakus, concluding with King Agnivarna. The fourth canto, the *Digvijaya* or path of victory, relating Raghu's conquest of India, is particularly famed. Noteworthy also is the treatment of the *Ramayana* (*q.v.*) story; canto XI is devoted to Rama's youthful exploits, while the next relates the events of his exile up to his defeat of Ravana. Of particular tenderness and pathos is canto XIII where Rama, on the return to Ayodhya, reminds his wife, Sita, of all the places where they had been together. The *Kumara-sambhava,* which is rather a dramatic poem than an epic, describes the courtship and marriage of Shiva and Parvati. Seventeen cantos survive, but it is unlikely that more than the first seven (possibly eight) are by Kalidasa. Besides containing detailed descriptions of nature, the poem reveals Kalidasa's ability to record the undertones of a dramatic situation in a brief and penetrating style. The *Megha-duta* is the reverie of a lover, separated from his beloved for a year, as he watches the clouds moving across the sky toward their home. He entrusts them with a message of love for her, describing the path by which they will reach her—the mountains, rivers, cities and peoples on the way. The poem encouraged numerous imitations, but none of equal merit. The last poem, *Ritu-samhara,* is a description of the six Hindu seasons, and its conventional nature suggests that it is a mere exercise, possibly an early one, on the author's part; indeed, arguments have been brought forward to question Kalidasa's authorship.

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(J. E. B. G.)

KALIMANTAN, the Indonesian section of Borneo, which excludes Malaysian North Borneo (Sabah) and Sarawak, and the Brunei sultanate. Indonesians, however, use the word as a geographic term for the entire island. The origin of the name Kalimantan is obscure. In Sarawak the term Kelamantan refers to the sago-eating pagans of the north. For geography, history and anthropology see BORNEO; INDONESIA, REPUBLIC OF; and MALAY ARCHIPELAGO. Kalimantan is divided into four provinces: West Kalimantan (Kalimantan Barat), with the capital at Pontianak; Central Kalimantan (Kalimantan Tengah), capital Plangkaraja; South Kalimantan (Kalimantan Selatan), capital Bandjermasin; and East Kalimantan (Kalimantan Timur), capital Samarinda.

(J. O. M. B.)

KALIMPONG, a Himalayan hill station and a town in Darjeeling district, West Bengal, India. It is situated 3,933 ft. above sea level on a saddle from Deolo hill to Durbin Danda hill. Pop. (1961) 25,105. It is linked with Darjeeling by a 20-mi.-long road across the Tista river, and is easily approachable from Calcutta by air as far as Bagdogra (300 mi.) and then by road (44 mi.). The town is also the terminus of the mule-trade route from Tibet to India, and there is brisk trade in raw wool. The Scottish Universities Mission college is affiliated to Calcutta university; St. Andrew's homes for destitute children and Dr. Graham's industrial homes are the principal educational and arts and crafts training centres. (S. P. C.)

KALINGA, one of the ancient territorial subdivisions of peninsular India. Mentioned by Pliny, it corresponds to northern Andhra Pradesh, most of Orissa and a portion of Madhya Pradesh. Strictly it stretched no farther south than the Godavari river, thus excluding Vengi (the Andhra territory between that river and the Krishna). With the ports of Coringa (Kakinada), Vishakhapatnam, Chicacole and Ganjam and the important towns of Rajahmundry and Vizianagram, it did a rich trade with Burma and farther south and east. The hinterland led through mountainous and thickly forested country, still inhabited by semi-Hinduized tribes, to central India and the Gangetic plain. In the time of the Nandas, Kalinga influenced northern Indian politics, and felt the weight of Asoka's enmity in the terrible war said to have helped to convert him to Buddhism.

The Somavamsis of southern Kosala (*q.v.*), possessing the strategic town of Chakrakotta (in the former Bastar state), ruled parts of the coastal strip for a time, as did the Yayatis, Vishnukundins, Bhanjas and Bhaumakaras. The Eastern Gangas were the most famous rulers of all Kalinga, sometimes competitors and sometimes allies of the Eastern Chalukyas of Vengi. The famous temple of Juggernaut (*q.v.;* Jagannath) at Puri was under their protection, and the god was treated as their landlord. Anantavarman Choda Ganga (*c.* 1077–1149) is particularly renowned. His successors between 1238 and 1305 successfully withstood Muslim infiltration from the north; the dynasty collapsed when the sultan of Delhi penetrated Kalinga from the south (1324). The famous temple of the sun-god at Konarak (Konarka) was built by Narasimha I (1238–64).

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(J. D. M. D.)

KALININ, MIKHAIL IVANOVICH (1875–1946), Russian Communist leader who from 1919 to 1946 occupied a position in the Soviet Union corresponding to that of head of state, was born at Verkhnyaya Troitsa, in Tver (now Kalinin) province, on Dec. 2 (new style; Nov. 20, old style), 1875, the son of a peasant. A member of the Russian Social Democratic Workers' party from 1898, he became a member of Lenin's *Iskra* organization within that party in 1902. He was arrested in 1899 and again in 1903 and spent some time in prison and in exile. He was an active participant in the 1905 revolution in St. Petersburg. After the Bolshevik Prague conference of 1912 he was co-opted a candidate member of the central committee and a member of its Russian bureau. He was one of the founders of *Pravda.* His attitude on World War I and on the seizure of power in 1917 differed from that of Lenin and the majority of the Bolsheviks, since he supported the war effort and opposed the Bolshevik *coup d'état* of Nov. 7. However, after the Bolshevik victory he became mayor of Petrograd and in March 1919 he succeeded Y. M. Sverdlov as chairman of the All-

Russian central executive committee. He remained on as chairman of its successor, the central executive committee of the U.S.S.R., from Dec. 1922 to Jan. 1938 and as chairman of the presidium of the supreme soviet from 1938 to March 1946. He was elected candidate member of the Politburo of the Communist party's central committee in 1924 and a full member in 1925. Simple and relatively accessible, he was to some extent generally popular in the country and sometimes interceded on behalf of people arrested on such charges as sabotage. He died in Moscow on June 3, 1946. (L. B. Sc.)

KALININ, an *oblast* (formed 1935) of the Russian Soviet Federated Socialist Republic, U.S.S.R., lies between Moscow and Leningrad, in the basin of the upper Volga. Its area of 32,548 sq.mi. extends from the Valdai hills in the southwest to the shore of the huge Rybinsk reservoir in the northeast. The Valdai hills are terminal moraines, with scores of lakes and many areas of swamp, drained chiefly by the Volga which rises there and flows across the south of the *oblast*. Northeast of the hills is a low, swampy plain of ground moraine, drained by tributaries of the Volga, notably the Tvertsa, Medveditsa and Mologa. The *oblast* is largely forested, with spruce dominant in the wetter areas and pine on the sands. Birch is widespread, while oak and other deciduous species occur in the south and southwest. Along the rivers are extensive flood-plain meadows. Everywhere are peat bogs (covering about 7% of the surface area) and grass marsh. Soils are podsols, usually of low fertility. The climate is continental, with a relatively high rainfall for European Russia, about 24 in. a year and more on the Valdai hills.

The population (1959) numbered 1,806,787, of whom 787,456 (44%) were urban and 1,019,331 (56%) rural. Of the 21 towns and 24 urban districts, most are small, the largest being Kalinin (261,000), Vyshni Volochek (66,000) and Rzhev (*q.v.*).

Agriculture forms the main sector of the economy, with the heaviest emphasis on livestock, especially dairy cattle, assisted by the extensive natural pastures. Poultry keeping is widespread. Because of the poor soils only about a quarter of the area is under the plow. Flax and potatoes are the most important crops, with rye and oats the chief grains. The *oblast* is the largest flax producer of the R.S.F.S.R. Industry is dominated by textile manufacture, not only of linen but also of cotton. Other industry consists largely of processing local agricultural products and light engineering. For the most part, industry is concentrated in the two largest towns. Peat and lignite are the chief local fuels. Timberworking is widely carried on. Communications are good, with the Volga, the Moscow-Volga canal, the Moscow-Leningrad railway and lines west and east. (R. A. F.)

KALININ, formerly known as TVER, a town and *oblast* centre of the Russian Soviet Federated Socialist Republic, U.S.S.R., lies 100 mi. N.W. of Moscow, at the confluence of the upper Volga and the Tvertsa. Pop. (1959) 261,000. Tver was probably founded in the 12th century, its first documentary mention being for 1209. It was one of the important towns of early Russia, the seat of a princedom which controlled trade across the key portages from the upper Volga to the Volkhov. In 1238 Tver was sacked by the Tatars. In 1485 it was seized by the grand dukes of Moscow. Later it became the administrative centre of a government (province) and so remained until the Revolution. With the construction in the 18th century of the Vyshni Volochek canal system between the Tvertsa and the Msta, a tributary of the Volkhov, river trade through Tver became important. Although this route is now in desuetude, Kalinin remains the major river port of the upper Volga, which is there crossed by the Moscow-Leningrad trunk railway. There is an imposing river terminal for passenger services. The Moscow-Volga canal provides a direct water link with the capital. The town was laid out in a gridiron pattern in the 18th century and a number of historic buildings survive. Its industries include the building of rolling stock, textile manufacture (cotton and artificial), radio engineering, machine making (for the textile and peat-working industries) and the production of rubber and imitation leather footwear. Kalinin was severely damaged during World War II when it was captured and occupied (1941) for a short time by the Germans. (R. A. F.)

KALININGRAD, *oblast* in the Russian Soviet Federated Socialist Republic, was formed in 1945 from the northern half of the former German East Prussia, which was ceded to the U.S.S.R. by the Potsdam agreement of that year. After a brief existence as a special *okrug*, the area was organized as Königsberg *oblast* in April 1946 and renamed Kaliningrad *oblast* in July 1946. Its area of 5,830 sq.mi. makes it the smallest *oblast* of the Russian S.F.S.R. Most of it lies in the basin of the Pregolya and its tributaries. Part of the northern boundary is formed by the river Neman with the Lithuanian S.S.R. to the north and east, and to the south the *oblast* borders on Poland. Along the coasts are the two large freshwater lagoons of Vislinski and Kurski (Frisches Haff and Kurisches Haff), each separated from the Baltic by long sandspits. Most of the *oblast* comprises low, gently rolling hills and swampy lowlands. About 20% is in mixed forest of oak, pine, spruce, beech, hornbeam and other species. Soils are mostly podsols or peaty. The climate is continental, but by Russian standards very much modified by the proximity of the Baltic, the January average temperatures being about 25° F. and the July average about 60°. Rainfall is about 24 in. a year.

Most of the Germans either fled or were deported. By the 1959 census the population of the *oblast* was 610,885, consisting entirely of settlers, mostly Russian, from various parts of the Soviet Union, and 65% (394,558) were urban. The largest towns are Kaliningrad (the administrative centre, formerly Königsberg), Baltisk (Pillau), Sovetsk (Tilsit), Chernyakhovsk (Insterburg) and Gusev (Gumbinnen). The main branches of industry are engineering, metal working and pulp-paper making. Amber, peat and lignite are the chief mineral resources. The amber (*yantar*) was once the monopoly of the Teutonic knights and Yantarny, formerly Palmnicken, 25 mi. W.N.W. of Kaliningrad city is the location of a major amber-producing combine. Fishing is of great importance all along the coast. Grains, potatoes, vegetables and dairy cattle dominate agricultural activity. (R. A. F.)

KALININGRAD (until 1946, the German city of KÖNIGSBERG), a town and seaport in the Russian Soviet Federated Socialist Republic of the U.S.S.R., and the administrative centre of Kaliningrad *oblast*, stands on the river Pregolya (Ger. Pregel) about 4 mi. upstream from Vislinski Zaliv (Frisches Haff [*q.v.*]), 680 mi. W. of Moscow and 340 mi. N.E. of Berlin. Pop. (1959) 203,570. Under Prussia and, later, Germany the town was, after Kiel, the main naval base on the Baltic and a key to the defense of the eastern frontier. In 1945 the town was ceded to the U.S.S.R. under the Potsdam agreement and its military role was reversed. Kaliningrad is now the Soviet Union's most advanced naval base on the Baltic.

The original settlement that grew around a fortress, founded in 1255 by the Teutonic knights, became a town in 1286. From 1340 Königsberg was a member of the Hanseatic league and its importance as a trading port grew steadily. Later, in the 15th century, it became the chief centre of the Teutonic knights and the residence of the grand master of the order. In the 16th century it became the seat of the dukes of Prussia. Immanuel Kant (b. 1724), the philosopher, was a professor at the university, the collegium Albertinium founded in 1544 by Albert I, duke of Prussia, as a "purely Lutheran" place of learning, which was destroyed in World War II. A monument was erected to Kant in the town in 1864.

Relatively little of the city's historic buildings survive, because of the severe destruction of World War II, especially during the two-month siege by the Russians.

The importance of Kaliningrad as a commercial port remains, especially since it is open in winter. Railways focus on it from Riga to the northeast, from Vilnius and Minsk to the east and from Bialystok and Gdánsk in Poland. It is connected by a dredged channel to its outport, Baltisk (*q.v.*), at the entrance to the Vislinski Zaliv from the Baltic. A fishing fleet is based on the port. There are a number of metal-working and engineering plants producing rolling stock and machinery, and equipment for the timber and fishing industries. The chemical industry and papermaking are also important. The Baltic branch of the All-Union Scientific Research Institute of Marine Fisheries and Oceanology and a pedagogic institute are located there. (R. A. F.)

KALINJAR, a town and hill fort in Banda district, Uttar Pradesh, India, 85 mi. W.S.W. of Allahabad. The fort stands on an isolated spur, the termination of the Vindhya range, at an elevation of 1,203 ft., overlooking the plains of Bundelkhand. Kalinjar is the most characteristic specimen of the hill fortresses, originally hill shrines, of central India. Its antiquity is proved by its mention in the *Mahabharata*. It was besieged by Mahmud of Ghazni in 1021, and there the Afghan emperor Sher Shah met his death in 1545. Both the fort and the town at the foot of the hill are of interest to the antiquary because of their remains of temples, sculptures, inscriptions and caves. (J. B.-P.)

KALISZ, a town of central Poland, a district capital in the Poznan *wojewodztwo* (province), situated on the Warsaw-Wroclaw railway. Pop. (1960) 69,946. The town has been famous since the 15th century for silk and linen manufacture, and maintains this reputation in many textile and clothing factories. It also has tanning and furniture and piano manufactures. Kalisz' beauty is enhanced by many public gardens, including a large 18th-century park with many rare species of trees and shrubs.

Kalisz lies on the Prosna river, on an island in which the old city was built. It is the oldest Polish town referred to in historical sources, being mentioned by Ptolemy in the 2nd century A.D. as a trading centre on the amber route. It obtained town rights in 1282. After the second partition of Poland in 1793, it was seized by Prussia, and from 1807 to 1815 was within the Warsaw kingdom; in 1815 it was incorporated in the Polish kingdom, which was dependent on Russia. The Versailles treaty of 1919 returned the town to Poland. (K. M. Wi.)

KÁLLAY, MIKLÓS (1887–1967), Hungarian statesman who as prime minister in World War II believed in an Allied victory and tried to extricate his country from the German alliance, was born at Nyiregyháza, of a very old and influential family of local landowners. After service in the administration of his county, he was secretary of state for commerce (1929–31) and minister of agriculture (1932–35), but resigned out of disagreement with the Right Radical policies of Gyula Gömbös (*q.v.*) and in 1937 left the government party itself. Miklós Horthy, the regent, made him commissioner for irrigation and a life member of the upper house, but he remained aloof from active politics until March 1942, when, at the regent's request, he accepted the premiership in an attempt to lead the country out of the dangerous dependence on Germany in which his predecessor, László Bárdossy, had involved it. He held this office for two years (March 9, 1942–March 19, 1944), during which he preserved democratic and human liberties in Hungary, especially protecting the Jews. He allowed Hungarian armies to go out and fight against Russia, but attempted to establish friendly relations with the west. In Oct. 1943 he authorized the signature of an instrument of unconditional surrender to the western powers, to take effect when their armies reached Hungary's frontiers. When Germany occupied Hungary in March 1944, Kállay was forced into hiding and subsequently taken prisoner and held in Germany. He was released when Germany collapsed. In voluntary exile from 1946, he finally settled in the United States. His memoirs, *Hungarian Premier,* appeared in 1954. He died in New York City on Jan. 14, 1967. (C. A. M.)

KÁLMÁN (1070–1116), king of Hungary from 1095, was the son of King Géza I by a Greek concubine. King László I, his uncle, would have made him a monk, but Kálmán had no inclination for an ecclesiastical career and escaped to Poland. On László's death (1095), he returned to Hungary and seized the crown. His legitimately born younger half-brother, Álmos, did not submit to this usurpation and in 1108 won over the German king Henry V, who thereupon invaded Hungary. The Germans were unsuccessful, and Kálmán was reconciled with Álmos for a time. Five years later Kálmán imprisoned Álmos and his infant son, Béla, in a monastery and had them blinded. Nevertheless Kálmán was a good king and a wise ruler. In foreign affairs he continued László's policy by trying to secure a seaboard for Hungary. In 1097 he overthrew Petar Svacic, king of Croatia, and acquired the greater part of Dalmatia, though there he came into conflict with the Byzantines, the Germans, the Venetians, the pope and the Normans of southern Italy, who were all alike interested in the fate of the province. By 1102, however, he was in possession of Zara, Trogir, Split and all the islands as far as Cetina river. But it was as a legislator and administrator that Kálmán was greatest. He was not only one of the most learned sovereigns of the earlier middle ages (hence his surname "the Booklover), but also one of the most statesmanlike. Under him the feudal system was consolidated in Hungary; and strict but just laws were passed to preserve the state, the church, the central power and private property and to strengthen the economic and military position of Hungary. He annexed Croatia, which was to be administered under a *ban,* the personal representative of the king. Kálmán died on Feb. 3, 1116. (Ge. Gr.)

KALMAR, a seaport of Sweden on the Baltic coast, chief town of the *län* (county) of Kalmar, 270 mi. S. of Stockholm by rail. Pop. (1960) 30,802. Built partly on two small islands, it lies on the Sound of Kalmar (Kalmarsund), separating mainland Sweden from the island of Öland. Kalmar has rail and air communications, and ferries run to Öland. It is mainly a manufacturing town, industries including a match factory and factories producing machinery and railway cars, wallpaper, joinery, food and confectionery. Shipbuilding has been carried on since the middle ages, and there is a good harbour. Main exports are timber and boards, matches, glass and machinery; considerable oil is imported.

The centre of the town, on the island of Kvarnholmen, is surrounded by the remains of 17th-century fortifications. Interesting buildings around the old market place (Stortorget) include the cathedral (1660–80), the town hall (1680), the municipal building (1834) and some old private houses. On the mainland lie the so-called Old Town and the castle (Kalmar Slott), built in the 13th century, which houses the Kalmar county museum.

Kalmar was founded in the 12th century. In earlier days, because of its strategic coastal position, it was much fought over, and in the "Kalmar war" between Sweden and Denmark in 1611–13 it was captured by the Danes. The town also gave its name to the treaty (Union of Kalmar) by which Denmark, Norway and Sweden in 1397 were united into one kingdom, and during the 15th century Kalmar was the political centre of this union. In the 17th century the town lost its military importance, but it continued to thrive as an educational, commercial and industrial centre. (M. Ho.)

KALMYK (Kalmuck), a Mongolic people of the Soviet Union, residing chiefly in the Kalmyk Autonomous Soviet Socialist Republic (*q.v.*), who belong to the Oirat or western branch of the Mongolian language group. The Oirat dialects are also spoken in western Mongolia, Sinkiang and neighbouring provinces of China. The home of the Kalmyks lies west of the Volga river in its lower courses, in an arc along the northwestern shore of the Caspian sea. A small number of Kalmyks of the Buzawa tribe live along the Don river. Another small group, called the Sart Kalmyks, live in the Kirgiz Soviet Socialist Republic (Kirgizia), near the Chinese border. A few emigrated after World War II to the United States, where they settled in New Jersey.

Their native habitat is a zone of dry steppe and steppe desert. Water is scarce; water courses are few, and many of the lakes are salt or brackish. The country is not suited for farming unless it is fertilized and irrigated; however, it is excellent for pastoralism and the Kalmyks are by long tradition nomadic pastoralists. They raise herds of horses and cattle, flocks of sheep and goats and a few camels. Their horses were marketed widely and as far west as Poland. Their nomadism is of a classical pattern: an annual round of movement from winter camp to spring, summer and fall pasture, and return.

The Kalmyk's home is a *yurt* or tent of felt on a lattice frame. It is readily assembled and disassembled and packed on a wagon or camel's back for transport to the next encampment. During the latter part of the 19th century the Kalmyks undertook agriculture in conjunction with pastoralism. Where agriculture plays an important role, the Kalmyks have introduced fixed dwellings. Elsewhere they continue to live in tents and raise herds of livestock.

The western Mongols were enemies of the eastern Mongols of the Chingiside empire at the time of its apogee in the 13th century

A.D. During the following centuries they maintained a separate existence under a confederation known as the *dörben oirat* ("four allies," from which the name *Oirat* is derived); at times they were allies, at times enemies of the eastern Mongols in the Chingiside line. Part of the western Mongols remained in their homeland, northern Sinkiang, or Dzungaria, and western Mongolia. Part of the *Oirat* confederation, including all or part of the Torgot, Khoshut, Dörbet and other groups moved across southern Siberia to the southern Urals at the beginning of the 17th century. From there they moved to the lower Volga, and for a century and a half, until 1771, they nomadized both to the east and west of this region. During the course of the 18th century, they were absorbed by the Russian empire which was then expanding to the south and east. In 1771, those on the left bank, to the east of the Volga, returned to China. The right-bank Kalmyks, comprising the contemporary Torgot, Dörbet and Buzawa, remained in Russia.

In their social organization the Kalmyks are strongly patrilineal. Family life, descent lines, marriage relations, inheritance of property, are all principally regulated by the laws of agnatic kinship. The family is traditionally an extended one composed of parents, married sons and their families and unmarried sons and daughters. Females marry away from their natal families. Several extended families are grouped into nomadic kin villages. The kin villages are grouped into lineages and clans, and these in turn were grouped in past centuries into clan confederations bearing the names indicated above: Torgot, etc. All these structures were interrelated by widening degrees of agnatic kinship. The wider kin structures, on the order of clan confederations, no longer exist. Current usage of such terms as Torgot and Dörbet refers to dialect groups and not to kin-political groupings.

Prior to the Russian Revolution, the Kalmyks were divided into a princely estate, which ruled the various confederations; a noble estate, which ruled the lower social hierarchies, clans and lineages; and a common estate. Aside from these estates there was a clerical order forming an estate of its own. All of these estates except the common have since disappeared.

The religion of the Kalmyks is that of the Mongols generally: Tibetan Buddhism (*q.v.*) or lamaism. This religion came from India to Tibet and from there passed to the Mongols in the 16th–17th centuries. The lamas are monastic clergy who take a vow of celibacy. They live apart from the communities of pastoralists and their monasteries contained at one time a large portion of the adult males of the people. This situation withdrew a large number of people from normal family life. However, lamaism has diminished to the point of virtual disappearance, both among the Kalmyks and in other parts of the Mongol world. Prior to their conversion to Buddhism, the Kalmyks were shamanists (*see* SHAMANISM). Their Buddhism has a strong admixture of shamanism. The Sart Kalmyks were converted to Islam.

Under the Soviet system they were organized into an autonomous region of the Russian Soviet Federated Socialist Republic. At the end of World War II they were accused of anti-Soviet activity as a whole, were moved from their home country and exiled to Soviet central Asia. In 1957 they were restored to their former territories and position in Soviet life. They numbered 134,000 in 1939. According to the Soviet census of Jan. 1959, they had decreased to 106,000 in 20 years. *See* also ASIA: *Anthropology.*

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KALMYK AUTONOMOUS SOVIET SOCIALIST REPUBLIC (KALMYTSKAYA AVTONOMNAYA SOVETSKAYA SOTSIALISTICHESKAYA RESPUBLIKA or KALMYKIA), of the Russian Soviet Federated Socialist Republic, U.S.S.R., lies northwest of the Caspian sea and west of the lower Volga, covering an area of 29,305 sq.mi. On the east it reaches the Caspian shore and in the northeast the Volga at two points. Almost the entire republic lies in the vast depression of the north Caspian lowland (Prikaspiyskaya Nizmennost), the greater part lying below sea level. Only along the western boundary rise the low Yergeni hills and the Sal-Manych ridge, rising to a maximum of 728 ft. The eastern face of the Yergeni is steep, greatly cut up by innumerable valleys and ravines, almost all dry, except during rainy periods. A long "panhandle" of the republic extends westward through the Manych depression (Kumo-Manychskaya Vpadina), by way of which the Caspian was formerly linked to the Black sea. Large salt lakes occupy the depression. East of the Yergeni, the republic stretches to the Caspian as a monotonous, level plain, broken only by solution hollows and ancient burial mounds. The Yergeni has steppe-grass vegetation and even groves of willow, elm and poplar in the valleys, but elsewhere conditions are semidesert. Sage is the dominant plant. Most lakes are salt and there are no permanent watercourses. Soils in general are light chestnut or brown, but saline soils are widespread. The climate is characterized by low rainfall, about 8 in. a year, and by hot summers, with July averages nearing 26.7° C. (80° F.). Rainfall is highly irregular, often coming in torrential downpours and causing "flashes" in the dry valleys.

Established in 1920 as an autonomous *oblast,* Kalmykia became an autonomous republic in 1935 which was abolished during World War II for alleged collaboration of the Kalmyks with the Germans. In 1957, however, it was re-established as an autonomous *oblast* within Stavropol *krai* and in 1958 it regained the status of autonomous republic. Its population (1959 census) was 184,857. Of these, only 38,616 (21%) were urban dwellers, living in the one town of Elista (23,000), the administrative centre, and the urban districts of Kaspiski and Bashanta. Population density is low, only 6.3 persons per square mile. About 55% of the inhabitants are Kalmyks, who according to the 1959 census numbered 106,000 throughout the U.S.S.R. (*see* KALMYK).

The economy of the republic is based on livestock rearing. Formerly the Kalmyks were nomadic, moving seasonally in search of pasture. Now most of the population has been settled and only herders move with the animals. Sheep for wool and meat form 90% of the livestock, more than half being Merinos, the other stock are mostly beef cattle, with some pigs, horses and camels. The Black Lands of the north Caspian lowland, with short winters of little snow and waterless summers, are used as winter pasture. The rest of the republic is mostly summer pasture, which attracts also herds from outside the republic, especially from the lower Volga. On the better soils of the Yergeni there is some arable farming, partly on irrigated land. Grains, maize (corn), fodder grasses, mustard seed and melons are the main crops. Along the Caspian shore fishing is important, centred on Kaspiski, which has a large fish-processing plant. In Elista there is industry concerned with processing livestock products—leather, wool, butter and cheese. The only railway is the Astrakhan-Baku line across the east of the republic, but Elista has road connections with Volgograd, Astrakhan and Stavropol. (R. A. F.)

KALNÓKY, GUSTAV SIEGMUND, GRAF (1832–1898), Austro-Hungarian statesman, minister of foreign affairs from 1881 to 1895, was born at Lettowitz (Letovice) in Moravia, on Dec. 29, 1832, of an old Transylvanian family. After spending some years in a hussar regiment he entered the diplomatic service in 1854 without giving up his connection with the army, in which he reached the rank of general in 1879. He was secretary of embassy in London (1860–70), served next in Rome and Copenhagen, became ambassador in St. Petersburg in 1880 and returned to Vienna as minister of foreign affairs in 1881. His policy was generally conservative and somewhat unimaginative, but not unsuccessful. He confirmed and renewed Austria's alliance with Germany and cooperated with Bismarck to secure Italy's adherence. He made a secret treaty with King Milan of Serbia in 1881 (saving him from disaster after Serbia's defeat by Bulgaria at Slivnitsa in 1885) and one with Rumania in 1883, both designed to diminish Russian power in the Balkans. At the same time he prevented Bulgaria from falling wholly under the influence of Russia, with whom he tried to improve Austria's relations, notably at the meeting of the Austrian, German and Russian emperors at Skiernewice in Poland (Sept. 1884). A Catholic, Kalnóky once caused some friction with Italy by stating in a speech to the delegations (1891) that the

papal question was still unsettled, and his resignation in 1895 was due to Hungarian suspicion of his ultramontane tendencies. He died at Prödlitz, in Moravia, on Feb. 13, 1898.

See E. R. von Rutkowski, *Kalnóky von Köröspatak* (1953).

KALONG, large fruit-eating bats of the East Indies. *See* Flying Fox; Bat.

KALONYMOS, a Jewish family which from the 8th century included among its members many Hebrew liturgic poets, talmudic scholars and rabbis. The family originated in Lucca, Italy, and spread from there to Germany, Lorraine and France.

Ithiel I (fl. *c.* 800), Moses ben Meshullam (Rome, or Lucca, *c.* 850), Kalonymos II ben Moses (Rome, or Lucca, *c.* 950) and Meshullam the Great (Rome, or Lucca, *c.* 980) wrote penitential prayers and other liturgic poetry. The last was, in addition, the author of a commentary on the Mishnah tractate "Sayings of the Fathers" and a polemic writer against the sect of the Karaites. His son, Kalonymos III (fl. at Mayence, Ger., *c.* 1000), wrote *U-Netanneh Toqef* ("Let Us Declare the Mighty Holiness of This Day"), a poem on the Judgment day which forms a part of the New Year's day liturgy. In the period of the crusades Kalonymos ben Judah the Younger (Mayence, *c.* 1100) wrote dirges on the martyrdom of Jews and an elegy on the destruction of communities.

Samuel ben Kalonymos the Hasid ("Pious"; Speyer, Ger., 12th century), commentator on the Talmud, and his son, Judah the Hasid (Regensburg, Ger., d. 1217), wrote the religio-ethical *Sefer Hasidim* ("Book of the Pious"); in their mystical circle originated the hymn *Shir ha-Yihud* ("Song of Divine Unity"). The community of the "Pious Men of Germany" (*Haside Ashkenaz*), of which Judah was the chief spokesman, cultivated withdrawal from the affairs of the world, ascetic life, equanimity, worship of God in utter simplicity and surrender, all-embracing love and humility. (*See* Cabala: *The Hasidim of Medieval Germany.*) Judah also wrote on rabbinic laws, treatises on mystical themes and on prayer, commentaries on the Pentateuch and the Book of Job, and *responsa.*

Kalonymos ben Kalonymos ben Meir (Provence, France, 14th century) was mainly a translator from the Arabic. Commissioned by Robert of Anjou, king of Naples and patron of scholarship, he rendered into Latin a philosophical work of Averroës and translated into Hebrew works of al-Farabi, al-Kindi, Galen and others. Of his more than 30 translations, 15 are in the field of mathematics and astronomy and three of medicine. In addition, he wrote *Even Bohan* ("Touchstone"), a satire on the customs of the time, and a "Treatise of Purim," a parody on the Talmud.

Kalonymos ben David (Calo Kalonymos; Naples and Venice, 15th–16th century), translated into Latin philosophical and astronomical texts of Muslim authors and collaborated in the great Venice edition of Aristotle and Averroës.

See S. Dubnow, *Weltgeschichte des jüdischen Volkes, passim* (1925–29). (N. N. G.)

KALPI, a municipal town in Jalaun district in the Jhansi division of Uttar Pradesh, India, lies on the right bank of the Jumna river among deep ravines, 45 mi. S.W. of Kanpur. The new quarters lie away from the river to the southeast. Pop. (1961) 17,278. A girder bridge built in 1888 spans the river and in 1934 a roadway was added. The main places of interest are the great enclosure called Chaurasi Gumbaj, or 84 domes, built during the Lodi period, and a lofty modern tower ornamented with the representation of battles of the *Ramayana* epic. The town is a centre of local trade, principally in grain, ghee (clarified butter) and cotton.

Kalpi was founded, according to tradition, by Vasudeva at the end of the 4th century A.D. In 1196 it fell to Kutb-ud-Din Aibak, the viceroy of the Afghan conqueror Mohammed Ghori, and during the subsequent Muslim period it played a large part in the annals of this part of India. About the mid-18th century it passed to the Marathas. It was captured by the British in 1803, and was occupied by them from 1806. In 1857, during the mutiny, the rani of Jhansi expelled the British from Kalpi, but in May 1858 the town was retaken by Sir Hugh Rose. (B. Si.)

KALUGA, an *oblast* in the Russian Soviet Federated Socialist Republic of the U.S.S.R., adjoins Moscow *oblast* to the southwest. Formed in 1944, it covers an area of 11,506 sq.mi. It lies in the drainage basin of the upper Oka (which crosses it in the east) and its tributaries, the Luzha, Ugra and Zhizdra. Only the southwest corner of the *oblast* is drained by the Bolva, a tributary of the Dnieper. The valleys are broad and often swampy, filled with fluvio-glacial deposits, especially sands. Between the valleys are rolling watersheds, forming part of the Central Russian upland, covered by loesslike subsoils. Kaluga *oblast* is in the mixed forest zone, with oak, spruce, pine, birch and other trees. Much of the forest has been cleared and it now covers only about one-third of the surface. Around Meshchovsk is an *opolye,* an area devoid of trees since prehistoric times. Much of the remaining forest is on the sands. Soils are mostly sod podsols, with gray forest soils in the Meshchovsk *opolye.* The upland location gives the *oblast* a rainfall above the average for the Russian plain, about 24 in. a year. Temperature conditions are moderately continental, with a range of about 50° F. Rivers and lakes are frozen for about four months.

The population numbered 935,852 in the census of 1959, 350,230 (37%) urban and 585,622 rural. There are 16 towns and 12 urban districts, mostly small. Only the administrative centre of Kaluga (134,000) has more than 50,000 inhabitants. Although the area was first settled by Slavs in the 10th and 11th centuries, intensive settlement dates from the 16th century and took place in safety behind the defensive lines of Tula and Bryansk. The *oblast* is one of the oldest ironworking regions of Russia and small centres such as Kirov, Duminichi and Dugna are scattered over its area. In the south lies part of the great iron ore deposits of the Kursk Magnetic Anomaly and large-scale mining is being developed. The main industries are engineering, which is concentrated chiefly in Kaluga and Lyudinovo; timber working, particularly the production of matches, paper, veneer and furniture; glass making; and, in the northeast, textiles. The first Soviet atomic power plant was completed at Obninsk in 1957. The processing of agricultural products is widespread. Agriculture is largely concerned with grain crops (rye, oats, wheat and buckwheat), potatoes and with livestock, especially beef and dairy cattle and poultry (especially geese). A considerable area is down to fodder crops. Throughout the north and west flax is grown, while hemp is cultivated in the south and east. Rail communications in the *oblast* are excellent, crossed as it is by such main lines as Moscow-Kiev, Bryansk-Rzhev, Smolensk-Tambov and Vyazma-Tula. Regular navigation on the Oka begins at Chekalin (Tula *oblast*), 50 km. (31 mi.) above Kaluga town. (R. A. F.)

KALUGA, a town and *oblast* centre in the Russian Soviet Federated Socialist Republic of the U.S.S.R., lies about 161 km. (100 mi.) S.W. of Moscow, on the left bank of the Oka river. Pop. (1959) 134,000. The town is on the Vyazma-Tula railway, not far from its junction with the main Moscow-Kiev line. There is a wide range of industries, producing equipment for railways (such as motor trolleys and track layers), matches, window glass, accordions, synthetic aromatics, clothing, shoes and foodstuffs. Kaluga was founded in the 14th century and formed a strongpoint against the Tatars on the southern borders of Muscovy. It underwent a siege during the "Time of Troubles" in 1607. Later it became the administrative centre of a *guberniya* (pre-Revolution province), and an agricultural centre, sending grain to Moscow. Shamil, the leader of the great revolt of the Caucasian peoples in the 1850s, spent part of his exile there. The town was held briefly by the Germans in 1941 during their drive on Moscow.

(R. A. F.)

KALVOS, ANDREAS IOANNIDES (1792–1869), Greek poet, was the author of 20 patriotic odes published in two fascicles: *The Lyre* at Geneva in 1824 and *Odes* at Paris in 1826. Born in the Ionian island of Zante in 1792 he was brought up at Leghorn (1802–12) and later lived in Florence, Switzerland, England, France, and at Corfu (1827–52). Lastly he returned to England where he died at Louth in Lincolnshire in 1869.

The form of Kalvos' odes, though based on popular Greek rhythms, is individual, consisting of five-line stanzas, four lines of iambic and the fifth of dactylic structure. His poetic diction is his native "demotic" arbitrarily enriched by copious borrowing, both verbal and grammatical, from the Greek classics. His melancholy, romantic style owes much to the earlier English romantics

(Edward Young, Thomas Gray, James Macpherson). In diction and subject he was influenced by his five-year contact (1812–17) with his fellow Zantiot Ugo Foscolo (*q.v.*). Though he had no followers in Greece, his concise, artificial, yet often moving, verses delight the discerning critic.

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(R. J. H. J.)

KALYAN, a municipal town of Thana district in Maharashtra, India, is situated on the Ulhas river 33 mi. N.E. of Bombay city. The two main lines of the Central railway diverge there, one to the northeast, the other to the southeast. Pop. (1961) 73,482. After 1947 considerable industrialization took place; the main industries are silk and nylon factories, rice husking and the making of bricks and tiles. The establishment of a refugee township called Ulhasnagar one mile from Kalyan has given impetus to varied economic and commercial activities in the town. A ferry plies to Kane on the opposite bank of the Ulhas.

Kalyan was a royal capital and a centre of sea-borne commerce in the early centuries of the Christian era, and a trade centre again in the 17th century. It became part of Maratha kingdom in 1662 and fell to the British in 1780. (M. R. P.)

KAMA (KAMADEVA), in the Vedic Hindu mythology, "desire," the first seed of the mind. From it emanate the gods in the Rigveda. But in the Atharvaveda Kama is one of the titles of the Creator, who fulfills all desires. In post-Vedic writings he is the god of love.

KAMAKURA, a coast town of Japan, 12 mi. S. of Yokohama, in Kanagawa *ken* (prefecture) on Honshū. It is situated in a picturesque valley enclosed on three sides by evergreen hills and with fine sandy beaches on the south. Pop. (1960) 98,617. It was a small fishing village until it was established by Minamoto Yoritomo as a capital of the Minamoto clan in 1180, and remained so for about 300 years. Wars, tidal waves and fires led to the decline of the town, which, however, was revived as a tourist centre about the middle of the Edo period. Neighbouring villages were incorporated in 1939, and the present Kamakura came into being in 1948 with the annexation of Ōfuna and Fukuzawa.

Functionally, Kamakura may be divided into three sections: as a site of historical interest; as a resort; and as a residential district along the Yokosuka railroad line. Ōfuna, a railroad juncture, now part of Kamakura, developed as an industrial area after 1945. As places of historical interest, the Great Buddha, or *Daibutsu,* a national treasure, is world famous; the Kenchōji and Engakuji temples, and the statue of *Kannon* (goddess of mercy) may be cited. As modern institutions, the Museum of National Treasures and the Museum of Modern Art are noteworthy. The beaches of Yui-ga-hama and Shichiri-ga-hama attract tens of thousands of bathers in summer. A lacquer ware called *Kamakura-bori,* developed and maintained by Buddhist sculptors since the 13th century, still flourishes as a folk art. (R. B. H.)

KAMARAN, an island in the Red sea off the coast of Yemen and a British dependency administratively attached to Aden, lies 45 mi. N. of the Yemenite port of Al Hudaydah (Hodeida) and about 200 mi. N. of the island of Perim. Pop. (1965 est.) 1,000; area 22 sq.mi. It is low-lying, flat and sandy. There are four villages; the people are mostly fishermen exchanging their catches for vegetables in Yemen, and there is a small pearl fishing industry; many of the men find work elsewhere. Kamaran (meaning "two moons") was occupied in the 16th century by the Portuguese who built a fort, destroyed later by the Turks. It became a quarantine station for the pilgrimage to Mecca in Turkish times. Captured in 1915 by the British, it was surrendered to the Allied and associated powers, but was never allotted to any power. The government of India administered the quarantine station, and after 1937 the government of Aden, but the quarantine service ceased. In 1949 it was given a constitution under the Foreign Jurisdiction act. Kamaran is not part of Aden or the protectorate of South Arabia but the high commissioner for Aden has direct legislative powers over it. There is an airport on the island.

(W. H. Is.)

KAMA RIVER, in the U.S.S.R., is the largest tributary of the Volga with a length of 1,261 mi. and a drainage basin covering 201,544 sq.mi. It rises in the upper Kama upland and flows northward. Near Rudnichny it swings to the east and at its confluence with the Vishera it flows southward in a steadily broadening valley. All this upper section is characterized by a sinuous course and a high right bank. At Perm the valley narrows and both banks are high. The river there turns southwestward to join the Volga below Kazan by two distributaries. The lower course has a flood plain about 6–10 mi. wide, across which the Kama, about 500–1,300 yd. broad, meanders, with many sandbanks and islands. The banks are high and hilly. The average annual flow is 57,669 cu.ft. per second at Perm and 132,783 cu.ft. per second at the mouth. Maximum flow comes from late April to mid-June following the snow melt, which supplies 57% of the annual flow. There is a slight secondary peak in late autumn. The upper course is frozen fast by mid-November and the lower in early December. The ice breaks up in April. Navigation is possible to Rudnichny.

The Kama is one of the most important rivers of Russia, historically as the routeway to the Urals and Siberia, economically as part of the vast Volga system of waterways. Salts mined along the middle Kama have given rise to regional chemical combines at Solikamsk, Berezniki and Perm on its banks, while the lower river passes the Second Baku oil fields. A large barrage for hydroelectric power is in operation at Perm, another was under construction at Votkinsk in the 1960s and a third is planned downstream. It was also planned to divert the upper Pechora and Vychegda by a series of barrages into the Kama, to increase the volume of flow.

(R. A. F.)

KAMBA (AKAMBA), a Bantu-speaking tribe (pop. *c.* 612,000 in the 1960s) of central Kenya, closely related to the Kikuyu (*q.v.*) and occupying the districts of Machakos and Kitui.

The Kamba are agriculturalists, keeping some livestock. In the dry and partly arid Kitui district herding predominates. Overcrowding and soil erosion in Machakos district has driven many to work in Nairobi. There are Kamba communities in and near Mombasa, and many work on European farms or as wandering traders and sellers of woodcarvings.

Traditional Kamba social organization, like that of the Kikuyu, rests on villages formed round a core of patrilineal kin and grouped into districts. There are some 25 dispersed patrilineal totemic clans. Unlike the Kikuyu, the Kamba do not base age-grades on initiation; at puberty a man becomes a warrior, later an elder. Senior elders form local district councils that traditionally regulate everyday political and jural affairs; government-appointed chiefs and headmen work with them. Kamba religion resembled the Kikuyu's with belief in a high god *Ngai* and in ancestral spirits. Sacrifices were made at sacred groves. Except for some older people, most Kamba have become nominally Christian. *See* also KENYA.

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(J. F. M. M.)

KAMCHADAL, aborigines in southern Kamchatka (*q.v.*) peninsula, U.S.S.R., numbering about 1,100 in the 1959 Soviet census. Much reduced by conquest and epidemics, they have been largely russianized since the 18th century. In Soviet usage the surviving remnant is designated by their own term *Itelmen;* in the 1960s the name Kamchadal referred to mixed bloods in the U.S.S.R. Racially they are classified with the Arctic Mongoloids (*e.g.,* Chukchi, Eskimo). Their language and mythology are closely related to those of the neighbouring Chukchi and Koryak (*qq.v.*). Along with many other tribes around the North Pacific the Kamchadal based their economy and pattern of life on the annual salmon run; extensive use of wild plants was also characteristic. The year's food supply was largely obtained with weirs, traps and nets in summer, permitting relative leisure during other seasons. The Kamchadal were primarily a riverine and coastal people; living in relative isolation, they were still technologically in the Stone Age when first reported (1697). Uniquely, they lived in underground houses in winter and in elevated pile structures during the

summer. Dog sleds or small dugout canoes provided transportation depending on the season. Warfare among local groups was frequent. Little is known about traditional Kamchadal social organization, but women had considerable influence. Religion included propitiation of countless spirits, and game-animal rituals designed to assure hunting success. Shamans were less important than elsewhere in Siberia, while the dead were simply abandoned.

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KAMCHATKA, the name of a large peninsula and river of the U.S.S.R., and also of an *oblast* of the Russian Soviet Federated Socialist Republic. The peninsula lies between the Sea of Okhotsk on the west and the Pacific ocean and Bering sea on the east. The *oblast* is nearly coterminous with the peninsula but includes, on the mainland, the basin of the river Penzhina and the Bering sea coast as far as Cape Rubikon. All the mainland part and the northern part of the peninsula are in the Koryak National Okrug (*q.v.*), which lies within Kamchatka *oblast*. The area of the *oblast* is 182,355 sq.mi., of which 116,409 sq.mi. are taken up by the Koryak National Okrug.

Peninsula and Oblast.—The peninsula is about 750 mi. long from the Rekinniki and Anapka rivers in the north to Cape Lopatka in the south. Its greatest breadth is about 350 mi. The structure of Kamchatka is simple, consisting of two parallel ranges, divided by a tectonic trough. The range on the west is the Sredinny (Central) range, extending from the neck of the peninsula as far south as the Bolshaya river and rising to 11,880 ft. in Ichinskaya Sopka (Vulkan Ichinski). A number of other peaks surpass 8,000 ft. The Vostochny (Eastern) range stretches from the Ozernoi peninsula to Cape Lopatka and is continued northward as Karaginski Island. Both ranges and the trough, which is occupied for much of its length by the Kamchatka river, are of recent geological formation and are part of the circum-Pacific belt of Alpine folding. They share the structural instability of the belt, as is evidenced by the presence of many volcanoes. In all, 127 volcanic cones or craters have been traced, although some have been destroyed. There are 22 still active, the only active volcanoes of the U.S.S.R. Most lie along a fault line on the eastern flank of the Vostochny range, the highest there being Sopka Kronotskaya (11,575 ft.) and Sopka Koryakskaya (11,338 ft.). Highest of all is Klyuchevskaya Sopka (15,584 ft.) to the west of the Vostochny range. Only one volcano on the Sredinny range, Ichinskaya Sopka, is active. Other features of tectonic weakness are the innumerable hot springs, geysers and mud volcanoes. The western coastlands form a low plain, up to 40 mi. wide, crossed by many rivers and with extensive swamps. The coast is low, fringed by a series of long sand bars. The east coast by contrast is an alternation of broad, sweeping gulfs and cliffed, mountainous peninsulas.

The cold monsoon climate is extremely severe. In summer, winds from the Pacific bring high rainfall and cool temperatures (Petropavlovsk averages 54° F. in August), while the bitterly cold winter monsoon from the continental interior is only little modified crossing the Sea of Okhotsk, but picks up enough moisture to bring heavy snowfalls. Only the sheltered valley of the river Kamchatka has drier conditions, with colder winters and hotter summers. The mainland part of the *oblast*, the higher areas and most of the west coast are in tundra-like vegetation, dominated by mosses. The rest is mainly in birch forest, with some fine stands of larch in the Kamchatka valley. Poplar and willow are common in lower, damper areas. Everywhere thickets of Kamchatka alder are found.

The *oblast* was established in 1932 as part of Khabarovsk krai, receiving its independent status in 1956. Its population was only 220,753 at the 1959 census, 1.2 persons per sq.mi. (in the Koryak National Okrug 0.2). This represents a considerable increase since 1914 (when the population was estimated at 20,000), due to Russian immigration. Russians now form the bulk of the population. The indigenous tribes were greatly depleted in numbers during the 18th and 19th centuries, especially by introduced diseases. Their numbers continue to decline. The Itelmeny, or Kamchadaly, numbered 4,217 at the 1926 census, but only 1,100 in 1959. The Koryaks of the north were 6,300 strong in 1959, while smaller groups were the Yukagiry (400), Lamuty (Eveny), Chuvantsy, Evenki and Chukchi. All except the Tungus-Manchurian Evenki belong to the Paleo-Asiatic group of people. (*See* PALEO-ASIATIC LANGUAGES.) On the Komandorski (Commander) Islands are about 400 Aleuts.

Fishing forms 80% of the industrial product. This has been developed on a very large scale, almost wholly by Russians and, before World War II, by the Japanese. The huge crab catch is canned and exported all over the world. Salmon, herring, cod and plaice are also caught. Fishing, preserving and canning support the series of small settlements round the coasts. In the Kamchatka valley timber is exploited, almost all used to make crates and boxes for the fish industry. In this protected valley, and at one or two places on the west coast, there are small patches of arable land, where potatoes, vegetables and a little rye and oats can be grown. Cattle are being kept in increasing numbers in the south. The native peoples are engaged in reindeer herding, fur trapping, hunting and fishing. Sealing is carried on in the Komandorski Islands. The only town is the administrative centre of Petropavlovsk-Kamchatski (*q.v.*; 86,000 persons), founded in 1740 on the sheltered Avachinskaya gulf. It is the main fishing, canning and timber-working centre and the only seaport. In 1958 a pedagogic institute was opened there.

River.—This is the major stream of the Kamchatka peninsula, 478 mi. long and draining a basin of 21,737 sq.mi. It rises in the Sredinny range and flows northeastward through the central trench to Krasny Yar and then swings east to the sea. In its upper course 20–40 yd. wide, it widens to 500–1,100 yd. in the lower reaches. There are many sandbanks and gravel banks and rapids at Krekurkinski but shallow-draft craft can navigate to Milkovo. The last 7 mi. are parallel to the sea from which the river is separated by a long sandspit. The main tributaries, of many, are the Bolshaya Kimitina, Kozyrevka and Yelovka on the left and the Shchapina and Tolbachik on the right. The average annual discharge is 33,549 cu.ft. per sec. with a spring maximum and winter minimum, but relatively little variation since much of the water is from ground sources or glaciers and snowfields. Many hot springs discharge into the Kamchatka, causing stretches of open water even in midwinter. Freeze-up lasts over three weeks, being complete in mid- or late November and breaking up in May. (R. A. F.)

KAME (a form of Scandinavian *comb*, hill), a more or less rounded hill or short ridge of sand and gravel which occurs associated with glacial deposits. Kames frequently occur in the outwash plain of a glacier and at the mouths of englacial streams and are formed by the deposition of the sediments carried by these streams. Kames are often situated directly behind a terminal moraine. They are common in Scottish glaciated valleys and morainic areas of north central United States. *See* GLACIER.

KAMENEV, LEV BORISOVICH (1883–1936), Soviet Communist leader prominent in the first years of the U.S.S.R., was born in Moscow, on July 22, 1883, the son of a Jewish engineer named Rosenfeld. He received a technical education, but in 1901 joined the Russian Social Democratic party and became a "professional revolutionary." From 1903 he was a member of the Bolshevik section of the R.S.D.P. and attended the 3rd and the 5th (London) party congresses. Following Lenin's call, he went abroad in 1908. Having assisted Lenin in the struggle against other factions in the party, sometimes against his own more conciliatory sentiments, he was sent to St. Petersburg at the beginning of 1914 to direct party activities in Russia. He adhered to Lenin's revolutionary policy on the war question, was arrested in 1915 and sent to perpetual banishment in Siberia. He returned at the outbreak of the March revolution in 1917 and, until Lenin's arrival, was the principal Bolshevik leader in Petrograd, inaugurating the policy of conditional support for the provisional government (backed up in this by Stalin). After Lenin's arrival Kamenev consistently opposed his policy of a seizure of power by the Bolsheviks alone, advocating a coalition government formed from all the socialist parties. He was elected to the first Politburo of the party's central committee in Oct. 1917 and was again a member from 1919, when the Politburo was re-established on a permanent basis. In

1923 he joined with G. E. Zinoviev and Stalin against Trotski but in 1926, with Zinoviev and others, he went over to the opposition and lost his leading posts. In 1926–27 he was ambassador to Italy. He was three times expelled from the Communist party (1927, 1932 and 1934) for oppositional activities, sentenced to five years' imprisonment in 1935, but retried and shot on Aug. 24, 1936.

(L. B. Sc.)

KAMENSK-SHAKHTINSKI, a town in Rostov *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., stands on the right bank of the Northern Donets, where it is crossed by the Voronezh-Rostov trunk railway, 120 mi. N. of Rostov-on-Don. Pop. (1959) 57,525. It was founded as a Cossack village in the early 19th century and from 1954 to 1957 was the administrative centre of Kamensk *oblast*, formed during those years out of the northern part of Rostov *oblast*. The town is one of the major centres of coal mining in the eastern part of the Donets basin, with many pits in and around the town. Agricultural machinery, mining equipment, and artificial silk and other fibres are manufactured and there are locomotive repair shops. The Northern Donets is navigable and there is a river port. During World War II the town was held by the Germans (1942–43). (R. A. F.)

KAMENSK-URALSKI, a town of Sverdlovsk *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., is located on the Iset river, a tributary of the Tobol, 55 mi. S.E. of Sverdlovsk city. Pop. (1959) 141,019. The first state iron foundry, Kamenski-Zavod, in the Urals was established there in 1682. Since then the town has become a large industrial centre, specializing in the production of aluminum, aluminum castings and sheets, from nearby sources of bauxite. Steel, rolled steel and steel tubes are made, and a range of electrical machinery, including mobile generators, electric motors and drills and mining equipment. Kamensk-Uralski is a major railway junction, where the Trans-Siberian is crossed by the north-south Urals Lateral railway. (R. A. F.)

KAMERLINGH ONNES, HEIKE (1853–1926), Dutch physicist who was awarded the 1913 Nobel prize in physics for his work on low-temperature physics and his production of liquid helium, was born in Groningen on Sept. 21, 1853. After studying mathematics and physics in his native town, he went in 1871 to Heidelberg, studied under Robert Bunsen and G. R. Kirchhoff and later returned to Groningen, where in 1879 he took his doctor's degree. He was professor of experimental physics at Leiden, 1882–1923, where he founded (1894) and developed the famous Cryogenic laboratory. Stimulated by Johannes van der Waals, Kamerlingh Onnes became interested in the equations of state and the general thermodynamic properties of liquids and gases. (*See* THERMODYNAMICS.) Kamerlingh Onnes set himself the task of making measurements over a large range of pressures and temperatures, his name being associated particularly with the measurement and attainment of low temperatures; in this direction he showed himself a master of experimental physics. In 1908 he succeeded in liquefying helium, but was unable to solidify it; this was subsequently done by his successor W. H. Keesom. Kamerlingh Onnes obtained the isothermals for a number of gases and mixtures of gases at low temperatures; he also studied the optical, magnetic and magneto-optical properties of bodies. He carried out investigations on the influence of low temperatures on nickel and manganese iron alloys. He also demonstrated that the resistance of electric conductors disappeared suddenly at a temperature near absolute zero and termed this phenomenon "superconductivity." His systematic researches on superconductivity (started in 1914) are of extreme importance because of their bearing on the theory of electrical conduction in solids (*see* ELECTRICITY, CONDUCTION OF: *Conduction in Solids*). In 1913 the Nobel prize for physics was conferred on him. His published work includes *Algemeine Theorie der Vloeistofen* ("General Theory of the Fluids"; 1881). He died at Leiden on Feb. 21, 1926.

KAMES, HENRY HOME, LORD (1696–1782), Scottish lawyer, philosopher and agriculturist, whose *Elements of Criticism,* two volumes (1762), is remarkable in the history of aesthetics for its attempt to equate beauty with what is pleasant to the natural senses of sight and hearing. He was born at Kames, Berwickshire. Called to the bar in 1724, he was appointed a judge in the court of session in 1752, with the style of Lord Kames, and a lord of justiciary in 1763. He died in Edinburgh on Dec. 27, 1782.

Other works include *Essays on the Principles of Morality and Natural Religion* (1751), which supported the doctrine of innate ideas and offended certain Presbyterian ministers by suggesting that God had implanted in the human mind a belief in free will, though without allowing actual freedom; *An Introduction to the Art of Thinking* (1761); *Sketches of the History of Man,* two volumes (1774); and *The Gentleman Farmer* (1776). His greatest practical achievement was the floating of a stratum of peat, covering 1,500 ac., piecemeal off his wife's estate at Blair Drummond, along channels of water raised artificially from the Teith river, into the Firth of Forth.

KAMPALA, the capital and largest town of Uganda, east Africa, lies in Buganda (*q.v.*) province 21 mi. N.N.E. of Entebbe, on Lake Victoria, by road. Pop. (1959) 46,735, including 24,056 Africans, 19,268 Asians, 3,179 Europeans and 232 others. The town, built on a group of rounded hills, covers 8½ sq.mi. and contains separate residential, commercial and industrial areas. It is the residence of the kabaka of Uganda. The main street is more than five miles long and near the middle stands the town hall, the gift of an Indian merchant in 1950. Though some ministries remain at Entebbe, which was formerly the country's administrative capital, many government departments and offices are now at Kampala where the new parliamentary buildings are situated. The early style Indian shops, or *dukas,* have largely given way to modern store and office buildings such as Amber house (1950) which is the headquarters of the Uganda Electricity board, the Lint Marketing board and the Coffee Industry board. The high court is in old colonial style and the Uganda museum, with its unique collection of musical instruments, was rebuilt in 1952.

There are mosques, Hindu temples and Christian churches in the town while on the hills around stand the white Kibuli mosque; the Rubaga Roman Catholic cathedral, headquarters of the White Fathers' mission; the Namirembe Anglican cathedral (to the west) with the headquarters of the Church Missionary society, its schools and teachers' training college for Africans and its hospital; and the Nsambya Roman Catholic cathedral (southeast), headquarters of the St. Joseph's mission (Mill Hill Fathers) with hospitals, schools and a coffee plantation.

To the north is the large Mulago hospital; the broadcasting station is on Bugolobi hill. Kampala has more than 20 schools of all grades for all races, and on a wooded hill to the northwest are the expanding buildings of Makerere University College; its new library was opened in 1959 by Queen Elizabeth, the queen mother. Jubilee park, commemorating the jubilee of King George V, is on the slopes of Nakasero hill, and at Lugogo, on land reclaimed from swamps, there are a municipal sports ground and stadiums for multiracial sports activities. Due south is Mengo where are the residences of the kabaka of Buganda and the ministers of the Buganda government, and the Buganda parliament house.

From Kampala radiate Uganda's 11,000 mi. of roads and 1,400 mi. of waterways, including Lake Victoria. The railway runs eastward to the coast via Jinja and Nairobi, Kenya, and the extension westward runs 208 mi. to Kasese at the foot of the Ruwenzori (*q.v.*) range, where it also serves the Kilembe mines. Entebbe airport is on the main route to the United Kingdom, the Rhodesias and South Africa and is also served by local airways.

The name Kampala ("place of the impala") is derived from the custom of the African rulers of the ancient kingdom of Buganda to graze their herds of tame impala on the hill now called Lugard's Fort in Old Kampala. It was here that Captain (later Lord) Lugard first flew the flag of the British East Africa company in 1890 (replaced by the union jack in 1893) and where the town subsequently grew. (WR. D. M.)

KAMPEN, a town in the province of Overijssel, Neth., lies on the IJssel river, 4 mi. above its mouth, 8 mi. N.W. of Zwolle. Pop. (1960) 25,464. It has railway communication with Zwolle and there are boats to Amsterdam. Kampen manufactures cigars and enamel goods and is a garrison town. Within its boundaries are farms reclaimed from the Zuider Zee.

The town was first mentioned in 1227. It was a Hanseatic town

and, until it was supplanted by Amsterdam in the 16th century, was a leading commercial centre. Among notable buildings are the Old Town hall (Stadhuis), restored after the fire of 1543, with the *Schepenzaal* (court of sheriffs), and the church of St. Nicholas and the *Buitenkerk* or church of Onze Lieve Vrouwe, both enlarged in 1396. Three turreted gateways—one of which, the *Broederpoort,* is used as a town museum—furnish excellent examples of 16th- and 17th-century architecture. (J. Do.)

KAMRUP, a district of Assam, India, lies on both sides of the Brahmaputra river. Pop. (1961) 2,062,572. Area 3,804 sq.mi. The ground rises in undulating knolls toward the Bhutan hills on the north and toward the Khasi and Jaintia hills on the south. The district in the immediate vicinity of the river is liable to annual flooding. The chief crops are jute, rice, mustard seeds, sugar cane and pulses. Sericulture products are the Endi, Muga and Pat silks, and hand weaving is the main cottage industry; Soalkuchi is the centre of the silk trade. There is an oil refinery at Gauhati. The district is well served by rail and road. In addition to Gauhati (*q.v.*), the district headquarters, other towns are Barpeta with a shrine to Vishnu built in the 15th century; Palasbari, a timber business centre; and Sarthebari which specializes in brassware.

The district derives its name from the ancient kingdom of Kamarupa which about A.D. 400 stretched from Bhutan southward to the sea with its capital at Pragjyotishapura, the present Gauhati. In Kamrup arose the Hindu cult of Tantrism, the chief temple of which is the Kamaksha-devi or Kamakhya near Gauhati.

(M. Ba.)

KAMYSHIN, a town in the Volgograd *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., stands on the high right bank of the Volga, on the shore of the reservoir created by the Volgograd barrage 100 mi. N.N.E. of Volgograd. Pop. (1959) 56,511. Founded under the name of Dmitriyevsk in 1697 as a strong point to defend the lower Volga, it became the centre of an agricultural region and a transshipment point. The sultan Suleiman the Magnificent and Peter the Great planned canals from there to the Don, by way of the Kamyshinka and Ilovlya. In 1895 Kamyshin became the river terminus of a railway from Tambov. It now has engineering, textile, paint making, flour milling and canning industries. (R. A. F.)

KANAGAWA, a Japanese *ken* (prefecture) south of Tokyo, with an area of 912 sq.mi. and a population (1965) of 4,430,518. Its capital city is Yokohama. The southern coastal zone has warm winters and is a noted resort. Agriculture supports 17% of the population, while manufacturing accounts for 25.2%. Kanagawa depends upon imports for most of its rice, but horticulture and dairying are well developed. The port of Misaki is a base for bonito and tuna fishing and is one of the chief fishing centres of Japan. Many large factories are concentrated on the shore between the cities of Kawasaki and Yokohama. Kamakura and the Hakone area are popular tourist places. (R. B. H.)

KANAGAWA, TREATY OF, Japan's first treaty with a western nation. Entered into by representatives of the United States and Japan on March 31, 1854, at Kanagawa (now part of Yokohama), it marked the end of Japan's era of seclusion (1639–1854). Commodore Matthew C. Perry, commanding an American far east squadron of "black ships," sailed to Tokyo bay twice, in July 1853 and again in Feb. 1854, to induce the Japanese to open their doors to American ships and commerce. He was instructed to accomplish his mission by persuasion, if possible, or by show of force, if necessary. The Japanese, already aware that continued seclusion was dangerous, if not impossible, responded to Perry's threatening diplomacy by agreeing to admit American ships to the ports of Shimoda and Hakodate and to accept a U.S. consul at Shimoda. Townsend Harris, who went to take the latter post, exercised great skill and patience to turn the limited concession under the treaty into a full-scale commercial agreement.

(F. H. Co.)

KANARA, a region comprising the districts of North Kanara and South Kanara in Mysore, India. The districts lie along the west coast, partly covering the coastal lowland and partly the Sahyadri range of the Western Ghats. The region, formerly included in the Madras presidency, was separated into two districts in 1862. The northern part (known as North Kanara) was integrated in the former Bombay presidency, and the southern part (South Kanara) remained in the Madras presidency. After the reorganization of states in 1956, both districts were included in Mysore, with the exception of Kasaragod subdivision, which was taken into Kerala.

Many geographical features are common to both the districts: the low coastal plain varying in breadth, the eastern hilly fringes covered with thick tropical forests, the high rainfall, the lateritic formations and soils, the production of rice and coconuts, the fishing along the coast, the plantations of betel nut, pepper and cardamom in the hills and the extraction of teak, sandalwood, resin, etc., from the rich forests. There are many rivers which flow west to the Arabian sea: Kali and Sharavati in North Kanara and Sita-Swarna and Netravati-Gurpur in South Kanara being the more important ones. The famous Jog or Gersoppa falls, with a drop of 829 ft., are on the Sharavati river. Salt is manufactured in open salt pans along the North Kanara coast; the coir industry is important in South Kanara. The manufacture of tiles was introduced in South Kanara by the Basel mission in the 19th century, and Mangalore tiles are distributed over almost all of south India and even exported in some quantities to the east African coastal countries and the middle east. The production of cashew nuts for export has gained in importance in both districts. Mangalore is served by one of the few railways and it is the largest port in Mysore. It exports betel nuts, cashew nuts, tiles, coffee and timber.

North Kanara district (area 3,965 sq.mi.; pop. [1961] 689,549) has its administrative headquarters at Karwar (pop. [1961] 23,906), where an arts and science college was established in 1961. Beekeeping is a popular industry and the annual yield of honey is about 35,000 lb. Another town of note is Sirsi (21,240), a centre of the betel-nut, pepper and cardamom trade. Gokarn is a renowned place of pilgrimage from ancient times, and round Bhatkal and Haduvalli are temples and other monuments of Jainism, which survived there until the 16th century. At Kumta is Kanara college, affiliated to Karnatak university. Dandeli has a number of sawmills and plywood and paper factories. Banavasi, also called Jayanti and Vaijayanti, was the former capital of the early Kadamba dynasty which ruled from the 4th to the 6th century, and it was one of the places where Asoka sent his missionaries for the propagation of the Buddhist faith.

South Kanara district has an area of 3,249 sq.mi. and a population (1961) of 1,563,837. Its administrative headquarters are at Mangalore. Udipi is a religious centre, and also has two colleges, one affiliated with Karnatak university and one with Mysore university. The rule of the Alupa kings lasted there for nearly ten centuries from the 6th century onward. An imposing figure of a Jain celebrity 41.5 ft. high was erected in 1432 at Karkala, and another 35 ft. high was put up in 1604 at Venur; both are carved out of single stones and are modeled on their prototype at Sravana Belgola near Mysore. Mudbidri, a centre of Jainism, is famous for its 1,000-pillared shrine and other monuments of remarkable workmanship. (V. V. B.; P. B. D.; M. S. H.)

KANARESE (Kannada), one of the Dravidian languages (*see* Dravidian), spoken chiefly in Mysore, Hyderabad and the adjoining districts of Madras and Bombay. It has an ancient literature, written in an alphabet closely resembling that employed for Telugu. The irregular forms in the alphabet are nearly the same as in Telugu, but it is closely related to Tamil. At mid-20th century there were about 15,000,000 speakers. (J. Wh.)

KANARESE LITERATURE, the literature written in Kanarese (Kannada) which, like the other languages of south India, is of the Dravidian family (*see* Kanarese; Dravidian).

The earliest records in Kanarese are inscriptions dating from A.D. 578 onward. The earliest literary work is the *Kavirājamārga* (*c.* A.D. 850), a treatise on poetics based on a Sanskrit model. The subject matter of this suggests that there was already a literature in Kanarese, but all of this earlier work is now lost. Nearly all the extant early texts are poems on religious subjects.

Jaina Literature.—Most of the oldest texts were written by

Jaina authors (*see* JAINISM). One of the most remarkable works was the 12th-century *Rāmāyaṇa* of Abhinava Pampa. In most of the "vernacular" versions in India this tale (*see* RAMAYANA; SANSKRIT LITERATURE) is essentially Hindu, since the hero, Rāma, is regarded as an incarnation of the Hindu god Viṣṇu (Vishnu). Pampa's is a Jain version, however, and according to him India is a Jain land. Some of the details are more plausible than in other versions: the Rākṣasa demons are but sky-going beings, and Hanumān, elsewhere a monkey-god, has become merely a mortal man with a banner bearing a monkey emblem.

Śaiva and Vaiṣṇava Literature.—After the 12th century Liṅgāyat Śivaism replaced Jainism as the most important religious influence upon Kanarese literature. The Liṅgāyats, or Vīraśaivas, worship Śiva (Shiva) only. Basava, who lived in the mid-12th century in a northern part of the Kanarese-speaking area, revived this cult, and seems to have been ruthless in propagating his beliefs. All Kanarese Liṅgāyat works are simple in style and some are meant for singing. The most popular works were the *Vacanakāvyas,* Śaiva devotional poems, written in rhythmic prose. Vīraśaivism was later extended to the southern part of the Kanarese area. Here the Vīraśaivites were patronized by the Hŏysaḷa kings of Dōrasamudra (Haḷebīḍ). The Hŏysaḷa, or Ballala rulers (11th century onward), had originally been Jainas, but had been converted to Vaiṣṇavism (*see* VISHNUISM) under the influence of the philosopher Rāmānuja (*q.v.*). Most of the Kanarese Vaiṣṇava literature of this period consisted of adaptations from Sanskrit originals. Another medieval movement of importance in the Kanarese area was that of Madhva (*q.v.*).

The earliest work in Kanarese that may be termed a novel was Nemicandra's *Līlāvatī* (A.D. 1370). It tells how a prince saw a beautiful princess in a dream, how she likewise dreamed of him, and how, after a long search and many adventures, they ultimately met and were married. This work was virtually unique in Kanarese literature for many centuries.

Kumaravyāsa (fl. 1419–46) composed a version of the *Mahābhārata* (*q.v.*) in which Kṛṣṇa (Krishna) as an incarnation of Viṣṇu is the hero. This was completed *c.* 1500 by Timmaṇṇa, whose Telugu work, *Pārijātāpaharaṇamu,* is better known.

Vaiṣṇava *dāsaru,* mendicant singers, wandered from village to village popularizing Kṛṣṇa-worship. The most important of them was Purandaradāsa (1494–1564), who composed an enormous number of songs in praise of Kṛṣṇa. He is regarded as the father of south Indian classical music, although the tunes to which his songs are sung today are later accretions.

One of the most famous Kanarese works is the *Rājaśekharavilāsa,* a fictional tale written in 1657 by Ṣaḍakṣaradeva in *campū* style (verse interspersed with prose). A prince and his friend, the son of his father's chief minister, ride spirited horses through the town, accidentally killing a boy. The king, impartial, has his son put to death since he has admitted liability. The prince's grieving friend and parents commit suicide and the queen and the prince's sister are about to do likewise when they are prevented by divine intervention. Śiva restores all to life and takes the king to heaven, commending him for upholding the law. Also highly esteemed is the 18th-century poem the *Jaiminibhārata,* by Lakshmiśa, elaborating an episode from the *Mahābhārata,* about the wanderings of the horse appointed for King Yudhiṣṭhira's horse sacrifice.

Dance-Drama.—The 18th century saw the rise of the Kanarese dance-drama, Bāyalāṭa, and its variant Yakṣagāna, which have their centre in North Kanara district. Bāyalāṭa may be compared to the better-known Kathākali dance-drama of Kerala (*see* DANCE: *The Orient: India and Pakistan;* INDIAN MUSIC). Strict Yakṣagāna is performed without costume, the participants sitting facing each other in two rows and declaiming or singing in dialogue.

Modern Period.—Among Europeans who interested themselves in Kanarese in the 19th century were John McKerrell, author of *Grammar of the Carnataca Language* (1820), and F. Kittel, who published a Kannada-English dictionary (1894) and a historical *Grammar of the Kannada Language in English* (1903).

Modern Kanarese literature, like other Indian literatures, has modeled itself on European forms, especially the novel and short story. K. S. Karanth (1902–), an outstanding novelist, is also an authority on Yakṣagāna. His novel *Marali Manṇigĕ* (1940, "Back to the Soil") is particularly notable. Masti Venkaṭeśa Aiyangār (1891–) is best known for his short stories. Adoption of Kanarese as the official language of Mysore (*q.v.*) seemed likely to stimulate literary output.

See A. L. Basham, *The Wonder That Was India* (1954); E. P. Rice, *A History of Kanarese Literature,* 2nd ed. (1921). (Jo. R. M.)

KANARIS, KONSTANTINOS (1790–1877), Greek naval officer and statesman, a regent in 1861–63 and four times prime minister, was born on the Aegean island of Psara. During the War of Greek Independence this island provided ships for the Greek navy, Kanaris contributing his own ship to the fleet. He soon achieved fame through his effective use of fire ships. While serving under the command of Andreas Miaoules off Chios, on June 18, 1822, he blew up the kapitan pasha's flagship and so harassed the Turkish fleet that it retreated to the Dardanelles. In Nov. 1822 he destroyed another large Turkish ship at Tenedos. Though unable to save Psara, which fell in June 1824, he took toll of the Turks off Samos and Lesbos and harassed and delayed the Egyptian squadrons, whose objective was Crete. His audacious attack on Mohammed Ali's fleet at Alexandria in Aug. 1825 failed at the last moment because of a contrary wind. A retiring man, Kanaris played little part in the stormy politics of the War of Independence; but after the war he was associated with the opposition to King Otho, though he served as prime minister in 1848–49. He was a member of the provisional government that deposed Otho in 1861, after which he was one of the three regents until 1863. He was prime minister from April to May 1864 and from Aug. 1864 to Feb. 1865. He came back from retirement to preside over the ministry formed during the Russo-Turkish War, which began on April 7, 1877. He died in office on Sept. 14, 1877. (D. DN.)

KANAZAWA, a historic Japanese city, the capital of Ishikawa prefecture and an important industrial centre. Pop. (1960) 298,972. In the 16th century Toyotomi Hideyoshi gave Kanazawa and the province of Kaga to the Maeda family, the wealthiest daimyō family in Tokugawa times, and the city remained under their jurisdiction for about 300 years. The walls, gates and a few buildings of their castle remain. Kenrokuen, formerly the daimyō garden, is considered one of the finest landscape gardens in Japan.

The industries of Kanazawa grew from the luxury industries which flourished under the Maeda and include fine lacquer and the famous Kutani porcelain. The ancient silk industry has been expanded to include cotton, woolen, rayon and nylon textiles.

(C. A. MR.)

KANCHANABURI, a province in Thailand, situated northwest of Bangkok on the Burmese border. Area, 7,524 sq.mi.; pop. (1960) 233,341. The province is drained by the Khwae Noi and Khwae Yai rivers, which join to become the Mae Klong near Kanchanaburi town (pop. [1960] 12,957), the provincial capital. A wartime railroad, no longer maintained, was built in 1942–43 along the ancient trade route which ascends the Khwae Noi valley and passes through Three Pagodas pass to Moulmein. Mineral products include tungsten, lead and zinc, while major crops are rice and tobacco. Large stands of bamboo supply pulp for the Kanchanaburi paper factory, Thailand's largest. (G. W. SK.)

KANCHEEPURAM, formerly known as CONJEEVERAM (Sanskrit KANCHI [PURAM]; Tamil KACHCHI [PURAM]), one of the seven Hindu sacred cities, in Chingleput district, Madras, India, lies 43 mi. W.S.W. of Madras city. Pop. (1961) 92,714. Of its many temples the earliest surviving date from Pallava times (A.D. 600–750). The architecturally important Kailasanath (Rajasimhesvara), commemorating and imitating Mt. Kailasa, Shiva's Himalayan fastness, was built about A.D. 670 by King Rajasimha. Its complex appearance comes from the repetition of *stupikas,* little domes, on the pyramidal tower of the main shrine, on the minor shrines and on the enclosure parapet (*see* also INDIAN ARCHITECTURE). The Kailasanath, stemming eventually from Buddhist prototypes, foreshadows the Kailasa temple of Ellora. Another important example of the Pallava style is the Vaikunthaperumal temple, built between 755 and 790 by Nandivarman Pallava Malla. Of the period of Chola rule

there are several small but excellent examples. Of the Vijayanagar period there are notable remains: the great Ekambareshwara temple (parts of which go back to early Pallava times) was largely the work of Krishnadevaraya (1509–30). Its gopura (gateway) is 188 ft. high. Of the same period, but slightly earlier, is the second largest structure in the city, the Varadarajaswami Vaishnavite temple, 1,200 ft. long, 800 ft. wide, with a hall of 100 pillars, a rich treasury and many inscriptions. At Tirupparuttikunram, 2 mi. S. of the city, is the only Jain temple, built at the height of Chola power (late 10th to mid-11th centuries); its inscriptions record the dynasties that held the country.

Kanchi is first mentioned in Patanjali's Great Commentary of the 2nd century B.C. The early rulers were Cholas (*q.v.*), later ousted by Pallavas, who made Kanchi their capital by the mid-4th century A.D. The Chinese traveler Hsüan Tsang described it about 640 as a Buddhist stronghold with considerable "Deva" (Hindu) and "heretic" (Jain) minorities. In the 9th century the Cholas' power was restored, and Kanchi was for a while their capital. Their successors, the Vijayanagar dynasty (1336–1565), enriched and enlarged the temples. In 1646 Kanchi fell to the Muslims and was successively part of the dominions of Golconda, Aurangzeb and the Carnatic. Captured by Robert Clive in 1752, it was ceded to the East India company in 1759. It was occupied and much damaged by Haidar Ali in 1768 and 1780. Kancheepuram is a centre for silk and cotton weaving. (F. R. A.)

KANCHRAPARA, an industrial town in the Twenty-Four Parganas district of West Bengal, India, lies 28 mi. N. of Calcutta and about 1 mi. E. of the Hooghly river. Pop. (1961) 68,966. The railway workshop of Kanchrapara is one of the largest in India. There is a fine temple to Shri Krishna, and a religious festival is held there annually. The land to the north of Kanchrapara in Nadia district has been developed by the government of West Bengal under the name Kanchrapara development area, which includes the planned town of Kalyani with modern amenities and educational facilities including a university, and a state tuberculosis hospital and a colony for refugees from East Pakistan. (S. P. C.)

KANDAHAR (QANDAHAR), the second city of Afghanistan and the capital town of the province of Kandahar, lies 3,300 ft. above sea level, 320 mi. S.W. of Kabul and 130 mi. N.W. of Quetta, Pakistan. Pop. (1962 est.) 116,992. The inhabitants of the city, as of the surrounding villages, are mostly Pathans of the Durrani tribe with some Ghilzais and Kakars and Persian-speaking elements. Together with Peshawar, Pak., Kandahar is one of the two great cities of the Pathans, and is the centre of the soft-voiced form of their language, called Pashto (*q.v.*), as opposed to the harder Pakhtu of Peshawar.

The centre of the modern city, with its cinema, schools and other new buildings, lies just to the west of the crowded old city built by Ahmad Shah Durrani (1724–73) as his capital. Although only a few sections of the great mud wall which formerly enclosed this old city survive, its geometric plan and rectangular shape (2,000 by 600 yd.) can still be distinguished. In the northeast corner stands the dominating mausoleum of Ahmad Shah, the only attempt at monumental architecture in the city. With its handsome gilded dome and the twelve minor tombs of Ahmad Shah's children grouped around, it contains some good fretwork and inlaid inscriptions. Next to it is the mosque of the "Khirqe," sacred because it is said to contain the cloak of the prophet Mohammed. There is a technical college aided by UNESCO.

About 4 mi. W. of the present city on the road to Girishk, extending along the slopes of a rocky ridge and into the plain at its foot, are the ruins of old Kandahar, the earlier city which was sacked and plundered by Nadir Shah in 1738. From the top of the ridge a small citadel overlooks the half-buried ruins. Within its walls is the garden of Baba Wali and a famous shrine which still attracts pilgrims. On the sharp northeast face of the hill 40 giant steps cut out of the solid limestone lead upward to a small dome-roofed niche which contains inscriptions by the Mogul emperor Babur, who built the steps, recording details of his kingdom and conquests. The emperor Akbar also added an inscription. Nearby a stone was discovered containing an inscription by the emperor Asoka, the most westerly of his monuments. In the garden of Kohkaran on the outskirts of this city stands the simple tomb of Mir Vais Khan, the Ghilzai leader who rose successfully against Persian rule in Kandahar and died in 1715.

Kandahar stands in a strategic position commanding the route from Herat to the India-Pakistan subcontinent. It is connected by main road with Quetta through the border town of Chaman, Pak., 70 mi. S.W. of Kandahar, and thus with the Pakistan railway system which extends to Chaman. In the early 1960s the road from the Soviet frontier through Herat to Kandahar and the very poor road from Kandahar to Kabul were both being reconstructed. Because of the city's situation on a direct line between Teheran and Delhi, an international airport was constructed in the early 1960s with U.S. aid.

The city is the most important trade centre in Afghanistan and its merchants are relatively wealthy. The wool produced in the area is of good quality, and a woolen mill established in the town in 1933 was later modernized. Some cloth is exported but most is sold within Afghanistan. The main export is fruit, for which the Kandahar region is famous, particularly grapes, melons and pomegranates; there is a large trade in fruit with Pakistan. Fruit is exported both fresh and dried, and modern canning, drying and packing plants are established. Other exports include cotton, madder, cuminseed and asafetida. Long lines of bazaars display goods of all kinds from all over the world.

KANDAHAR PROVINCE is one of the major provinces of Afghanistan. Pop. (1962 est.) 1,036,392. It stretches from the mountainous Hazara country in the north to the sandy wastes of the Registan desert and the Pakistan border in the south, and from beyond Kalat-i-Ghilzai in the east almost to the Helmand river in the west. In the northwest a barren plain is bounded by a double line of hills, called Torkani ("black stone"), rising to about 3,000 ft. above the plain. To the northwest these hills form a watershed between the valleys of the Arghandab and the Tarnak, until they are lost in the mountain masses of the Hazarajat. On the southwest they lose themselves in the sandy desert of Registan.

The climate, at its best in spring, is also good in winter. In summer it is exceedingly hot and dry. Where there are no rivers the old system of irrigation by *karez* is much used. The *karez* is an underground channel which taps a subsurface water supply at the foot of apparently waterless hills. The water is carried over long distances by a slightly inclined channel or drain, constructed by sinking shafts at intervals along the required course, and connecting the shafts by tunnelling.

The central region is rich and fertile. Immediately to the south and west of Kandahar is a highly cultivated area well irrigated from the new Arghandab reservoir, but the valley of the Arghandab itself, with luxuriant orchards and vineyards, is the most fertile in the province. Vines are planted in trenches and trained on artificial banks. The newly constructed Kajakai and Arghandab dams, and the series of canals and irrigation ditches connected to them, built by the Helmand Valley authority with the help of the U.S., were designed to increase agriculture in the province and to supply electricity for Kandahar city. Some of the newly irrigated land has already produced good crops; the government planned to settle some of the Afghan nomads or Kuchis on the newly reclaimed land. Besides fruit and wool the general agricultural products of the province are wheat, barley, pulse, madder, asafetida, lucerne (alfalfa), clover and tobacco. (X.)

History.—The strategic and commercial importance of the site, on main routes via Herat to central Asia, to Kabul and to India, explains the founding of several cities of Kandahar. The city and district were included in the Achaemenid empire by Darius I, were taken by Alexander in 329 B.C., surrendered by Seleucus I to Chandra Gupta Maurya in 305 B.C. and dignified by a rock inscription in Greek and Aramaic by Asoka and thereafter successively held by Greco-Bactrians, Parthians, Sakas, Kushans and Sasanians.

In the Islamic period Kandahar came under the Arabs in the 7th and the Abbasid caliph Al-Mansur in the 8th century A.D. In the 9th century it was included in the Saffarid kingdom and from 977 in the Ghaznavid. The destruction of the rival city of Bust by Ala ud-din Ghori in 1150 enhanced the importance of Kandahar,

which was also a principal town of the Karts, the clients of the Mongols, until their overthrow by Timur in 1383 and the appointment of his grandson Pir Mohammed as governor. At the close of the 15th century it was a mint town of the Timurid Husain Bayqara of Herat, for whom the Arghun Zu' l Nun Beg governed Kandahar.

The Arghuns were dispossessed briefly in 1507 and permanently in 1522 by the Mogul emperor Babur. Thereafter, control of the city was contested by the Moguls and the rising Safawid power in Persia. In 1535 a Persian attack was beaten off by Kamran; in 1545 the Persian allies of the exiled emperor Humayun took the city, only to be promptly dispossessed by Humayun. In 1558 Shah Tahmasp took advantage of the young Akbar, seizing Kandahar; not till 1595, when he had secured Sind, was the Mogul emperor able to retake it. In 1622 Shah Abbas, utilizing Mogul preoccupation in the Deccan, took Kandahar, but in 1638 the Persian governor Ali Mardan Khan came over to the Moguls. Finally Shah Abbas II retook Kandahar in 1649 and held it against the costly counterattacks of prince Aurangzeb in 1649 and 1652 and of Dara Shikoh in 1653.

The Persians next lost Kandahar (in 1709) to its Ghilzai governor Mir Vais whose successors conquered most of Persia. Nadir Shah restored Persian control after a year-long siege in 1738, but on his death his Afghan general Ahmad Shah made a new Kandahar the capital and mint town of a Durrani Afghanistan. His son Timur transferred the capital to Kabul, but Kandahar remained a major prize in the struggles of Zaman Shah with Shah Shuja and then of the Barakzai Dost Mohammed with his brothers in Kandahar.

Fear of Russia led the Indian government to interfere in Afghanistan by supporting Shah Shuja with an army, which in 1839 occupied Kandahar and Kabul (the first Afghan War). Gen. William Nott held out at Kandahar when the Kabul army was destroyed in Jan. 1842, and from Kandahar he made his avenging march on Kabul.

British influence was reasserted in 1878 by an attack on Amir Sher Ali and the occupation of Kandahar in 1879 during the second Afghan War. On Sher Ali's death the British government prepared to dismember Afghanistan by recognizing Wali Sher Ali Khan as sardar of Kandahar, but on Abdurrahman's reappearance chose to recognize him as amir of Afghanistan, handing Kandahar to him in 1881. His rival Ayub Khan, who had overwhelmed a British force in 1880 at Maiwand, outside Kandahar, but had then been defeated by Lt. Gen. Frederick Roberts (later Earl Roberts), promptly took Kandahar from Abdurrahman, only to lose it finally in Sept. 1881. The subsequent history of Kandahar has been comparatively uneventful. *See* also AFGHANISTAN; PERSIAN HISTORY.

(J. B. HA.)

KANDERSTEG, a holiday resort in the Bernese Oberland, Switz., lies 3,937 ft. high and 44 km. (27 mi.) by road southwest of Interlaken. The population (937 in 1960) is German-speaking and chiefly Protestant. Kandersteg is the highest station on the important Bern-Lötschberg-Simplon railway and has direct connections with Rome, Paris, Brussels and the English channel ports. It is a centre for winter sports and climbing—the Blümlisalp (12,231 ft.), Balmhorn (12,178 ft.) and Doldenhorn (11,962 ft.) are all nearby. Mountain walks lead to the Oeschinensee, the Blausee and over the Gemmi pass between Bern and Valais cantons.

(O. E. ST.)

KANDINSKY (KANDINSKI), **WASSILY** (VASILI) (1866–1944), Russian painter, one of the originators of nonobjective painting, was born in Moscow on Dec. 4, 1866. While studying law and ethnology, he decided to become a painter and in 1896 went to Munich where he worked under Anton Azbe and Franz von Stuck and studied Impressionist colour and *art nouveau* form. From the very beginning his own work showed an interest in fantasy. During extended travels in the first decade of the 20th century he came in contact with Fauvism in Paris, and in 1909 he was instrumental in founding the New Artists' association in Munich, one of the springboards of the Expressionist movement. In 1910 he painted a water colour which is generally considered the first nonobjective painting and at this time formulated an aesthetic theory of abstract art in "Concerning the Spiritual in Art" (1912). Also in 1912 Kandinsky and Franz Marc edited the almanac *Der blaue Reiter* ("the Blue Rider"), in which they reproduced art from all ages that appealed to them by virtue of its unconventionality and spiritual authenticity. Kandinsky and Marc formed a rallying point for modern artists, and avant-garde, international exhibitions were held in Munich and traveled from there. With the outbreak of World War I Kandinsky left Germany and returned to Russia where he rose to an influential position after the Revolution of Nov. 1917. In 1921, however, he returned to Germany, and became professor at the Bauhaus school at Weimar, in 1922. Together with Paul Klee, Lyonel Feininger and Alexej von Jawlensky he formed the Blue Four. He continued what he called "concrete painting"; *i.e.,* a complete independence of colour and form from the world of nature. But a significant change took place in his work during the 1920s. In place of the dynamic, dramatic qualities of his earlier abstract expressionism, his painting crystallized into geometric forms: points, bundles of lines, circles and triangles.

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"EMPHASIZED CORNERS" BY WASSILY KANDINSKY; IN THE SOLOMON R. GUGGENHEIM MUSEUM, NEW YORK CITY

Again he formulated this newly gained consciousness of formal relationships in an important essay, "Point and Line to Plane" (*Punkt und Linie zu Fläche,* 1926). Kandinsky remained at the Bauhaus until it was closed by the Hitler regime in 1933. He then moved to Paris. He died on Dec. 15, 1944, at Neuilly-Sur-Seine. During the last decade of his life, he achieved a synthesis between the free, intuitive image of his earlier period and the more scientific ones of his Bauhaus period. He gave evidence that "art like nature creates form for its own ends in a world where everything is both tangible and intangible, physical fact and subjective symbol" (Selz). In both his painting and his art theory Kandinsky had profound impact on modern painting. *See* also PAINTING: *Expressionism and the German School.*

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KÄNDLER, JOHANN JOACHIM (1706–1775), German sculptor and modeler of Meissen porcelain, was born in Fischbach, Saxony. In 1731 Kändler, a sculptor at the court of Augustus the Strong, elector of Saxony, was engaged to reorganize the modeling department of the porcelain factory at Meissen. He lent his great talents to the factory for a period of 44 years until his death in Meissen, May 18, 1775. His versatility and imaginative spirit were extraordinary and it was largely through his genius that the world fame of the Meissen factory was established. As a start he had to see to such details as the proper shaping of handles, spouts and other features. Through the years, however, he extended his work to modeling series of large and small animals, dinner sets consisting of hundreds of pieces, groups, genre figures, vases and whatever was ordered to decorate the palaces of the court of Saxony. Scarcely a palace in Europe did not contain Meissen porcelain of the Kändler period at some time.

See W. B. Honey, *Dresden China,* rev. ed. (1946); G. W. Ware, *German and Austrian Porcelain* (1952). (Hs. H.)

KANDY (formerly CANDY), a town of Ceylon and the administrative centre of Central province and Kandy district, is situated near the centre of the island on the Kandy plateau 75 mi. N.E. of Colombo by rail and 1,602 ft. above sea level. Pop. (1953) 57,200. Known to the Sinhalese as Senkadagala Mahanuwara, it became the capital of a kingdom about 1480. It was temporarily occupied by the Portuguese in the 16th century and by the Dutch in 1763; but the Sinhalese kings maintained their independence, protected by an encircling ring of heavily forested hills, until the British occupation in 1815. Kandy lies in a district renowned for

its beauty, amid hills round the margin of an artificial lake constructed by the last king of Kandy in 1806. Of a number of important Buddhist temples the best known is Dalada Maligawa or the "Temple of the Tooth" where the sacred Tooth Relic of the Buddha is supposed to be preserved. This relic is the centre of the well-known annual *Esala Perahera,* a torchlight procession of dancers, dignitaries and richly decorated elephants. The Royal Botanic gardens and part of the University of Ceylon are situated at Peradeniya, 3 mi. distant, and two Buddhist temples, Lankatilaka Vihare and Gadaladeniya Vihare, are quite close to Peradeniya.

Kandy is an important administrative, commercial, cultural and educational centre, and attracts many tourists. The Pavilion of the governor general is located there. Round it lies a hilly region filled with densely populated Sinhalese villages whose inhabitants grow paddy in skilfully terraced fields and also produce tea, areca nut and other crops. There is much estate production of tea, though Kandy is less of a centre than formerly for European planters.

KANDY DISTRICT.—The administrative district of Kandy had a population of 840,382 in 1953. Sinhalese are in a majority, but there are a large number of Indian Tamils. The district has an area of 914 sq.mi. and contains most of the tea estates of Ceylon as well as cacao plantations on the banks of the Mahaweli Ganga, a few miles below Kandy town. Its dry northeastern part is still largely covered with jungle. (B. H. F.)

KANE, ELISHA KENT (1820–1857), U.S. scientist and arctic explorer who led an expedition to northwest Greenland, was born in Philadelphia, Pa., on Feb. 3, 1820. In 1842 he received the degree of M.D. from the University of Virginia and in 1843 entered the U.S. navy as surgeon. In 1850 Kane joined the first Grinnell expedition, under Lieut. Edwin de Haven, in search of Sir John Franklin. On his return he immediately made plans for an expedition of his own. Financed by Henry Grinnell he sailed in 1853 in the brig "Advance" to northwest Greenland and entered the sea which now bears the name of Kane basin. There the ship was beset in the ice, but much valuable geographical and scientific work was accomplished and the then highest northern latitude of 80° 35′ N. was attained. After abandoning their ship, the expedition eventually reached Upernavik and returned to New York in Oct. 1855. Kane died at Havana on Feb. 16, 1857. (H. G. Kg.)

KANEM, an ancient African Negro kingdom north and east of Lake Chad that reached its peak in the 12th and 13th centuries. Still called Kanem, the area was inhabited in the 1960s by Kanembu people. Culturally, these Kanembu are closely related to the Kanuri of Bornu and speak related languages. The origins of the Kanem empire are shrouded in legend. Linguistic and historical evidence indicates that the peoples of Kanem originated in the central Sahara, probably in the neighbourhood of the modern Daza and Teda peoples. In the early 9th century the Sef (Sefawa) established what was to remain the ruling dynasty in Kanem and Bornu for a millennium. The early rulers, called *mais,* had their capital at Njimi, 35 mi. E. of the present city of Mao. A great expansion of the empire occurred under *mai* Umme who accepted Islam at the end of the 11th century. A century later, under *mai* Dunama Dibbalami, the empire extended from Fezzan in the north to the hills of Dikwa in the south, from Wadai in the east across the land of the Hausa to the Niger river in the west. Bornu is mentioned as the southernmost province of Kanem at that time.

In the middle of the 13th century, wars with the Teda and civil strife split the kingdom until finally attack by the Bulala tribe from the Lake Fitri area forced the Sef to flee to Bornu in 1380, taking many followers with them. Succeeding centuries saw the rise of Bornu, formerly a province of Kanem, until under *mai* Idris Katakarmabi the former capital at Njimi was recaptured. Kanem was made a protectorate of Bornu in the 16th century under the great *mai* Idris Alooma who left the Bulala to rule there. Until the end of the 19th century Kanem was subjected repeatedly to raid and conquest by the Arab-speaking Tungur, the Teda, the Soliman Bedouins and the Sanusi until the French occupation in 1901. Kanem territory was part of the Republic of Chad when it achieved political independence on August 11, 1960. *See* BORNU; KANURI; for additional discussion and bibliography.

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KANESH: *see* KULTEPE.

KANGAROO, a common, native-derived name for several Australian pouched mammals, or marsupials, with the hind limbs greatly enlarged for hopping and with long, thick muscular tails. Kangaroos and their allies compose the family Macropodidae ("big-footed"). They were first described in a report published in 1773 by Capt. James Cook, who saw these animals in what is now north Queensland. The family comprises about 20 genera, including more than 150 species and subspecies; of these, 6 genera and 29 species are known only as Pleistocene fossils.

General Features.—The kangaroos belong to the order Marsupialia, one of whose characteristics is the possession of a pouch in which the young remain for a considerable time after birth. The nearest living relatives of the kangaroos are the phalangers and wombats, which inhabit the same region. The kangaroos differ, however, from the phalangers, which are slow-moving, arboreal forms, and from the burrowing wombats, in that they are adapted to rapid progression on the ground by hopping on the enlarged hind limbs. The gray kangaroo (*Macropus canguru*) has been known, on level ground and over a short distance, to attain a speed of 25 m.p.h.

The largest living kangaroos, the gray and sooty kangaroos, have heads the size of that of a sheep and stand about 6 ft. high. The largest extinct form had a head as large as that of a Shetland pony and stood 10 ft. or more. The tiny musk kangaroo (*Hypsiprymnodon*) has a head smaller than that of a rabbit. The hind foot is greatly elongated and very narrow. The first toe or hallux is wanting (except in *Hypsiprymnodon*); the second and third toes are exceedingly slender and joined throughout their length by skin. These syndactylous digits have no function in locomotion but are of use in scratching and cleaning the fur. The straight, long fourth digit forms the principal part of the foot and is provided with a heavy claw. The fifth digit also takes part in locomotion; its metatarsal bone is closely appressed to that of the fourth digit but the toe diverges. The tail is long, tapering and very heavy. It is used for balancing during rapid progression, and, when the animal moves slowly with its forefeet on the ground, the tail and forefoot together act as supports while the hind feet are moved forward. In standing and sitting, with body erect and forefeet off the ground, the tail acts as a prop.

Except in *Hypsiprymnodon* the stomach is usually sacculated. The mouth opening is small and partly hidden by the lips. The dark brown eyes are of moderate size. The rounded ears are rather large and capable of being turned back and forth. The fur is soft and somewhat woolly in most large forms. In some rat kangaroos (*Bettongia*) the pelage consists of stiff hairs and soft underfur.

In all kangaroos the pouch is well developed, opens forward and contains the four teats. In the colder parts of Australia the young are usually born at the beginning of the cold season. As a rule there is but one young born at a time. It is born alive at an immature stage, up to 40 days after conception, when it is slightly longer than one inch. Immediately after birth it uses its precociously developed forelimbs (equipped with claws) in a swimming motion to crawl up the mother's body and enter the pouch or marsupium, where shelter, warmth and food are available. The baby kangaroo, or joey, attaches by the mouth to a teat, which then enlarges and holds the young in place. After continuous attachment for several weeks, the joey begins to explore its surroundings, becomes bolder and bolder in its forays from the pouch, till at about six months of age it is able to fend for itself.

Musk Kangaroos (Hypsiprymnodontinae).—On the damp floor of the tropical rain forest of north Queensland lives the musk kangaroo (*Hypsiprymnodon moschatus*). This form, the most primitive and generalized member of the Macropodidae, has a number of characteristics in common with the phalangers. From its peculiar characters *Hypsiprymnodon* is placed in a distinct subfamily in which is included the somewhat larger Pleistocene *Propleopus.*

Wallabies and True Kangaroos (Macropodinae).—The New Guinea genus *Dorcopsis* is represented by many species, all living in tropical rain forests and none larger than a fox terrier. These are short-footed forms with rather short, partly naked tails, long heads and exceptionally long sectorial premolars. They are most closely allied to the climbing tree kangaroos (*Dendrolagus*) of the rain forests of New Guinea and northeastern Queensland. The tree kangaroos are about the same size as *Dorcopsis* but have shorter ears than any other kangaroos, longer, thinner tails and less disproportion between the fore- and hind limbs, the toes of which are all provided with sharp, curved claws. The soles of the feet are broad and underlaid by a heavy pad of fat, modifications for climbing.

The pademelons or scrub wallabies (*Thylogale*) are stocky little animals resembling *Dorcopsis* except in their much shorter heads. The sectorial teeth are also much smaller than in *Dorcopsis* and *Dendrolagus* and the third upper incisor tooth is grooved at the posterior edge. They range from New Britain, New Ireland, New Guinea and the Aru Islands to eastern Australia, Tasmania and southwestern Australia in places where there is suitable forest.

The genus *Wallabia*, sometimes referred to as the large wallabies, contains numerous species, most of which are primarily grassland forms but others transitional in habitat, feeding at night in the open grasslands and resting during the day in dense scrub. They resemble the true kangaroos in their proportions and many of the species are commonly called kangaroo rather than wallaby, the name by which most of the smaller forms are known. *Wallabia* is characterized by a long, tapering tail, moderately long feet, large ears, cheek and hip stripes, and a groove on the external face of the third upper incisor that divides the tooth into anterior and posterior halves. Short-footed extinct wallabies constitute the genus *Protemnodon*. Some fossil species are larger than any living kangaroos.

The typical kangaroos of the genus *Macropus* are all large forms with long, narrow hind feet. The best known are the gray kangaroo, forester or boomer (*M. canguru*), of the grassy plains of the open eucalyptus forests; the wallaroo or euro (*M. robustus*), whose build is more robust and with a preference for grass-covered, stony ridges; and the red kangaroo or red flier (*M. rufus*, the female of which is blue-gray and is called blue flier) which inhabits the interior of the continent where most of the terrain is level and the vegetation sparse.

H. ARMSTRONG ROBERTS

SMALL WALLEROO KANGAROO (MACROPUS ROBUSTUS) CARRYING BABY IN POUCH

Kangaroos generally travel in troops or mobs, watched over by an old buck who meets the challenge of younger males by biting, boxing with the fore feet and pummeling and slashing with the full weight of the heavy, large-clawed hind feet. All macropodids are grazers (the counterparts of antelope and deer of other continents). They are easily incited to panic and headlong flight, at which times they can seriously injure themselves. They usually flee rather than fight, except when closed in and unable to escape.

The rock wallabies (*Petrogale*) which are as specialized in foot structure as the large kangaroos, usually spend their days among the crevices of rocks on ridges and beside gullies, as a rule near watercourses. They feed on grass, much of which they obtain at night. The nail-tailed wallabies (*Onychogalea*) are among the most beautiful of the kangaroos. These small, graceful creatures of the semiarid country are specialized in tooth and foot structure and have a peculiar, naillike horny growth on the end of the tail. The banded wallaby (*Lagostrophus*) and the hare wallaby (*Lagorchestes*) avail themselves of much the same sort of habitat as do the kangaroos. They hop about on the open plains and take refuge among bushes.

The bulky, heavy-jawed, short-headed and rather short-footed kangaroos of the Australian Pleistocene have been grouped together in the genus *Sthenurus*. All the short-footed kangaroos of the present time are forest-living animals; it is therefore assumed that the species of *Sthenurus* also lived largely in forests. *Procoptodon*, the Pleistocene giant kangaroo, probably weighed as much as a small horse and, to judge by its dentition, also resembled a horse in feeding habits.

Rat Kangaroos (Potoroinae).—Branching off in another direction from a primitive type somewhat similar to *Hypsiprymnodon* there developed several genera of small size popularly known as rat kangaroos. The most primitive of these is the potoroo (*Potorous*), about the size of *Hypsiprymnodon*. It has, however, lost its great toe or hallux. Apart from *Hypsiprymnodon* it is the only member of the family with the primitive plantar pads. The three more specialized genera (*Caloprymnus*, *Bettongia* and *Aepyprymnus*) inhabit more open country but still may be called thicket-living.

Classification.—The family Macropodidae may be divided into three sub-families, the most generalized being the Hypsiprymnodontinae; the largest, the Macropodinae; and the Potoroinae.

All the evidence indicates that the ancestors of the kangaroos were forest animals with an arboreal habitat. The members of the family now show various stages of specialization for terrestrial bipedal locomotion and for a vegetable diet. There is also a definite correlation between the foot and tooth structure of the animals and the type of habitat they occupy. The Hypsiprymnodontinae and the Potoroinae, which feed principally on berries, roots, fallen fruits and succulent vegetation in the forest or thickets, all have low-cusped molar teeth. The Macropodinae either browse on leaves of vines and saplings in the forest, in which case they have crested, short-crowned molars, or graze in the open grasslands, in which case they have crested, long-crowned molar teeth; the crested molars are better adapted to grinding than the low-cusped types. The more specialized members of the Potoroinae inhabit thickets in more open country and correlated with this is an elongation of the hind feet.

See also MAMMAL; MARSUPIAL.

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KANGAROO ISLAND, the third largest Australian offshore island (90 mi. long, maximum breadth 34 mi.), lies across the mouth of Gulf St. Vincent, South Australia. It is in general a low cliffed plateau, with rather poor soils which are, however, capable of improvement; a large-scale land development scheme was in progress in the early 1960s. The people (3,285 in 1961) are mainly engaged in sheep farming, with tourism (especially for fishing) as an ancillary source of income. First occupied by American sealers in 1803, it was in 1836 temporarily used as a base by the South Australian company which colonized the state.

(O. H. K. S.)

KANGAROO RAT, any small North American jumping rodent of the genus *Dipodomys*, belonging to the family Heteromyidae. They resemble in appearance the gerbils and jerboas of the old world in having a large head, large eyes, tiny forelimbs and elongate hindlimbs and a tail somewhat longer than the body. They differ from these and other rodents, excepting the pocket gophers (Geomyidae) and the other heteromyids, in having fur-lined cheek pouches in which they carry a store of food. Many species and subspecies are known, varying in length from 4 in. (tail 5¼ in.) to 6½ in. (tail 8½ in.) and in colour from rich brown to pale buff above; the underparts, a hip stripe and the feet are white. The tail, which ends in a furry tuft, acts as a rudder when the animal is in one of its mid-air bounds. They are capable of jumping six to eight feet into the air.

Kangaroo rats are found on the great plains and southwestern

deserts, where they forage by night for food consisting of seeds and retire to their burrows by day. The two to five young born in spring have a life span of about two years.

The name kangaroo rat is sometimes used to denote small kangaroos, better called rat kangaroos and known technically as the subfamily Potoroinae (*see* KANGAROO).

See also RODENT; POCKET MOUSE. (J. E. HL.; X.)

WILLIS PETERSON

BANNER-TAILED KANGAROO RAT (DIPODOMYS SPECTABILIS)

KANGCHENJUNGA (KANCHENJUNGA, KINCHINJUNGA, Nepali KUMBHKARAN LUNGUR), the world's third highest mountain, 28,168 ft. high, stands on the border between Nepal and Sikkim, south of the main axis of the Himalayas and 46 mi. N.W. of Darjeeling, from where it is conspicuous.

The Kangchenjunga massif is in the form of a gigantic cross, the arms of which lie north, south, east and west. There are four summits, of which the highest is at the centre of the cross and the second, Kangchenjunga II, 27,823 ft., is on the south ridge. A third summit is between Kangchenjunga I and Kangchenjunga II, and the fourth, Kangchenjunga West, is on the west ridge. The four main ridges join Kangchenjunga to neighbouring peaks: the south ridge to Talung peak, 23,080 ft., and Kabru, 24,002 ft.; the east ridge to Simvu, 22,360 ft., in Sikkim; the west ridge to Kambachen, 25,782 ft., and Jannu, 25,294 ft., in Nepal; and the north ridge to a range of high mountains on the watershed between Nepal and Sikkim, a range which includes The Twins, 24,117 ft., Nepal peak, 23,500 ft., Langpo peak, 22,800 ft., near the Tibetan frontier. From the faces enclosed by these four ridges flow four main glaciers: the Zemu and Talung glaciers from the northeast and southeast faces, the Kangchenjunga glacier from the northwest face and the Yalung glacier, by way of which the first ascent was made in 1955, from the southwest face.

The name Kangchenjunga is derived from four words of Tibetan origin, usually rendered Kang-chen-dzo-nga or Yang-chhen-dzönga and interpreted in Sikkim as "The Five Treasuries of the Great Snow." The mountain has an important place in the mythology and religious ritual of the inhabitants of the country and its slopes were no doubt familiar to herdsmen and to traders for many centuries before a rough survey of it was made.

Exploration and Ascent.—The first map known of Kangchenjunga was made by Rinzin Namgyal, one of the Pundit explorers of the mid-18th century, who made a sketch of the circuit of the mountain. In 1848 and 1849 the first European, Sir Joseph Hooker, visited and described the region, and in 1899 the explorer-mountaineer Douglas Freshfield made a circuit of the mountain and suggested that the summit might be reached from the Yalung valley. In 1905 this route was attempted by a mixed Anglo-Swiss party but the attempt ended when one of the Swiss and three porters lost their lives in an avalanche accident.

Twenty-five years later mountaineers began to explore other faces of the mountain, a Bavarian expedition led by Paul Bauer in 1929 and 1931 attempting it from the Zemu side and G. O. Dyhrenfurth in 1930 from the Kangchenjunga glacier. The greatest height reached during these explorations was 25,263 ft., the point on the northeast spur at which members of Bauer's party in 1931 were turned back by the dangerous state of the snow at the time. There were fatal accidents on two of these expeditions and the mountain acquired a reputation for unusual danger and difficulty. No more attempts were made to climb it until 1954 when, partly for the political reason that the Sikkimese objected to attempts on the mountain, attention was again turned to the Yalung face, which is in Nepal.

In 1951 and 1953 Gilmour Lewis had visited the Yalung and in 1954, with John Kempe, he took a party to examine the chance of an ascent from the upper Yalung. Their report was so favourable that in 1955 a British expedition under the auspices of the Royal Geographical society and the Alpine club and led by Charles Evans set out to make an attempt on the mountain from this side.

Two-thirds of the way up the Yalung face, at about 24,000 ft., there is a broad snowy shelf, easily seen even from Darjeeling. From a base camp at 18,000 ft. the party reached the shelf in three weeks; they pitched camp V at the upper end of it, at over 25,000 ft. Camp VI was put between the upper end of the shelf and the west ridge of the mountain, at nearly 27,000 ft., and from this camp it was found possible to reach the west ridge and to follow it to the summit. Oxygen was used on the upper slopes and at the high camps and the final ridge was climbed by two separate parties on successive days: Joe Brown and George Band on May 25, Norman Hardie and H. R. A. Streather on May 26. The actual summit was not climbed, for, in deference to the wishes of the Sikkimese, the two parties stopped when a few yards from the highest point.

See Charles Evans, *Kangchenjunga, the Untrodden Peak* (1957).

(R. C. Ev.)

K'ANG-HSI, a term denoting the reigning years (1661–1722) of the second and greatest Manchu emperor of China. His personal name was Hsüan-yeh. Born in 1654, he succeeded to the throne when he was 7, but until he was 13 control was vested in four regents. Militarily, it fell to his lot to complete the conquest of southwest China and Formosa, and to pacify Mongol tribes in the north and northwest. In 1689 he concluded with Russia the treaty of Nerchinsk, the first treaty that China made with an Occidental power. Though Manchu by race, he was thoroughly Chinese in his love of learning and in his patronage of the arts. He encouraged the compilation of great dictionaries, encyclopaedias, collections of verse, and works on agriculture. During his long reign the manufacture of porcelain reached a high degree of excellence. Except for a dispute on rites, he was friendly to missionaries, especially to astronomers, mathematicians, and architects employed in the palace. For relaxation from cares of state he made hunting trips. The only ruler of comparable stature in the Manchu period (1644–1912) was his grandson, Hung-li, who is better known as Ch'ien-lung—a term which likewise denotes the years of his reign (1736–96).

See also references under "K'ang-hsi" in the Index.

(A. W. H.)

KANGRA, a town and district in the Jullundur division of Punjab, India. The town, sometimes called Nagarkot, lies 2,409 ft. above sea level and is approached by rail from Amritsar via Pathankot. Pop. (1961) 5,775. The Rajput Katoch rajas had a stronghold there. Kangra has a fort containing a temple which was plundered in 1009 by Mahmud of Ghazni, who carried away enormous treasures. In 1360 Kangra was again plundered by Feroz Shah. The temple of Devi, one of the oldest and wealthiest in northern India, was destroyed together with the fort and town by an earthquake in 1905. In the 18th and 19th centuries Kangra was the centre of a notable school of Rajput miniature painting.

In 1855 the district headquarters were moved from Kangra to Dharamsala (pop. [1961] 10,255), 16 mi. N.E. of Kangra by road. Dharamsala is a health resort on the spur of the Dhaola Dhar. It extends from 4,500 to 7,112 ft. above sea level amid beautiful scenery. It has two colleges affiliated with Panjab university, and it also has a cantonment.

KANGRA DISTRICT is the northernmost district of Punjab. It stretches eastward from the plains of the Punjab over the Himalayan ranges to the border of Tibet, covering an area of 4,904 sq.mi. Pop. (1961) 1,062,518. The district has a series of parallel ranges separated by longitudinal valleys. There are three natural regions: the outer Himalayan; the mid-Himalayan, consisting of Kulu and upper Bengahal; and the areas of Lahul and Spiti. Four rivers rise in the district—the Beas, the Chenab, the Ravi and the Spiti. Level land being limited, only 9% of the total area is under cultivation. Wheat, maize (corn), rice, millets, potatoes and tea are the principal crops; tea cultivation was introduced in the district about 1850. Pears and apples are grown in the Kulu valley. Wood is an important product and blanket and shawl making are the main industries. Nurpur (pop. [1961] 3,405) and Palampur (6,116) are the chief towns in the district. Kulu and Manali are hill resorts in the Kulu valley which attract a large

number of visitors. (O. P. B.)

K'ANG YU-WEI (1858–1927), Chinese scholar noteworthy chiefly for his independent thought and leadership in the reform movement of 1898. Schooled in the prevailing Confucian tradition, he was stimulated into critical thinking by Buddhist texts and translations from western books. The troubled condition of the Chinese empire prompted him to advocate intellectual and institutional reforms. His intellectual reform began with an attack on Neo-Confucianism, hitherto honoured as the orthodox teaching. He blamed it for China's stagnation and denounced as forgeries the classics upon which it was based. He maintained that authentic Confucianism, essentially in accord with Buddhism and Christianity, pointed to progress, democracy and universal love. K'ang thought that it would make China a great nation and would lead mankind eventually to a world community of freedom, equality and happiness. His plans for institutional reform were aimed primarily at rendering the imperial administration more efficient and less autocratic. Many of his proposals were accepted by the emperor, Kuang Hsü, but foes of reform persuaded the empress dowager to proscribe him and to order his execution. He escaped and traveled in Japan, India, Europe and the United States for 15 years. He remained loyal to the cause of constitutional monarchism and antagonistic to the republic of 1911. He took an active part in the brief restoration of the emperor Hsüan-T'ung; he was rewarded with a high office but denied opportunity to shape the administration. After the overthrow of this regime, he sought refuge in the foreign legation quarter, but his fame as a scholar soon won him freedom and he continued to promote Confucianism as an antidote against "moral degeneration" and indiscriminate westernization. Intellectuals of the 1920s and 1930s tended to dismiss him simply as conservative or reactionary; but, in fact, in addition to making the last significant contribution to Confucianism, he prepared the ground for the reappraisal of traditional culture and anticipated some of the intellectual trends of republican China. (K. Hs.)

KANIAPISKAU, a river of Quebec, Can., rises in Lake Kaniapiskau among a maze of lakes in the east-central part of the province, about 85 mi. S.S.W. of Schefferville. Below the upper gorge, which extends about 200 mi. northward from the lake and contains numerous cataracts, the Kaniapiskau continues north in a well-defined valley for about 250 mi. before joining the Larch river to form the Koksoak, which flows for about 85 mi. and discharges into Ungava bay at Fort Chimo, a post of the Hudson's Bay company. Albert P. Low, Canadian government geologist, explored the Kaniapiskau in 1893, giving it an Indian name meaning rocky point, after the iron-bearing rocks through which it flows. (J. D. I.)

KANISHKA (fl. *c.* A.D. 120), a king who ruled over the northern part of the Indian subcontinent, Afghanistan and possibly regions north of Kashmir during the first half of the 2nd century A.D. He belonged to the Kushan (Kuei-Shuang), one of the five tribes into which the Yue-Chi (Yüeh-chih; *q.v.*) were divided after their occupation of Bactria. Inscriptions referring to the name of Kanishka are dated in the years 1 to 41, the starting point of which is still a matter of controversy. Kanishka's reign lasted 23 years and inscriptions referring to his name but dated after the year 23 are thought to belong to the reign of a second Kanishka, probably his grandson. Kanishka's regnal year was used by his successors as a continuous reckoning up to at least the year 99. Through inheritance and conquest his kingdom covered an area extending from Bukhara in the west to at least Patna in the east and from the Pamirs in the north to central India in the south. It is believed that he succeeded in crossing the Pamirs and that he subdued the chiefs in Khotan, Yarkand and Kashgar who had been tributary to China. His capital was probably at Purushapura (Peshawar). His fame rests mainly on his patronage of Buddhism, in the history of which his reign marked a turning point. He spent vast sums in the construction of Buddhist monuments and convened the fourth Buddhist council at Jullundur under the presidency of his teacher Vasumitra. As a result of the council's deliberations, authorized commentaries on the Buddhist canon were prepared and engraved on copper plates. These texts have, however, survived only in Chinese translations or adaptations. The beginnings of Mahayana Buddhism were also associated with this council. Kanishka was a tolerant king and his coins prove that he honoured the Zoroastrian, Greek and Brahmanic gods and goddesses besides the Buddha. During his reign contacts with the Roman empire led to a significant increase in trade and in the exchange of ideas.

See also references under "Kanishka" in the Index.

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KANKAKEE, a city of Illinois, U.S., 55 mi. S. of Chicago on the Kankakee river; the seat of Kankakee county. The history of Kankakee really begins with the settlement of Bourbonnais, 3 mi. N., by French Canadians in the 1830s. Bourbonnais remained for 20 years the most important town in the region and became the parent of other French communities nearby, including Kankakee. The latter was largely the creation of the Illinois Central railroad, whose builders bypassed Bourbonnais in the 1850s and chose Kankakee as a station because it offered a better opportunity for townsite promotion. Kankakee quickly outstripped its older neighbour in population and became a thriving shipping centre for agricultural products. It is also important for its manufactures, which include home appliances, furniture and farm implements. The Kankakee State hospital for the mentally ill was established there in 1877. Central high school houses a large exhibition of George Gray Barnard's sculpture. Bourbonnais is the home of Olivet Nazarene college, a coeducational institution organized in 1907 and supervised by the Church of the Nazarene. The name Kankakee derives from the Indian name for the valley, meaning "beautiful land." For comparative population figures *see* table in ILLINOIS: *Population.* (D. E. F.)

KANNADA: *see* KANARESE.

KANNAPOLIS, an industrial city of Cabarrus county in the Piedmont region of North Carolina, U.S., 29 mi. N.E. of Charlotte. The town, built on land purchased by James William Cannon in 1906 for a textile village, is owned by Cannon Mills Inc. It is notable for its planned growth, its Williamsburg colonial architecture and its program of remodeling, in progress since 1937. It is unincorporated. For comparative population figures *see* table in NORTH CAROLINA: *Population.* (B. P. R.)

KANNAUJ (ancient KANYAKUBJA), a town and *tehsil* in Farrukhabad district, Uttar Pradesh, India, lies on the right bank of the Ganges, 52 mi. N.W. of Kanpur on the Grand Trunk road to Delhi. Pop. (1961) 24,646. *Tehsil* pop. (1961) 285,784, area 393 sq.mi. It is noted for the manufacture of fine perfumes and tobacco. Among its ancient monuments are the ruins of an old fort, the Jami Masjid and the shrine of Makhdum Jahania. Many mounds in and around the town are a rich source of ancient coins and occupy a semicircle 4 mi. in diameter but have been neither systematically excavated nor explored.

Although referred to in the epics and early Buddhist texts, the town came into prominence in the early 7th century when Harsha (*q.v.*) made it the capital of an empire extending throughout northern India. It continued to be a metropolitan city for several centuries and had unrivaled splendour, particularly under the Gurjara-Pratihara dynasty in the 9th and 10th centuries. During this period a large number of Hindu temples and Buddhist monasteries were established and the city became a great cultural centre. One of the highest divisions of the Brahman caste traces its origin to this city. In 1018 it was razed by Mahmud of Ghazni and passed to the Rathor dynasty, until Mohammed Ghori again plundered it in 1194. It was then almost totally destroyed and has since been of only minor importance. (B. SI.)

KANO, the principal city of the province of that name in Northern Nigeria, Federation of Nigeria, and one of the seven original Hausa states, lies about 550 mi. inland from the federal capital and port, Lagos. Pop. (1963) 295,432.

Within the city of Kano are four distinct areas: the walled city,

nearly 12 mi. in circumference, holding the Hausa population; the Sabon Gari (strangers' settlement) for non-Hausas; the commercial township; and the residential area for non-Africans. The architecture of the old city is unique but the buildings are of mud and of no great antiquity. Kano has a recorded history dating back to A.D. 999 and a legendary one going several hundred years further back, but the present city is probably no more than 200 or 300 years old. A carved wooden door in the emir's residence is reputed to be 500 years old. In the mid-20th century some impressive buildings were erected, outstanding ones being the mosque, council chamber and court (adjoining the emir's residence), the alkalai's court and the native authority's administrative building.

In former times, travel to Kano involved a month-long hazardous journey; but Kano has again become the principal entrepôt for northwestern Nigeria and the African republics of former French West and Equatorial Africa. The railway connects it directly with Lagos and Port Harcourt on the coast, and with the east and west of Northern Nigeria. Trunk roads link it with most parts of the country and it has an important international airport (5 mi.).

"Kano," wrote Lord Lugard in 1900, "is said to be the greatest emporium in Africa." It was for centuries one of the chief markets of the region, known as Western Sudan, but, lying amid desert or near desert, it had little contact with the outside world until the arrival of British merchants in 1904. It was noted especially for its woven and embroidered cloth, tanned goatskins (which gave the world the famous "morocco" leather) and ornamental leatherwork. To these local crafts several industries were added: peanut milling and oil refining, meat canning, tanning of hides and skins, weaving of cotton drills and Bedford cords, and the making of concrete blocks, terrazzo tiles, soap, scent, carbon dioxide and dry ice, and steel furniture. Kano's principal wealth is derived from the export of peanuts, the annual production of which amounts to about £20,000,000 ($56,000,000). Hides and skins are also important exports. The names of the principal roads in the commercial area, Manchester, Liverpool and Hull, reflect the city's close commercial ties with the United Kingdom. In 1959 a "festival of Kano" was held to speed its growing importance, the first such event to be held in Northern Nigeria.

KANO PROVINCE (area 16,630 sq.mi.) with a population (1960 est.) of 3,902,884, contains more than one-fifth of the entire population of Northern Nigeria. It lies in the savanna country between the Sahara and the tropical forests, and drains northeastward into Lake Chad. In the south and west are scattered granite hills and in the north and east the deep sands of the Chad basin. The average annual rainfall is 30–35 in., falling between late May and October. March, April and early May are very dry and hot with shade temperatures up to 110° F.

The Hausa and Fulani (*qq.v.*) are the dominant tribes, the Hausa being more than twice as numerous. The Hausa language is understood everywhere and spoken by the majority as the mother tongue. English is a lingua franca for Nigerians from other regions. (F. O. B.-B.)

KANON (CANON) is one of the main forms of Byzantine liturgical chant. It consists of nine odes, based upon the nine biblical canticles of the Greek Church, which they replaced in the Morning Office after the Trullan council (691–692). The Kanon is melodically of great variety because each ode has its own melody which is established in the first strophe, called Hirmos. The melodies of the Hirmoi have come down in the Hirmologia, whose manuscripts date from the 9th to the 15th century.

All nine odes were sung on Sundays in Lent only; outside Lent the second ode (built on Deut. xxxii, 1–43) was soon omitted because of its mournful character. After the third and sixth odes monostrophic hymns were inserted. On weekdays during Lent three odes only were sung. The liturgical book containing the Lent Kanons was therefore called Triodion.

The Kanon originated in Jerusalem at the end of the 7th century. St. Andrew of Crete is the author of the "Great Kanon," unique for its length (250 stanzas). The greatest masters of the new genre are St. John of Damascus, the author of the famous Easter Kanon translated by J. M. Neale as "Tis the day of Resurrection," and John's foster brother Cosmas "the Melode," who wrote Kanons of great poetical beauty for the major feasts. The St. Sabas monastery in Jerusalem where they both lived became the centre of hymnography at the beginning of the iconoclastic controversy, and hymnography flourished in Syria and Asia Minor. In 798 however the centre of hymn writing shifted to Constantinople. St. Theodore Studites (d. 826), who inaugurated a liturgical revival, St. Theophanes Graptus (d. 845) and St. Joseph the Hymnographer (d. 883) were the principal hymn writers who enriched all the festivals with Kanons. When in the 11th century the church forbade the addition of new Kanons, the musicians (*maïstores*) began to embellish the existing melodies. Kanon writing, however, continued during the 12th century in the Greek monasteries in southern Italy. The melodies now used by the Greek church were mostly composed in the 17th and 18th centuries; they are stylistically different from those which were sung in the heyday of Byzantine chant.

See the Kanons and their music published in C. Høeg *et al.* (eds.), *Monumenta musicae Byzantinae. Transcripta,* vol. 3 (1941), vol. 4 (1952), vol. 5 (1949), vol. 6 (1952), vol. 8 (1956); *see* also E. Wellesz, *A History of Byzantine Music and Hymnography,* ch. 9 (1949).
(E. J. Wz.)

KANPUR (formerly CAWNPORE), a city, *tehsil* and district in the Allahabad division of Uttar Pradesh, India, is situated on the south bank of the Ganges river 43 mi. S.W. of Lucknow, 115 mi. N.W. of Allahabad and 245 mi. S.E. of Delhi. The urban area includes the three railway colonies, the cantonment and the suburb of Armapur. The city's population has more than trebled since 1901 and the rate of growth remains high (in 1961 was 881,177). Kanpur, a large rail and road junction, has long been an important military station which was further enhanced by the establishment of a military airfield at Chakeri. Developments in the mid-20th century enabled Kanpur to become the chief city in the state and one of the largest in India. After 1960 it was administered by a corporation.

As an educational centre, Kanpur contains several colleges affiliated to Agra university including the colleges of agriculture and textiles. Its Indian Institute of Technology occupies a significant place among the higher technological institutions of India and its medical college was established as a constituent of Lucknow university. Places of interest include the agricultural college and experimental farm, Kamla Retreat (a picturesque resthouse on a small lake), the Memorial well and a glass temple sacred to Hindus in the heart of the city.

Kanpur is on the Grand Trunk road from Delhi to Calcutta. As a main junction on the Northern, North-Eastern and Central railways the town is connected to most parts of India.

The industrial development of Kanpur was unique in northern India. The manufacture of leather goods, which started with a government harness factory, became a large-scale industry. Other industries include cotton spinning and weaving, cotton ginning and pressing, the manufacture of jute and woolen goods, vegetable oils and soap, plastics, biscuits (cookies) and chemicals, flour milling, rice husking, distilling and general engineering. The city is a commercial centre of wholesale trade in cotton piece goods, general merchandise, sugar, spices and grains.

As Cawnpore village, it formed from early times a frontier outpost of the people of Oudh and Bengal against their northern neighbours. In 1801, when the ceded provinces were acquired by the East India company, it became the chief British frontier station; but at the outbreak of the Indian mutiny (*q.v.;* called by Indians the freedom struggle) in May 1857, the frontier had moved forward and Cawnpore was denuded of troops. It was the scene in July 1857 of a siege by the Nana Sahib (*q.v.*). The British soldiers under Gen. Sir Hugh Wheeler put up a heroic defense for 21 days but surrendered on the promise of safe conduct for the residents to Allahabad. Hundreds of Europeans were, however, attacked and slain by undisciplined forces at Sati Chaura Ghat (a sacred bathing place) while escaping by boats. Survivors were reported to have been thrown into a well, where a memorial was later raised and surrounded by gardens. The memorial, a Romanesque red brick building, is crowned by the figure of an angel in white marble and on the wall of the well is a commemorative inscription.

KANPUR DISTRICT lies between the Ganges and the Jumna

(Yamuna) rivers in the well-watered and fertile tract known as the doab. Pop. (1961) 2,381,353; area 2,357 sq.mi. Besides these two rivers the main streams are the Arand (Rhind), the Kavan or Sengar, the Isan and the Pandu. The climate is hot and dry in summer and cold in winter with an average annual rainfall of 33 in. The district is also watered by the four branches of the Ganges canal and its principal crops are grain, wheat, jowar (sorghum), barley, mustard, corn, sesame, rice, bajri (pearl millet), sugar cane and cotton. There are mango and mahua groves, and a part of the district is a dhak forest.

Bithur (*q.v.*), now in ruins, is a Hindu holy place and many small temples lie along the Arand, built between the 6th and 9th centuries.

See G. Trevelyan, *Cawnpore* (1894); D. N. Majumdar, *Social Contours of an Industrial City* (1960). (B. St.)

KANSAS, popularly known as the "Sunflower state," is situated in the heart of the conterminous United States. Lying between approximately 37° and 40° N. and 94° 37′ and 102° 03′ W., it is not only the geographical centre of the country excluding Alaska and Hawaii but is also the site of the geodetic datum of North America from which all North American mapping is made. The state is nearly rectangular in shape with a breadth of 207 mi. from north to south and a length of 403 mi. from east to west; the total area is 82,264 sq.mi., 216 sq.mi. of which are water. The 14th state in size, it is bounded on the north by Nebraska, on the east by Missouri, on the south by Oklahoma and on the west by Colorado. Kansas was admitted to the union in 1861, the 34th state. The capital city is Topeka. The state flower is the native sunflower; the state tree, the cottonwood; the state bird, the western meadowlark; and the state animal, the American buffalo (bison). The state flag consists of a blue field bearing the state seal surmounted by a sunflower. The name is from the Kansa, or Kaw, Indians who inhabited the region.

PHYSICAL GEOGRAPHY

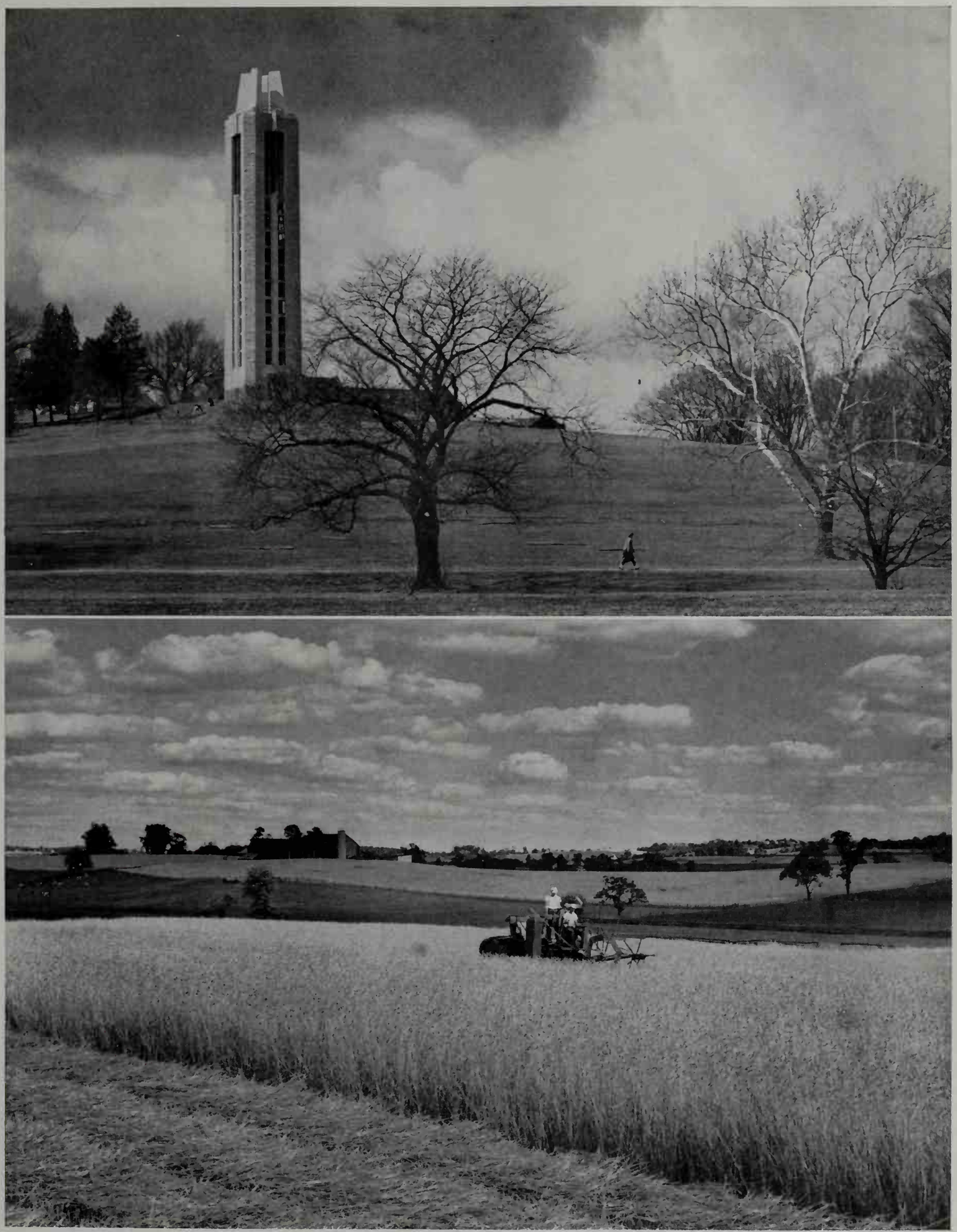
Physical Features.—Geologists claim that 50 seas flooded Kansas during the geological process through which the earth was formed. This action left rich deposits of oil, gas, coal, lead, zinc and salt in the state. The surface structure of Kansas has often been thought of as a featureless flat plain, but this description is unfitting to a major portion of the state which offers a wide variety of landscapes. There are thousands of hills 100 to 400 ft. in height and equally numerous valleys. The state lies in an area of transition from prairie lands to high plains. There are eight distinct surface areas in this transition. In the southeast corner lies the Cherokee plain, an extension of the Ozarks from Missouri that is rich in minerals. To the north are the Osage cuestas, distinguished by the presence of many east-facing rocky escarpments with fertile valleys. The northeastern section is the Glaciated region with many evidences of deposits from the early glaciers. West of the above three sections lie the Flint hills. This narrow band starts in Washington and Marshall counties on the northern border and extends southward across the state to Cowley and Chautauqua counties. The Flint hills are famous for bluestem pasture lands. They are rich in limestone deposits and are nearly mountainous in their appearance. West of the Flint hills, covering nearly one-third of the state, is a transition area to the High plains. The Smoky Hills upland in the north owes its origin to the exposure of moderately hard, thick, brown Dakota sandstone with numerous outcroppings. South of Smoky hills lies the Great Bend prairie, an area embraced by the great bend in the Arkansas river. The surface is quite flat, but is frequently interspersed with sand hills and dunes. To the south of the Great Bend prairie is a smaller area called the Red hills-Wellington area or Cimarron Breaks on which the higher country to the north and west is suddenly interrupted by a prominent escarpment carved by steep southward flowing streams, most of them tributaries of the Cimarron and Medicine Lodge rivers. Much of the rock in this area is red shale or fine sandstone, and the rock exposures and the soils are coloured red. The western one-third of Kansas is in the High plains. There the land rises gradually toward the Rocky mountains in Colorado. The northern section of the High plains is carved by east and northeast flowing streams which form long and prominent uplands between the streams with innumerable rounded hills. The central and southern portions of the High plains are unbroken and level. There are bluffs along the Arkansas river, and a belt of sand hills on the south side of the river. The land surfaces of Kansas slope eastward from a maximum elevation of 4,135 ft. above sea level in Wallace county, adjoining the Colorado line on the west, to the lowest point, about 700 ft., where the Verdigris river crosses the Oklahoma boundary in Montgomery county on the south. The state has three main rivers or drainage systems. The Kansas (the Kaw) and its tributaries the Smoky Hill, the Blue and the Republican drain the northern half of the state. The southwestern part of the state is drained by the Arkansas river and its tributaries. The southeastern section of the state has the Marais des Cygnes river system and the Neosho and Verdigris rivers which empty into the Arkansas in Oklahoma. Many of the rivers are subject to floods. A flood in eastern and southern Kansas in 1951 was one of the most damaging in the history of the state. The water area in the state is small. However, Kansas has more than 100 public and many private artificial lakes. Federal dam projects at Kanopolis, Fall River, Cedar Bluff, Webster, Kirwin and Tuttle Creek have greatly expanded the water area for irrigation, flood control and recreation. There are many springs which help to keep a constant flow in the rivers. Diamond springs was a historic spot on the Santa Fe trail. Rock springs, Big springs and Sand springs are scenic areas. The ground water reserve has been used extensively for pump-irrigation of farm crops.

Climate.—The climate of Kansas is subject to wide fluctuations typical of the central continental area. Extremes of heat and cold occur, but as a rule the winters are dry and fairly mild, while the summer heat is tempered by prairie breezes. The absolute temperature extremes range from 120° to −40° F. (about 50° to −40° C.). The sun shines eight out of ten days and beautiful sunsets are typical. The temperature across the state is more uniform than the precipitation which diminishes somewhat regularly westward. The average annual rainfall is about 27 in. In the eastern third of the state rainfall averages 35.27 in.; in the central area 26.45 in.; and in the western third 19.01 in. Low rainfall in the west has made necessary a revolution in farm crops and methods of farming, usually called dry farming (*q.v.*). Kansas is subject to floods and droughts. Damaging floods came in 1844, 1858, 1903, 1915 and 1951; years of severe drought were 1860, 1874, 1894, 1932–36 and 1952. Tornadoes are not infrequent.

Soils.—The soil of the upland prairies is generally a deep rich clay loam of a dark colour. The bottom lands near the streams are a black, sandy loam; and the intermediate lands, or second bottoms are a rich deep and black loam containing little sand. These soils are easily cultivated and highly productive. Some soils in the uplands are composed of stiff clay and are more difficult to cultivate. There are frequent sandy areas in the state. Many of the soils derive from residual sandstone, shales, limestone and glacial accumulations.

Vegetation.—Kansas had three distinct areas of native vegetation. The eastern third of the state had a rich supply of the large bluestem grasses. Bluegrass flourishes in this section. On the high plains of the western section gramas and buffalo grass were predominant. The central part of the state had a mixture of the eastern and western grasses. The early pioneer in Kansas found an ample supply of oak, cottonwood, hickory and walnut trees in the wet bottom lands along the streams of the eastern half of the state. Man-made timber areas thrive in many parts of Kansas, offering much-needed shade and shelter.

Animal Life.—The pioneer found the animals and game birds common to the midwest in abundance in Kansas. Buffalo (bison), antelope, deer, elk and coyotes roamed the prairies and during the 1870s and 1880s buffalo hunting was a prominent sport. Turkeys, prairie chickens and quail furnished game and many family incomes were supplemented by trapping beaver and other small fur-bearing animals. The state has made a determined effort to restore many of the animals and game species. The buffalo sanctuary in Scott County State park, the animal and game refuge in



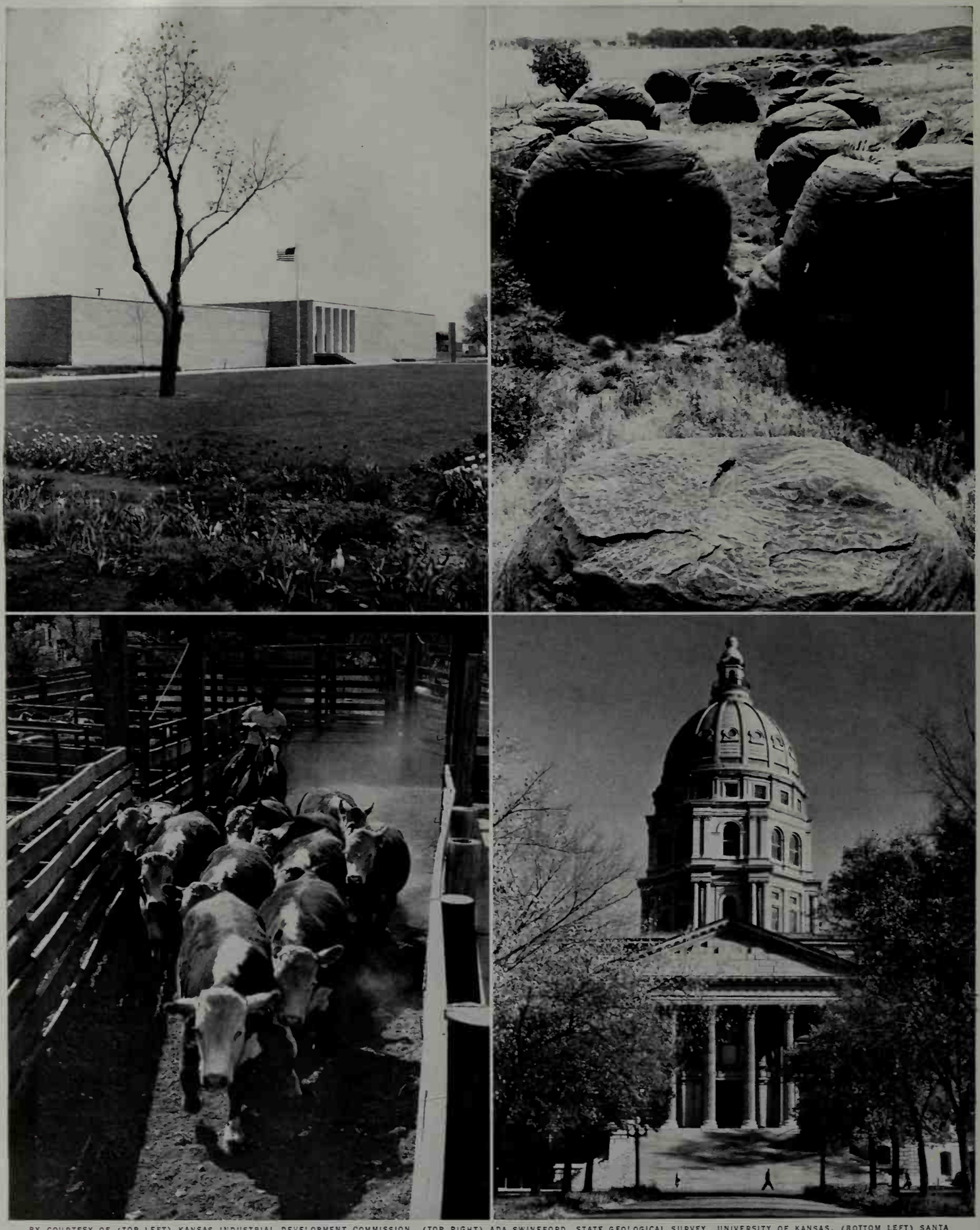
BY COURTESY OF (TOP) THE PHOTOGRAPHIC BUREAU, UNIVERSITY OF KANSAS; PHOTOGRAPH, (BOTTOM) H. ARMSTRONG ROBERTS

VIEWS OF KANSAS

Top: The campanile at the University of Kansas, Lawrence, was erected in 1951 as a World War II memorial

Bottom: Wheat harvesting. Kansas is the largest wheat producing state in the U.S.

KANSAS



BY COURTESY OF (TOP LEFT) KANSAS INDUSTRIAL DEVELOPMENT COMMISSION, (TOP RIGHT) ADA SWINEFORD, STATE GEOLOGICAL SURVEY, UNIVERSITY OF KANSAS, (BOTTOM LEFT) SANTA FE RAILWAY; PHOTOGRAPH, (BOTTOM RIGHT) H. ARMSTRONG ROBERTS

SCENES IN KANSAS

Top left: The Dwight D. Eisenhower museum at Abilene. The museum houses decorations, and trophies won and souvenirs collected by Eisenhower during his military career

Top right: "Rock City," Ottawa county, a group of about 200 sandstone concretions varying in diameter from 8 to 27 ft. The concretions were formed by water-borne calcium carbonate which was deposited between grains of sand thus cementing them. When the softer stone was eroded, the concretions remained

Bottom left: Cattle being driven toward railway cars at Eskridge. Kansas is one of the largest cattle-producing states in the U.S.

Bottom right: The state capitol at Topeka, built 1866–1903, stands in the centre of landscaped grounds covering four city blocks

Meade County State park and the Finney County State Game refuge located south of Garden City are examples of the wildlife preservation projects. More than 150 buffalo roam the Finney preserve. There are many similar preserves, such as the wildlife project in Linn county near La Cygne; Cheyenne bottoms in Barton county is a nationally known game refuge.

State Parks.—Kansas has no national parks or monuments. The state maintains about 40 state lakes and parks for fishing and other recreation. These are supervised jointly by a state forestry and game commission and a park commission. There are many historic sites and memorials, private parks and municipal parks. The Kansas State Historical society has under its supervision the first Territorial capitol on the Ft. Riley reservation, Funston Memorial State park near Iola, the old Indian mission at Council Grove and Shawnee mission in Kansas City. Among the private parks are the John Brown Memorial park at Osawatomie, the Bartlett arboretum in Belle Plaine, Pawnee Rock park and the Frontier Historical park in Hays.

Historic Sites.—Ft. Leavenworth, Ft. Riley and Point of Rocks in Morton county are federal property. Seventeen sites are owned by the state. The Kansas State Historical society has placed markers on nearly 50 sites and about 40 are marked by private organizations. Some of the well-known historical landmarks are: Ft. Larned, the Santa Fe trail remains near Dodge City, the Beecher Bible and Rifle church at Wabaunsee, the Pony Express station near Hanover, Rock City near Minneapolis, the restored cow town in Wichita, the Boot Hill cemetery at Dodge City, the Kaw Methodist museum and the Post Office oak in Council Grove, the Ft. Harker Guardhouse at Kanopolis, the Eisenhower home and museum in Abilene, the Cathedral of the Plains at Victoria and the pueblo ruins of El Quartelejo in Scott county.

The state capitol (1866–1903) at Topeka, modeled after the national capitol, contains marble from many areas of the world, as well as mahogany and walnut. Murals by John Steuart Curry and David H. Overmeyer depict historical events in Kansas. A modern state office building was completed in 1957. The State Historical society's memorial building and museum is located east of the capitol.

HISTORY

Early History.—Recorded history of the area now included in Kansas began in 1541 when Francisco de Coronado led his company of Spaniards from Culiacán, Mex., across the plains in search of the wealth of the mythical kingdom of Quivira. Coronado's expedition reached the highlands of central Kansas, although the exact point reached is a matter of dispute. The sword of a member of the expedition, found in Kansas, is in the museum of the Kansas State Historical society in Topeka. Except for a brief French penetration, 1719–25, and a few minor explorations, the region was in possession of the Indians until 1803 when it passed to the U.S. (all except the part west of 100° and south of the Arkansas river) as part of the Louisiana Purchase (*q.v.*). From 1803 to 1820 the region was well explored. Lewis and Clark touched the northeast border on their way to the Pacific in 1804; Zebulon M. Pike traversed its breadth on his route to the southwest in 1806; and Maj. Stephen H. Long led a scientific expedition into the region in 1819 and reported it was a sandy wasteland. Kansas, however, was on the main overland routes to the west and in 1821 William Becknell pioneered his lucrative commerce from Franklin, Mo., across Kansas territory to Santa Fe, N.M., thus opening the historic Santa Fe trail (*q.v.*). Part of the trail that the pioneers followed to Oregon and California also crossed Kansas. The Mormons and the gold seekers opened new western trails, and fur trading expeditions added to the new knowledge of the area. All these events helped to remove the myth of the "Great American desert" and stimulated the desire for permanent settlement of the territory.

The hunters, trappers, Mormons, miners and westward-bound homeseekers moved through Kansas but did not settle there. Until official territorial status was secured in 1854 (see *The Free-State Struggle,* below), Kansas remained an Indian land. Archaeologists have uncovered many evidences of the early Indian cultures. The Upper Republican culture, 1200–1500, had an agricultural civilization along the Republican and Blue rivers. When the first whites reached the area the resident tribes were Kansa, Osage, Wichita, Pawnee and Pueblos. The hunter tribes of Kiowas, Comanches, Arapahoes, Cheyennes and Apaches roamed over western Kansas. Even before the Indian Removal act of 1830 several eastern tribes had been brought to the area. In 1850 the federal government sent approximately 19 tribes to Kansas. Nearly one-fourth the present state area was set aside as Indian lands. The Potawatomi reservation near Holton is the largest Indian reservation in the state. There are few Indians living in Kansas, but the state carries many place names from the Indian tribes and their languages. Some white settlers came with the removal policy, mostly missionaries, agents, blacksmiths and farmers. Ft. Leavenworth was established in 1827; Ft. Scott in 1842; Ft. Riley in 1853; and three smaller forts—Mann, McKoy and Atkinson—between 1845 and 1854. Methodist (1830), Baptist, Quaker, Catholic and Presbyterian missions were active by 1837.

The Free-State Struggle.—By 1852 there was considerable political agitation for the creation of an organized territory. The Kansas-Nebraska bill, providing that the people of the territory should decide whether it should be free or slave, was introduced by Sen. Stephen A. Douglas of Illinois and became a law in 1854. (*See* UNITED STATES [OF AMERICA]: *History: Civil War and Reconstruction, 1850–1876: Kansas-Nebraska Act.*) The news of the creation of the Kansas-Nebraska territory was a signal for southern proslavery forces to make a bold bid for the creation of a new slave state and opened a six-year era often referred to as "bleeding Kansas." Indian reserves vanished rapidly as new federal legislation and treaties opened the lands of eastern and southern Kansas to the white settlers. Soon there was intense activity in the northern states to create a free-soil state. The first census, in Feb. 1855, listed 2,905 voters, but in the first election, a month later, 6,307 ballots were cast. Proslavery Missourians had crossed the border to vote. This single act kept the early government of Kansas territory in the hands of the proslavery forces for nearly four years. It gave the forces of slavery a touch of legality—a legality that was approved by the territorial court, supported by early governors and encouraged by presidents of the United States. The free-soilers maintained that this was a bogus legislature and Charles Robinson, agent for the New England Emigrant Aid society, led the citizens of Lawrence (*q.v.*) in the establishment of a free-soil government. James H. Lane raised a militia to defend the free-soil cause. Antislavery guerrilla bands known as Jayhawkers were organized. Meanwhile, Samuel J. Jones, a proslavery sheriff, took charge of the proslave militia. John Stringfellow organized the southern sympathizers of Leavenworth. A near reign of terror followed; each side sought to drive the other from the new territory. Emigrant companies were formed in both the north and the south. Rifles, ammunition and cannon were imported; cities were fortified, men were murdered, armed bands raided other armed bands, livestock was stolen, farm houses burned and the city of Lawrence was sacked. The nation witnessed these extremes, and leadership from Washington was ineffective as the slave controversy spread. The so-called Potawatomi massacre, led by abolitionist John Brown (*q.v.*), and Charles Hamelton's shooting of 11 free-state men in a ravine near the Marais des Cygnes river added to the uncertainty. Late in 1856, territorial Gov. John Geary, using federal troops, eased the tension and his successor, Robert Walker, ended the southern control of the legislature. Proslavery forces by their excesses had defeated themselves. But the free-state legislature could not defeat the Lecompton constitution, framed by a convention of proslavery delegates meeting at Lecompton in 1857, which would have made Kansas a slave state. Congress delayed statehood by the English bill, introduced by William Hayden English, which conditioned the normal cession of land to a new state on acceptance of the Lecompton document, a proposition rejected by Kansas on Aug. 21, 1858, by a vote of 11,300 to 1,788. Gradually the leaders of the proslavery faction drifted away from Kansas territory and

more moderate forces from Iowa, Pennsylvania, Ohio, Kentucky and Virginia took over. The slave question shifted to other areas in the United States and became the leading political issue of the nation. Kansas, with the Wyandotte constitution, was granted statehood, as a free state, on Jan. 29, 1861.

The American Civil War.—In 1860, Kansans faced severe drought and famine and then, shortly after admission to statehood, in 1861, Kansans had to face the strain of the American Civil War; however, the state, with fewer than 30,000 men between the ages of 18 and 45, furnished over 20,000 men for the Union army, supplying 18 regiments and 3 batteries in addition to 2 Negro infantry regiments and a Negro battery. Some of the troops were used in defense against border raids by guerrilla, Indian and Confederate forces, but most of the regiments served outside the state; casualties reached 8,494. The most disastrous episode of the war in Kansas was William C. Quantrill's raid. After sacking several small towns along the Kansas border, on Aug. 21, 1863, Quantrill's forces invaded Lawrence. Approximately 200 buildings were burned and 150 citizens were killed. The largest military engagement on Kansas soil was the battle of Mine Creek in 1864 in which the Confederate Gen. Sterling Price was badly defeated—a defeat which ended the Confederate bid to control the west. Following the Civil War, although the Kansas tribes were rapidly moved to Indian territory after 1868, Indian raids harassed the state until the late 1870s.

The Coming of the Railroads.—At the close of the Civil War, the frontier civilization in Kansas developed rapidly. Two economic phases of this growth were found in the building of railroads and the development of the range-cattle industry. Even before the Civil War Kansans were chartering new railroad companies. In 1857, the Elwood-Marysville railroad was chartered as an extension of the Hannibal and St. Joseph line. Formal opening of this five-mile road between Elwood and Wathena, on which ran the first "iron horse" in Kansas, took place on July 19, 1860. While the war delayed further building, many surveys were made and the federal government made land grants possible in 1862. At the close of 1865, Kansas had only 71 mi. of railroad but, backed by federal, state and local aid, over 200 companies built railroads in the state during the next 30 years. By 1871 Kansas had about 1,200 mi. of track; by 1880, more than 3,000 mi. and by 1890 a total of more than 8,700. This last figure placed Kansas second in the union in railroad mileage. The railroads speeded settlement and made possible the shipment of the raw materials and farm products of the state to the markets of the world.

The Opening of the Range.—Before the Civil War it was commonly known that cattle would fatten during the summer months on the grasslands where the buffalo grazed; however, when several small herds of cattle were sent into the Flint hills during the winter months it was found they could live on the nutritious dried grasses. With the coming of the railroads this fact made possible the opening of millions of acres of range lands after 1866, and created one of the most profitable industries in Kansas. Thousands of tough Texas longhorns were driven to the railroads. A large number of these were shipped to market and to the corn-producing states of the east. But many of the herds that were a part of the "long drive" were left to winter on the plains. Cow towns sprang up at almost every western railway terminal and as the railroads moved westward, the cow towns followed. Baxter Springs and Chetopa were early cow towns. Some of the biggest drives came to meet the Kansas-Pacific at Abilene. Later Ellsworth, Wichita, Ellis, Newton, Dodge City and others became rival centres. Cattle trails, such as the Chisholm trail, became famous roadways to the new towns of which T. A. McNeal, a Kansan, said that "in a competitive examination for wickedness" they "would have given Hell a neck and neck race." During the same period many eastern cattle were brought into the state. Cattle raising brought considerable wealth and established one of the state's basic industries which often had a greater financial value than the wheat crop. Restorations of parts of the cow towns have been made in Dodge City, Wichita and Abilene.

Political History.—Politically, the history of Kansas has been basically Republican on both the state and national level. In the struggle for a free-soil state the majority of the voters joined the party of Abraham Lincoln. Following the Civil War a large number of Union veterans settled there. This gave the Republican party a firm control of political policy. However, this control frequently has been upset and from the 1870s reform elements were engaged in a succession of radical party protests. Leadership for the Grangers, the Farmer's alliance and the Populist party was often furnished by Kansans. The Populists controlled the state government in 1892–94 and 1896–98. In 1892–93, when the Populists elected the governor and senate, and the Republicans (as determined by the court) the house of representatives, political passion was so high as to threaten armed conflict in Topeka. Kansas, in its first 100 years as a state, had 35 governors, of whom 6 were Democrats and 2 Populists; the remainder were Republicans. After World War II the Democrats made marked gains. George R. Docking (1957–60) was the first Democrat to be re-elected governor. His son, Robert Docking, also a Democrat, upset the Republican incumbent for the governorship in 1966.

Kansas Populists helped to inject Jeffersonian liberalism into the progressivism of Theodore Roosevelt and Woodrow Wilson and the state has contributed much to progressive political issues. Under the first constitution women were given equal property rights with men. The first legislature gave women the right to vote in school elections; and in 1887 the right was extended to city and bond elections. Universal suffrage was granted in 1912 by constitutional amendment. From 1880 to 1948 Kansas had prohibition. The state pioneered in the direct primary, referendum and recall, the eight-hour day and blue-sky laws to protect purchasers of stocks and bonds from fraud. The Legislative council (little legislature) was a valuable experiment which developed an effective research division. The merit system for state employees was adopted in 1941. Kansas has no state bond debt, and is on a pay-as-you-go basis. The state has furnished a president (Dwight D. Eisenhower) and a vice-president (Charles Curtis) for the United States and former Gov. Alfred M. Landon was the Republican nominee for the presidency in 1936.

GOVERNMENT

Kansans are governed by the original state constitution which came into effect on Jan. 29, 1861. An amendment to the constitution must have legislative origin. The amendments are numerous. The governor and other state executive officers are elected for two-year terms. There are nearly 100 appointed boards and commissions. Representatives are elected for two-year terms from 125 single-member districts based on population (reapportioned 1966) and senators for four-year terms from 40 districts based on population (reapportioned 1963). The judicial system consists of a 7-member supreme court, 38 district courts with 51 judges and a probate court in each county of the state. All judges except the supreme court are elected. In 1958 an amendment to the constitution provided for the appointment of justices on the supreme court by the governor; the governor selects from a list submitted by a panel of laymen and lawyers. Kansas has 105 counties, 1,552 townships and 2,976 election precincts. The counties and townships are governed by elected officials. Kansas has 613 incorporated cities; 35 are governed by a city manager and 38 are operated under a commission form of government. A city must have 15,000 population to become a first-class city. Kansas derives revenue from a general property tax, an income tax, general sales tax and fees collected for special services. Other sources of revenue were vehicle licence fees and a gasoline tax. The total annual expenditures for all state functions in the second half of the 20th century were over $250,000,000. The total assessed value of all property in Kansas was more than $5,200,000,000; of this sum almost $900,000,000 was the assessed value of intangible property.

POPULATION

The population of Kansas in 1860, the year before it became a state, was 107,206; in 1870 it was 364,399; in 1880 it was 996,096 and in 1890 it was 1,427,096. Few states had as rapid a growth in population as did Kansas from 1870 to 1890. In 1950

the population was 1,905,299 and in 1960 it was 2,178,611 by the federal census. In 1960 there was one city, Wichita, with over 250,000 people; two cities, Kansas City and Topeka, with over 100,000. In 1960 the Wichita standard metropolitan statistical area (Sedgwick county) had a population of 343,231 to which Butler county (pop. [1960] 38,395) was added in 1963, and the Topeka standard metropolitan statistical area (Shawnee county) had a population of 141,286. Kansas City, Kan., is included in the Kansas City, Mo. (*q.v.*), metropolitan area. The urban population has been increasing over the rural: in 1960 the urban population accounted for 61.0% of the total, in 1950 it accounted for 52.1%.

While many of the early settlers came from eastern states, Kansas had many immigrants from Europe. Many of these nationalities settled in colonies within the state. Germans and Swedes predominated among the foreign groups; there were also settlements of Danes, Norwegians, English, Bohemians and French. These people made many contributions to the art, literature and music of the state. S. Birger Sandzén, born in Sweden, taught art at Bethany college in Lindsborg. He became a leader in western art and his Kansas landscapes are to be found in the world's major art galleries. The state was also settled by religious sects, such as Quakers, Mormons and Mennonites. Kansas was one of the main recipients of the "Negro Exodus movement" from the southern states after the Civil War. According to the 1960 census, 93.9% of the population in Kansas was native white, 1.5% foreign born and 4.6% nonwhite, practically all Negro.

*Kansas: Places of 5,000 or more Population (1960 census)**

Place	Population				
	1960	1950	1940	1920	1900
Total state	2,178,611	1,905,299	1,801,028	1,769,257	1,470,495
Abilene	6,746	5,775	5,671	4,895	3,507
Arkansas City	14,262	12,903	12,752	11,253	6,140
Atchison	12,529	12,792	12,648	12,630	15,722
Augusta	6,434	4,483	3,821	4,219	1,197
Chanute	10,849	10,109	10,142	10,286	4,208
Coffeyville	17,382	17,113	17,355	13,452	4,953
Concordia	7,022	7,175	6,255	4,705	3,401
Derby†	6,458	432	256	—	—
Dodge City	13,520	11,262	8,487	5,061	1,942
El Dorado	12,523	11,037	10,045	10,995	3,466
Emporia	18,190	15,669	13,188	11,273	8,223
Fairway	5,398	1,816‡	—	—	—
Fort Scott	9,410	10,335	10,557	10,693	10,322
Garden City	11,811	10,905	6,285	3,848	1,590
Great Bend	16,670	12,665	9,044	4,460	2,470
Hays	11,947	8,625	6,385	3,165	1,136
Haysville	5,836§	—	—	—	—
Hutchinson	37,574	33,575	30,013	23,298	9,379
Independence	11,222	11,335	11,565	11,920	4,851
Iola	6,885	7,094	7,244	8,513	5,791
Junction City	18,700	13,462	8,507	7,533	4,695
Kansas City	121,901	129,553	121,458	101,177‖	51,418
Larned	5,001	4,447	3,533	3,139	1,583
Lawrence	32,858	23,351	14,390	12,456¶	10,862
Leavenworth	22,052	20,579	19,220	16,917	20,735
Leawood	7,466	1,167‡	—	—	—
Liberal	13,813	7,134	4,410	3,613	426
McPherson	9,996	8,689	7,194	4,595	2,996
Manhattan	22,993	19,056	11,659	7,989	3,438
Merriam	5,084§	—	—	—	—
Newton	14,877	11,590	11,048	9,781	6,208
Olathe	10,987	5,593	3,979	3,268	3,451
Ottawa	10,673	10,081	10,193	9,018	6,934
Overland Park	21,110	—	—	—	—
Parsons	13,929	14,750	14,294	16,028	7,682
Pittsburg	18,678	19,341	17,571	18,052	10,112
Prairie Village	25,356§	—	—	—	—
Pratt	8,156	7,523	6,591	5,183	1,213
Roeland Park	8,949§	—	—	—	—
Russell	6,113	6,483	4,819	1,700	1,143
Salina	43,202	26,176	21,073	15,085	6,074
Shawnee	9,072	845‡	597	—	—
Topeka	119,484	78,791	67,833	50,022	33,608
Wellington	8,809	7,747	7,246	7,048	4,245
Wichita	254,698	168,279	114,966	72,217	24,671
Winfield	11,117	10,264	9,506	7,933	5,554

*Populations are reported as constituted at date of each census. †Name changed from El Paso since 1930. ‡Denotes an unincorporated place of under 2,500 in an urbanized area. §Incorporated since 1950. ‖Total for 1900 includes population (5,878) of Argentine city, annexed to Kansas City between 1900 and 1910. Parts of Quindaro, Shawnee, and Wyandotte townships annexed to Kansas City since 1910. ¶Douglas. Part of Wakarusa township annexed to Lawrence city since 1910.

Note: Dash indicates that place did not exist during the reported census, or data not available.

EDUCATION

Kansas ranks high among the states in its small percentage of illiteracy. The state has a system of tax-supported free public schools. The state superintendent of public instruction is elected by popular vote and the state school board is appointed by the governor. Enabling legislation has permitted the reorganization of the small local school districts, each with a separate school board, into larger districts. Although consolidation proceeded slowly before World War II, considerable progress was made in this direction in the 1940s and 1950s: the more than 5,600 school districts in existence in 1948, for example, were consolidated into about 2,800 districts, a reduction of 50% by 1959. In addition to the public schools, there were about 250 private and parochial schools in the state.

The state system of higher education includes six state-supported institutions of higher learning. The University of Kansas (1866) at Lawrence has schools of engineering, law, pharmacy, liberal arts and sciences, fine arts, education, business and journalism and a graduate school. Kansas State University of Agriculture and Applied Science (1863) at Manhattan is the state land-grant college and university. Wichita State University (1895) at Wichita has colleges of business administration, education, fine arts and a school of engineering. Other state-supported colleges are: Kansas State Teachers college (1863) at Emporia; Fort Hays Kansas State college (1902) at Hays; and Kansas State College of Pittsburg (1903) at Pittsburg. The University of Kansas medical school (1899) is in Kansas City. There are agricultural experiment stations at Hays, Garden City, Colby and Tribune.

In addition to the state schools various accredited private and denominational colleges are maintained: Baker university (Baldwin, Methodist, 1858); Bethany college (Lindsborg, Augustana Lutheran, 1881); Bethel college (North Newton, Mennonite, 1887); College of Emporia (Emporia, related to Presbyterian Church, 1882); Friends university (Wichita, Society of Friends, 1898); Kansas Wesleyan university (Salina, related to Methodist Church, 1886); McPherson college (McPherson, Church of the Brethren, 1887); Marymount college (Salina, Roman Catholic, 1922); Mount St. Scholastica college (Atchison, Roman Catholic, 1863); Ottawa university (Ottawa, affiliate of American Baptist convention, 1865); St. Benedict's college (Atchison, Roman Catholic, 1859); St. Mary college (Xavier, Roman Catholic, 1923); Southwestern college (Winfield, affiliate of Methodist Church, 1885); Sterling college (Sterling, related to United Presbyterian Church, U.S.A., 1887); and Washburn University of Topeka (Topeka, municipal, 1865). There are a number of junior colleges and small business and professional schools. Haskell institute (1884) at Lawrence is a U.S. government school for Indians.

HEALTH AND WELFARE

State charitable institutions are supervised by a state board of social welfare. Hospitals for the mentally ill are maintained at Topeka, Larned and Osawatomie and a hospital for epileptics at Parsons. Kansas has an advanced program for the care of mental illness. Other charitable institutions are a school for feebleminded youths at Winfield; a tubercular sanatorium at Norton; an orphans' home at Atchison; a soldiers' home at Ft. Dodge; Mother Bickerdyke home, founded after the Civil War for armed services nurses and mothers, widows and daughters of veterans, at Ellsworth; a school for the blind at Kansas City; and a school for the deaf at Olathe. The industrial school for girls is at Beloit and a similar school for boys at Topeka. The state maintains a penitentiary at Lansing and a reformatory at Hutchinson. Kansas cooperates with the programs of aid to the aged, the blind and the disabled and to dependent children which are supported by the federal government.

THE ECONOMY

Agriculture.—Nearly one-third of the state's population lives on about 100,000 farms and ranches. Kansas has approximately 50,000,000 ac. in farm land and pasture. The total value of farm production in an average year will range from $1,500,000,000 to $2,000,000,000. Often called the breadbasket of the world, Kansas is by far the nation's leading wheat state, producing one-fifth of the nation's crop, nearly all of it hard winter wheat. In addition to wheat the state's leading crops include sorghums, corn, oats, barley, alfalfa, hay, flax, soybeans, potatoes, sugar beets,

apples and other fruits. The total annual value of farm crops in the second half of the 20th century exceeded $500,000,000. Livestock, dairy products and poultry had an additional value of about $1,000,000,000. There are excellent herds of purebred cattle. Agriculture is varied and highly diversified in the eastern half of the state.

Industry.—Since 1940, the state has industrialized at a rapid rate and industrial paychecks have been the largest single source of income. The state's 3,500 plants turn out thousands of products from glass fibres to aircraft; these plants employ more than 100,000 persons. At the top of the list of payrolls is transportation equipment, followed by meat products, machinery, printing and publishing, chemicals, petroleum and coal products, fabricated metals, stone, clay and glass, dairy products and grain milling. Two of the newer industries are cellophane and chemical fertilizers.

Minerals.—Mineral production in Kansas is increasing, with the state eighth in the nation at mid-20th century. There are about 20 basic minerals in production. Petroleum is the state's greatest mineral asset; annual production in the second half of the 20th century was approximately 124,000,000 barrels. Kansas has a number of large oil refineries. Gas production exceeds 550,000,000,000 cu.ft. annually; the largest production is in the Hugoton field. The state has about 15,000 mi. of pipelines to carry oil and gas. Other valuable mineral products include salt, cement, stone, sand, gravel and clay products.

Transportation and Communications.—The state has more than 125,000 mi. of federal, state and county highways. Railroad mileage is about 8,000 mi. Major commercial airlines serve the state which ranks high in private ownership of airplanes. Kansas City, Leavenworth and Atchison are served by barge lines in the Missouri river. Kansas is well supplied with means of communication; its newspaper tradition was symbolized by Pulitzer prize winner William Allen White and his nationally famous *Emporia Gazette*. About 300 weekly and 50 daily newspapers are published in the state. These are supplemented by about 50 radio stations and a dozen television stations.

Trade and Finance.—Retail, wholesale and service industries employ about 200,000 persons per year. There are more than 25,000 retail and 4,200 wholesale establishments. In addition to the many national and state banks and several trust companies, Kansas also has numerous building and loan associations and home-owned insurance companies.

See also references under "Kansas" in the Index.

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See *Kansas Historical Quarterly, Kansas Magazine* and "Directory of Interesting Facts" prepared by the secretary of state in 1958. Current statistics on production, employment, industry, etc., may be obtained from the pertinent state departments; the principal figures, together with the current history, are summarized annually in the *Britannica Book of the Year*, American edition. (A. B. SR.)

KANSAS CITY, a city of eastern Kansas, U.S., and the seat of Wyandotte county, is located on the eastern boundary of the state at the confluence of the Kansas (Kaw) and Missouri rivers. Only the state line separates the city from Kansas City, Mo., and there is no apparent division between the two areas. Much of the city is built on hills and bluffs overlooking the Kansas river, which in its flow from the southwest approximately bisects the urban area. It is the eastern terminus of the Kansas turnpike, a state toll road.

The city is the site of a large proportion of the heavy industry of the Kansas City metropolitan area and is a leading meat-packing centre. Important manufactures include chemicals, paper goods, automobiles, railroad cars, petroleum products, casting and foundry materials and dairy and agricultural commodities. Pop. (1960) 121,901; for comparative figures *see* table in KANSAS: *Population*. (For metropolitan area *see* KANSAS CITY, Mo.)

History.—Kansas City has not grown in a regular pattern. The city is a consolidation of small towns, many of which sprang up as the result of the rapid development of the area as a livestock and meat-packing centre after the American Civil War. In 1843 an educated tribe of Wyandot Indians, who had come to the region from Sandusky, O., founded the original settlement within the city's boundaries on land purchased from the Delaware Indians. With the opening of large-scale white settlement in the territory after the passage of the Kansas-Nebraska act (1854), the Wyandots sold the site to a town company, which laid out Wyandotte (initially called Wyandott) in 1857. By the mid-1850s, the transfer points for overland trade to the west had moved up the Missouri river to the Missouri-Kansas border and the quiet Indian village was quickly changed into a thriving river town. A short distance north, a group of free-state leaders in 1856 founded the town of Quindaro on the east bank of the Missouri river. The town was intended to serve as a free-state port to compete with proslavery river towns. For two years, the widely advertised town grew rapidly and constituted a rival to Wyandotte. But Quindaro's prosperity declined during the Civil War; the town's business houses were abandoned and the community was eventually absorbed through natural growth of Kansas City.

Wyandotte, officially incorporated as a city on Jan. 29, 1859, was the site during July of that year of the writing of the Kansas constitution under which the territory entered the Union early in 1861 (*see* KANSAS: *History*). In 1863 the town was selected as the eastern terminus of the Union Pacific, Eastern division (later the Kansas Pacific), the first transcontinental railroad. After this decision, the town temporarily boomed. Community leaders predicted that Wyandotte would eclipse its larger rivals, Leavenworth, Kan., and Kansas City, Mo., and would eventually become the metropolis of the lower Missouri river valley.

This hope proved illusory. In order to make connection with projected lines into central and southern Kansas, the Hannibal and St. Joseph railroad, the first line to reach the western border of Missouri, decided in 1866 to support the building of a branch from Cameron, Mo., to Kansas City, Mo., and to bridge the Missouri river at the latter point. This decision assured that the Missouri town would become the area's railroad centre and the dominant regional city: at the end of the Civil War, vast numbers of Texas cattle were driven northward to railheads on the Kansas Pacific for shipment eastward and it quickly became a major marketing and reshipment point. During the late 1860s and early 1870s, stockyards and meat-packing plants were built on the bottom lands between Wyandotte and Kansas City, Mo. Although the business operations accompanying this trade were concentrated in Missouri, much of the physical development occurred on the Kansas side of the line. Over 62% of the land on which the stockyards are built, for example, lies within the boundaries of Kansas City, Kan.

As population poured into the area, efforts were made to develop systematically the land lying near railroads. In 1869, the year the Hannibal and St. Joseph bridge across the Missouri was opened to traffic, a section of land between the Kansas river and the Missouri state line was platted as Kansas City, Kan. The town was incorporated three years later. A settlement called Armstrong developed on a hill south of Wyandotte. An industrial district, Armourdale, named after the meat-packing firm, was laid out north of the Kansas river in 1880 by a group of Boston investors important in the Hannibal and St. Joseph railroad and in the organization of the stockyards. South of the river, Argentine grew up around the Santa Fe railway shops and yards and became the site of a smelting plant. After several years of agitation, Wyandotte, the largest of the communities, Armourdale, Kansas City and Armstrong combined as a first-class city on March 6, 1886, and took the name Kansas City. At the time of incorporation,

the city had a population of 21,299. By 1910, with the annexation of Argentine, the population had grown to 82,331. Rosedale, a second town south of the river, was annexed in 1922. Because much of this urban development occurred in low land along the Kansas river, Kansas City has been subject to serious floods. Particularly destructive were those of 1903 and 1951.

Population Characteristics.—During the latter part of the 19th century, European immigrants were attracted to the city by the prospect of employment in packing plants and other manufacturing establishments. Accordingly, the city has a greater proportion of foreign-born and first-generation Americans than does the metropolitan area. Partly because of the effect of the "great exodus" into Kansas from the south during the late 1870s, Negroes constitute about 20% of the population of the city. Yearly per capita income and the median value of individual homes is significantly lower in the city than in the urban area as a whole. It has been argued that the Missouri city leaders have deliberately followed the policy of trying to confine heavy industry across the state line as a means of insuring that Kansas City, Mo., will retain the desirable features of a primarily mercantile community.

Administration.—With few architecturally significant buildings and with much of its central business district located along a wide main street (Minnesota avenue), Kansas City in appearance is little like its more cosmopolitan Missouri neighbour. Still, Kansas City leaders have had little success in their struggle to emphasize the separate identity of their city in the metropolitan area. It is frequently confused with the Missouri city.

Recreational and Educational Facilities.—Kansas City has a number of parks and several auditoriums, including that of the municipal memorial building, which seats 4,000. There are two junior colleges, Donnelly, a Roman Catholic coeducational college founded in 1949, and the Kansas City Kansas Junior college, a municipal institution opened in 1923. The University of Kansas medical school is located there. (C. N. GL.)

KANSAS CITY, a city of western Missouri, U.S., on the Missouri river, at the mouth of the Kansas (locally, the Kaw), is the heart of a standard metropolitan statistical area composed of Jackson, Clay, Cass and Platte counties in Missouri and Johnson and Wyandotte counties in Kansas. Other cities located in the metropolitan area are Kansas City, Kan. (*q.v.*), separated from the Missouri city only by the state line; Independence, Mo. (*q.v.*) and North Kansas City, Mo. Population (1960) city 475,539; standard metropolitan statistical area 1,092,545. (For comparative population figures *see* table in MISSOURI: *Population.*)

In the city, diversified terrain has made possible an extensive park system and drives of unusual beauty, notably Cliff drive, 3.5 mi. long. The downtown section was occupied originally by high bluffs and deep ravines, which were graded and filled. West of this high land, along the Kansas river, is a low, level tract, occupied chiefly by railway yards, stockyards, wholesale houses and manufacturing establishments. North and east are Missouri river valley lands, which have grain elevators as well as yards and factories. Northeast of the business section, in the bend of the Missouri opposite the mouth of the Kansas, lies the municipal airport.

History.—The first pioneer settlement within the present city limits was established in 1821. A second settlement was made in 1831. This became the town of Westport in 1834 and for a time seemed destined to become the dominant city of the locality. It was a rival of Independence in the Santa Fe trade and succeeded to most of it after the floods of 1844 destroyed the Independence landing. Westport, incorporated in 1857, continued as a corporate entity until near the turn of the century when it was merged with Kansas City. Lots were surveyed in 1838 for the town of Westport Landing, which eventually grew into Kansas City. The town of Kansas was incorporated in 1850. Chartered as the city of Kansas in 1853, rechartered in 1875, it adopted new charters in 1889, 1908 and 1925. Kansas City assumed its present name with the 1889 charter.

Before 1850, what is now Kansas City was practically the exclusive eastern terminus for western and Santa Fe trade. Whiskey, groceries, prints and notions were sent to Santa Fe; wool, buffalo robes, dried buffalo meat, Mexican silver coin, gold and silver dust and ore came in return. During the American Civil War Independence and Westport were scenes of battles. There was no fighting in Kansas City but its trade went to Leavenworth, protected by a Federal army post and a quiet frontier. After the war, Kansas City declined as a trading centre until the coming of railroads assured its resurgence. On Sept. 25, 1865, the first railroad reached Kansas City from St. Louis. Finally, in 1869, a railroad bridge across the Missouri assured predominance over Leavenworth and St. Joseph.

The population of Kansas City grew from 4,418 in 1860 to 55,785 in 1880. By 1900 it increased almost threefold and between 1900 and 1920 almost doubled. Between 1930 and 1940 it decreased slightly but after 1940 continued to increase.

Government.—Under the fifth charter, adopted Feb. 24, 1925, and subsequent amendments, the city is under a council-manager form of government. The city council has nine members, elected for four years, including the mayor as president. The council appoints the city manager, clerk, auditor and street railway commissioner. The mayor appoints the board of park commissioners and other citizen boards and commissions. The city manager is the chief administrative officer. The police department is under the direction of a board appointed by the governor of Missouri with the mayor as chairman ex officio. The municipal court forms the judicial branch of the government.

The water plant, completed in 1928, is owned by the city. All other public utilities are under private ownership. The municipal auditorium, completed in 1936, seats a total of 24,000 persons in 32 separate units. The skyscraper city hall was dedicated in 1937. Quality Hill project, started in 1950, was the first urban redevelopment project in the state.

Commerce, Industry and Transportation.—Kansas City is the seat of the Federal Reserve bank of the tenth district. In the 20th century it has become an increasingly important manufacturing city. Its economic life is closely linked with that of its neighbouring cities, especially Kansas City, Kan. (*q.v.*). Greater Kansas City ranks among the first in the nation in hard wheat, stocker and feeder, cash wheat and primary wheat markets; in vending machine production and farm equipment distribution; as a sorghum grains market and futures wheat market; in total flour production, grain elevator capacity, automobile assembly, wheat flour production; and as a railroad centre. The city is also important as a cattle market; as a correspondent banking centre; in the apparel industry (women's wear); and in the printing trade.

Union (passenger) station, built in 1915 at a cost of over $6,000,000, is one of the largest in the country; it is operated by the Kansas City Terminal Railway company, which also operates freight terminals. The Kansas City Connecting railroad transfers livestock between all roads and the stockyards. The 4,590 ac. Mid-Continent International airport, one of the largest municipal airports in the nation and designed primarily for jet aircraft, began operation in 1955. In 1952 the Southwest Trafficway was completed, the first link in a $150,000,000 expressway plan; the second link, Sixth Street Freeway, was completed in 1958. Three railroad and six highway bridges span the Missouri; across the Kaw valley extends a great interstate viaduct.

Because of its central position Kansas City is an advantageous meeting place for national conferences. The American Royal Livestock show, held each October, is one of the largest horse and livestock exhibitions in the nation. The Kansas City Livestock exchange is the largest livestock exchange building in the nation.

Education and Cultural Activities.—The public school system includes a junior college, opened in 1915, and there is a large parochial (Roman Catholic) school system. The University of Missouri at Kansas City, chartered in 1929 (until 1963, the University of Kansas City), is in a south-side area which includes Rockhurst, a Roman Catholic college for men, founded 1910; the College of St. Teresa, a Roman Catholic college for women, founded in 1916; the Conservatory of Music, founded in 1907 and joined with the University of Kansas City in 1959; the Kansas City Art Institute and School of Design (private, 1884); the Nelson-Atkins Art galleries; the Midwest Research institute; and Linda Hall library, a privately endowed library of science and

technology. Also in the city are National college (Methodist, 1899); the Police academy; three Protestant theological seminaries, Nazarene (1945), Midwestern Baptist (Southern Baptist convention, 1959) and St. Paul School of Theology (1958); and other institutions for professional and technical training. Kansas City museum is in the north part of the city. The public library maintains branches. A downtown library and board of education building was completed in 1960. Citizen support maintains the Philharmonic orchestra, established in 1933, and the Lyric theatre, established in 1958. The leading newspaper is the *Kansas City Star*, established in 1880 and employee-owned.

Parks and Recreation.—Of more than 50 parks comprising over 3,000 ac., the most notable is 1,300-ac. Swope park, which contains a zoo and an outdoor theatre. In Oct. 1958, the Volker Memorial fountain, the work of Carl Milles, was unveiled at the south end of a vista looking north to the Nelson galleries. Noteworthy also is the Liberty memorial, facing Union station across a plaza to the south. It was completed in 1925 at a cost of $2,500,000. The city supervises 50 playgrounds and operates several full-time community centres. (C. St.)

KANSAS-NEBRASKA ACT, an act passed by the U.S. congress and signed by Pres. Franklin Pierce on May 30, 1854; it was one of the most significant developments in the sectional controversy between the North and the South that eventually resulted in the American Civil War. The author of the act was Sen. Stephen A. Douglas of Illinois, who, as chairman of the senate committee on territories, was directly concerned with problems of western development. As a leader of the Democratic party he had played an important role in the formulation of the Compromise of 1850. Douglas was anxious to preserve the unity of both his party and the nation in the face of the disruptive tendencies of the rising slavery agitation by finding a solution to the problem on which both North and South could agree.

The Kansas-Nebraska act created the two new territories of Kansas and Nebraska out of the vast "permanent" Indian reservation that lay between the Missouri river and the Rocky mountains. Since 1844, when Douglas was in the house of representatives, he had sought to organize this area. Following the expansion of the United States to the Pacific at the end of the Mexican War in 1848, the existence of a large, unorganized Indian reservation, lying athwart the transportation routes to the Pacific coast and occupying the heartland of the nation, became increasingly anachronistic. The creation of the territories was long overdue.

The Kansas-Nebraska act was also important for its statement of Douglas' principle of popular sovereignty, the doctrine that the territories of the United States should be allowed self-government in all matters of domestic importance, including the slavery issue. In order to make this self-government effective, Douglas, by amendment of his original plan, included in the act the repeal of the Missouri Compromise of 1820, by which slavery had been forever excluded from that part of the Louisiana purchase lying north of 36° 30′, the area included in the two new territories. This was the most controversial aspect of the Kansas-Nebraska act.

The bill was reported from Douglas' committee early in Jan. 1854, and was followed by several months of bitter debate, both in and out of congress. On March 3 it passed the senate by a vote of 37 to 14, and on May 22 the house of representatives approved it by the close vote of 113 to 100. "The true intent and meaning" of the legislation, Douglas wrote in the act itself, was "not to legislate slavery into any Territory or State, nor to exclude it therefrom, but to leave the people thereof perfectly free to form and regulate their domestic institutions in their own way, subject only to the Constitution of the United States." In keeping with popular sovereignty, Douglas also dropped from his act the restrictions on territorial legislation that had characterized earlier acts, removed the long-standing provision for congressional disallowance of acts passed by the territorial legislature and provided that territorial bills could be passed over the governor's veto—all innovations in the system of territorial administration.

The Act, especially its repeal of the Missouri Compromise, was immediately arraigned by antislavery extremists as "a gross violation of a sacred pledge; as a criminal betrayal of precious rights," and as part of an "atrocious plot" to convert the area into a "dreary region of despotism, inhabited by masters and slaves." Douglas himself was the subject of bitter vituperation and attack. At the same time, some western settlers hailed the act as a significant step toward the achievement of territorial self-government.

The consequences of the Kansas-Nebraska act were momentous. Its passage was followed by a new alignment of political parties in the nation, the demise of the Whig party and the rise of the Republican party as an organization vigorously opposed to the expansion of slavery into the territories. In Kansas territory, a period of political chaos, confusion and bloodshed was inaugurated as both northerners and southerners sought to win the territory for their respective institutions. Douglas' search for a national solution to the slavery problem was frustrated by the rising forces of sectionalism. *See* also KANSAS: *History;* UNITED STATES (OF AMERICA): *History.* (Ro. W. J.)

KANSK, a town in Krasnoyarsk *krai* of the Russian Soviet Federated Socialist Republic, U.S.S.R., stands on the left bank of the Kan river, where it is crossed by the Trans-Siberian railway 135 mi. E. of Krasnoyarsk city. Pop. (1959) 73,814. Founded in 1640 as a Russian fort, it is now the centre of a developing coal field and has cotton, timber and food industries. (R. A. F.)

KANSU (KAN-SU SHENG), a province of northwest China. Area 137,104 sq.mi.; pop. (1953/55) 12,928,102, (1957 est.) 12,800,000. The west section of the Great Wall divides southeastern Kansu from former Ningsia province, which after incorporation extended the boundary of Kansu as far as Outer Mongolia. In 1958 Ningsia was separated from Kansu province and became the Ningsia Autonomous region.

Physical Characteristics.—The province lies in the most active earthquake zone of China. Kansu may be divided into three major divisions: (1) the desert area about 300 mi. wide by 600 mi. long reaching from the west arm of the Yellow river loop to Sinkiang Uighur Autonomous region; (2) southeast Kansu east of that arm of the river; and (3) the Ho-hsi or Kansu corridor in which the line of oases at the base of the northern Tibetan mountain front provides the historic and productive route of communication between eastern China and central Asia. The first major division forms parts of the Mongolian plateau and runs without a break into the Gobi desert. Into its western half flow two rivers that irrigate extensive oases, the Etsin Gol and the Su-lo Ho or Shuleh river. Most of the plateau here lies between 3,000–5,000 ft. above sea level. Separating the Mongolian plateau division from the Ho-hsi corridor are the Ho-li, Lung-shou and Ma-tsung mountains rising up to almost 10,000 ft. in the Ho-li range. These and the Ch'i-lien (Nan Shan) to the south which rises to over 18,000 ft. run more or less parallel, and sandwich between them the corridor of 10–40 mi. width that for a distance of over 600 mi. runs at elevations around 4,000–5,000 ft. The corridor begins west of the Wu-hsiao mountains which divide it from east Kansu with its chief city and provincial capital of Lan-chou (*q.v.*). The Wu-hsiao Shan and the Ho-lan Shan (sometimes erroneously, Ala Shan mountains) along the west bank of the Yellow river farther north form the divide between internal and external drainages. East Kansu may be divided into five subregions, including the Tsinling Shan adjoining the Szechwan border, the southwest grasslands of the Hsia Ho, the rolling loess hills of the Wei Ho drainage facing Shensi province, and the Yellow river oases running in a line northward, known as the Ningsia plain.

Climatically, there is a gradual change from a monsoon regime in east Kansu to the continental desert regime in the northwest. In parts of east Kansu rainfall may reach 20–25 in., but west of the Ho-lan Shan and Wu-hsiao Shan in most areas it is under 4 in. Sandstorms during the winter sometimes last two to three days. Streams are few in the northwest and disappear into the desert or end in salt lakes after irrigating oases. Even in east Kansu stream beds are often dry during the winters, which are bitterly cold.

Production.—Kansu's agriculture is mainly extensive, with spring wheat and millet predominating. Tobacco and cotton are cash crops. In the 19th century frequent uprisings by the Muslim section of the population caused much land abandonment. The Chinese Communist regime made great efforts to restore produc-

tion on arable land, with emphasis on irrigation, especially in the Ho-hsi corridor. The largest of the irrigation projects are those involving the damming of the Yellow river, at the Liu-chia gorge and at Tsingtung south of Wu-chung. Livestock raising is significant in the former Ningsia province.

Kansu is rich in minerals. Coal is found south of Lan-chou and at Shih-tsui-tzu on the east slope of the Ho-lan Shan; salt and soda in the Ningsia desert lakes. In the late 1950s a major iron ore find on the flanks of the Ch'i-lien Shan provided the basis for important iron and steel developments at Lan-chou. One of the most significant minerals is oil, developed first in the Yü-men (*q.v.*) district in the 1930s on a modest scale, and later expanded greatly by the Communist regime. Oil is brought by railroad from Yü-men and Chiu-ch'üan to Lan-chou for refining.

The Yellow river still continues to provide primitive transport by oxskin and sheepskin rafts and shallow-draft junks but the important means of transportation are the highways that enter the province from the Wei river valley and along the Yellow river to funnel into the great Northwest highway at Lan-chou, and the railroad paralleling this highway running northwestward from the Lung-hai railroad at T'ien-shui to eastern Turkestan. Petroleum and mineral exploitation and the railroad have brought industrial progress to Kansu, centred especially at Lan-chou. Industrial projects include textile mills, power stations, printing presses, marble quarries; also food processing, fertilizer, cement, steel and paper plants.

History.—From the earliest times the Chinese have had contact with central Asia and the west via the Ho-hsi corridor which was the route of the "Silk road." From the 3rd century B.C. when China organized a defensive scheme against the steppe nomads and connected the various sections of the Great Wall to its terminus at the Jade Gate (Yü-men), the function of the Ho-hsi corridor as the key to the defense of the western borderland became increasingly conspicuous. Under strong dynasties, notably those of the Han and T'ang, the corridor was kept open and military colonies were placed at strategic oases. At such times, too, new influences such as Buddhism and Nestorian Christianity reached China via this route, while overland trade reached even Rome. Tun Huang is the site of famous caves preserving ancient paintings and sculptures. (*See* CHINESE PAINTING.) During times of weakness in China, Tatar invasions penetrated along the route, and Lan-chou became a base for conquering China.

Chinese now constitute nearly 90% of the population. The remainder comprises mixed ethnic groups resulting from the movements of peoples. These include Mongols in the northwestern desert steppes, Tibetans in the southwestern uplands and Muslims in the corridor and east Kansu. The latter, largely T'ung-kan (Dungan) of Chinese origin, have often risen in rebellion. The Communist regime has organized the various ethnic groups into so-called autonomous areas (*chou* and *hsien*). (H. J. Ws.)

KANT, IMMANUEL (1724–1804), German philosopher, one of the most important thinkers of modern times, the exponent of "critical," "transcendental" or "formal" idealism, was born at Königsberg in East Prussia on April 22, 1724. According to his own account his grandfather was an emigrant from Scotland. His father was a master saddler of very small means, his mother an uneducated woman remarkable both for her character and for her natural intelligence. Kant went to school at the Collegium Fridericianum in Königsberg, founded at the end of the 17th century to bring up children on the basis of Pietism; and the influence of the Pietists was very strong in his early years. He proceeded to the University of Königsberg in 1740.

Little reliable information is available about the content of the education that he received either at school or at the university, but he probably owed his wide knowledge of Latin literature to the former, and he was certainly introduced at the latter both to the fashionable philosophy of Leibniz and of Christian Wolff and to the ideas of Sir Isaac Newton. His earliest work, *Thoughts on the True Estimation of Living Forces*, written in 1746, was concerned with a point in Leibniz' physical theory. After leaving the university Kant earned his living for several years as a private tutor before returning to Königsberg as a *Privatdozent* in 1755. He taught in this capacity for the next 15 years, lecturing on a wide range of subjects, scientific and mathematical as well as philosophical, and managing in this way to gain an income which was at best extremely modest. In 1770 he was elected professor of logic and metaphysics in Königsberg, a post in which he was active until a few years before his death. Kant's literary activity in the '60s brought him into contact with most of the best-known thinkers in Germany, including Moses Mendelssohn and J. H. Lambert; and he also made the acquaintance of J. G. Hamann and J. G. Herder during these years.

The publication of the *Critique of Pure Reason* in 1781, an event long awaited in learned circles, produced mixed results. Many were enthusiastic for the new doctrines and flocked to Königsberg to hear their author; teachers of philosophy in universities all over Germany began to call themselves Kantians. But there were others who said, to Kant's great chagrin, that there was nothing in the *Critique* which could not be found in Leibniz, and yet others who, under the influence of the growing romantic movement, argued that Kant had failed to understand himself and had not pushed his arguments to their logical conclusion. For about 15 years after 1781 Kant was vigorously engaged, both publicly and privately, in defending himself against misunderstanding: the *Prolegomena* of 1783, the attack on J. A. Eberhard (1790) and the abortive essay on the "progress of metaphysics in Germany" (1793), among other productions, are the result of this activity.

In the '70s and '80s Kant had been on excellent terms with the Prussian authorities (the first *Critique* was dedicated to Baron von Zedlitz, minister in charge of education, who in 1778 had offered him a professorship at Halle), but in his declining years he fell foul of them. This was because of his writings on religion, which were altogether too rationalistic for orthodox taste. The publication of *Religion Within the Bounds of Mere Reason* in 1793 was followed next year by a *démarche* from the authorities in which Kant was informed that the king, Frederick William II, had long observed with displeasure how he was "misusing" his philosophy to the "distortion and depreciation of many leading and fundamental doctrines of holy writ and Christianity" and was required to give an undertaking not to lecture or write further on religious subjects. Kant duly gave the undertaking, but privately interpreted it as being a personal promise to the king, from which he felt himself to be released on the latter's death in 1797. At all events he returned to the forbidden subject in his last major essay, *The Conflict of the Faculties* (*Der Streit der Fakultäten*), in the following year.

Kant's physical and intellectual powers declined rapidly toward the end of his life. Physically he had always been feeble (he was only just over five feet in height and hollow chested), but by dint of imposing a stern regimen on himself he avoided major illnesses and did not need regular medical attention until within a year or two of his death. Nor did his weakness interfere with his social life: until late in life he had a circle of friends with whom he dined regularly and conversed, so it is said, according to rule. He died on Feb. 12, 1804.

Kant's general intellectual and cultural interests were lively and wide ranging, if not entirely catholic in scope. He admired English literature of the Augustan period as well as Voltaire and Rousseau and his own German contemporaries, though his taste was for prose and satire rather than for imaginative writing (he once refused a professorship of poetry). Although he never journeyed far from Königsberg, never even visiting other parts of Prussia, he was a great reader of books of travel. He took little interest in the fine arts, but followed political developments with close attention, greeting the French Revolution with enthusiasm. He had a low opinion of women and did not marry.

KANTIAN PHILOSOPHY

Kant's philosophical career may be divided into three main periods. The first, commonly called his "precritical" period, ran from 1747, the year in which he published his *Thoughts on the True Estimation of Living Forces* (*Gedanken von der wahren Schätzung der lebendigen Kräfte*), to 1770, when he became professor in Königsberg. During these years Kant produced a num-

ber of studies which won him attention among philosophers in his own country, but remained unknown outside it. Looking back on these studies now, we can see many of his later ideas in the making, but there is little trace of the constructive genius which shaped his final system.

In the 20 years from 1770 to 1790, which form the second period in his career, Kant was occupied with the elaboration and exposition of his mature philosophy. He published virtually nothing between 1770 and 1781, but from 1781 onward he poured out an astonishing series of original works on a wide variety of philosophical topics, including the *Critique of Pure Reason* (*Kritik der reinen Vernunft,* 1781; 2nd rev. ed., 1787), *Prolegomena to Every Future Metaphysic* (*Prolegomena zu einer jeden künftigen Metaphysik,* 1783), *Groundwork of the Metaphysic of Morals* (*Grundlegung zur Metaphysik der Sitten,* 1785), *Metaphysical Foundations of Natural Science* (*Metaphysische Anfangsgründe der Naturwissenschaft,* 1786), *Critique of Practical Reason* (*Kritik der praktischen Vernunft,* 1788) and *Critique of Judgment* (*Kritik der Urtheilskraft,* 1790). These works brought him immediate fame in Germany and presently stirred interest in France and England, though it was long before their meaning was properly appreciated there (the first English translation of the *Critique of Pure Reason* dates from 1838).

With the publication of the third *Critique* Kant's main philosophical work was done; his third period, from 1790 to his death, was devoted partly to the elaboration of subjects not previously treated in detail, partly to replies to criticisms and to the exposure of misunderstandings. In his last years he was engaged on a work which might have amounted to a major restatement of his philosophical views, but which he did not live to complete. The chief published writings of this period are *Religion Within the Bounds of Mere Reason* (*Die Religion innerhalb der Grenzen der blossen Vernunft,* 1793), the essay on *Perpetual Peace* (*Zum ewigen Frieden,* 1795) and *Metaphysic of Morals* (*Die Metaphysik der Sitten,* 1797).

Kant's mature philosophy is often known as the critical philosophy. He himself contrasted "criticism" with the "dogmatism" that he imputed to previous philosophers; "dogmatism" being understood here as the presumption that the human intellect can arrive at important truths by pure thinking, without first undertaking a critical survey of its own resources and powers. Kant also described his position as one of transcendental, critical or formal idealism; his use of the first of these terms, with his statement that the *Critique of Pure Reason* laid the foundation for a complete "transcendental philosophy," explain why he was sometimes referred to by later writers as a "transcendentalist" (*see* TRANSCENDENTALISM).

Precritical Writings.—A modern commentator has described Kant's procedure as "taking the form of a continuous discussion with Leibniz." Whether or not this description is appropriate to the works of his maturity, it certainly fits his precritical writings. The prevailing philosophy in the German universities in the half century or so after Kant's birth was the philosophy of Leibniz as systematized and popularized by Christian Wolff (1679–1754) and by Alexander Gottlieb Baumgarten (1714–62). Leibniz' works as we have them now were not fully available to these writers (even the *Nouveaux essais sur l'entendement humain,* his commentary on Locke, did not appear until 1765), and the Leibniz they presented was extravagantly rationalistic, abstract and cut and dried. Yet he remained, even in this distorted version, a powerful figure, and the main efforts of independent thinkers in Germany at the time were devoted to examining his ideas. This applies to C. A. Crusius and to J. H. Lambert, the most gifted of Kant's philosophical contemporaries, as much as to Kant himself.

Kant's philosophical position in his early years is best characterized as that of a critical follower of Leibniz (in the general sense of the word critical). Accepting the main outlines of Leibniz' system, he nevertheless had many doubts about its details. His doubts, moreover, sprang largely from his admiration for Newton, to whose writings he is said to have been introduced by his Königsberg teacher Martin Knutzen. Newton was important for Kant at this period as much for the philosophical implications of his ideas as for their scientific content; for Kant as for Voltaire he represented English empiricism as against continental rationalism. But it would be quite wrong to think of Kant as taking only an amateur interest in scientific developments. The truth is, of course, that the dividing line between philosophy and physics or "natural philosophy" was by no means sharply defined at the time and was often crossed and recrossed by the same people. Many of Kant's first essays would be classified as scientific by modern standards, but he never kept his philosophy and his science in watertight compartments. The same, for that matter, had been true of Leibniz himself.

Something must here be said about the main philosophical problems with which Kant was concerned in his precritical writings. First, there was the problem of philosophical method. The Leibnizians held that philosophy should model itself on mathematics; ideally, it would consist of a chain of demonstrated truths whose first premisses were self-evident. In his *Inquiry Into the Distinctness of the Principles of Natural Theology and Morals* (*Untersuchung über die Deutlichkeit der Grundsätze der natürlichen Theologie und der Moral,* 1764) Kant trenchantly exposed the deficiencies of this view. Mathematics proceeds from definitions which are arbitrary and by operations which are clearly and sharply defined; it has, moreover, the advantage of being able to exhibit its concepts in concrete form. In contrast with this, philosophy deals with concepts which are already given, "though confusedly or insufficiently determined." Philosophers cannot begin with definitions, or they will remain shut up in the circle of words; at best they can arrive at them as an end product. Philosophy has to analyze and clarify where mathematics can proceed synthetically.

Secondly, there was the problem of causality, which arose for Kant in the first place as a problem about the status of Leibniz' "principle of sufficient reason." Wolff had attempted to deduce this principle from the logical principle of contradiction, thus carrying rationalism to extreme lengths. Kant, under the influence of Crusius, was already expressing doubts about this move in 1755; in a later essay, published in 1763, he pointed out clearly the differences between opposition as treated in logic and opposition as encountered in things. The relation of causality could not be reduced to the logical relation of ground and consequent. Closely connected with this second problem was a third, which concerned the question of existence. The ontological argument (*see* THEISM), which sought to prove God's existence by pure logic, was the exact counterpart of Wolff's identification of real with logical relations and had of course been accepted by Leibniz. In *The Only Possible Ground of Proof for a Demonstration of God's Existence* (*Der einzig mögliche Beweisgrund zu einer Demonstration des Daseins Gottes,* 1763) Kant exposed the fallacy of this argument by pointing out the difference between existential and attributive statements.

Finally, we may mention the problem of the nature of space, over which there had been a direct clash between Leibniz and Newton. Kant discussed this repeatedly in his precritical writings, deciding eventually that Leibniz' view that space is "an order of co-existences," and that spatial differences are hence capable of statement in conceptual terms, is untenable.

Some indication of a possible alternative of Kant's own to the Leibnizian standpoint can be gathered from two works written at the end of the period—the curious *Dreams of a Spirit-Seer* (*Träume eines Geistersehers,* 1766) and the inaugural *Dissertation* (*De mundi sensibilis atque intelligibilis forma et principiis,* 1770). The former is an examination, in the context of an inquiry into the spiritualist claims of Emanuel Swedenborg, of the whole notion of a world of spirits. Kant's general attitude to this notion seems at first to be entirely skeptical (the influence of Hume is more apparent here than in any previous work of his), but closer reading suggests that this impression is misleading. Kant is not so much arguing that the notion of a world of spirits is illusory as insisting that we have no insight into the nature of such a world—a conclusion which has devastating implications for metaphysics as Leibniz conceived it. Metaphysicians dream just as spiritualists dream, but that is not to say that their dreams are necessarily

empty: there are already hints that moral experience can give content to the idea of a *mundus intelligibilis* (intelligible world), Rousseau (whom Kant is known to have greatly admired) acting here as a counterinfluence to Hume.

The implicit dualism of the *Dreams* is made explicit in a bold, not to say incautious, manner in the *Dissertation* of 1770, the argument of which rests on a wholly un-Leibnizian interpretation of the distinction between sense and understanding. Sense is not, as Leibniz had supposed, a confused form of thinking but a source of knowledge in its own right, though the objects known through the senses are still described in Leibniz' term as "appearances." They are appearances because all our sensing is conditioned by the presence in our sensibilities of the forms of time and space, which are not objective characteristics or frameworks of things but "pure intuitions." But though all knowledge of things sensible is thus of phenomena, it does not follow that we know nothing of things as they are in themselves. Certainly we have no intuition of (direct insight into) an intelligible world, but the presence in us of certain "pure intellectual concepts" ("possibility, existence, necessity, substance, cause" are given as examples) enables us to attain some descriptive knowledge of it. By means of these concepts we can arrive at an "exemplar" which is "the common measure of all other things as far as real. This exemplar—*Perfectio Noumenon*—is perfection either in a theoretical or in a practical sense. In the former, it is the supreme being, God; in the latter, moral perfection" (*Dissertation,* sec. 9).

The pure intellectual concepts here mentioned, to which there was no counterpart in the *Dreams,* are of course the ancestors of the later categories. But to see the very different role which Kant was to assign them in his mature thinking we must turn to consider the *Critique of Pure Reason.*

The Critique of Pure Reason.—The simplest way of characterizing the contents of the *Critique of Pure Reason* is to say that it is a treatise about metaphysics; it seeks to show the impossibility of one sort of metaphysics and to lay firm foundations for another. The metaphysics which Kant criticized is that practised by Leibniz and Wolff, the complaint against whom is, briefly, that they assume that the human intelligence has powers which a careful examination shows to be nonexistent; they believe that it is possible for men to arrive by pure thought at truths about entities which in their nature can never be objects of experience, and for this belief there are no proper grounds. It is true that explanations can be offered to show why metaphysics as thus understood is what Kant calls "a natural disposition of human reason": for example, by pointing to the special interest which we all, as moral agents, have in establishing that the world of the scientist is not the only world, and by mentioning the encouragement that metaphysicians have derived from the success of mathematicians in using purely rational procedures. But to explain here is not to justify. Metaphysics regarded as the speculative study of things suprasensible, or as demonstrated doctrine about God, human freedom and immortality, is a sham; and its place must be taken by something more modest, though nonetheless important: an inventory of those rational principles which men necessarily employ within experience rather than outside it.

This question of metaphysics seems, on the face of it, highly academic, but Kant himself did not see it in that light. He thought it important to get rid of the metaphysics of his predecessors not merely because it involved wasted intellectual effort, but for more serious reasons. Metaphysical arguments might have little popular effect, but the endless disputes between metaphysicians on such subjects as the existence of God and the immortality of the soul were, even so, more than unedifying. They served indirectly to undermine the beliefs of the common man and so to encourage "materialism, fatalism, atheism, free-thinking, fanaticism and superstition."

Only a thorough investigation of the powers of reason, such as he proposed to undertake, could show the emptiness of these disputes and at the same time reveal the true basis on which popular belief rested. It is important in this connection to emphasize that, far from wanting to undermine belief in God or in the spiritual nature of man, Kant was anxious to strengthen it. But he thought the way to do so was not to offer one more set of supposed speculative proofs; it was to show the impossibility of any speculative proof or disproof in these fields.

Because of his insistence on the need for an empirical component in knowledge and his antipathy to speculative metaphysics, Kant has sometimes been presented as a positivist before his time. It was on these lines, for example, that the German neo-Kantians tended to interpret him. But it is not difficult to show that the interpretation is mistaken. Not only did Kant propose to put metaphysics "on the sure path of science," rather than to destroy it; he was prepared also to say (*Critique of Pure Reason,* 2nd ed., p. 856) that he "inevitably" believed in the existence of God and in a future life and was certain that nothing could shake those beliefs. But he added that this was not logical but moral certainty and rested on the "subjective" ground of moral sentiment. A man should say not "*It is* morally certain that there is a God," but only "*I am* morally certain . . ."; for except to a person who felt the force of moral scruples the statement could have no real significance.

Synthetic A Priori Truths.—In order to bring the problem of metaphysics more sharply into focus, Kant introduced the now celebrated distinction between synthetic and analytic judgments. An analytic judgment he defined as a statement whose predicate-concept was "contained in" its subject-concept, or again as a statement whose truth was guaranteed by the principle of contradiction. Analytic truths were in this way one and all necessary or a priori. Synthetic judgments, by contrast, were such that their truth or falsity could not be determined by purely logical considerations; reference to something further was needed to decide whether or not they were valid. In most cases this something further was simply fact, but in the case of a small but all-important group it was not. For there were certain judgments which were at once synthetic and a priori; it was into this class, indeed, that metaphysical judgments must be supposed to fall. Hence the importance of asking the question "How (*i.e.,* under what conditions) are synthetic a priori judgments possible?" Only by answering this could we hope to decide "what and how much understanding and reason can know apart from all experience."

The problem of synthetic a priori judgments arises, according to Kant, in three fields, namely mathematics, physics or science of nature, and metaphysics; and the three main divisions of the *Critique,* "Transcendental Aesthetic," "Transcendental Analytic" and "Transcendental Dialectic" (the latter two being grouped together under the heading "Transcendental Logic"), deal respectively with these. In each case Kant explains what he takes to be the facts by linking them up with necessary features of the human cognitive apparatus. He accounts for the synthetic a priori judgments of mathematics by arguing that mathematics has a necessary connection with space and time, which are a priori forms of human sensibility; for those of "pure physics" (as he calls it) by tracing them to our possession of categories or pure concepts of the understanding; and for those of metaphysics by connecting them with a further group of a priori concepts which he calls ideas of reason.

But the three cases are not precisely parallel, for while Kant is in no doubt that we have synthetic a priori knowledge in mathematics and physics, he holds that the reverse is true of metaphysics as hitherto conceived. His procedure in the "Dialectic" is accordingly to argue that ideas of reason are misused by metaphysicians and to show in detail how this misuse leads to error. He does, however, indicate at the end of this section a way in which even these concepts can be given a positive use, though it turns out to be very different from that to which previous philosophers had put them.

The "Transcendental Analytic."—It will not be possible in this short survey to consider the grounds on which Kant maintains that space and time are a priori intuitions conditioning whatever is apprehended through the senses rather than concepts arrived at by reflection on experience, or to discuss the philosophy of mathematics which he believes to be bound up with this view. Of the first we need remark only that it leads, in the *Critique* as in the *Dissertation,* directly to the conclusion that all the

objects of sense experience are "appearances" as opposed to things in themselves; of the second, that, whatever its initial attraction, it is presented altogether too impressionistically to satisfy a modern student of the subject. But the argument of the "Transcendental Analytic" cannot be dealt with in this summary fashion. This is, by universal agreement, the most crucial as well as the most difficult part of the *Critique;* in it Kant both deploys his main case against traditional metaphysics and expounds the alternative which he proposes to put in its place.

The central concept of this section is the concept of a category (a term which Kant took over from Aristotle), and its main argument can be stated in the following terms. To account for what knowledge we have and, in particular, to account for our scientific knowledge, we need to recognize the existence and operation of concepts of a special sort.

These concepts are not so much read out of experience as read into it and, for that reason, are described as pure or a priori as opposed to empirical. But they differ from empirical concepts in something more than their origin. Their whole role in knowledge is different, for whereas empirical concepts serve to correlate particular experiences and so to bring out in a detailed way how experience is ordered, categories have the function of prescribing the general form which this detailed order may be expected to take. As "concepts of an object in general," to use Kant's own description of them, they are of a different logical type from concepts of particular kinds or characteristics of objects. They belong, as it were, to the framework of empirical knowledge rather than to its substance, and without them the whole building would, in Kant's view, collapse.

It may help in this connection to notice that, while the Kantian categories are rather obviously descendants of the innate ideas of Descartes and Leibniz, the account that Kant gives of them is altogether more subtle than that put forward by any innate-idea theorist. The Cartesian innate ideas were nonempirical in a singularly crude way: they were supposed to be literally present in the mind at birth and to be a source of knowledge of material truths which would otherwise not be available to us. Kant himself in the *Dissertation,* while denying that his pure intellectual concepts were literally innate, had nevertheless assigned them a somewhat similar role: by means of them we were to attain some sort of knowledge of a nonsensible world. But, as his correspondence during the 1770s makes clear, he had soon asked himself how he could guarantee that such concepts have any objective reference and had concluded that the question could be answered satisfactorily only if they could be shown to play a part in empirical knowledge. The part that he found for them was that of supplying the framework of ultimate presuppositions inside which empirical questions were posed or, in his own terminology, of conferring "objectivity" on the data of the senses.

There is another respect in which Kant disagreed with his predecessors over this matter. Previous rationalists had been all too apt to assume that the mind has a power of intellectual intuition; *i.e.,* that it is a source of knowledge on its own account. But Kant was convinced that the human intellect is a discursive instrument, which can come into operation only when it is supplied with material on which to work. The functions of the intellect were, in his view, essentially formal; its prime business was to conceptualize the data of the senses. The subject of knowing itself—the "unity of apperception" which preceded experience as its necessary condition—had no content of its own. But this innovation set Kant a special problem about the categories, a problem which must be taken into account if we are to understand what would otherwise be a singularly obscure part of his work. Since there is no such thing as intellectual intuition for human beings, the core of the categories can be nothing but pure logic; the fundamental ideas which they represent cannot be other than purely logical ideas. But if this is so, we are left asking how they can be used to say anything specific—in Kant's own language, how they can be shown to have any real "sense and significance."

Kant sought to solve this problem by his doctrine of schematism. He argued that the categories are not empty because in the case of each one of them we can point to a "pure schema," a "transcendental time-determination" (to use his own mystifying phrase), which helps us to apply it. Thus to the pure category of ground and consequent there corresponds the schema succession of events in time according to a necessary rule, and the latter is, Kant believes, a sort of phenomenal counterpart of the former, which enables us to bring it down to earth and to make a concrete use of it. Except in conjunction with schemata, categories are abstract and indeterminate—a point which was not appreciated by writers like Leibniz when they tried to use them to determine the characteristics of "things in general."

Categories are indispensable for objective knowledge, but the sole knowledge that they can give is of objects of possible experience. The whole argument of the "Analytic," negative and positive, comes out in this statement. Negatively, the restriction of categories to experience involves the condemnation of many famous metaphysical arguments such as the argument to God's existence as a first cause; positively, the need for a priori concepts to underly the presuppositions of experience means that the place of the old transcendent metaphysics can be taken by a new metaphysics of experience. Whether metaphysicians can find much consolation in this substitute is another matter, but at any rate it is the sole substitute (apart from "pure practical belief") to which in Kant's view they are entitled.

Kant is not content to work out the argument here summarized in general terms. Professing to have not merely a list of categories but a complete list, he proceeds to offer proofs of the principles to which they severally give rise. The argument starts in each case from some feature of experience and attempts to discover its necessary condition. "The possibility of experience" is the "third thing" which, in the case of this group of synthetic a priori judgments, "mediates" subject and predicate and so can be appealed to to decide their validity.

Kant himself seems to have thought that such a "transcendental" argument, from a fact to its necessary condition, was an important discovery of his own; he distinguished it both from the "dogmatic" proofs of his predecessors (who in his view had argued "from concepts"; *i.e.,* by arbitrarily adopting certain notions and working out their implications) and from inductive arguments. Unlike the latter, transcendental arguments were alleged to lead to conclusions which were certain and incorrigible. Unfortunately Kant did not explain how they could achieve such a result; he did not make clear how we could know what was *the* necessary condition (or set of necessary conditions) of a fact. His failure to deal with this question is part of a wider failure to discuss the nature and conditions of philosophical assertions—a problem which clearly arises in his work but to which he nowhere gave sufficient attention.

Despite this general defect, there is much that still deserves careful study in Kant's treatment of his individual principles. For instance, the subsection entitled "Anticipations of Sense-Perception" (in ch. 2 of book ii) raises interestingly the question why we suppose that every quality must be present in a determinate and measurable degree. The "First Analogy," in the following subsection "Analogies of Experience," attempts to find an empirical use for the old metaphysical concept of substance, interpreted here as the permanent which must be thought of as underlying change. The "Second Analogy," which is often said to contain Kant's "answer" to Hume, offers a parallel treatment of the concept of cause in which the emphasis on the notions of precedence and succession in time is very much in Hume's spirit even if some other aspects of the argument are not.

In a provocative discussion of real possibility (in the subsection "Postulates of Empirical Thought") Kant tells us that concepts like precognition and telepathy, although they involve no formal contradiction, "cannot be based on experience and its known laws" and "without such confirmation are arbitrary combinations of thoughts which can make no claim to objective reality" (*op. cit.,* p. 270). It would be interesting to know why he felt so sure about this. The significant point is, however, not where Kant drew the line between what is and what is not really possible, but the fact that he had no doubts that such a line could be drawn. The bold and clear-cut—or, as critics would have it, extravagant and schematic—character of his philosophical thinking is nowhere

more evidently displayed.

Some later writers have argued that, in drawing up his detailed list of categories and principles, Kant was unduly dependent on Newton; it is a common complaint that he set out to find the presuppositions of experience and found only the presuppositions of Newtonian physics. The passage just mentioned might be cited in support of this view. The charge is certainly not without foundation, but it can all the same be pressed too far.

Kant was at least encouraged in his belief that certain principles were synthetic a priori by finding counterparts to them in the Newtonian scheme; but despite his description of the principles of the understanding as belonging to pure physics he clearly thought of them as something wider. The very fact that, after completing the *Critique of Pure Reason,* he went on to write a further work, *Metaphysical Foundations of Natural Science,* in which he tried to apply the results of the *Critique* to the sphere of physics proper, shows as much. What he attempted in the *Critique* was to find out what was involved in any objective knowledge of things in space and time. But the distinction between everyday and scientific knowledge of the world was perhaps not so clear to him as it should have been.

Theoretical and Practical Reason: the "Dialectic" and Ethics.—The "Transcendental Dialectic," which follows the "Analytic" in the *Critique of Pure Reason,* introduces a fresh type of a priori concept, that of an idea of reason, and the reader might expect to find in it an independent discussion of the problem of metaphysics. In fact, however, virtually all the main conclusions of this part of Kant's work could be anticipated, given the argument of the "Analytic." The "Dialectic" consists, in effect, of criticism of a number of detailed metaphysical positions in the light of Kant's discussion of the nature and significance of the categories. The only concept brought into play which was not present in the "Analytic" is the concept of the unconditioned, and this is, in truth, the one and only idea of theoretical reason in the technical sense of that term.

Reason, according to Kant, seeks for the unconditioned or absolute in three distinct spheres. First, in the sphere of psychology, it seeks for an absolute subject of knowledge. Second, in the sphere of cosmology, it seeks for an absolute beginning of things in time, for an absolute limit to them in space and for an absolute limit to their divisibility; it further seeks for an absolute beginning to the causal series. Finally, in the sphere of theology, it seeks for an absolute condition for all things. Relying mainly on the results of the "Analytic," but introducing a series of independent arguments in the chapter called "The Antinomy of Pure Reason," Kant has no difficulty in showing that the effort is in every case doomed to failure. The metaphysical "sciences" of rational psychology, rational cosmology and natural theology, familiar to Kant from the text of Baumgarten on which he had to comment in his lectures, thus turn out to be without foundation.

This, however, is not the end of the matter. Although it is impossible to make a constitutive use of ideas of reason, they can, Kant thinks, be employed regulatively to guide the operations of the understanding. The absolute regarded as a suprasensible object may be unattainable, but even on the theoretical plane the urge to reach it can be converted into something healthy, namely an impulse to push empirical inquiries to the greatest possible extent and to introduce the maximum amount of system into our knowledge. Further, the failure of reason to make good its claims in its theoretical capacity does not entail that those claims be entirely abandoned. Practical (moral) reason can take over where theoretical reason fails. This does not mean, as Kant carefully explains in the *Critique of Practical Reason* (*see* book ii of that work), that morality gives us insight into the suprasensible. From the cognitive point of view the ideas remain as empty as before; it is only in moral contexts (because we see that they are bound up with the fulfillment of certain injunctions which are morally incumbent on us) that they can be said to have significance, and even here it cannot be said that the ideas are made comprehensible in any very palpable sense. To bring them home to ourselves we have to interpret them in familiar terms, a process which involves the use of symbols and analogies; thus we can make sense of the idea of God by thinking of God's relation to the world on the analogy of a father's relation to his children. But it is idle to suppose that by this means we extend our knowledge in the strict sense. As Kant says in the *Prolegomena,* sec. 58, "by means of this analogy we are left with a concept of the highest being adequately determined *for us,* although we have left out everything that could determine it absolutely and *in itself.*" Fortunately, however, this is not only all that we can attain, but also all that we need. Insight into the true nature of things might well have destroyed the essential value of moral actions, for if we had it "God and eternity in their awful majesty would stand unceasingly before our eyes" and "most actions conforming to the (moral) law would be done from fear, few would be done from hope, none from duty" (*Critique of Practical Reason,* in the *Werke,* Berlin ed., vol. v, p. 148).

The *Critique of Practical Reason* is the standard source book to be consulted not merely for Kant's views on the subject just discussed but also for his ethical doctrines. The earlier *Groundwork of the Metaphysic of Morals* is a shorter and, despite its title, more readily comprehensible treatment of the same general topic; there are no differences of importance in the views expressed in the two works. Both differ from the *Metaphysic of Morals* in that they deal with "pure" ethics and try to elucidate basic principles, whereas the later work is concerned with applying what they establish in the concrete, a process which involves the consideration of particular virtues and vices and the foundations of law and politics.

There are many points of similarity between Kant's ethics and his theory of knowledge. Just as the distinction between sense and intelligence is fundamental for the argument of the *Critique of Pure Reason,* so is that between the inclinations and moral reason for his ethical writings. And just as the nature of the human cognitive situation is elucidated in the first *Critique* by reference to the hypothetical notion of an intuitive understanding, so is that of the human moral situation made clear in Kant's ethics by reference to the notion of a "holy will." For a will of this kind there would be no distinction between reason and inclination; a being possessed of a holy will would always act as it ought. It would not, however, have the concepts of duty and moral obligation, which are in point only where reason and desire find themselves opposed. In the case of human beings the opposition is continuous, for man is at once flesh and spirit; the influence of Kant's religious background is here at its clearest. Hence the moral life is a continuing struggle in which morality appears to the potential delinquent in the form of a law which demands to be obeyed for its own sake, a law, however, whose commands are not issued by some alien authority, but represent the voice of reason which the moral subject can recognize as his own.

The notions of duty, the moral law, the categorical imperative and the autonomy of the will are thus all bound up together and constitute the distinctive concepts of Kantian ethics. It is perhaps worth emphasizing that there are many systems of ethics in which these concepts have no such importance, or indeed are altogether absent. In the system of Aristotle, for example, the moral problem is conceived as one of training the inclinations, which are looked on as natural to human beings, in such a way that in the end the person concerned will engage by second nature in those activities which lead to true happiness. Both the optimism and what may be called the humanism of this view are quite foreign to Kant. Doing what we ought and pursuing happiness are for him two entirely different things, even though it is true that all men seek their own happiness. There is a world of difference between the commands or laws of morality, which demand to be obeyed for their own sake, and counsels of prudence, which, like rules of skill, are only "hypothetical imperatives" or in other words have authority only because they lead to a certain end and for persons who seek that end.

Kant is often described as an ethical rationalist, and the description is clearly not wholly inappropriate. Nevertheless it should be recognized that his rationalism here, as in theory of knowledge, is rationalism with a difference. He never espoused the full-

blooded rationalism favoured by some of his contemporaries as well as by some more recent philosophers, the sort of view which claims that reason has insight into a world of values or can intuit the rightness of this or that moral principle. Practical, like theoretical, reason was for him essentially formal rather than material. This is why Kant put such stress on his first formulation of the categorical imperative, "Act only on that maxim through which you can at the same time will that it should become a universal law." Lacking any insight into the moral realm, men can only ask themselves whether what they are proposing to do has the formal character of law: the character, namely, of being the same for all persons similarly circumstanced.

It is true that Kant proceeds in the *Groundwork* from this formulation to others which are on the face of things less formal; he introduces the notions of man as an end in himself and of a kingdom of ends in which the moral agent is at once subject and lawgiver to give body to his moral thinking. But, rightly or wrongly, he believed that these notions could be derived from that of the moral law and its formal characteristic, impartiality. He certainly never suggested that they were attained through rational intuition.

In his applied ethics Kant has been criticized as unduly rigorous; his views on capital punishment, in particular, are often cited as those of a reactionary. It is true that he was a stern moralist, keenly aware himself of the call of duty and never tired of reminding others of their moral responsibilities. But that he was such should be ascribed neither to moral priggery nor to inhumanity; it was rather that he saw an essential connection between moral freedom and human dignity and constantly wished to bring the connection home. As some of his occasional writings show, he was certainly not insensitive to the extent to which external factors beyond their control shape men's actions and inhibit their moral effort. But he thought all the same that, normally at any rate, men have the power to lift themselves out of their natural environment and adopt the moral point of view; and he believed that they were most truly themselves when they did so. This belief is the key both to his moral philosophy and to his general philosophical outlook.

The Critique of Judgment.—The *Critique of Judgment* is perhaps best regarded as a series of appendices to the other two *Critiques* and, especially, to the *Critique of Pure Reason*. It treats in detail a number of topics on which Kant had touched in passing in his earlier works and takes up others which naturally connect with what is there discussed. This description must not, however, be taken as indicating that the third *Critique* is of minor importance, for despite its scholastic exterior it is among the most original and instructive of all Kant's writings.

The work falls into two main parts, called respectively "Critique of Aesthetic Judgment" and "Critique of Teleological Judgment," and these are preceded by a long introduction. The first part discusses the concepts of the beautiful and of the sublime and the logical status to be assigned to judgments which employ these predicates. The second part treats of the concept of teleology as applied to objects in nature; it contains a careful analysis of the notion of a "purpose of nature" or organism and a discussion of the status of the teleological principle and its place in natural science and theology. The introduction not only attempts to relate these apparently unconnected topics by arguing that the concept of purposiveness is involved in each case, but also finds a further use for that concept in yet another field, that of the everyday search for scientific laws.

The purposiveness considered in the introduction is "logical purposiveness," by which is meant the characteristic that nature has which makes it such that we can have scientific knowledge of it. Kant professed to have proved in the first *Critique* that whatever falls within experience will stand under the categories. But the order imposed by use of the categories is entirely general; if scientific knowledge is to be possible we need something more specific. We need for science not merely concepts but an interconnected system of concepts, and it is not obvious that nature will accommodate us by providing material which can be fitted into such a system.

In the first *Critique*, as we saw, Kant connected the demand for system with the faculty of reason and carefully underlined that the "maxims" to which this faculty gives rise do not have the constitutive status of principles of the understanding. In the *Critique of Judgment* he develops what is essentially the same view, but now speaks of "reflective judgment" where he had previously spoken of reason. Reflective judgment, he says, proceeds in its search for particular laws on a principle which it cannot strictly prove, but which is all the same indispensable to it: the principle that it will be able to make sense of its experience in detail. The bearing of this doctrine on what later philosophers have called the problem of induction should be obvious.

In the "Critique of Aesthetic Judgment" Kant moves on to consider "aesthetic purposiveness." He begins from the paradox that judgments which ascribe beauty at once, unlike mere judgments of taste, lay claim to general validity and yet cannot be said to be cognitive. When we say that something is beautiful we are not predicating an objective characteristic of it (as is shown by the fact that we regard it as a question of feeling rather than of argument), and yet we expect other people to agree with our judgment. The explanation of the paradox, according to Kant, is as follows. When we contemplate an object and find it beautiful there is a certain harmony between our imagination and our understanding, and of this we are aware in the form of the immediate delight that we take in the object. Imagination grasps the object and finds it orderly and yet is not restricted to any definite concept; in such a case it is as if we were always on the point of expressing the order in conceptual terms and never have to do so. We impute the delight that we feel to others because it springs from the free play of our cognitive faculties, which may be supposed to be the same in all men.

Kant's remarks on the sublime are of more specialized interest, and we may pass on at once to the last main topic of the *Critique*, the concept of teleology in nature. Kant's powers of subtle and incisive analysis are perhaps nowhere seen to better advantage than in his treatment of this concept. He explains at the outset how the problem is set, not by the fact that some things serve the purposes of others, but by the existence of things whose parts are reciprocally means and ends to each other, namely organic bodies. In dealing with these bodies we cannot be content with merely mechanical principles, for it is too much of a coincidence to suppose that they might have been produced by the ordinary play of mechanical forces. Yet if we abandon mechanism and take the term *Naturzweck* (purpose or end of nature) literally, we seem to be implying that the things to which it applies must be the work of some supernatural designer and so to be passing from the sensible to the suprasensible in a way which was expressly forbidden in the *Critique of Pure Reason*.

Kant's solution of the difficulty is again to have recourse to reflective judgment. We cannot avoid using teleological language if we are to take proper account of natural phenomena, but we must not press it. Organisms must be thought of *as if* they were the product of design, but that is by no means the same as saying that they *are* deliberately produced. For that matter, even the more moderate way of speaking is not entirely satisfactory, for, after all, living things are only something like products of art; they do not literally answer that description. Kant even suggests, in a passage of remarkable insight, that mechanism and teleology stand in this respect on the same footing: both belong to reflective judgment and have regulative rather than constitutive force. But elsewhere he makes his preference for the mechanical model clear enough. We feel satisfied with the thought of nature as a machine, because we know what machines are, have insight into their workings and can produce them ourselves. To produce living things in the same sort of way (*i.e.*, artificially) is, by contrast, "infinitely" beyond our powers. Hence teleology forms no "proper part of theoretical natural science," but "is relegated to theology by way of a propaedeutic or transition" (*Critique of Judgment*, sec. 68).

Other Philosophical Writings.—Kant's philosophical output from 1781 onward was not only enormous in bulk, but also extraordinary in its range, and the above account is necessarily confined only to his best-known works. To fill it out adequately we should

need to go into his detailed contributions to philosophy of science (in the *Metaphysical Foundations* of 1786), to philosophy of history (especially in his essay *Idea for a Universal History,* that is, *Idee zu einer allgemeinen Geschichte in weltbürgerlicher Absicht,* written in 1784), to philosophy of religion (in *Religion Within the Bounds of Mere Reason*) and to the philosophies of law and politics in the late *Metaphysic of Morals.* In all these fields Kant's views had decisive importance for later developments of the subject. Indeed, the very names "philosophy of science," "philosophy of religion," etc., derive from his critical approach.

Neither these works nor the contents of Kant's lectures, published toward the end of his life, on anthropology (philosophical psychology), logic, physical geography and pedagogics can be treated here, but a word must be said of the *Opus Postumum,* the treatise whose preparation occupied Kant's last years and the fragments of which fill the two final volumes of the great Berlin edition.

It should be said at once that this is not so much an unfinished work as a series of notes for a work which was never written, the interpretation of which is naturally somewhat conjectural. Kant seems to have begun by asking himself whether the argument of the *Metaphysical Foundations,* in which, starting from the categories and a single empirical concept, he had claimed to deduce the basic laws of physical science, could not be taken a stage further. He now thought it possible to construct a priori not merely the general outline of a science of nature, but a good many of its details as well; and, making extensive use of the concept of the ether, he tried to elaborate the construction in detail. Constructivism of this sort was, as the early works of Fichte and Schelling witness, very much in the air at the time; and in carrying out this "transition" from "metaphysics" to physics Kant may only have been wanting to show that there was nothing in the new fashion which was not already implicit in his own work. But there is some evidence that he was attempting something more ambitious, namely a reconstruction of his whole theory of knowledge on lines which would make the "transition" plausible. H. J. de Vleeschauwer has gone so far as to say that the *Opus Postumum,* if completed, would have amounted to a third edition of the *Critique of Pure Reason,* an edition in which the cautious empiricism of the original statement of Kant's views would have been modified on the lines of, though somewhat differently from, those followed by Schelling in his *System of Transcendental Idealism* (1800). Whatever the truth on this point, however, Kant never got as far as writing out his ideas in continuous form, and we must judge him not by these fragments but by the magnificent series of works that he put out when his powers were at their height.

See also references under "Kant, Immanuel" in the Index.

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KANURI, an African society numbering about 1,250,000 in the 1960s, including the Manga, Mobber, Kwoyam and Budawai peoples. They represent the dominant element of the population of Bornu province in northeastern Nigeria, and are also found in large numbers in Niger in the areas bordering on Bornu and along the western shore of Lake Chad. A tall Negro people, they characteristically scar their faces in distinctive tribal patterns. Kanuri language has been classified as belonging to the independent Central Saharan family. The Kanuri developed a powerful state at the Sudanese terminus of the important trans-Saharan trade route running through the Bilma (*q.v.*) oasis to Libya. This empire, known as Bornu, reached its zenith in the 16th century (*see* BORNU; KANEM). The Kanuri have been Muslims since the 11th century and practise the Malikite code of Islamic law.

Kanuri economy is based on millet agriculture; in recent times, however, peanuts have become an important additional cash crop. The Kanuri live in settled villages and towns, and farm the sandy soil of the surrounding countryside. Maiduguri, the capital of Bornu province, is a city of 83,000; other large towns include Nguru, the railhead, and Geidam, on the Yobe river. The Kanuri are a commercial people with well-developed internal trade; they trade with Fulani and Shuwa Arab herders for dairy products. Cow hides and goat skins are exported in quantity from Bornu province. Other Kanuri are engaged in a wide variety of crafts.

Kanuri society is stratified into several distinct classes. The family of the *shehu,* political and religious head of all Kanuri, represent a royal lineage. There is, in addition, an aristocracy, formerly similar to European feudal nobility. Much pageantry was and still is connected with the court. Most Kanuri form a class of commoners. Prior to the coming of the British, there was also a class of slaves who could, however, rise to prominence in court. Kin groups are not important; the household of a rich, powerful and noble individual becomes the central focus for many people. The Kanuri are polygamous, and may marry as many as four wives; each wife must have her own house. Extended families are rare, and the typical household unit is the nuclear family

or the polygamous family living within a compound. Houses are of sun-dried mud bricks and may be square and flat-roofed or round with thatched roofs.

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KANYA KUMARI, a district in the extreme south of Madras, India. Pop. (1961) 996,915; area 643 sq.mi. It comprises the predominantly Tamil-speaking areas formerly in Kerala, which were transferred to Madras in 1956 and reconstituted as the Kanya Kumari district with its headquarters at Nagercoil (*q.v.*). It is an important Christian centre, closely linked with British missionary effort, and contains the Scott Christian college and the Salvation Army hospital. The temple of Kanya Kumari lies on the Cape Comorin headland (*see* COMORIN, CAPE), and the beach sands there contain rich deposits of ilmenite and monazite. (G. KN.)

KAO-HSIUNG (Japanese TAKAO), the second largest city and leading port (pop. [1964 est.] 577,000) and one of two heavy industrial centres of Formosa, is on the southwest coast of the island in an area of relatively low precipitation and irrigated agriculture.

Settled originally by Chinese from Kwangtung and Fukien, Kao-hsiung was developed by the Japanese (1895–1945) as a manufacturing centre and port. Its development was accelerated by Japan's expansion toward southeast Asia and its position as chief outlet for Formosa's exports. After World War II Kao-hsiung came to handle more than half of the island's imports and nearly three-fourths of its exports, chiefly salt, sugar, cement and canned pineapples.

Kao-hsiung's industries are concentrated in two areas, one near the port, the second in the northern periphery. They produce textiles, aluminum, machine tools, ceramics, chemicals, lumber, printed matter, cement, petroleum products, fertilizers and foodstuffs. Kao-hsiung also is a fishing centre, handling about 10% of the Formosa marine production. (N. S. G.)

KAOLACK, a town in the Republic of Senegal, west Africa, the headquarters of a *cercle* (district), lies on the right bank of the Saloum river, 95 mi. E.S.E. of Dakar. Pop. (1958) about 45,222 (commune). Kaolack is a river port with an important export trade in peanuts and is linked by rail with Guinguinéo (13 mi. N.E.) on the metre-gauge Dakar-Niger railway. The administrative quarter lies between the station and the river, with an African market place and European trading stations. The African houses, mostly low and square and built of banco (clay) or wood with thatched roofs, extend along the river bank. The town has no industries but salt pans nearby yield 20,000–30,000 tons annually. Kaolack is the centre of the important Tijania Muslim brotherhood, whose great mosque of Al Hadj Ibrahima Niasse is just outside the town. (J. D.)

KAOLIN (CHINA CLAY) is an essential ingredient in the manufacture of whiteware (china) and porcelain and is widely used in the making of paper, rubber, paint and many other products. The word kaolin is derived from the Chinese Kau-ling ("high ridge"), a hill east of Fou-liang (Kingtechen), where the earliest samples of clay sent to Europe were obtained by a French Jesuit missionary, François Xavier d'Entrecolles (1662–1741). The samples represented materials used by the Chinese in the manufacture of porcelain. Some of the earliest discoveries of china clay or kaolin in Europe were at Aue, near Schneeberg in Saxony, and at St. Yrieix, near Limoges in France. In England it was discovered in Cornwall about 1750 by William Cookworthy of Plymouth, and the area near St. Austell has continued to supply much of the world's kaolin. Since then in Europe important deposits of kaolin have been developed in Bohemia, in the Zettlitz area, and in Brittany in France. In the United States many states contain kaolin, but the best-known deposits are in the Carolinas, Georgia, Florida, Tennessee and Kentucky. Good-quality kaolin has also been found in many other parts of the world; *e.g.*, Brazil, Italy, Australia and South Africa.

Physically kaolin is a white, soft powder consisting of crystals and groups of crystals which range in diameter from about 0.2 to 50 μ (one micron = one-thousandth of a millimetre). These crystals are mostly small particles of the mineral kaolinite (*q.v.*) which may be observed in the electron microscope as masses resembling small books, hexagonal in shape. Each leaf of every book is composed of a succession of parallel layers of oxygens, silicons, oxygens and hydroxyls, aluminums and hydroxyls arranged in a definite structural pattern. The chemical formula of kaolinite is $Al_2O_3.2SiO_2.2H_2O$. It has a theoretical composition of 46.3% silica; 39.8% alumina; 13.9% water. Some few kaolins also contain particles of the mineral halloysite (*see* CLAY AND CLAY MINERALS), which has the same proportions of aluminum and silicon as kaolinite, but frequently somewhat more water. Also halloysite has a slightly different atomic structure which causes the mineral to occur in tubular particles.

Kaolin as found naturally usually contains varying amounts of small particles of other minerals such as muscovite, quartz, feldspar and anatase (TiO_2). In addition crude kaolin is frequently stained yellowish by iron hydroxide pigments. Often it is necessary to bleach the clay chemically to remove the iron pigment and to wash it with water to remove the quartz, mica, feldspar and anatase in order to prepare the kaolin for satisfactory commercial use.

When kaolin is mixed with water in the range of 20% to 35% it becomes plastic, *i.e.*, it can be molded under pressure, and the shape is retained after the pressure is removed. With larger percentages of water, the kaolin forms a slurry or watery suspension. The amount of water required for plasticity varies with the size of the kaolinite particles and also with certain chemicals which may be present in the kaolin or added to control plasticity. The viscosity and other properties of kaolin suspensions also vary with the size of the kaolinite particles and with the presence of certain chemicals. With some sodium polyphosphate dispersing agents, fluid slurries containing at least 70% kaolin can be prepared.

Uses.—Approximately one-half of the kaolin produced in the world is used in the filling and coating of paper. In filling, the kaolin is mixed with the cellulose fibre and forms an integral part of the paper sheet to give it body, colour, opacity and printability. In coating, the kaolin with an adhesive (starch, casein, rubber) is plated on the surface from a slurry to give gloss, colour, high opacity and greater printability. Kaolins for paper must be grit free and yield the above properties. By wet classification, some kaolins for coating are prepared so that most of the kaolinite particles are less than two microns in diameter.

Kaolins are used extensively in the ceramic industry where their high fusion temperature and white burning characteristics make them particularly suitable for the manufacture of whiteware (china), porcelain and refractories. The absence of any iron, alkalies or alkaline earths in the structure of kaolinite confers upon it these desirable ceramic properties.

In the manufacture of whiteware the china clay or kaolin is usually mixed with approximately equal amounts of fine quartz (silica) and feldspar, and a somewhat smaller amount of a plastic light burning clay known as ball clay. These components are necessary to get proper properties of plasticity, shrinkage, vitrification, etc., for forming and firing the ware. Other constituents may be added, for example, small amounts of phosphates in bone china to attain high translucency in the fired product. Kaolin is generally used alone in the manufacture of refractories.

Substantial tonnages of kaolin are used for filling rubber to improve its mechanical strength and resistance to abrasion. For this purpose, it must be extremely pure kaolinite and exceedingly fine grained (mostly particles of less than one micron). Kaolin is also used as an extender and flattening agent in paints. It is frequently used in adhesives for paper to control the penetration into the paper. Kaolin is an important ingredient in ink, organic plastics, some cosmetics and many other products where its very fine particle size, whiteness, chemical inertness and absorption properties give it particular value.

It has been shown that the surface of the kaolinite particles may be reacted with various organic compounds. This property makes kaolin particularly valuable as filler in many organic com-

pounds, and further permits kaolinite particles to be coated with various organic molecules so that the particles become an integral part of the organic material.

Also, cracking catalysts which have outstanding heat stability have been made from kaolin for the production of gasoline.

Modes of Occurrence.—There are two modes of occurrence of kaolin. The so-called primary type of which the Cornwall, Eng., deposit is an example is formed in place by the alteration, primarily of the feldspar minerals, of a granitic igneous rock. The alteration may be due to the action of water from the surface seeping downward through the granite, or more often by the action of hot water rising from great depths in the earth's crust and penetrating the granite. The reaction is essentially that the potassium, sodium and/or calcium are leached from the feldspars, and the mass is hydrated and recrystallized into the sheet structure of kaolinite or the tubular structure of halloysite, depending on the composition of the granite and the conditions of alteration. Kaolins in France, Germany, North Carolina and elsewhere have had this mode of origin.

The second mode of occurrence of kaolin is in sedimentary beds which may be 20 ft. or more in thickness and have areal dimensions of many thousands of square yards. In such deposits, kaolinite from a primary source has been transported by streams and then deposited in lakes or lagoons. Sedimentary kaolins often contain particles of quartz and mica, pigmentary iron hydroxyls and organic material mixed with the kaolinite. In some deposits the amount of nonkaolinite is so small that it is difficult to postulate the sedimentary conditions which could have permitted the formation of such high-purity kaolinite. For many ceramic uses, no purification of sedimentary kaolins is required, but for use in paper and other purposes, the clay must be washed and bleached chemically to purify it. The kaolin deposits in Georgia, South Carolina and Florida are examples of sedimentary kaolins. Other examples are to be found in France, South Africa and elsewhere.

Ball clays are sedimentary kaolins with unusually high plastic and colloidal properties. These properties are imparted to the clay because the kaolinite particles are relatively poorly crystalline and because of the presence of considerable organic material and/or small amounts of other clay minerals such as illite and montmorillonite. Ball clays are extensively produced in England, Germany and in the United States in Kentucky, Tennessee and Mississippi. *See* CHINAWARE; POTTERY AND PORCELAIN.

See also references under "Kaolin" in the Index.

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(R. E. GM.)

KAOLINITE, a hydrated aluminum silicate having the formula $Al_2O_3.2SiO_2.2H_2O$. This mineral was so named by S. W. Johnson and T. M. Blake in 1867 from kaolin, or china clay, of which it is the principal ingredient. It occurs in scales which are crystalline but too minute for identification under the microscope. The silvery-white powder, found at Almwich in Anglesea, is described by A. Dick as consisting of minute hexagonal plates, with perfect basal cleavage, which belong to the monoclinic system.

Kaolinite is a decomposition product of many aluminum silicates (*e.g.,* albite, orthoclase, leucite, scapolite, beryl and topaz); but all large deposits of china clay are due to the decomposition of orthoclase feldspar in granite. Ball clay or potters' clay and common clay are also mixtures of kaolinite, or lithomarge and halloysite, which are compact or colloidal varieties of the same mineral, with other decomposition products and minerals which resist weathering such as quartz, muscovite and other silicates. *See* CLAY AND CLAY MINERALS; KAOLIN. (F. H. HA.)

KAO-TSU (HAN KAO-TSU) (256–195 B.C.), the posthumous title conferred on LIU PANG, founder of the Han dynasty (206 B.C.–A.D. 221). Under this dynasty the Chinese empire assumed most of the characteristics that it was to retain until it was overthrown in 1911.

Liu Pang began his career as a police officer under the Ch'in dynasty (221–207 B.C.), but turned rebel after the death of the emperor Shih Huang Ti, who had been the first to unify China. Liu attracted a band of followers which rapidly grew to the size of an army; thus he was able, by 206 B.C., to occupy Sian, the capital of the Ch'in, and to dethrone the last Ch'in emperor. But he could not yet claim the throne for himself because a rival claimant, Hsiang Yü, commanded forces superior to his own. The two rebel chieftains concluded an uneasy compromise before plunging into all-out war. Initially the weaker, Liu gradually prevailed over his rival by cleverer strategy and subtler diplomacy. The civil war ended when Hsiang Yü took his own life in 202 B.C.; Liu Pang then became ruler of China.

As emperor, Liu dealt harshly with military satraps who tried to carve out their own kingdoms or to replace him on the throne; otherwise he ruled more humanely and with deeper concern for the popular welfare than his predecessors. In domestic policy he showed particular concern for reviving the rural economy and for lightening the tax burden of the peasants. In his conduct of foreign affairs, Liu benefited, as he had during his rise to power, from his talent for combining diplomacy with use of force. Thus, when the Hsiung-nu, a powerful nomad tribe in the northwest, proved more than a match for his armies, he succeeded in stopping their inroads by clever bargaining. The chief merits of his reign lay in reuniting and consolidating the empire; it fell to his great-grandson, Wu Ti (*q.v.*) to expand its frontiers. (T.-A. H.)

KAPITZA, PETER (PETR LEONIDOVICH KAPITSA) (1894–), Soviet physicist, noted for his research in magnetism and low-temperature physics, was born in Kronstadt, Russia, on June 26, 1894. His father and grandfather were military officers. He attended Petrograd Polytechnical institute, where he remained as a lecturer until he went to England in 1921 to study at Cambridge. He worked there with Sir Ernest Rutherford and became assistant director of magnetic research at Cavendish laboratory in 1924. In the following year he was made a fellow of Trinity college; in 1929 he was elected to the Royal society, the first foreigner in 200 years to become a member; and in 1930 he was named Messel research professor by that society, which had the Mond laboratory built especially for him in 1933.

In 1934 Kapitza went to the U.S.S.R. for a professional meeting, as he had done before, but did not return. In 1935 the Mond laboratory was sold to the Soviet government at cost and transported to the Institute for Physical Problems of the Academy of Sciences in Moscow, of which Kapitza became director.

At Cambridge Kapitza's contributions included the development of means of producing extreme magnetic fields and of a technique for liquefying helium by adiabatic expansion which eliminated the presence of liquid hydrogen characteristic of previous methods. Later he invented a turbine for producing large quantities of liquid air cheaply, and his work in the production of liquid oxygen and its application to industry was of great importance, particularly to Soviet steel production. Universities on four continents awarded him honorary degrees, and he received various prizes from the Soviet government including the Lemonosov gold medal in 1960, and awards from western professional societies.

Kapitza's research in atomic structure caused much speculation among western scientists on his contribution to the Soviet atomic and hydrogen bombs, but reliable information was not available. He headed the Soviet Interplanetary committee, formed about 1955, and was given a large proportion of the credit for putting the first two Soviet earth satellites into space in 1957.

KAPLAN, MORDECAI MENAHEM (1881–), U.S. religious leader, founder of the Reconstructionist movement in Judaism, was born in Swenziany, Lithuania, on June 11, 1881, the son of a rabbi. He went to the U.S. at the age of 8, was graduated from the City College of New York in 1900, from Columbia graduate school in 1902 and was ordained the same year at the Jewish Theological Seminary of America. In 1909 he became principal of the teachers institute there, a position he held until he was made dean in 1931. He also taught homiletics and philosophies of religion.

In 1916 he organized the Jewish centre in New York, the first synagogue centre in the U.S. In 1922 he organized the Society for the Advancement of Judaism. The Reconstructionist movement

dates from the publication of Kaplan's book *Judaism as a Civilization* (1934). The next year the *Reconstructionist*, a biweekly periodical under Kaplan's editorship, appeared. Reconstructionism is a school of thought which interprets Judaism as a civilization with the Jewish religion as its core. It emphasizes the necessity of a Jewish community, organized across lines of difference, which will encourage participation in Jewish life.

Kaplan also wrote *Future of the American Jew* (1948) and *Judaism in Transition* (1936) and was co-editor of *The New Haggadah for the Pesah Seder* (1941) and *Sabbath Prayer Book* (1945). The latter, in which Kaplan denied that the Jews are a chosen people and that the Torah is divinely inspired, caused a controversy in which the Union of Orthodox Rabbis issued a proclamation of excommunication, their first, against him. In 1957 he was honoured on his 75th birthday by a banquet which more than 1,000 Jewish leaders attended, and was presented with $250,000 for the endowment of Jewish Reconstructionist foundation.

KAPODISTRIAS, IOANNIS ANTONIOS, COUNT (GIOVANNI ANTONIO CAPO D'ISTRIA) (1776–1831), Corfiote statesman, prominent first in the Russian service and later in Greece during the war of independence, son of Count Antonio Capo d'Istria, was born in Corfu (then still under Venetian rule) on Feb. 11, 1776, and studied at Padua. In 1803 he became secretary of state in the "septinsular republic" of the Ionian Islands, then in effect under Russian protection after a short-lived French occupation (1797–99). On the return of the French to the islands after the peace of Tilsit, he saw in Russia the best hope for the Orthodox Christian subjects of Turkey and, in 1809, accepted a career in the Russian foreign service. After three years his grasp of Balkan affairs earned him a post with the Russian commander on the lower Danube; but that army soon had to march north to meet Napoleon's invasion of Russia. Attached diplomatically to the army staff during the campaign of 1813, he was chosen personally by the tsar Alexander I for a difficult mission in Switzerland, where he was praised for his successful mediation (1814). He did not oppose the treaty placing the Ionian Islands under the sole protection of Great Britain (which had already seized them from the French), but he later much resented the British high commissioner's treatment of the islands virtually as a colony.

Between 1815 and 1821 his influence with the tsar was great, and from Jan. 1816 he was second secretary of state, sharing the conduct of foreign affairs with K. R. Nesselrode. He opposed any undue humiliation of France and expressed doubts about the tsar's Holy alliance and about Austrian policy in Italy; he was less sympathetic toward Germany, but he drafted the tsar's protest against the Carlsbad decrees. From about this time, the tsar's confidence in him was gradually undermined by Metternich, notably during the congress of Laibach when the Greek revolt (March 1821; *see* GREEK INDEPENDENCE, WAR OF) created an intolerable dilemma for a man of Greek sentiments in Russian service. Finding the tsar unwilling fully to exploit a revolutionary situation which he and his minister had not planned but had partly foreseen and could not try to extinguish, Capo d'Istria withdrew in 1822 and for five years devoted himself, from his retreat at Geneva, to the material and moral relief of the Greeks, who began to see in him a potential leader. When the British statesman George Canning tried to restrain the new tsar, Nicholas I, by means of an alliance (1826–27), Kapodistrias (as he was now called) saw his opportunity and, in April 1827, was elected governor of Greece for seven years, with unwonted concord and with the support of the leading British philhellenes, Sir Richard Church and Thomas Cochrane, who were to command the Greek forces by land and sea. He was allowed to resign from the Russian service, toured Europe in search of financial and diplomatic support and landed at Nauplia in Jan. 1828.

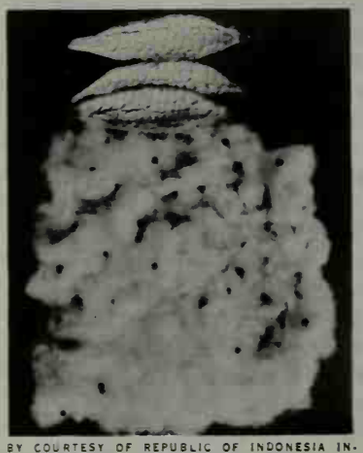
He foresaw the difficulties—a penniless government, a land still not rid of an Egyptian army and a people divided between a peasantry attached to the church and to different fighting chieftains and a limited class of more articulate men, some of whom were touched by western political ideas. Nor was it easy to satisfy the three protecting powers, Russia, France and Great Britain, each jealous of the others. His austere devotion to duty and his tenacity in making head against financial and diplomatic obstacles, won him widespread support; but his unconcealed distrust of personal and sectional rivalries among the leaders, and his promotion of Phanariote and Corfiote newcomers (including his own brothers) produced an active opposition centring in the islands and fostered by the British and French residents, who represented him as the tool of a despotic tsar. Finally, two members of the powerful Mainote clan of Mavromikhalis, resenting his treatment of the family, assassinated him on Oct. 9, 1831, as he was entering the church at Nauplia.

Kapodistrias' death was no victory for liberty; contemporary critics dwelt on his real and supposed defects but later historians stressed rather his devoted practical services to Greece in face of appalling handicaps.

BIBLIOGRAPHY.—Published extracts, in French, from the Kapodistrias papers in the Corfu senate's archives include some of his correspondence for the years 1827–31, 4 vol. (1839); his correspondence with the Swiss banker J. G. Eynard, 1826–31 (1929); and his "Aperçu de ma carrière politique depuis 1798 jusqu'à 1822" in the *Sbornik* of the Russian Historical Society, iii (1868; Greek ed., 1940). The scanty information about the earlier years was assembled by S. T. Lascaris, *Capodistrias avant la révolution grecque* (1918); *see* also C. W. Crawley, "Capodistrias and the Greeks Before 1821," *Cambridge Historical Journal*, xiii, 2 (1957). K. W. P. Mendelssohn-Bartholdy, *Graf Johann Kapodistrias* (1864), still the only real biography, is somewhat censorious.

(C. W. CR.)

KAPOK is the name for the moisture-resistant fibres derived from the seeds of the silk-cotton or kapok tree (*Ceiba pentandra*), or the tree itself. Actually many species of the family (Bombacaceae) yield good seed fibres, some of which doubtless enter commerce as kapok. The tree is wild in the tropical American forests; it has also been widely introduced throughout the world, and many strains or varieties selected. Kapok is reported especially abundant in second-growth African forest, and is much planted in the far eastern tropics. Normally about 90% of commercial production, several thousand tons annually, comes from the orient, especially Indonesia, about 3,000 tons of which is consumed in the United States.



BY COURTESY OF REPUBLIC OF INDONESIA INFORMATION OFFICE

FIBROUS FLOSS AND SEED CAPSULES OF THE KAPOK TREE (CEIBA PENTANDRA)

The kapok tree is large, with spreading crown, elephantine trunk and broad palm-shaped leaves. Mature trees bear hundreds of football-shaped pods, up to six inches long, filled with fibrous seeds. Fallen fruits are gathered, or they are cut down with knives affixed to long poles. The fruits are dried, then the cottony fibre extracted by hand.

The hollow fibres are similar to such seed fibres as cotton and milkweed. They are outstanding for resiliency and buoyancy but are too brittle to be spun. Very impervious to water, they achieved most renown as life-preserver filling, remaining afloat for hours without appreciable absorption of water. Other uses are for insulation, especially in the less expensive sleeping bags, and as a stuffing material. The seed, after fibre divestment, can provide an oil similar to cottonseed oil, edible or used to make soap.

E. AUBERT DE LA RUE

BRANCH OF KAPOK TREE BEARING SEED PODS, MARQUESAS ISLAND

With development of foam rubber, plastics and man-made fibres, kapok became less important, but still continued to fill specialty uses. (R. W. SY.)

KAPOSVÁR, the chief town of Somogy *megye* (county) in Trans-Danubian Hungary, lies on the north bank of the Kapos river and in its upper valley. Pop. (1960) 43,428 (mun.). The Kapos joins the Sió river, a west-bank tributary of the Danube, some distance to the northeast. Somogy county has a low population density for Trans-Danubia (158 per square mile) and Kaposvár itself has something of the sparse loneliness of the steppes. There are the ruins of a castle taken three times by the Turks in the 16th and 17th centuries. Kaposvár, approximately 145 km. (90 mi.) S.E. of Budapest, is on the main railway line which runs between Budapest, Zagreb in Croatia and the Adriatic port of Rijeka (Fiume). The road from Dombóvár to Nagykanizsa passes through the city. Being far from other substantial towns, Kaposvár has a wide range of small-scale manufacture and trade. It is a market for the farming products and livestock—maize, rye, oats, sheep and pigs—of Somogy county. Industries include the manufacture of bricks, agricultural machinery, soap and linen; there are important sugar factories. (H. G. S.)

KAPP, WOLFGANG (1858–1922), German politician notorious as the leader of the abortive Kapp *Putsch* in 1920, was born in New York on July 24, 1858. He was the son of Friedrich Kapp (1824–84), who had emigrated to the United States in 1849 and there began his series of histories of the Germans in America. Brought back to Germany by his father in 1870, Wolfgang Kapp graduated as doctor of law. He began managing a manorial estate in East Prussia in 1890 and became councilor at the Prussian ministry of agriculture in Berlin in 1900. He was appointed director-general of the East Prussian agricultural credit banks at Königsberg in 1906.

During World War I, Kapp took an extreme conservative point of view and opposed the policy of the chancellor Bethmann Hollweg. In 1917 he and Adm. Alfred von Tirpitz founded the German Patriotic party (*Deutsche Vaterlandspartei*), which had a strong pan-German bias. Elected to the *Reichstag* in 1918, he worked for the restoration of the monarchy after the November revolution. Supported by groups of the army, by the *Freikorps* and by the East Prussian nationalists, he organized the *coup d'état* of March 13–17, 1920, named after him the Kapp *Putsch* (*see* GERMANY: *History*). Its aim was to overthrow the republican government and the democratic constitution. This "revolt of the disinherited of 1918" was under the benevolent protection of Erich Ludendorff, but the military elements started it prematurely, against Kapp's wishes. When it failed, Kapp and other conspirators fled to Sweden; but after some of his collaborators had been tried and found guilty (notably Traugott von Jagow, his "minister of the interior"), he came back to stand trial. He died in prison at Leipzig on June 12, 1922.

See A. Luckau, "Kapp-Putsch—Success or Failure?" *Journal of Central European Affairs,* vol. 7 (1948); J. W. Wheeler-Bennett, *The Nemesis of Power: the German Army in Politics, 1918–1945* (1953). (R. Mo.)

KAPTEYN, JACOBUS CORNELIUS (1851–1922), Dutch astronomer, who was noted for his application of photography in astronomy, was born at Barneveld, Neth., on Jan. 19, 1851. He attended the University of Utrecht and in 1875 became a member of the observing staff of the Leiden observatory. In 1878 he was elected to the chair of astronomy and theoretical mechanics at Groningen.

Kapteyn was not the first to utilize the photographic method in astronomy, but his breadth of scientific vision and capacity for carrying through large programs gives him a classical position in the field of photographic astrometry. In conjunction with Sir David Gill, he determined the positions of more than 400,000 stars of the southern hemisphere. In a series of publications from the Groningen laboratory, Kapteyn investigated the motions and distribution in space of the stars; in the course of that work he discovered the phenomenon known as star streaming; *i.e.,* that the peculiar motions of the stars are not at random, but prefer two opposite directions in space.

Kapteyn's influence on the astronomical research of the first quarter of the 20th century was profound, and many later investigations in the realm of the distances and arrangement in space of the stars stemmed from his work. He died at Amsterdam on June 18, 1922. (W. W. M.)

KAPURTHALA, a municipal town, district and *tehsil* in the Jullundur division of Punjab, India. The town (pop. [1961] 29,334) lies 11 mi. W. of Jullundur city. It has a beautiful palace, a garden, a college affiliated to Panjab university and a hospital. The town was founded in the 11th century. In 1780 Sardar Jassa Singh conquered it and from then until 1948 it remained the capital of the princely state of Kapurthala. It is connected by rail and road with Jullundur city.

KAPURTHALA DISTRICT, with an area of 630 sq.mi. and a population (1961) of 343,778, corresponds with the former princely state. It lies to the northwest of Jullundur district mainly along the Beas river, and is predominantly agricultural. Wheat, gram, cotton and sugar cane are the major crops. Sultanpur (pop. [1961] 7,661) and Phagwara (37,929) are the other main towns in the district. Phagwara is a centre of trade. (O. P. B.)

KARACHAI-CHERKESS AUTONOMOUS OBLAST (KARACHAYEVO-CHERKESSKAYA AVTONOMNAYA OBLAST) forms part of Stavropol *krai* in the Russian Soviet Federated Socialist Republic, U.S.S.R. The *oblast* lies on the northern flank of the Greater Caucasus range. Its area (5,444 sq.mi.) extends from the broad plains and gently rolling foreland hills of the Stavropol uplands, across the Chernyye, Skalisty and Bokovoi ranges, to the main crest line. Just over the boundary at the southeast of the *oblast* is Mt. Elbrus, 18,481 ft. On the boundary crest itself are Mts. Dombai-Ulgen, 13,277 ft., and Gvandra, 13,068 ft., and a number of other high peaks, many of which have large glaciers. The *oblast* is drained by the Kuban, which rises in the Elbrus ice field, and by its tributaries, the Teberda, Aksaut, Marukha, Bolshoi Zelenchuk, Kyafar and Laba, which flow north in deep, more or less parallel valleys and gorges. In the northeast of the *oblast* are the headwaters of the Kuma, flowing to the Caspian. The vegetation ranges in vertical zones, from feather grass steppe on the northern uplands, through deciduous and coniferous forest and alpine meadow, up to the bare rock, snow and ice of the great peaks. Soils display a similar vertical zoning. The black earths of the steppe are particularly rich in humus. The deciduous forest zone, dominated by oak, beech and hornbeam and with brown earth soils, lies between 2,300–2,600 ft. and 4,900–5,250 ft. The coniferous forest, chiefly of fir and spruce, reaches up to 6,500–7,900 ft. Climate varies greatly with relief, the mountains having long, severe winters and brief, cool summers, while the steppe areas have very hot summers, with maximum temperatures reaching 38° C. (100° F.) and more. Rainfall is low in the north, 20–24 in. a year, but rising to 40 in. in the mountains.

The population at the 1959 census was 277,959, concentrated mostly on the northern plains and in the valleys. About 23.6%, 65,520, were urban, living in the two towns of Cherkessk (41,709), the administrative centre (formerly known as Batalpashinsk) and Karachayevsk, together with five urban districts ("settlements of town type"). The Cherkess or Circassian peoples are Caucasian, closely related ethnically and linguistically to the neighbouring Kabardinians and to the Adygei (*see* CIRCASSIAN). They speak a Japhetic language, which only after the Revolution received a written form. The 1959 census recorded 30,453 Cherkess living in the whole U.S.S.R. The Karachai are a Turkic group (*see* TURKIC PEOPLES). During World War II they were deported to the eastern regions of the U.S.S.R., together with the related Balkar. In the U.S.S.R. as a whole (1959 census) they numbered 81,403. Both groups are mainly Sunni Muslims and both, like other Caucasian peoples, put up a long, fierce resistance to Russian conquest in the 19th century. They participated in the great revolt of Shamil, after which many migrated to Turkey. A considerable proportion of the present population is made up of Russian and Ukrainian settlers and some Nogai Tatars and Abaza.

The Karachai-Cherkess *oblast* was originally formed in 1922. It was divided into the Cherkess national *okrug* and the Karachai autonomous *oblast* in 1926, the former being constituted as an autonomous *oblast* in 1928. In 1936 the Karachai and Cherkess *oblasts* were reunited as a single autonomous region. In 1944, because of alleged collaboration of its population with the Ger-

mans, the Karachai areas were partitioned and merged into the reconstituted Cherkess autonomous *oblast* and the Georgian Soviet Socialist Republic. The dispersed Karachai minorities were rehabilitated and resettled after 1957, when the Karachai-Cherkess autonomous *oblast* was again restored.

Agriculture is the most important sector of the economy and is concentrated in the north. There wheat, maize (corn), millet, barley, sunflowers and hemp are grown, together with many fruits and vegetables, especially melons. The mountain areas have abundant pastures and large numbers of sheep and cattle are kept. There is considerable transhumance between the high pastures in summer and the steppe of Stavropol *krai* in winter. Poultry and beekeeping are widespread, and Kabardinian horses are bred. The presence of coal has been known since the 1840s, but only since the Revolution has it been exploited. By the early 1960s, 15 pits were operating near Ordzhonikidzevski. Zinc, lead and barites are mined at Magaro. Marble quarried near Karachayevsk was used in the Moscow underground railway. There is much timber cutting in the mountains, supplying the furniture industries of Cherkessk and Karachayevsk. Many of the industries of the *oblast* are concerned with processing agricultural products: meat packing, butter and cheese making, milling, jam making and fruit drying. Cherkessk has light engineering and makes clothing and shoes. The mountains, the attractive scenery and the presence of many mineral springs have made the area popular with tourists. Teberda is one of the main resorts, with nearby springs. There are six tuberculosis sanatoria. The *oblast* is served by a branch railway from the main Rostov-Baku line at Nevinnomyssk to Cherkessk and on to Ust-Dzhegutinskaya. From the railhead the Sukhumi military highway follows the Kuban and Teberda valleys and crosses the Greater Caucasus range by the Klukhorski pass to Sukhumi. (R. A. F.)

KARACHI, the principal seaport and the chief commercial and industrial centre of West Pakistan, lies on the Arabian sea immediately to the northwest of the Indus delta. The city (pop. [1961] 1,912,598), formerly the capital of Sind province, is the headquarters of the district and division of Karachi. On July 23, 1948, the area of the capital of the federation was demarcated from the province of Sind and formed into a centrally administered unit called "Federal Capital Area Karachi," comprising the city and cantonments, the islands in Karachi harbour and 54 of the *dehs* (villages) which had previously formed part of the Karachi district. In Oct. 1959 the capital was shifted to Rawalpindi, though many offices of the central government remained at Karachi. From Aug. 1, 1960, the Federal Capital area came to be known as the Federal Territory of Karachi. Thirty-seven villages of Thatta (*q.v.*) district (to form part of the Karachi district) and the district of Las Bela (*q.v.*) were added to the Federal Territory by the president's order of Oct. 27, 1960. The Federal Territory was merged in the province of West Pakistan on July 1, 1961, as a division consisting of the districts of Karachi and Las Bela. The division is administered by the president through his agent, the governor of West Pakistan. In 1961 the population of the division was 2,134,870 contained in Karachi district (2,044,044) and Las Bela district (90,826). Total area 8,405 sq.mi.

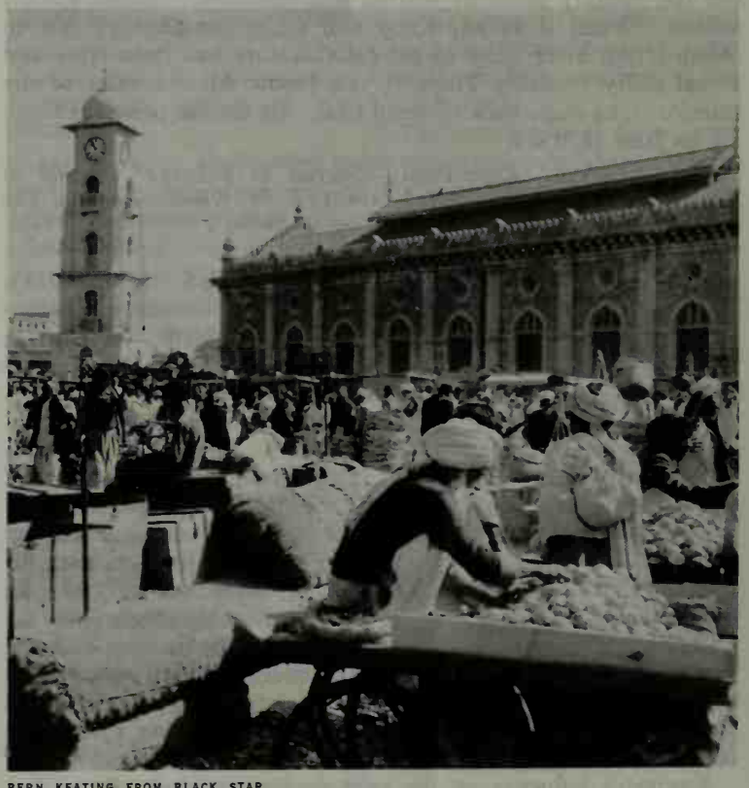
Karachi stands on a backwater which opens south on the east-west stretch of coast and marks a sharp change in direction of the shore line between Cape Monze and the Indus delta. Westward this backwater is screened from the sea by the rocky point of Manora, joined to the mainland by a sandspit. Manora head is the extremity of a ten-mile reef, and the natural harbour this provides is mainly responsible for the growth of Karachi as a seaport. To the east the city is bounded by what was once the island of Kiamari but which, as a result of the construction of the Napier mole (1850) and subsequent reclamation undertakings, is no longer an island. The western approach, passing under Manora point, has always been the only one, the eastern approach having been closed when Chinna creek was finally blocked in 1873. The hinterland in the north is practically a desert. In the prevailingly hilly landscape (Kohistan), the limestone spurs of the Kirthar range break down southward into sandy wastes. The Indus delta shows in the southeast a monotonous expanse of alluvium, riddled by creeks and passing seaward into mangrove swamp.

The natural scour of the backwater under the action of currents on either side of Kiamari was a real asset along a coast prone to severe silting, and it is to this that the port owes its foundation and early development by Hindu merchants at the beginning of the 18th century. About that time the port serving Baluchistan, at the outfall of the Hab river in the neighbourhood of Cape Monze, became choked, while a similar fate was always overtaking ports at the mercy of the shifting Indus. Besides the natural protection against monsoon storms, Manora head furnished an excellent site for the defense of the harbour, and the Talpur Mirs, who gained Karachi from the khan of Kalat in 1795, erected a permanent fort on it. This was demolished by British guns in 1839, and a modern fortification, naval and other establishments and a lighthouse (148 ft. above sea level) were built there. In 1909 the lighthouse was fitted with a flashing light in place of the old fixed light.

Karachi has grown to its present position within a comparatively short time. When the British under Sir Charles Napier annexed Sind (*q.v.*) in 1843 there was only a fishing village with a small fort and a ditch called Kalachi-jo-Kun with two gates, one called the Kharadar (the salt water gate) facing the sea, and the other called Mithadar (the sweet water gate) facing the Lyari river. Neither the actual site nor the immediate surroundings suggest conditions favourable to the emergence of a city of such importance. However, its strategic value in relation to the North West frontier and to the route via Suez is obvious. Karachi is the nearest port to Europe (being 6,077 mi. from London, via Suez) not only for West Pakistan but also for Afghanistan and adjacent parts of central Asia, Iran and the western part of India.

The development of international air transport considerably increased Karachi's importance, though the greatest single stimulus to the growth of modern Karachi was the expansion of irrigation in Punjab and Sind which gave it a great export trade, mainly in wheat and cotton. The establishment of independent Pakistan in 1947 further increased its significance, though the port was by then already developed. It is West Pakistan's naval headquarters.

The principal shopping centre is Sadar bazaar; Bunder road, McLeod road and Frere road are commercial areas. The city's chief buildings are those of the constituent assembly, of the Karachi Port trust and the corporation, the president's house and the national stadium. Karachi university, founded in 1950, has 21



BERN KEATING FROM BLACK STAR

VIEW OF THE VEGETABLE AND FRUIT SECTION OF THE LEA MARKET IN THE OLD PART OF KARACHI, PAKISTAN

colleges: for arts and science, medicine, engineering commerce, law and teacher training. Frere hall, which stands in a public garden, is the national museum. Burns garden is also public and there is a zoological garden. In 1957 the Karachi Development authority was founded to plan the city's growth. After partition there was a great influx of people from all over India (58.7% of the city's inhabitants at the 1951 census were refugees). Satellite towns were built, and at Korangi creek, about 2 mi. from the Pakistan air force cantonment, a new township called Korangi provides for the settlement of 500,000 people with their own social and economic life. There are fine bathing beaches at Hawkes bay, Sandspit, Paradise point and Clifton.

After 1956 the Karachi Port trust began reconstruction and modernization of the east wharf (built between 1886 and 1909) which would increase the capacity of the port by 30% and the depth of the water along the berths from 27 ft. to 32 ft. below datum level. In a new shipyard ships of 5,000–7,000 tons dead weight can be built. A dry dock, 600 ft. by 90 ft., is deep enough at low tide for ships drawing about 16 ft. Along the east wharf are 18 berths including the return berth; the west wharf has 5 berths and 2 tanker berths are along the oil pier. There are 5 swinging and 11 fixed moorings and the total cargo-handling capacity of the harbour exceeds 4,000,000 tons a year.

The industrial region extends to Landhi, 13 mi. E. The chief manufactures are cotton, silk and wool textiles, plastics, chemicals and leather goods.

The city is linked by the Pakistan Western railway with the interior of West Pakistan, and a line through the border town of Munabao is joined to the Indian railways. There is a large modern airport at Drigh Road. Karachi forms an essential link in air communications between all parts of Europe, India, Australia, Malaya and the far east. Proximity to oil fuel, abundant space at sea level, immunity from floods and heavy rains and minimum frequency of low cloud cover all favour Karachi as an airport, and it is largely for climatic reasons that it has been preferred as a main base to Bombay or Calcutta. During World War II Karachi's air facilities were greatly extended because its geographical position between India, as a great supply base, and the near eastern theatres of war made it a vital air base. (K. S. Ad.)

KARADŽIĆ, VUK STEFANOVIĆ (1787–1864), the father of modern Serbian literature, was born on Nov. 6, 1787, in the Serbian village of Trshich, on the Bosnian border. He learned to read and write in the old monastery Tronosha (near his native village), and was engaged as writer and reader of letters to the commander of the insurgents of his district at the beginning of the first Serbian rising against the Turks in 1804. Mostly in the position of a scribe to different voivodes (military leaders), sometimes as schoolteacher, he served his country during the first revolution (1804–13). At the collapse of the revolution he left Serbia, but instead of following Karageorge and other leaders to Russia he went to Vienna. There he was introduced to the great Slavonic scholar Yerney Kopitar, who encouraged him to collect the poems and popular songs, write a grammar of the Serbian language and, if possible, a dictionary.

His first book, *Mala Prostonarodna Slaveno-Serbska Pyesmaritsa* (Vienna, 1814), contains 100 lyric songs, sung by the peasant women of Serbia, and six poems about heroes or, as the Serbs call them, *Yunachke pesme,* which are generally recited by the blind bards or by peasants. From that time Karadžić's literary activity moved on two parallel lines: (1) to give scientific justification and foundation to the adoption of the vernacular Serbian as the literary language; and (2) by collecting and publishing national songs, folk lore, proverbs, etc., to show the richness of the Serbian people's poetical and intellectual gifts and the wealth and beauty of the Serbian language. By his reform of the Serbian alphabet and orthography, his Serbian grammar and his Serbian dictionary, he established the fact that the Serbian language contains 30 distinct sounds, for 6 of which the Old Slavonic alphabet had no special letters. He introduced new letters for those special sounds, at the same time throwing out of the Old Slavonic alphabet 18 letters for which the Serbian language had no use. This reform was strenuously opposed by the church and many conservative authors, who went so far as to induce the Serbian government to prohibit the printing of books in new letters, a prohibition removed in 1859. Karadžić's alphabet facilitated his reform of orthography; his principle was "write as you speak, and read as it is written!" Hardly any other language in the civilized world has such a simple, logical, scientific spelling system and orthography as the Serbian has in Karadžić's system. His first grammatical essay was published in Vienna in 1814, *Pismenitsa Serbskoga yezika po govoru prostoga naroda* ("The grammar of the Serbian language as spoken by the common people"). An improved edition appeared in Vienna in 1818, together with his great work *Srpski Ryechnik* (Lexicon Serbico-Germanico-Latinum). This dictionary—containing 26,270 words—was full of important contributions to folk lore, as Karadžić never missed an opportunity to add to the meaning of the word the description of the national customs or popular beliefs connected with it. A new edition of his dictionary containing 46,270 words, was published at Vienna in 1852.

Meanwhile he gave himself earnestly to the work of collecting the "creations of the mind of the Serbian common people." He traveled through Serbia, Bosnia, Hercegovina, Montenegro, Dalmatia, Syrmia and Croatia, and the result was shown in a largely augmented edition of his *Srpske Narodne Pyesme* (Leipzig, 3 vol., 1823; vol. iv, Vienna, 1833). *Popular Stories and Enigmas* was published in 1821, and *Serbian National Proverbs* in 1836. From 1826 to 1834 he was the editor of an annual, called *Danitsa* (The Morning Star), which he filled with important contributions concerning the ethnography and modern history of the Serbian people. In 1828 he published a historical monograph, *Milosh Obrenovich, Prince of Serbia;* in 1837, in German, *Montenegro and Montenegrins;* in 1867, *The Serbian Governing Council of State.* He supplied Leopold von Ranke with the materials for his *History of the Serbian Revolution.* He also translated the New Testament into Serbian, for the British and Foreign Bible society (Vienna, 1847). Karadžić died in Vienna on Feb. 6, 1864; the government in 1897 transferred his remains to Belgrade. (C. Mij.; X.)

KARAGANDA, the largest *oblast* (established 1932) in the Kazakh Soviet Socialist Republic of the U.S.S.R., extends 480 km. (300 mi.) northward from Lake Balkhash to the *oblast* of Tselinograd and more than 960 km. (600 mi.) westward to the Aral sea. It lies mainly in the desert and dry steppe zones and the north includes a large part of the Kazakh uplands (Kazakhski Melkosopochnik) and the Bet-Pak-Dala desert steppe in the south. The principal rivers are the Nura and Sarysu, both flowing into inland lakes. The climate is continental: the summer is hot and dry and the winter severe with strong winds and slight snowfall. The *oblast* is the main mining and metallurgical area of the republic and includes the Karaganda coal basin, the copper deposits of Kounradski and Dzhezkazgan, and the iron deposits at Atasuski. Manganese, tungsten, molybdenum, lead and zinc are also mined. Copper smelting and refining, and steel milling are carried on. The rapid industrial development of the region since the 1930s was based partly on a system of forced labour camps. By the 1960s the importance of the *oblast* had been greatly advanced by the selection of the flinty desert around Baikonur as the site of the cosmodrome and base for Soviet space exploration. Wheat, vegetables and dairy products come from the black earth belt to the north of Karaganda town, the administrative centre of the *oblast.* Elsewhere sheep, camels and cattle are raised. The *oblast* is traversed by the Trans-Kazakhstan railway, the Mointy-Chu section having been completed in 1953. There are branches from Zharyk to the Dzhezkazgan copper area and from Mointy to Balkhash. The population was 1,018,661 (1959) of which 80% was urban. Apart from the capital the chief towns are Balkhash (*q.v.*), Temir-Tau and Karkaralinsk. In the early 1960s there were more than 640 schools in the *oblast.* (G. E. Wr.)

KARAGANDA, the capital of Karaganda *oblast* in the Kazakh Soviet Socialist Republic of the U.S.S.R., is the centre of the Karaganda coal basin, about 490 mi. W.N.W. of Alma-Ata. It has grown from a mining settlement (originally established in 1857) of 150 inhabitants in 1926 to a population of 398,000 in 1959. During World War II the population increased by 50,000

over the 1939 census, largely owing to the transfer of industries from western Russia, in particular the Parkhomenko coal mining machinery works from the Donets Basin. The city comprises more than 50 districts. Most of the industrial plants are located in the old town; the new town, developed since 1934, is mainly a residential area. The latter now has many large buildings, including the headquarters of the Karaganda local industrial combine and the "miners' palace of culture." These and others stand around the Ordzhonikidze park. In addition to heavy industry the town has many light industries, such as sweet (candy), boot and soft-drink factories. The large Temir-Tau reservoir 20 mi. away, provides the water supply. There are over 80 schools in the town and a number of technical institutes (including mining and medicine) and training establishments. (G. E. WR.)

KARAGAS (TUBALAR, TOFALAR) are a Turkic-speaking people of southern Siberia who numbered about 600 according to the Soviet census of 1959. Their traditional habitat is in the Sayan mountains; traditional Karagas economy was based on nomadic hunting and reindeer breeding in the taiga. In contact with the Russians since the mid-17th century, they have been under powerful Russian cultural influence.

By origin, the Karagas are a mixed people; they call themselves Tubalar, their official Soviet designation is Tofalar (-lar is a plural ending), while the older designation for the people is Karagas. The names Tuba and Tofa are etymologically related to Tuva and the Karagas are close to the Tuvinians (*q.v.*) in language, culture and history. These names are Samoyedic in origin, and indicate a derivation of some of both the Karagas people and the Tuvinians from the Uralic language family. They have been Turkic speakers for several centuries; thus, successive waves of Turkic and Russian influence upon Samoyedic peoples are postulated for the Sayan mountain area. Little is known of Karagas history prior to Russian contact (*see* SAMOYED; TURKIC LANGUAGES).

Traditionally, the Karagas people were organized in patrilineal clans that functioned as exogamic units. Both in social organization and in their shamanistic religion they were typical of indigenous Siberian peoples. During the Soviet period they were collectivized and settled in permanent villages; but their economy was still based on hunting and reindeer breeding in the 1960s. Their traditional tents (in winter of hide and in summer of birch-bark) were replaced by wooden houses of Russian type.

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KARAGEORGE (GEORGE or DJORDJE PETROVICH) (1762–1817), the "leader of the Serbian nation" and the founder of the house of Karageorgevich, was born at Visevac on Nov. 14 (new style; 3, old style), 1762, the first child of Petar Yovanovich, a destitute peasant, and Maritsa, née Zhivkovich. His father, having killed a Turk, fled his native village and settled with his family at Maslosevo, where he died. His widow remarried Petroniye, a peasant, and moved to Topola. George—nicknamed Karageorge (Black George) because of his dark complexion—worked as a swineherd and goatherd and as a groom. Having in his turn killed several Turks, he fled to Vrbica, met Yelena Yovanovich and married her about 1786. He later emigrated to Austria (1787), worked as a forest ranger, enlisted in an Austrian *Freikorps* (1788), fought in Italy and won fame during the Austro-Turkish war. The armistice of 1790 having been signed, he remained in Serbia waging an irregular warfare on his own and became well known throughout the Belgrade pashalik. After the Sistova (Svishtov) treaty of 1791 he settled at Topola, started to trade in cattle and became a wealthy merchant. He had seven children. His third son Alexander (*q.v.*) eventually became prince of Serbia.

When the Serbs decided to rise against the Turks, about 300 leaders met at Orasac (1804) and elected Karageorge their *vozhd* or leader. At first the rising was only directed against the outlawed rebellious janizaries, but when the four leaders of the janizaries had been killed Karageorge refused to lay down arms before the Turks accepted that their agreement with the Serbs be guaranteed by a third power. When Karageorge defeated the Turkish regulars at Ivankovac (1805) and organized the Serbian state council it was clear that he aimed at complete independence. The Turks were again routed at Misar (1806); the conquest of Belgrade followed. Serbia was liberated without any outside help. When the Russians declared war on Turkey (1806) an alliance was concluded with them (1807), but Russian help consisted only in a token force and Serbia was not even mentioned in the armistice of Slobozia (1807). Karageorge resented such behaviour and tried to obtain Austrian and French help. His reputation as a soldier, his powerful position and his anti-Russian feelings aroused jealousy and suspicion among some of his commanders, which resentment was fostered by K. K. Rodofinikin, the first Russian diplomatic agent in Serbia. When the state council saw that Russia was attempting to gain an exclusive influence, it promulgated the first Serbian constitution and recognized Karageorge as the "first and supreme Serbian hereditary leader" (1808).

War between Russia and Turkey broke out again (1809). A Serbo-Russian army defeated the Turks at Varvarin (1810), and Serbo-Russian relations became friendly. In order to silence the opposition Karageorge appointed his first government (1811). Then, in view of France's intention to declare war on Russia, the latter concluded the Bucharest treaty with Turkey (1812). Its article 8 stipulated an amnesty for all Serbs and a kind of autonomy for Serbia, but all the details were left to be negotiated directly between Serbs and Turks. Having thus a free hand, the Turks advanced with all their military might, and the first Serbian rising (1804–13) was crushed. Karageorge, sick with typhus and nervously broken down, took refuge in Austria (1813) and was interned, but was at last permitted to go to Hotin in Bessarabia (1814).

When the Serbs rose again (1815) Karageorge was not allowed to return to Serbia. He went to St. Petersburg (1816) and was well received but ordered to move to Novomirgorod in the Ukraine. He left Hotin secretly for Radovanje near Smederevska Palanka, in Serbia (1817). His object was to organize a general Balkan rising in conjunction with the Greek *Hetairia*. The new Serbian leader Milosh Obrenovich (1780–1860) feared the presence of such a strong rival and decided to kill him. Milosh's plan, submitted to the grand vizier through the pasha of Belgrade, was approved, and Karageorge was assassinated in his sleep at Radovanje, on July 25 (N.S.; 13, O.S.), 1817. His head was sent to Istanbul.

Karageorge had military genius of the highest order, combined with dauntless courage and unsurpassed energy, so that his mere appearance was said to be enough to turn defeat into victory for the Serbs. He was loved by his admirers, hated by his opponents, feared by all. His temper was choleric, his hand heavy, but he was just and at times magnanimous. He always assumed full responsibility for all his acts. He was a born leader and laid the foundations on which later the Serbian state was built.

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KARAÏSKAKIS, GEORGIOS (*c.* 1780–1827), a chieftain in the War of Greek Independence, was born at Mavromati in Agrapha. As a young *pallikari* or member of a military police force recognized by the Turks (*see* ARMATOLES), he took part in the wars of the Turkish pasha Ali (*q.v.*), frequently changing sides. But from 1808 he served Ali faithfully until 1820, when he joined the sultan's armies. The next year he joined the Greek revolts in western Greece, but when these failed he submitted to the Turks. He again revolted; but in 1824, wishing to rule Agrapha and detesting Alexandros Mavrokordatos' leadership in western Greece, he again submitted to the Turks. Later the Greek government pardoned him. He supported Ioannis Kolettis against the Moreots and then returned to western Greece where, in April 1826, he tried vainly to save Missolonghi. He subsequently fought with distinction in the campaigns to relieve Athens. In April 1827, he supported Count I. A. Kapodistrias for the presidency

of Greece and Sir Richard Church as generalissimo of the Greek land forces. He died on May 5, 1827, of wounds received when assisting Gen. Richard Church to relieve the besieged Acropolis.
See D. Photiadis, *Karaïskakis* (1956). (D. Dn.)

KARAISM (Qaraism), from Hebrew *Qara,* to read or study the Scriptures, a Jewish movement originating in Persia in the 8th century, rejecting the oral tradition and challenging the authority of the rabbinites, the teachers of the Talmud. Factors in the development of the movement were the messianic hopes aroused by local conditions as a result of the Muslim conquest of Persia (640) and the fall of the Omayyad dynasty (750). Karaism is characterized by a prophetic passion for individual righteousness and social justice, puritanical zeal and asceticism, yearnings for national redemption and uncompromising monotheism.

The Karaites claimed that the Bible is a self-explanatory book, requiring no completion by the Oral Law, and accused the talmudists of misinterpreting the biblical law and of substituting a man-made talmudic law for a God-given Torah. The chief points of difference with the rabbinites were the calendar, Sabbath and marriage laws.

The Karaites were also influenced by the school of Mu'tazilites (*see* Islam: *Development of the Shari'a*), which, emerging in the 2nd century of the Hegira, brought about a schism in the Muslim theological schools of Basra. In order to avoid the stigma of heresy, the Mu'tazilites sought the support of philosophy. They thus founded a rational theology designated the *Ilm-al-Kalam* (Science of the Word), and those who professed it were known as *mutakallimun.* They accused their opponents of destroying monotheism. The Karaites derived many of their reformatory notions from this Muslim movement. Both Karaites and Mu'tazilites believed in the confluence of revelation, reason and conscience.

'Anan ben David, elder son of the exilarch, emerged as legislator of the sect and its first literary figure. In his *Sepher ha-Mizvot,* written in 760, he delineated a code of life that excluded the Talmud. A small number, calling themselves Ananites, accepted his authority. Other groups sprang up two centuries later, vehemently rejecting the Oral Law. The outstanding leader was Benjamin ben Moses al-Nahawandi of Persia, who called the sect Karaites and wrote their first systematic book of observances and regulations. Adherents traveled extensively to make converts among the rabbinites. But they were handicapped greatly by schisms within the movement, which resulted from their insistence on the freedom of each individual to interpret the Torah in the light of his own understanding and judgment. They were also affected by the dearth of scholars supporting their views. Further, Karaism, by the austerity of its asceticism, burdened the lives of the people—already full of privation and self-denial—even more than did rabbinism: the adherents could have no fire on Sabbath; prohibited degrees of consanguinity were expanded; dietary laws and laws of ritual cleanliness, clothing and fasts became harsher; the celebration of Hanukkah and the use of *tephilin* (phylacteries) and *mezuzoth* (door post amulets) were eliminated. Despite their controversies, the Karaites under the influence of the rabbinites borrowed much from the Talmud and developed a similar Oral Law of their own. The stress was laid on practical observances rather than on ethics and metaphysics.

Their first antagonist was Saadia ben Joseph (*q.v.*), who in his philosophical and exegetical writings bitterly attacked the Karaites and tried to exclude them from the Jewish community. The onslaught by Saadia and others united the factions and brought about the Golden Age of Karaitic literature in Hebrew and Arabic, producing noted works in Hebrew lexicography, biblical exegeses, polemics and codes. It also played an important part in the formation of medieval Jewish philosophy and exerted some influence on the development of a Jewish prayer book. The movement flourished from the 9th to the 12th centuries, spreading from Babylonia to Palestine (where the Karaites established themselves as "Mourners of Zion"), thence to Egypt, Syria and into Europe by way of Spain and Byzantium.

In Spain, Abraham ibn Daud (1110–80) refuted their claims in his *Sepher ha-Qabalah* ("Book of Tradition"); in Egypt they were favoured by the Muslim authorities, but the influence of Maimonides (*q.v.*) and his descendants caused their numbers to shrink after the 12th century. They have never been numerous. Toward the end of the 17th century, Protestant theologians in Sweden became interested in Karaism, and wrote studies on the sect. After the establishment of the state of Israel, several thousand Karaites settled there.

The liturgy of the Karaites is jejune, being composed almost entirely of scriptural excerpts and possessing practically no hymns. Nevertheless this constitutes no general reflection on Karaite intellectualism. No movement can be considered barren from the literary standpoint that has produced scholars such as the theologian Abu Yusuf Ya'qub al-Qirqisani (10th century) and his contemporary exegetes and theologians Yefet ben 'Ali, Sulayman ibn Ruhaym, Daniel al-Qumisi, Sahl ben Masliah, Mishawayh al-'Ukbari, Malik ar-Ramli, Abu 'Imran at-Tiflisi and Jeshuah ben Judah (11th century); the poet Moses Dar'i (12th century); the philosopher Aaron ben Elijah (14th century); the codifiers Samuel ben Moses al-Magribi and Elijah ben Moses Basyatchi (15th century); the chronicler David ben Se'adel ibn al-Hiti (15th century); the author of the best-known anti-Christian polemical work, *Hizzuq 'emunah,* Isaac ben Abraham Troki (1533–94); and, latterly, Abraham Firkovich (1786–1874). Firkovich came from the Crimean peninsula and, in his zeal to prove that the Karaites were descendants of the ten lost tribes of Israel and had settled in the Crimea in the 6th century B.C., traveled to Cairo, Palestine and Constantinople and succeeded in bringing together the largest collection of Hebrew, Samaritan and early Karaitic manuscripts in the world, later acquired by the St. Petersburg (now Leningrad) Public library.

Firkovich's efforts contributed greatly to the exemption of the Karaites from the religious persecution that the Russian Jews suffered. A notable controversy arose in consequence of his discoveries, but modern Masoretic studies by Paul Kahle and others incline to support them, with reservations.

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(A. I. K.)

KARAJ, a town in Iran, in the Central (Teheran) *ostan* (province), lies 25 mi. W. of Teheran, at the southern foot of the Elburz range where the Karaj river emerges from its gorge onto the plateau. Pop. (1956) 14,526. Formerly a village, the town has grown considerably in the 20th century. The shortest motorable road from Teheran to the Caspian shore (at Chalus) leaves the main western highway (Teheran-Tabriz) at Karaj, which is also a station on the Tabriz branch of the Trans-Iranian railway. The experimental station of the department of agriculture of the University of Teheran is nearby and the town has a beet sugar refinery, a cardboard factory and a chemical plant. (H. Bo.)

KARAK (Al Karak or Kerak; ancient Kir Moab, Kir Hareseth or Kir Heres), a town in Jordan about 17 mi. S. of the Arnon river (Wadi al Mawjib) and 11 mi. E. of the Dead sea. Pop. (1961) 7,427. It stands 3,100 ft. above the Mediterranean and 4,400 ft. above the Dead sea, on a small plateau about 2,500 ft. long. A coalition of the kings of Israel, Judah and Edom besieged the city which was the capital of Moab. However, King Mesha of Moab sacrificed his oldest son as a burnt offering upon the wall, whereupon the allied armies withdrew (II Kings iii, 4 ff.). The oracles against Moab by Isaiah and Jeremiah each mention the city twice. Pottery remains show occupation in the Moabite, Nabataean, Roman, Byzantine and medieval Arabic periods. A tunnel, a cul-de-sac about 200 yd. long, runs toward the citadel from the wadi below; it was probably an unfinished water passage. The crusaders fortified the town (1136), calling it Le Krak du Desert (not to be confused with Le Krak des Chevaliers in Syria). Since the time of the crusades, the Greek bishop of Petra has had his seat at Karak. (E. D. Gr.)

KARA-KALPAK AUTONOMOUS SOVIET SOCIALIST REPUBLIC (KARA-KALPAKSKAYA AVTONOMNAYA SOVETSKAYA SOTSIALISTICHESKAYA RESPUBLIKA) was founded on March 20, 1932, as part of the Uzbek Soviet Socialist Republic. Area 63,938 sq.mi. It is divided into 10 *raions* and has 5 towns and 7 "settlements of town type."

The republic, also called Kara-Kalpakia and Kara-Kalpakistan, occupies the western half of the Kyzylkum desert, the delta of the Amu-Darya and the southeastern part of the Ustyurt plateau. It is bordered on the north by the Aral sea. The Kyzylkum is a vast plain mainly covered with undulating sand, to the south of which rise the Sultan-Uizdag mountains (maximum altitude, 1,552 ft.). The delta of the Amu-Darya is a depression intersected with watercourses, canals and lakes. There are deposits of minerals including phosphorites, talc, graphite and salt. The climate is continental with an average yearly temperature of (10° to 13° C. (50° to 55° F.) and an average yearly rainfall of only 3–4 in.

According to the 1959 census the population was 510,101, of which 27% were urban and 73% rural. The main concentrations are in the central plain, along the shores of the Aral sea and in the Amu-Darya delta. Kara-Kalpaks predominate, but there are also Uzbeks, Kazakhs, Turkmens, Russians, Ukrainians and Tatars. The towns are: the administrative centre of Nukus, Turtkul, Chimbai, Khodzheili and Takhia-Tash.

The mainstay of the economy is cotton, which is cultivated principally in the southern part of the Amu-Darya valley and in the delta near Chimbai (east) and Kungrad (west). Cotton ginning is carried out at Chimbai, Kungrad, Khodzheili, Biruni, Takhta-Kupyr and Mangit. Cattle and karakul sheep are raised in the desert pastures. A secondary crop, cultivated in the cotton areas and used for fodder, is the lucerne variety of alfalfa. In addition to cotton ginning, industries consist of meat packing and flour milling. There are fisheries on the shores of the Aral sea and a large fish cannery at Muinak.

The chief transport facility is the Chardzhou-Kungrad railway. There are shipping services on the Amu-Darya and the Aral sea. In the early 1960s there were more than 640 schools and 250 libraries in the republic.

For the origin and early history of the Kara-Kalpak people *see* TURKIC PEOPLES. At the outbreak of the Russian Revolution in 1917 that part of the Kara-Kalpak population living on the left bank of the Amu-Darya was under the rule of the khanate of Khorezm (*q.v.*) or Khiva and that on the right bank under Russian rule in the governorate general of Turkestan, to which they had been annexed in 1873. In 1920 the khanate of Khorezm became the Khorezm People's Soviet Republic, and, with the incorporation of the Amu-Darya *oblast* in the Turkestan republic, the whole Kara-Kalpak people came under Soviet rule. As a result of the frontier realignment of 1924–25, a Kara-Kalpak autonomous *oblast* was created as part of the Kazakh S.S.R. In 1930 this *oblast* came under the direct administration of the Russian S.F.S.R. and in 1932 was constituted an autonomous soviet socialist republic. Under the constitution of 1936 the Kara-Kalpak A.S.S.R. became part of the Uzbek S.S.R. Between 1927 and 1929 the land of many wealthy farmers was seized and collectivization embarked upon, the first *kolkhoz* (collective farm) being established in 1928 in the face of strong religious opposition and resistance from the kulaks, as the more prosperous peasants were called. (G. E. WR.)

KARAKORAM RANGE, the great mountain region in northern Kashmir between the lower Shyok and Indus rivers on the south and the Shaksgam tributary of the Yarkand river on the north. It is bounded on the west by the Karambar watershed about longitude 74° E., where its ranges merge with the Hindu Kush (*q.v.*), and on the east by the upper Shyok and Karakoram pass. The most heavily glaciated area outside subpolar regions, it contains some of the longest glaciers: Batura (36 mi.) in the west; Siachen (47 mi.), feeding the Nubra tributary of the Shyok toward the east; and the Hispar-Biafo glaciers (between the Hunza and Shigar tributaries of the Indus), an ice passage 76 mi. long. Twenty peaks exceed 25,000 ft., 14 being in the Great Karakoram, including K2 (*q.v.;* 28,250 ft.), the second highest mountain in the world. The Great Karakoram is the main axis. It forms the southern wall of the Batura glacier, the northern wall of the Hispar, Punmah, Baltoro and Siachen glaciers. The Lesser Karakoram comprises the ranges north and south of it. There are two natural routes through the range: on the west from Gilgit, through the deep Hunza gorge (the track in summer is carried on pegs driven into the cliffs, in winter it follows the river bed) over the Mintaka pass (15,450 ft.) and Pamirs to Kashgar; on the east the caravan trade route by the Khardung (17,600 ft.), Saser (17,480 ft.) and Karakoram (18,290 ft.) passes to Khotan or Yarkand. There are no settlements or supplies obtainable on this route for ten stages. Other passes which cross the Karakoram are only fit for mountaineers, though the region is well mapped. By 1961 12 of the 20 peaks over 25,000 ft. had been climbed.

The southern ranges are basically crystalline, markedly garnetiferous on the west. Intrusive rocks have altered the sedimentaries. Liassic (Early Jurassic) and Cretaceous deposits have been identified on the Karakoram pass. It seems likely that the orogeny is fundamentally similar to that of the Tibetan plateau though here the original folds have been more deeply scoured by the Indus tributaries. *See* also GILGIT; LADAKH. (K. M.)

KARAKORUM (Mongolian KHARA-KHORIN), famous ancient capital of the Mongol empire whose ruins lie on the upper Orkhon river in the Ara Hangay (Ara Khangai) *aimak* (province) of the Mongolian People's Republic. It was founded in 1220 by Genghis Khan (*q.v.*), a Mongol chief who gradually acquired dominion not only over all the Mongols but also over other more or less related peoples of the whole steppe from the Altai mountains to the middle Amur river. In 1235 Ogdai (Ugedei) Khan surrounded Karakorum with walls and built a rectangular palace, 230 by 150 ft., supported by 64 wooden columns standing on granite stones. Karakorum had many brick houses along its streets, 12 Shamanist shrines, 2 mosques and, according to William of Rubruquis, a Christian church. In 1267 Kublai, the great khan, moved his capital to Khanbaliq (Cambaluc, modern Peking). When his younger brother Ariq Böge rose against him, making Karakorum his headquarters, Kublai's forces took the city and destroyed it.

In 1368, Bilikt Khan, the son of Togon Timur, the last emperor of the Mongol (or Yüan) dynasty of China, who had been banished from Peking, returned to Karakorum which was partly rebuilt. It was then known as Erdeni Dzu (Mongol name for Buddha), because during the 13th century Lamaistic Buddhism (*see* TIBETAN BUDDHISM) had made progress under Kublai Khan. Erdeni Dzu served as the capital of Togon Timur's descendants, who were described by the Chinese as *liao van-tse* (small or negligible khans). By the 16th century Erdeni Dzu had fallen completely into decay, but the three temples of Buddha remained. Surrounded by a wall, they are now a museum.

In 1246 and 1254, respectively, Karakorum was visited by the Franciscan monks, Joannes de Plano Carpini and William of Rubruquis (*qq.v.*). The precise location of Karakorum was established at the end of the 19th century by two Russian orientalists, N. M. Yadrintsev and A. M. Pozdneev.

During 1948–49 the ruins were explored by U.S.S.R. and Mongol archaeologists under the leadership of S. V. Kiselev of the Academy of Sciences of the U.S.S.R.

See *Bibliography* to the article MONGOLIA. (K. SM.)

KARA-KUM (Russianized Turkmen, *Karakumy;* lit. black, *i.e.,* with vegetation, sands), a general term used to describe a vast sandy desert (*peski*) of 115,830 sq.mi. extending over most of the Turkmen Soviet Socialist Republic (*q.v.*) of the U.S.S.R. A smaller desert called the Cis-Aral Kara-Kum (Peski Priaralskiye Kara-Kumy) in the Kazakh S.S.R. extends from the Chelkar-Tengiz and Shubar-Tengiz lakes southward to the lower course of the Syr-Darya river.

The Turkmen Kara-Kum extends from the Sarykamysh depression (Sarykamyshskaya Kotlovina) and the Amu-Darya valley in the north and northeast nearly to the Afghan frontier in the southeast and to the foothills of the Kopet-Dag mountains in the southwest. It is divided into the Unguz (Zaunguzskiye) Kara-Kum in the north, the central lower (Tsentralnyye Nizmen-

nyye) Kara-Kum, and the southeastern (Yugo-Vostochnyye) Kara-Kum. It is undulating and sandy, the general slope being from east to west. The sand is disposed in shallow waves in the north, and in dunes interspersed with salt flat clay platforms (*takyrs*) in the south. About 5% of the area consists of loose sand mounds (*barkhans*). In the spring the whole area except for the *barkhans* is covered with green ephemera. Except in the south where they tend to be replaced by grass, there are various bushes, including *Calligonium, Halimodendron* (salt tree) and *Atraphaxis; Lek,* a kind of sedge suitable as cattle food, and white and black saxaul are also common. Except on the *takyrs* and salt marshes there is a considerable fauna including antelope, wolves, wildcats and various desert rats. Birds abound in the winter.

The Kara-Kum provides a large area of all-year-round pasturage for sheep, goats and camels. The population is sparse, being confined to the Amu-Darya, Tedzhen and Murgab oases and valleys. There are two so-called "settlements of town type"—Darvaza 178 mi. N. and Bakhardok 56 mi. N. of Ashkhabad. There are important sulfur deposits at Serny Zavod near Darvaza.

The old caravan routes which formerly crossed the Kara-Kum from south to north and from southwest to northeast have now lost much of their significance. The Ashkhabad railway connects Chardzhou with Tedzhen and in 1952 a new line was built from Chardzhou to Urgench. This has now been extended to Kungrad. Air transport is widely used.

In 1946 a grandiose project known as the Main Turkmen canal was designed to bisect the Kara-Kum with a canal connecting the Amu-Darya at Tashauz with the Caspian via Kazandzhik. For reasons which have never been properly explained this project was abandoned in 1953. Another project—the Kara-Kum canal designed to traverse the southeastern part of the desert—made good progress. The canal starts at Mukry near Kerki on the Amu-Darya and by Feb. 1959 it had been completed as far as Mary; by 1965 it was expected to reach the Tedzhen river.

(G. E. Wr.)

KARAMAN, the name given to a region of southern Asia Minor embracing ancient Lycaonia, the Cilician Taurus and the lands along the southern shore as far westward as Antalya (Adalia). The area comprises part or the whole of the land areas of Antalya, Ichel (Ich-ili) and Konya in Turkey. The name designates the territories which belonged at one time or another to the Turkish emirate of Karaman. The Ottomans, after taking over these territories, transformed them into a *beylerbeylik,* with its centre at Konya.

Karaman was, in addition, the name given to a branch of the Turkmen tribe called Salur. A certain Karim al-Din Karaman attained prominence in the region of Ichel during the mid-13th century. It was this man and his descendants (the Karaman-Oghlu) who, in conflict with the declining Seljuk sultanate of Iconium (Konya), the Mamelukes of Syria and Egypt, the Christians of Lesser Armenia and Cyprus and the other Turkmen chieftains of the Taurus area, created the powerful emirate of Karaman, with its capital at Laranda (now itself called Karaman). The Karaman-Oghlu, drawing large revenues in the form of tolls on commerce from Cyprus and Syria through the Cilician passes into Asia Minor and having as a sure refuge against their foes the almost impregnable mountains of Ichel, brought under their own control, in the 13th–14th centuries, the plains of Konya and of Cilicia. Karaman, under its own dynasty, offered a long and stubborn resistance to the Ottoman Turks in the 14th–15th centuries. Not until 1466 and the years immediately following was the emirate absorbed into the Ottoman empire. (V. J. P.)

KARA MUSTAFA (1633–1683), Ottoman grand vizier, surnamed "Merzifunli," was a son of Uruj Bey, a famous cavalry officer of Merzifun (Merzifon), and brother-in-law of Ahmed Köprülü (*q.v.*), whom he succeeded as grand vizier in 1676. After conducting an unsuccessful campaign in Poland, he responded to the appeal for aid made by the Hungarians under Imre Thököly (*q.v.*) when they rose against Austria, his hope being to seize Vienna and extend Ottoman domination throughout central Europe. The plan was foiled by the heroic resistance of Vienna and its timely relief by John III (Jan Sobieski), king of Poland, in 1683. Kara Mustafa was beheaded at Belgrade in the same year and his head was brought to the sultan on a silver dish. He was one of the cruelest and most ambitious grand viziers of Turkey. *See* also Turkey: *History.* (X.; E. Z. K.)

KARAMZIN, NIKOLAI MIKHAILOVICH (1766–1826), Russian historian, journalist, essayist and poet, a prominent figure in the sentimentalist movement in Russian letters at the end of the 18th century, was born at Mikhaylovka, on Dec. 12 (new style; Dec. 1, old style), 1766, the son of a landowner in the Simbirsk province. Educated in Moscow, he began to publish articles and translations shortly after leaving school. In 1789–90 he spent 18 months in western Europe, including Germany, France, Switzerland and England. Upon returning to Russia he described these experiences in his *Pisma russkogo puteshestvennika* ("Letters of a Russian Traveler"), the most important of his contributions to a monthly review, *Moskovski zhurnal* ("The Moscow Journal," 1791–92), founded by himself. These memoirs, influenced by Rousseau and other western writers, helped to introduce the cult of literary sensibility into Russia. Karamzin's short story *Bednaya Liza* ("Poor Liza," 1792), about a village girl who commits suicide after a tragic love affair, became the most celebrated work of the sentimental movement. In 1802 he started a political review, *Vestnik Evropy* ("The Messenger of Europe"), but in the following year abandoned this in order to devote himself wholly to historical research. From this time onward he was a friend of the tsar Alexander I to whom he submitted a memorandum in 1811, *Zapiska o drevney i novoy Rossii* ("Note on Ancient and Modern Russia").

By now Karamzin had moved from a relatively liberal position in politics and was beginning to appear as a pillar of autocracy, a trend which coincided with the tsar's own movement away from the liberalism of his early years on the throne. It is to the glorification of autocracy that Karamzin's greatest work, the 12 volume *Istoriya gosudarstva rossiyskogo* ("History of the Russian State," 1816–29), is devoted. This was the first full and carefully written study of Russian history to have been produced. Its vivid narrative manner and effective style have secured it a permanent place as a literary monument, though as history it has been largely superseded by later research. The "History" was a work of major importance in guiding the evolution of Russian literary prose, which, when Karamzin began writing, was a stiff and unwieldy implement. He sought to bring written Russian closer to educated speech, to moderate the use of the cumbrous and antique locutions known as "Slavonicisms," and to equip the language with a full cultural vocabulary, such as was still partly lacking at the beginning of the 19th century. Many of his verbal innovations were adapted from French. His pioneering work as a stylist annoyed more conservative theoreticians, notably A. S. Shishkov, whose circle preferred Slavonic to western linguistic influence. Karamzin's supporters, including Pushkin, formed a society called Arzamas to support his reforms, which became the basis of literary Russian as it continued to develop. Karamzin died on June 3 (N.S., May 22, O.S.), 1826, in the Tauride palace in St. Petersburg. (R. F. Hi.)

KARA SEA (Karskoye More), a shallow sea (not more than 620 ft. deep) covering the continental shelf north of Siberia between Novaya Zemlya and Severnaya Zemlya. A part of the Arctic ocean, it is ice-covered for about nine months in the year, but in the summer large portions become accessible to shipping. Its southern coast was first described by members of the Russian Great Northern expedition of 1733–43, and because of energetic Soviet work since 1925, the whole sea has been reasonably well charted. It is used by ships, predominantly Soviet, passing along the Northern Sea route (*q.v.*), of which the Kara sea contains the most westerly section, and by those going to the mouth of the Yenisei (the Kara sea route), in particular to transport timber and mineral products from the river ports of Igarka and Dudinka, which serves Norilsk. It receives the Ob, Yenisei and Pyasina rivers and its main seaport apart from the river ports mentioned, is Dikson off the mouth of the Yenisei. (T. E. A.)

KARATEPE, "black hill," is located in the rugged forested piedmont country of the Taurus range in the Maras *il* of southern

Turkey, on the west bank of the Ceyhan river (the ancient Pyramus) where it flows down to the Cilician plain. There, about five hours' horseback ride from the town of Kadirli, near an old caravan road (the "Akyol") an archaeological team led by H. T. Bossert and H. Cambel discovered in 1945 the ruins of a Late Hittite fortress city dating from the 8th century B.C.; annual systematic exploration work was thereafter carried on, beginning in 1947.

The short-lived settlement at Karatepe was of relatively modest dimensions, with a polygonal fortress wall, topped at regular intervals by 28 rectangular towers, surrounding the summit of the hill; additional fortification walls are discernible on the overgrown hillsides, running down toward the river. The fort was approached via an upper and a lower gateway of monumental proportions, provided with ramps and towers and decorated with lions and sphinxes. The gate chambers are lined with inscribed orthostates, and the walls exhibit *in situ* a veritable gallery of well-preserved sculptured slabs, mostly of crude artistry but showing intensely interesting traces of Assyrian and Egypto-Phoenician motifs and influences. The upper (southwest) gate leads via a winding staircase to the entrance of a building containing a statue on a base of two bulls. The lower (northeast) gate is well-preserved, giving access to a street which led to the heart of the citadel. The palace building on the summit was of familiar type, with rows of rooms surrounding a central court.

The peculiar importance of Karatepe lies in its inscriptions. At the very first a long Phoenician text was discovered, carved on the back of an overturned royal statue. The gateways were found to contain extensive versions of the same royal inscription covering the ornamental lions, whole epigraphic orthostates and the bases of contiguous sculptured slabs. On entering, the walls to the left contained what has proved to be the longest extant Phoenician inscription, while those to the right were carved with so-called Hittite hieroglyphs, the peculiar writing system which was used for monumental purposes in the Hittite empire and served as the predominant graphic medium in Late Hittite city communities like Karatepe during the early 1st millennium B.C. The partial decipherment of this script had previously revealed a southern Anatolian vernacular related to the Indo-European Hittite language; when the Karatepe texts were proved to be Phoenician-hieroglyphic bilinguals, many interpretations were confirmed and large additions were made to the knowledge of this hieroglyphic script and language.

According to the first-person testimony of the text the founder and ruler of the city was one Asitawandas, king of the Danuna, a vassal of Awarikus of Adana. He controlled as well a second stronghold, perhaps the smaller fort of Domuztepe which was simultaneously discovered on the opposite (east) bank of the Ceyhan. Asitawandas claims descent from the "House of Mopsus," who is known in Greek legend as an *émigré* from Ionia and founder of nearby Cilician Mopsuestia (modern Misis). A further comparison of the Danuna with the Dananians of Egyptian records and the Homeric Danaoi has raised a host of historical problems. In Asitawandas' contemporary world his overlord, Awarikus, is plausibly identifiable with the Cilician ruler "Urikku of Kue" in the Assyrian records of Tiglath-pileser III (*c.* 735 B.C.). The Assyrians probably proved the city's undoing somewhere around the year 700, when the last remaining principalities in the region were subjugated. The sudden fiery ruin of the community left numerous orthostates unfinished, now providing valuable insights into their stonecutters' artistic methods.

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KARAVELOV, LYUBEN (1834–1879), Bulgarian writer and revolutionary who contributed to the national reawakening of his country, was born at Koprivshtitsa. He emigrated to Russia at the age of 23 and soon began contributing to widely read Russian newspapers. Under the influence of the Pan-Slavs he pleaded in his writings for the reunion of the Balkan Slavs into a federation leaning on Russia. Revolution was in the air in the 1860s in many parts of Europe, including Russia. For his contacts with Russian revolutionaries Karavelov came under police observation, but the Pan-Slavs saved him from serious trouble. A short stay in Serbia ended with his expulsion (1868) for criticizing the government; he went to Austria where he was imprisoned as a Russian spy. In 1870 Karavelov settled down in Rumania and took a leading part in the Bulgarian Revolutionary organization. In collaboration with Khristo Botev he issued propaganda to be spread throughout the Balkans. In 1876 a premature and ill-organized rising in Bulgaria was crushed with great cruelty by the Turks. This eventually led to the Russo-Turkish War of 1877–78, which ended with Bulgaria's liberation. Karavelov returned to Bulgaria and died at Ruse in 1879. As a political writer and revolutionary he consistently advocated the idea of Balkan union. His many novels—notably *Bulgari ot staro vreme* (1872), *Slava* (1872) and *Mamino Detentse* (1876)—and short stories left deeper and more lasting marks on Bulgaria's literature. A collected edition of his works in eight volumes appeared in 1886–88. (N. I. M.)

KARBALA (KERBELA), capital of a *liwa'* (province) and principal holy city of Iraq, lies 60 mi. S.S.W. of Baghdad on the Husayniyah canal, 20 mi. S.W. of the Euphrates river system and almost on the edge of the western desert. Pop. (1957) 60,804. To the east lies a belt of marsh, and the town is encircled, other than on the west, by irrigation channels. Its original function, which still exists, was that of a market where locally produced dates, cereals and manufactured goods were exchanged for the pastoral products of the Bedouin and sheep-rearing areas to the west. In A.D. 680, however, the town was the site of a battle between Sunni and Shi'a Muslims, following which Husain, the leader of the Shi'a sect, was put to death, and Karbala thenceforward became, with its nearby sister town Najaf (*q.v.*), a principal centre of Shi'a Muslim pilgrimage. Burial in these towns is considered a means of ensuring entry into paradise. Karbala has frequently been a centre of disaffection against the rulers in Baghdad, whether Ottoman Turk, British or Sunni Muslim.

The present town comprises an old walled centre, with newer quarters to the south. In the old town are two great shrines: Sahan al Husain and Hadhrat al Abbas, commemorating Husain, son of Ali, and his half brother Abbas, with bazaars and shops between. Another sacred site is the Khaimgah, marking the site of Husain's tent before the battle. The town functions as a departure point for pilgrimage from Iraq and Iran direct to Mecca. A branch line joins the Baghdad-Basra railway north of Hillah. A further source of revenue since the 18th century is the Oudh bequest, left by an Indian raja for support of the faithful. About one-half of the resident population is Persian by origin or descent, and there are a number of Indians and Pakistanis. During the season of Muharram the population may increase to over 100,000.

KARBALA LIWA' (area 2,619 sq.mi.; pop. [1960 est.] 237,319) is virtually limited to the region of the two holy cities of Karbala and Najaf, and includes a mainly agricultural population, together with a few tribal groups, some of them nomadic. (W. B. FR.)

KARCAG, a town of eastern Hungary in Szolnok *megye* (county), is mainly a focal point of communications. Pop. (1960) 26,098 (mun.). It is the railway junction between the main line from Budapest to Debrecen and the line which runs northwest to connect with the Budapest-Miskolc railway. The highway from Budapest to the eastern Hungarian towns also passes through Karcag. The town is within that part of northeast Hungary which appears to have useful resources of natural gas. (H. G. S.)

KARELIAN AUTONOMOUS SOVIET SOCIALIST REPUBLIC (KARELSKAYA AVTONOMNAYA SOVETSKAYA SOTSIALISTICHESKAYA RESPUBLIKA) of the Russian Soviet Federated Socialist Republic, U.S.S.R., lies in the northwest of European Russia, between the Finnish frontier on the west and the White sea on the east, extending from Lake Ladoga in the south to the Gulf of Kandalaksha (Kandalakshski Zaliv) in the north, and covering an area of 66,564 sq.mi.

Physical Geography.—The terrain, which slopes very gently down from the Manselkya heights along the Finnish frontier to a

broad, flat and very swampy coastal plain, consists of a shield of ancient crystalline rocks, chiefly granites and gneisses. The whole area was greatly affected by the Ice Age which shaped its characteristic surface features. In the southern half of the republic are long, narrow ridges of glacial deposition, known as *selgi,* orientated roughly northwest to southeast. Between them are long, finger-shaped lakes and swampy depressions. Farther north ice action has largely scraped the basement rocks clear of surface deposits and in the ice-scraped hollows are many broad lakes. In all there are about 50,000 lakes in Karelia taking up nearly one-quarter of the surface area. The largest are Lakes Ladoga and Onega in the south, and Vygozero, Segozero, Top-ozero and Kuyto in the north. The presence of hard rocks at the surface causes innumerable rapids in the many rivers, of which the most important are the Vyg, Kem, Pongoma and Keret, all flowing to the White sea. Almost the entire land surface of Karelia is in either forest or swamp. The forest is dense taiga dominated by pine, spruce and birch, with groves of alder and willow along rivers or in swampy areas. A high proportion (89%) consists of mature and over-mature trees. The swamp is mostly sphagnum peat bog. Soils are very thin and poor podsols or bog soils. The climate is severe but frequently modified by incursions of Atlantic air masses which can bring thaws even in midwinter. Average temperatures for February, the coldest month, range from −9° C. (15° F.) in the south to −14° C. (7° F.) in the north. Arctic air masses moving in can bring very low temperatures, down to −46° C. (−50° F.). Summers are short and cool and liable to frosts, with average temperatures 16°–17° C. (61°–63° F.) in the south and 13°–14° C. (55°–57° F.) in the north. Precipitation, much coming in the form of snow, varies from 21 in. a year in the south to 16 in. in the north. Snow cover can be as much as 40 in. thick in the Ladoga region. Fauna include brown bear, fox, wolf and reindeer.

History.—Eastern Karelia has been part of Russia since Novgorod fur hunters penetrated the area in the 12th century, a possession recognized by the 1323 treaty of Nöteborg. Western Karelia, including Vyborg, was obtained by Peter the Great from Sweden by the 1721 treaty of Nystad, but this area was reunited with the grand duchy of Finland in the 19th century when Russia obtained suzerainty over all Finland. With the Revolution and the proclamation of Finnish independence, fighting took place in Karelia between the Red armies and the Finns, who were aided by a small British expeditionary force based in Murmansk. The 1920 peace treaty left eastern Karelia in Soviet hands and western Karelia to Finland. As a result of the "Winter War" of 1939–40 western Karelia was annexed by the U.S.S.R. and, although in World War II the Finns reoccupied western and parts of eastern Karelia, including Petrozavodsk, the 1947 peace treaty confirmed the annexations. Almost the entire Finnish population of western Karelia moved into Finland. The Soviet area was formed in 1920 as the Karelian Workers' commune and, after two increases in area, in 1923 became the Karelian Autonomous S.S.R., with a further increase of area in 1924. In 1940, after the addition of western Karelia, the Karelo-Finnish S.S.R. was set up, with full union republican status. This, however, was abolished in 1956 and the area reverted to its present title and status.

Population.—By the 1959 census the republic had 651,346 inhabitants. Of these 415,918, or 64%, were urban, living in 12 towns and 37 urban districts. The largest towns are the capital, Petrozavodsk (136,294), Belomorsk, Kem, Medvezhyegorsk, Kondopoga and Sortavala. The villages of Karelia are mostly very small, the largest, with up to 250 inhabitants, being the fishing villages along the shores of the White sea and Lakes Ladoga and Onega. The Karelians, who ethnically and linguistically are very closely related to the Finns, numbered 167,000 in the entire U.S.S.R. in 1959, of whom 164,000 lived in the Russian S.F.S.R. Clearly, within the Karelian S.S.R. they are heavily outnumbered by Russian settlers. Finns numbered 93,000 in the U.S.S.R., including 72,000 in the Russian S.F.S.R.

Economy.—The oldest industry of Karelia is ironworking which developed there as early as the 17th century, especially at Kunga and Kizhi. Peter the Great gave the industry considerable impetus to supply his new capital of St. Petersburg. He founded an ironworks and munitions plant in 1703 at Petrozavodsk, which means Peter's factory, and others at Povenets and Konchezero. At the present time iron ore is mined at Pudozh east of Lake Onega, where it is found together with titanium, and at Gimoly in central Karelia. The metallurgical industry is now concentrated in Petrozavodsk and Vyartsilya near the Finnish border. Other minerals exploited are copper at Medvezhyegorsk and Pitkyaranta, pegmatite, chiefly round the Chupa gulf in the north, and mica at Chupa and in the south near the Svir river. The largest industry is timber cutting and working. This developed in the 19th century but only reached a large scale by mid-20th century as more southerly forests became increasingly exhausted. Timber is cut throughout the republic and the logs floated down the rivers to sawmilling centres on the Kirov railway or White Sea canal, such as Kem, Keret, Belomorsk and Solomennoye, near Petrozavodsk. Large quantities of saw timber, pit props and railway ties are sent to other parts of the U.S.S.R. Much timber is processed in the republic. Paper and pulp are made at Segezha, Kondopoga, Suoyarvi, Pitkyaranta, Kharlu and Lyaskelya. Furniture, veneer and prefabricated houses are produced at various places and skis are a speciality of Petrozavodsk. Agriculture is greatly limited by the environment and occupies less than 3% of the total area, largely in small patches in the south especially round Petrozavodsk. Of this only one-third is arable, where rye, oats and vegetables are grown. The pasture lands are used to support dairy cattle. Fishing is very important on lakes, rivers and especially the White sea. Belomorsk and Kem are the chief fishing ports. The main axis of communications is the standard-gauge Kirov railway, built in World War I from Leningrad through Petrozavodsk to Belomorsk and along the White sea coast to Kandalaksha and on to Murmansk. Nearly all the towns are along this line. Equally important is the White Sea canal, built by penal labour in 1931–33 from Belomorsk on the White sea to Povenets on Lake Onega, which together with the canalized Svir, Lake Ladoga and the Neva river, links the Baltic and White seas. It is capable of taking ocean-going ships and is of the greatest commercial and strategic importance. (R. A. F.)

KAREN (KAYIN), a Burmese term applied to a variety of tribal peoples of southern Burma. Little scientific research has been carried out among them and available evidence is confusing. About 70% belong to one or the other of two endogamous groups, the Sgaw and the Pwo (terms meaning male and female respectively). These White Karens are distinguished by dress from the Red Karens (also called Karenni, Kaya, Bwè, Bghai). This latter category includes several culturally distinct groups such as Brè, Padaung, Yinbaw, Zayein. Taungthu (hill man) has a less specific connotation. In former times Kayin was a term of contempt, but under the British, Karens were often privileged and there was a tendency for the term to become increasingly comprehensive. During the 19th century the Mon-speaking Talaing population tended to disappear while the number of sophisticated Buddhist Karens increased out of all proportion. (*See* MON.) A substantial section of the modern Pwo-Karen are probably of Talaing origin. The 1931 census listed in all 1,367,673 Karens of whom about 1,000,000 were Buddhist, 250,000 Christian and the remainder animists. This population is dispersed over a wide area, a factor that led to the failure of the British to agree with the Burmese in 1947 over the boundaries of a proposed Karen state (*q.v.*). Since that date a condition of sporadic civil war has prevailed between the Burmese government and various dissident groups calling themselves Karen. Karens occupy areas in the south of the Shan state, in the Karenni (Kayah) and Karen states and contiguous parts of Thailand, and in the Pegu Yoma range in lower Burma, and also an important "island" of Irrawaddy delta land in the civil districts of Bassein, Myaungmya and Henzada. Christian Karens, because of their mission-school education, form a particularly influential section of the community.

The success of the early Christian missions is attributed to an ancient Sgaw Karen prophecy foretelling that the Golden Book of their god Y'wa would be returned to them by a white man. Karens show a tendency toward religious syncretism. From 1832

onward, a succession of messianic prophets appeared and founded short-lived personal churches that combined elements of Christian and Buddhist teaching with features of traditional Karen animism. During the British period a sentiment of Karen nationalism was fostered not only by the missions but by the formation of special Karen units in the Burmese army. By the 1960s the principal unifying factor among Karens was a common distrust of Burmese political domination, and the assimilation of this large, unco-operative minority into the Burmese state was the most pressing Burmese political problem. It must be stressed that Karens are not a unitary group in any ethnic sense, and most sources of reference are in this respect misleading. *See* BURMA: *The People.*

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KAREN LANGUAGES are spoken by about 1,250,000 people in lower Burma and on the borders of Thailand. The relationship of these languages has been much debated in the past, but research, much of it unpublished, particularly that of G. H. Luce of Rangoon university, points to a Tibeto-Burman basis, with Austroasiatic and Tai influence of probably very ancient date. The relationship with Burmese, though hardly to be doubted, is not close. Syntactically the languages follow the common Austroasiatic or Tai pattern, with the verb placed between subject and object, rather than that regarded as typical of Tibeto-Burman languages, in which the verb follows both subject and object. There are many dialects, all of which are tonal and predominantly monosyllabic in type, but with a fair proportion of words with unaccented prefixes. There is a rich variety of vowel sounds, including in some dialects (*e.g.*, Pwo) both oral and nasalized vowels. The number of tones appears to be in inverse ratio to the use made in syllable structure of consonantal differences. The southern dialects (*e.g.*, Pwo and Sgaw), with five or six tones, have no consonants at the end of syllables other than the glottal stop and make very little use of the distinction between surds and sonants at the beginning of syllables. The central dialects (*e.g.*, Bwè, Geba), which regularly distinguish between initial surds and sonants, have only three tones. The northern dialect, Taungthu, which has final consonants, has only two tones. Of the many dialects spoken, only two of the southernmost, Sgaw and Pwo, have recognized written forms. Both the Sgaw and Pwo writing systems, which differ slightly from each other, were devised by missionaries in the last century. They are based on the Burmese script, but with important differences in the conventions attached to the symbols, and with the addition of special symbols to mark the tones. *See* also SOUTHEAST ASIAN LANGUAGES.

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KARENNI STATES, the name formerly given to the three states of Kantarawadi (area 3,161 sq.mi.; pop. [1931] 30,677), Kyebogyi (790 sq.mi.; pop. [1931] 14,282) and Bawlake (568 sq.mi.; pop. [1931] 13,802), which lay to the south of the Federated Shan States and east of Burma proper when Burma was a province of British India. From Oct. 1, 1922, the three states were administered by the commissioner of the Federated Shan States. The constitution of the Union of Burma of Sept. 24, 1947, proclaimed that the three states should form a constituent unit of the union and be known as the Karenni state. It was constituted on Jan. 14, 1952, with the addition of Mong Pai, and the name was changed to Kayah state (*q.v.*). (L. D. S.)

KAREN STATE, a constituent part of the Union of Burma from Sept. 24, 1947, when, according to the constitution then adopted, the Salween district and certain undefined adjacent areas were designated as the Karen state. The Karens, however, considered both the degree of autonomy accorded to them and the territory of the proposed state inadequate (*see* KAREN). The independence of Burma meant for them only a change of suzerainty and a change for the worse, for they were despised by the Burmese (Karen in Burmese means "wild man"). When the central government in 1948 began calling in the Karens' arms to equip its own supporters, the Karens' National Defense organization (K.N.D.O.) rallied and occupied all the allegedly Karen territory east of the Sittang river, besides many localities in the Irrawaddy delta, thus beginning a long rebellion.

The Karens seemed determined to continue their resistance until their demand for an autonomous Karen state was conceded. An effort to conciliate them was made by act xiv (1952) establishing the Karen state, comprising the Salween district and the adjoining townships of Kya-in, Kawkareik, Hlaingbwe, Pa-an and Thandaung. The Karen state government was formed, with headquarters at Rangoon; its power of administration over the state was to begin when law and order were declared restored by the president of the Union of Burma.

Karen state was formally inaugurated on June 1, 1954, with Pa-an as its capital. In the period 1957–59 Pa-an was linked by tarred motor road with Hlaingbwe, an airfield was completed, government buildings were constructed and a hospital was built.

The state (area 11,091 sq.mi.; pop. [1962 est.] 627,600) is a long narrow area stretching from north to south with high forested hills on the Thai border to the east and with lower hills covered with tropical rain forests but largely ruined economically by shifting cultivation (*taung-ya*) over much of the remainder. The centre of the state is traversed by the Salween river and it is on the alluvial lands by this and other rivers that the main crop, rice, is grown. In the uplands some sesame and peanuts are cultivated and in the early 1960s experiments were begun with rubber, jute, cotton, coffee, sugar cane and other crops. *See* also BURMA. (L. D. S.)

KARG-ELERT, SIGFRID (1877–1933), German musician, one of the principal composers of organ music of his time, was born at Oberndorf-on-Neckar on Nov. 21, 1877. He studied at the Leipzig conservatory with Karl Reinecke and S. Jadassohn and in 1919 became a professor there. Influenced in his earlier works by Debussy, Schoenberg and Scriabin, he later developed an original style of organ music based on a revival of the early polyphonic composers.

Many of his works, including the 33 *Stilstudien,* conceived in styles ranging from Palestrina to Schoenberg, were written for a type of harmonium, built by Victor Mustel, that he introduced on his numerous concert tours. Among his best-known organ works, many of them first published in England, are his 66 *Chorale Improvisations* and his 20 *Chorale Preludes and Postludes.* He died at Leipzig on April 9, 1933.

See G. Sceats, *The Organ Works of Karg-Elert* (1950).

KARIBA, LAKE, between Zambia and Rhodesia, was formed by damming the Zambezi river in the Kariba gorge, where the river narrows between hills of hard rock 300 mi. below Victoria falls. The concrete-arch dam, 420 ft. high and 2,025 ft. long and carrying a road, was built in 1955–59 for a hydroelectric project with a projected capacity of 1,200 megawatts to serve the copper-belt towns of Zambia, the Salisbury and Buluwayo areas and the southern part of Rhodesia. The hydroelectric scheme was officially opened on May 17, 1960.

The land to be flooded, about 2,000 sq.mi. in area, was sparsely populated, but about 51,000 primitive river dwellers of the Thonga or Tonga group were resettled. As the water rose, game rangers removed numerous animals from islands and inundated areas to dry land and 375 sq.mi. of bush were cleared for inshore fishing areas. The lake extends upstream 175 mi. to Devils gorge and has a maximum width of 20 mi., with a deeply indented shore and many islands. Its water level is normally 1,590 ft. above sea level and its depth irregular (280 ft. near the dam); its capacity of 130,000,000 ac.ft. when full compares with 30,000,000 ac.ft. for Lake Mead formed by Hoover dam in the U.S., but was ex-

pected to be exceeded by the lake formed by the Aswan high dam in Egypt. Four harbour sites were planned and the waters, stocked with *Tilapia*, were expected to yield 10,000 tons of fish annually, but during the 1960s fishing and navigation were being hampered by overgrowth of the waterweeds *Salvinia auriculata* and *Pistia stratiotes* (Nile cabbage). (R. T. Ba.)

KARIERA, an aboriginal tribe of Western Australia that has become one of the type groups for the study of Australian social organization and religion. The Kariera originally occupied the coastal and neighbouring inland regions in the vicinity of the De Grey river. The tribe had no central organization but was composed of about 20 to 25 local groups, each with its own territory of 100–200 sq.mi.; there was an average of about 30 persons per group. Groups were patrilineal and exogamous; wives came to live in the husbands' territory. Members of the local group (or horde) often camped together, each family of parents and children having its own shelter; unmarried men camped together. The local group (or clan) was named after a plant or animal species and served as the religious or totemic unit. In each region was a ceremonial ground or totem centre where the men performed rituals designed to increase the species after which the group was named (*see* Totemism). No agriculture was practised aboriginally; men hunted and fished and women gathered wild seeds and roots.

The tribe was unified by language, common customs and by an extensive kinship network. There were four named tribal divisions or sections, and when a man of one section married a woman of another, the children became members of a third section. This pattern has been shown to be related to a division in terms of matrilineal moieties and cross-cutting patrilineal moieties, as well as to cross-cousin marriage. A social organization of the Kariera type was widespread in aboriginal Australia. In some regions it has developed into more elaborate systems involving eight subsections and more complex marriage practices.

See also Kinship Terminology; Arunta.

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KARIKAL, a town of the centrally administered state of Pondicherry (*q.v.*), India, but geographically within the Tanjore district of Madras. It lies between Tranquebar and Nagore on the Coromandel coast, 1½ mi. from the mouth of the Araslar, a distributary of the Cauvery (Kaveri), and 90 mi. S. of Pondicherry. Pop. (1961) 22,252. Karikal is the chief town of the former French settlement, which became part of India in 1954. At that time the settlement consisted of 110 villages with a total area of 52 sq.mi. in the fertile Tanjore delta, the most important rice-producing area of Madras. The present commune has a total area of 7 sq.mi. The exceptional fertility of the region is to some extent reflected in the unusually high density of its rural population, in parts more than 2,000 persons per square mile.

The town is on a branch line, the Mayavaram-Peralam route, of the Southern railway. Its port is an open roadstead; it has a lighthouse 142 ft. high with a visibility of eight to ten miles.

Sayaji, the exiled raja of Tanjore (*see* Thanjavur), promised to grant Karikal to the French in 1738 in return for their help in restoring him to power. As he failed to keep his promise, the grant was obtained from him by force in 1739 with the assistance of Chanda Sahib, who was at war with Sayaji. A further grant of 81 villages followed in 1839 under similar circumstances. The English captured Karikal in 1760 and restored it in 1765. This recurred on three subsequent occasions. It was, however, finally restored to the French in 1817 with the stipulation that no fortifications were to be erected nor was an army to be stationed there. *De facto* transfer to India of the former French possessions, including Karikal, took place in Nov. 1954, and the *de jure* transfer in 1956. It is now directly administered by the government of India through a chief commissioner at Pondicherry. (G. Kn.)

KARIM SHAHIR, a shallow mound of archaeological interest in the Kurdish hills of northeastern Iraq, near Jarmo (*q.v.*). It has yielded artifacts that suggest a level of very primitive and incipient cultivation. At least two other sites in the same environmental zone, M'lefaat and Zawi Chemi Shanidar, have yielded roughly similar material. Karim Shahir cultural development probably represents the very beginnings of a transition from general food collecting to food production. The Karim Shahir level has been dated by radiocarbon at about 8750 B.C. (*see* Archaeology: *Prehistory: The Old World of the Recent Period: The Rise of Village-Farming Communities in the Near East*). (R. J. B.)

KARKAR, an ancient fortress on the Orontes (Al 'Asi) river northwest of Hamah, about equidistant from Hamah and Latakia in Syria. Karkar was strategically located for the protection of Hamath (modern Hamah), and a coalition of Aramaeans and allies fought against Shalmaneser III of Assyria in 853 B.C. at Karkar. While Bar-Hadad I of Damascus (Hebrew, Ben-Hadad; throne name, Hadadezer; Akkadian, Adad-idri) and Irhuleni of Hamath led the host, Ahab of Israel was an important ally who provided 2,000 chariots and 10,000 foot soldiers; Bar-Hadad supplied only 1,200 chariots and Irhuleni 700. The Assyrian "Monolith" inscription, now in the British museum, reports an Assyrian victory, but since Shalmaneser advanced no farther into Syria, the battle was probably fought to a stalemate. Assyrian claims for the number of men slain in the battle range from 14,000 in the "Monolith" inscription to 29,000 on a statue from Ashur.

In 720 B.C. Arpad, Simirra, Damascus and Samaria were induced to revolt against Assyria and joined Ia'ubidi, king of Hamath, in battle against Sargon II of Assyria at Karkar. Sargon defeated his enemies, captured and burned Karkar, flayed Ia'ubidi alive and made Hamath an Assyrian province. (J. S. I.)

KARLFELDT, ERIK AXEL (1864–1931), Swedish lyrical poet who received the Nobel prize for literature posthumously in 1931 after refusing it in 1918. He was born at Folkärna, in the province of Dalarna, July 20, 1864, of peasant stock, and his work showed the influence of his rural homeland and upbringing. He studied at Uppsala, but his father's loss of fortune and early death forced him to spend several years as a schoolmaster before taking his degree in philosophy in 1898. He was an assistant at the royal library in Stockholm (1900–03) and librarian of the academy of agriculture (1903–12). He was elected to the Swedish academy in 1904, and became its permanent secretary in 1912. He died in Stockholm on April 8, 1931.

Karlfeldt's poetry is remarkable for its transmission of sensual impressions rather than for intellectual content. His rich poetic orchestration depends on an acute sensitivity to physical sensation —colour, sound, scent and touch. In *Fridolins visor* (1898) and *Fridolins lustgård och Dalmålningar på rim* (1901) he depicts the scenery and people of his native province and with warmth, humour and nostalgic sadness recalls the traditional folk culture, then threatened by the modern age. Fridolin, a dashing independent yeoman farmer, who has had a scholarly education, and is also a poet and dreamer, has much in common with Karlfeldt himself. *Flora och Pomona* (1906) shows wilder and more primitive elements: especially in the famous cycle about witches. *Flora och Bellona* (1918) contains some poems which treat contemporary society and wartime conditions with withering scorn. His last collection, *Hösthorn* (1927), is marked by a more religious, contemplative and personal note, but retains Karlfeldt's highly individual style: a baroque mixture of archaic vocabulary, artistic playfulness and strength drawn from rural themes and symbols.

Selected poems were translated by C. W. Stork as *Arcadia Borealis* (1938). (L. G. G. T.)

KARLI, a village in Poona district, Maharashtra, India, famous for its rock-cut chaitya or Buddhist sanctuary, lies 32 mi. N.W. of Poona. The chaitya is of the normal lapsidal plan, 124 ft. long, 46 ft. 6 in. wide and about 45 ft. to the crown of its teak-ribbed vault. Dedicated in the first quarter of the 2nd century A.D., it is the largest and most elaborate of the cave temples of Hinayana (early, doctrine-emphasizing) Buddhism. Karli differs from earlier chaityas in that its entrance screen—other than the teak-wood lotus window—is of stone; and the nave columns are elaborated with vase bases and campaniform capitals crowned with groups of figures riding elephants. The effect is at once simple and grand, and marks the apex of the early period of

rock art in western India. The entrance-screen reliefs date from the sanctuary's conversion for Mahayana (later, Buddha-worshipping) ritual, probably in the 6th century A.D.

See P. Brown, *Indian Architecture (Buddhist and Hindu Periods)*, (1949); S. K. Saraswati, *History and Culture of the Indian People*, vol. 11, ch. xx (1953). (F. R. A.)

KARL-MARX-STADT (until 1953 CHEMNITZ), a town of Germany which following partition of the nation after World War II became capital of Karl-Marx-Stadt *Bezirk* (district) in the German Democratic Republic. It stands on the Chemnitz river at the foot of the Ore mountains, 81 km. (50 mi.) W.S.W. of Dresden by rail. Pop. (1961 est.) 286,100. The town was severely damaged in World War II. The Street of the Nations leads from the main station to the market place, in which are the medieval and modern (1911) town halls. It passes through Schiller square, where stands a memorial to Marx and Engels, and where is also the academy of machine construction (founded as an industrial school in 1836), and also through Theatre square, which contains the opera house, a museum and the Red tower, one of the oldest buildings, originally built as a courthouse. The Schlossbergmuseum, to the northwest, originally a Benedictine monastery founded in 1136, was fortified as a castle in 1546. Its late Gothic hall church and the "Stiftskirche" of Ebersdorf contain valuable sculptures. There are an institute of education and various technical colleges. The town has good communications, including easy access to the eastern German Autobahn network. It is an expanding industrial centre producing stockings, gloves, underwear, textiles, heavy and light machinery, chemicals and other goods.

In the 12th century Chemnitz was a trading place on a salt route to Prague. As a result of the grant in 1357 of a monopoly in bleaching it became a centre for the textile industry. In the 17th century hosiery manufacture was added to linen and cotton weaving, and in the 19th century, stimulated by the development of the coal and lignite fields of middle Saxony, the machine construction industry began. The first German machine tools and the first German locomotive were made there.

KARL-MARX-STADT BEZIRK consists of the southwestern portion of the former *Land* (state) of Saxony. Area 2,320 sq.mi. Pop. (1961 est.) 2,098,592. Hard coal is mined in the Zwickau-Oelsnitz region and there are uranium deposits in the south near the Czechoslovakian frontier.

KARLOVAC (Ger. KARLSTADT; Hung. KÁROLYVAROS), a town and *kraj* of Croatia, Yugos., lies 57 km. (35 mi.) S.W. of Zagreb by road. Pop. of town (1961) 39,803. It has Orthodox and Roman Catholic cathedrals and the oldest public library in Croatia. An important railway and road junction, Karlovac has a considerable transit trade in timber, grain, wine, spirits and honey. In the town are woolen mills, tanneries, boot and chemical factories. The fortress of Karlovac was built in 1579 to stem the advance of the Turks and was named for the Habsburg archduke Charles, the first commander of the military frontier against the Turks. The latter made several unsuccessful attempts in the 16th and 17th centuries to capture the fortress. (V. DE.)

KARLOVCI, SREMSKI (Ger. KARLOWITZ; Hung. KARLÓCA), a town in the autonomous province of Vojvodina, Serbia, Yugos., lies 64 km. (40 mi.) N.W. of Belgrade on the main railway and road from Belgrade to Subotica. Pop. (1961) 6,383. The fruit farms and vineyards of the Fruska Gora range to the south yield excellent plum brandy and red wine. From the early 18th century Karlovci was the seat of the Serbian Orthodox metropolitan and the centre of the cultural and political life of the Serbs in the Habsburg lands. Buildings remaining from that time include the cathedral and the palace of the patriarch. In 1731 the first Serbian high school was established there. In 1848–49 the city was the headquarters of Serbian opposition to Hungary. An obelisk at Slankamen, 21 km. (13 mi.) S.E., commemorates the defeat of the Turks by Louis of Baden in 1691. The treaty of Karlovci between Austria, Turkey, Poland and Venice was concluded in 1699. In 1918 Karlovci, with the Vojvodina, became a part of Yugoslavia. (V. DE.)

KARLOVY VARY (CARLSBAD; Ger. KARLSBAD), a celebrated spa in West Bohemia region, Czech., lies at the junction of the Tepla and Ohre rivers 70 mi. W. of Prague. Pop. (1961) 46,877; in 1936 the great majority of inhabitants were German speaking. The Tepla valley near the confluence is deeply entrenched in the northern part of the Tepla plateau, and the ancient granitic rocks which form this highland area were subject to the volcanic eruptions and intrusions of Tertiary times. This volcanic activity accounts for the number and character of the thermal springs. The word *tepla* means "warm," and the word *var* itself means "boiling." Vridlo is the Czech name for the great Sprudel, the geyser which forms the main supply of the spa; of the 19 springs, 17 are hot and 2 are cold.

The emperor Charles IV is often cited as the discoverer of the springs, but they were certainly known long before his time (1316–78). The town grew steadily in the 18th and 19th centuries because of the valued medicinal properties of the spring water (mainly sulfate and bicarbonate of soda, sodium chloride, potassium sulfate and bicarbonates of magnesium and lithium). Before World War I it was a gathering place of the wealthy invalids of Europe, and the town, spreading up the steep, wooded slopes, retains the framework of its fashionable past. The Carlsbad decrees (*q.v.*) of 1819, devised to discipline liberalist university education in German hands, were framed there. There are glass and porcelain industries, both of long tradition. (H. G. S.)

KARLSEFNI, THORFINN: *see* THORFINN KARLSEFNI.

KARLSKOGA, a town of Örebro *län* (county), Sweden, situated on Lake Möckeln. The town was incorporated in 1940, and by boundary extensions it increased its population from 23,000 in that year to 35,343 in 1960. It is connected by rail with Stockholm and Oslo, and a major highway runs through the town. Karlskoga is an industrial town whose most important factory is Bofors, world renowned for gun manufacture; Nobelkrut, a division of Bofors, is mainly responsible for explosives. Other industries include clothing manufacture. The most important buildings are the church (*c.* 1400), the town hall (1940) and the community hall with the town theatre. The high school, built in 1957, is one of the most modern school buildings in Sweden. (G. O. M.)

KARLSKRONA, a town of Sweden, capital of the *län* (county) of Blekinge, is an important fortress and naval port on the Baltic coast 550 km. (342 mi.) S.S.W. of Stockholm by rail. Pop. (1961) 33,010. It occupies a group of islands linked by bridges. Its fishing harbour is one of the largest in Sweden; among other industries are telephone, porcelain and hat manufactures. The commercial harbour also is capacious and safe. Exports include sawn wood, pulpwood and fish; chief imports are coal, oil, fertilizer and grain. Notable buildings include the Amiralitetskyrkan (Admiralty church), the oldest building in the town (1685) and the largest wooden church in Sweden; Fredrikskyrkan (King Frederick's church; 1774); the Varvsmuseet (Shipyard museum), and the town hall (1796). Karlskrona was founded by Charles XI in 1679 as a Baltic base relatively ice-free in the winter, and it has been the country's chief naval base since that time. (S. S. A.)

KARLSRUHE (CARLSRUHE), a city of Germany which after partition of the nation following World War II was in the *Land* (state) of Baden-Württemberg, Federal Republic of Germany, is 53 km. (33 mi.) S.W. of Heidelberg and 48 km. (30 mi.) W.N.W. of Stuttgart. Once the capital of the former Baden state, Karlsruhe became the seat of justice of the Federal Republic; both of the highest German courts—the supreme court and the constitutional court—hold their sessions there. Standing like a gateway on the edge of the Black and the Hardt forests, about 5 mi. from the Rhine, the city is easily reached from Baden-Baden, Saarbrücken, Mannheim, Heidelberg, Strasbourg and Stuttgart, and the German wine district of the Rhine Palatinate. It is a rail junction for the Basel-Frankfurt southeast European express lines and junction of the Frankfurt-Basel and Frankfurt-Munich Autobahnen, near the Forcheim airfield. Pop. (1961) 241,929.

Karlsruhe was founded in 1715 by Charles William, margrave of Baden-Durlach, who built his hunting lodge and villa in the middle of the Hardt forest after trouble with the citizens of his family town of Durlach. The town was built round the castle

with the streets fanning out from the castle tower. Frederick Weinbrenner (1766–1826) extended the fanwise ground plan, building in a classical style, and joined the east and west gates of the town by a street (now Kaiserstrasse, the main street of the town). Weinbrenner also built a number of municipal and private buildings near the town hall and the Evangelical and Catholic city churches. Educational establishments include the city technical college, the college of music, the academy of fine arts and the Fridericiana technical college (the oldest school of its kind in Germany, founded in 1825). Scientists who taught at the Fridericiana include Fritz Haber, the Nobel prize winner in chemistry, and Heinrich Hertz, noted for his study of electromagnetic waves.

Places of special interest include the art gallery (works by Mathias Grünewald, Anselm Feuerbach and Hans Thoma), the Art association (permanent collection of contemporary art), and the Pfinzgau museum. Karlsruhe is well known for sports with its Wildpark stadium (capacity 55,000) and the Schöneck sports school, where the German football club often trained. Besides many parks, the municipal gardens and a zoo, there are the Black Forest hall (congress hall), the pyramid in the market place (the town symbol), the mint and the former Prince Max palace (supreme court), near the former archducal palace.

During World War II Karlsruhe sustained severe damage through air raids, especially on Sept. 3, 1943, when 40% of the town was destroyed. After the war, the city was rebuilt and new industries sprang up. Electrical and radio apparatus, machinery and steel products, building equipment, bicycles and motorcycles, perfumes, pharmaceutical products, stockings and jewelry are manufactured and exported.

After 1956 a nuclear reactor to help develop atomic power for peaceful purposes was constructed at Karlsruhe, which is the centre for nuclear research in the Federal Republic. In collaboration with the European Atomic Energy community (EURATOM), the building of the Transuranium Elements institute was begun in 1961. Karlsruhe was made the terminus of a pipeline stretching from Marseilles, France, to Strasbourg and the Rhine, and the beginning of the "Rhine-Danube" pipeline to Ingolstadt. Oil refining facilities were established on the Rhine with a special harbour. The industrial harbour, established in 1901, has grain storage facilities. A satellite town, Waldstadt, was built to accommodate 25,000 inhabitants by 1964. (H. G. Sr.)

KARLSTAD, a city of Sweden, capital of the *län* (county) of Värmland, is situated at the mouth of the Klarälven where it enters Lake Vänern, 330 km. (205 mi.) W. of Stockholm. Pop. (1960) 42,924. Karlstad was almost completely destroyed by fire in 1865 and was afterward rebuilt as a modern city with broad avenues and large parks. Only a few buildings remain from before that time, among them the old grammar school (1754–59) and the cathedral (1723–30). The museum contains comprehensive collections of art and cultural objects from Värmland. The Östra Bron (1761–70) across the Klarälven is an impressive bridge. Karlstad's industry is largely based on forest products and heavy machinery for paper and cellulose. Connected with the ocean via Göteborg and the North sea, it has a large export-import trade. Charles IX founded the town in 1584. It was made a cathedral city in 1645 and the seat of the provincial government in 1779. In 1905 the union of Sweden and Norway was dissolved at Karlstad, and a peace monument was erected in 1955 in memory of that event.

KARLSTADT (Carlstadt), **ANDREAS RUDOLF BODENSTEIN VON** (?1477–1541), German Reformer and pioneer of radical Puritanism in the 16th century, was born in the Franconian village of Karlstadt. He attended the Universities of Erfurt and Cologne, and was trained as a Thomist. In 1505 he was appointed to the new University of Wittenberg, where he combined teaching duties with his religious offices in the *Schlosskirche,* first as canon, then as archdeacon. In 1517 he began to lecture on Augustine's *De spiritu et litera.* He assisted his younger colleague, Martin Luther, in replanning theological studies round Augustine and "the old Fathers." With the opening of the Indulgence controversy, Karlstadt defended Luther and became the protagonist against Johann Eck in the Leipzig disputation of July 1519, in which Luther also took part. His name was added to the papal bull against Luther in 1520. In 1521 he went to Denmark at the request of King Christian II, but the reformation was abortive and he returned in June 1521 when Luther's enforced sojourn in the Wartburg had left his friends to deal with numerous practical problems. Karlstadt published many theses and tracts dealing with clerical celibacy, private Masses and communion in both kinds. Until mid-October it seems that the initiative lay with the Augustinians led by Gabriel Zwilling and on Oct. 19 Karlstadt urged caution against Melanchthon. By the end of the year he had come to the fore as a radical reformer, announcing his betrothal to a girl of 16, Anna von Mochau, and administering Holy Communion to the laity in both kinds on Christmas day, without vestments and with an abridged service.

The magistrates of Wittenberg carried through practical reform in Jan. 1522 which owed something to Luther's ideas and to Karlstadt's initiative, and Karlstadt's iconoclastic tract *Von abtuhung der Bilder* (1522) revealed a radical, legalistic attitude to the Old Testament. It is not clear how much he was influenced by the Zwickau prophets who had come to the city the previous December, or by their ally, Thomas Müntzer, who became his friend, but his own religion had earlier shown mystic traits.

At the beginning of February, Zwilling and Karlstadt were named as authors of the serious revolutionary ferment which eventually forced Luther to leave his hiding place and redress the situation in a series of masterly sermons stressing the need of care for the weaker brethren, against Karlstadt's vehement program of reform without tarrying for any. Karlstadt now dressed as a peasant, calling himself "Brother Andreas," and denounced all academic degrees and distinctions. In 1523 he retired to Orlamünde on the Saale where he displaced his own vicar, Konrad Glitzsch, and introduced his own pattern of reformation. From Jena he published a stream of pamphlets full of mystical jargon and much influenced by J. Tauler and the *Theologia Germanica,* notably *Von dem Sabbat, Was das wort Gelassenheit bedeutet* and *Von mannigfaltigkeit des eynfeltigen willen Gottes.*

Aug. 1524 was a dangerous time in Thuringia, and Luther undertook a preaching tour of the Saale area at the request of his prince. He and Karlstadt met dramatically at Jena when Luther tossed a golden guilder at him in token of open feud. As Luther left Orlamünde Karlstadt preached against him, amid pealing bells. But he had overreached himself and exile followed. He now wrote a series of bitter tracts which did immense harm to Luther's cause by championing a symbolic presence in the Eucharist. Luther had dealt firmly with Karlstadt's legalism in "Of the Heavenly Prophets" (*Wider die himmlischen Propheten*), but the division in the matter of the Eucharist remained an open wound in the Reformation movement. Karlstadt's tract "Shall We Go Slowly?" (*Ob man gemach faren soll*) was read with delight by the radicals from whom the Anabaptists later arose.

During the peasant war, Karlstadt was at Rothenburg ob der Tauber, and though he was no social revolutionary only obtained pardon through the intercession of Luther and by recantation. But he could not remain silent and left Saxony for East Frisia where he joined the equally explosive Melchior Hoffman. In 1530 he went to Basel and Zürich, where the Reformers were kind to him. In 1534 he became professor of Old Testament theology in Basel. There he became involved in a great controversy, setting the university against the pastors led by Oswald Myconius and Simon Grynaeus, and demanding that they be submitted to university discipline and take their doctorates. Thus he who in 1523 attacked a learned ministry now elevated it above the Word and sacraments. At the end of 1541 plague raged in the city. Karlstadt was infected early in December and died on Dec. 24.

Despite his eccentricities an amazing amount of later Puritanism is to be found in the turgid style of his writings. German Protestantism suffered from a lack of such a mystic lay Puritan element as Karlstadt could have supplied had not the personal element bedeviled the situation. He was a persistent troublemaker to the end, frustrating his own many gifts.

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KARMA (sometimes written Karman; Pali Kamma), a Sanskrit noun (from the root *kri,* "to do"), meaning deed or action. As applied to the action of a conscious being, it is the doctrine that every deed, good or bad, receives due retribution. In Hindu thought it has been combined with the doctrine of transmigration, making it possible to explain any apparently undeserved pleasure or pain as a result of deeds done in a previous existence. The doctrine is not found in the earliest Vedic thought, but appears in the Brahmanas, and is fully developed in the earliest Upanishads. It has remained an essential part of the Indian religions that accept the doctrine of transmigration. Both the Jains and the Buddhists took it for granted. The Jains worked it out most consistently by making the extinction of karma essential to the attainment of salvation. The Buddhists interpreted karma strictly in terms of ethical cause and effect. In all sects the doctrine remains a powerful ethical argument, used especially in tales (Avadana, Jataka) invented to illustrate its effects. *See* also Buddhism: *Origins and Development: Developed Doctrines of Early Buddhism;* Jainism: *Philosophy;* Metempsychosis: *Eastern Thought;* and references under "Karma" in the Index. (Ce. H. H.)

KARMATIANS (Carmathians), one of the names applied to the Muslim Shi'ite sect of the Isma'ilis, derived from the name of Hamdan Karmat, the leader of the movement in southern Iraq in the second half of the 9th century, and mainly used for the members of the movement in Iraq, Yemen and more especially Bahrain, during the 9th–11th centuries. The name of the Karmatians became notorious from their insurrection in Syria and Iraq in 903–906, and to the exploits of the Bahrain leader Abu Sa'id al-Jannabi and his son and successor Abu Tahir Sulayman, who several times invaded Iraq and in 930 sacked Mecca and carried off the Black Stone of the Ka'ba. *See* also Isma'ilism.

See S. M. Stern, "Isma'ilis and Qarmatians," *L'Élaboration d'Islam* (1961); "Karmatians," in *Shorter Encyclopaedia of Islam,* pp. 218–223 (1953). (S. M. Sn.)

KARNAK (Al Karnak), a village in Qina governorate, Upper Egypt, which has given its name to the northern half of the ruins of Thebes on the east bank of the Nile, the southern being known as Luxor. *See* Thebes.

KARNAL, a town and district in the Ambala division of Punjab, India. The town lies on the old bank of the Jumna (Yamuna) river, 7 mi. W. of the present channel, and is 73 mi. N. of Delhi on the Grand Trunk road and the main Delhi-Amritsar railway. Pop. (1961) 72,109. It has two degree-granting colleges affiliated to the Panjab university, a mission and civil hospital and a fine marble tomb built by Emperor Ghiyas-ud-din in memory of Bu Ali Kalandar. A new township was built after 1947. Cotton cloth and shoes are manufactured, and a horse fair is held annually.

Karnal District (area 3,062 sq.mi.; pop. [1961] 1,490,430) stretches along the right bank of the Jumna. It is an entirely alluvial plain and 86% is cultivated. The watershed of the Indus and the Ganges drainage systems traverses the district from north to south and 45% of the cultivated area is irrigated by the western Jumna canal, the Sarsuti canal and wells. The principal crops are wheat, sugar cane, cotton, millets, maize (corn), barley and gram.

No district of India can boast of a more ancient history than Karnal, as almost every town and stream is connected with the epic of the Mahabharata (*q.v.*). The town of Karnal itself is said to owe its foundation to Raja Karna, the mythical ally of the Kauravas in the great war which forms the theme of this national epic. Panipat, a town in the south of the district, is also connected with the Mahabharata. During the latter half of the 18th century the Sikhs managed to introduce themselves in Karnal, and in 1767 one of their chieftains, Bhai Desu Singh, appropriated the fort of Kaithal, 14 mi. N. of Karnal. The Bhais, or rulers of Kaithal, were the most powerful of the Cis-Sutlej chiefs until their territory lapsed to the British in 1843.

Panipat (pop. [1961] 67,026), Kaithal (34,890), Shahabad (18,975), Thanesar (16,828) and Nilokheri (8,035) are the most important towns in the district. (O. P. B.)

KÁROLYI, MIHÁLY, Count (1875–1955), Hungarian political leader, president of the short-lived democratic republic (Jan.–March 1919), was born at Fót, near Budapest, on March 4, 1875, of one of the most famous and wealthiest families of the Hungarian aristocracy. After a gay youth spent in fashionable and extravagant pleasures, he entered public life as president of the ultraconservative Landowners' association, then entered parliament in 1910. There he quarreled with the authoritarian Liberal leader, István Tisza, and adopted the cause of the extreme wing of the Party of Independence, with a program which included the maximum of independence for Hungary within the Dual monarchy, far-reaching social and political reforms, concessions to Hungary's non-Magyar populations and a reorientation of foreign policy to one of friendship with Serbia and Rumania and also with Great Britain, France and Russia in place of the Triple Alliance. He had gone to France in May 1914 to make connections favourable to this policy; he was in the United States, hoping to go next to Russia, when World War I broke out. For about three years public opinion rejected his policy, but when the military situation turned against the Central Powers he came forward with it, as Hungary's hope of salvation, and now found eager hearers. His influence increased rapidly as the situation deteriorated; and a National council composed of his followers, the Social Democrats and the bourgeois Radicals, formed on Oct. 25, 1918, had already usurped what authority still existed in Hungary when, on Oct. 31, King Charles IV appointed him prime minister.

Károlyi's activities during the following months are described elsewhere (*see* Hungary: *History*). As prime minister and then (after Jan. 11, 1919) as president of the republic, he made sincere attempts to translate his program into action, but found the situation, in every respect, beyond his powers. In July 1919 he escaped abroad. Thereafter he spent many years in exile and poverty, the counterrevolutionary government having tried him *in absentia* for high treason and sequestrated his estates. During these years he became a left-wing Socialist. During World War II he lived in London. He returned to Hungary in 1946. In 1947 he was appointed ambassador to Paris, but resigned in 1949 in protest against the trial of László Rajk. He died at Vence, in France, on March 20, 1955. Károlyi wrote his memoirs in *Fighting the World* (1924) and *Faith Without Illusion* (1956). (C. A. M.)

KARPATHOS (Italian Scarpanto; Lat. Carpathus), an island of the Dodecanese (*q.v.*) belonging to Greece, about 30 mi. S.W. of Rhodes in that part of the Mediterranean which was called, after it, the Carpathian sea. Area 303 sq.km. (117 sq.mi.). Pop. (1961) 6,689. The principal town is Pigadhia. Among the crops are olives, grapes, barley and wheat. Sheep and goats are raised and there is some fishing. The island has gypsum deposits. Karpathos was in ancient and medieval times closely connected with Rhodes; it was held by noble families under Venetian suzerainty, notably the Cornari from 1306 to 1540, when it was acquired by the Turks. In 1912 it passed to Italy and after World War II was ceded to Greece. As a result of its remote position Karpathos has preserved many peculiarities of dress, customs and dialect, the last resembling those of Rhodes and Cyprus. (W. G. F.)

KARRER, PAUL (1889–), Swiss chemist, shared with W. N. Haworth of Birmingham, Eng., the 1937 Nobel prize for chemistry for his researches into the constitution of carotinoids, flavins and vitamins A and B_2. He was born in Moscow on April 21, 1889, of Swiss parents and was educated in Switzerland, receiving his doctor's degree at Zürich in 1911. After a year in the Chemical institute at Zürich he joined Paul Ehrlich at the Georg Speyer Haus in Frankfurt am Main where he remained for six years.

In 1918 Karrer returned to Zürich as professor of chemistry and in 1919 also became director of the Chemical institute. His best-known researches were on the plant pigments, particularly the yellow ones (carotinoids) which are related to the pigment in carrots. He not only elucidated the chemical structure of the carotinoids but also showed that some of these substances are

transformed into vitamin A in the animal body.

In 1930 he established the correct constitutional formula for β-carotine—the chief precursor of vitamin A—and this was the first time that the chemical structure of a vitamin or provitamin had been established. Shortly afterward he was able to clear up the constitution of vitamin A itself, and he also confirmed the constitution ascribed to ascorbic acid (vitamin C) by A. Szent-Györgyi.

Later Karrer turned his attention to vitamin B_2 and vitamin E, and made important contributions to the chemistry of flavins, one of which, lactoflavin, is part of the complex originally described as vitamin B_2.

His *Lehrbuch der organischen Chemie* (1930) passed through many editions in several languages. (W. J. Bp.)

KARROO, derived from a Hottentot word meaning arid or barren, is used in South Africa with two connotations: (1) botanical, for the shrubs characteristic of the drier parts; (2) physiographical, for two distinct basins named the Great Karroo and the Little Karroo in Cape of Good Hope province.

The Great Karroo lies chiefly between the plateau edge or Great Escarpment and the folded belt southward. It represents the effect of headwater erosion by rivers flowing from the escarpment (altitude about 5,000 ft.) across the folded belt (altitude 2,000–7,000 ft.). It is divided by the watershed between the Doorn and Buffels rivers into a western basin, which is the headwater basin of the Doorn and is about 140 mi. from north to south by about 50 mi. broad, and a much larger eastern basin. The eastern basin, bounded northward by the Nieuwveld, Sneeuwberge, Winterberg and Amatola escarpments and southward by the northern line of the Swartberg ranges of the folded belt, contains the headwaters of the Buffels, Dwyka, Gamka, Groot and Sundays rivers. It is about 300 mi. long, its width decreasing from about 80 mi. in the east to about 50 mi. in the west. Its northern part tends to be rugged and uneven; the southern part is much flatter. The rainfall decreases from about 16 in. annually in the east to 4 in. or less in the west. The vegetation is of karroo type but over great areas of the western basin nothing grows except briefly after rain. Cultivation is generally possible only where irrigation can be practised along stream courses, as below Van Ryneveld pass dam near Graaff-Reinet. Lucerne (alfalfa), wheat, barley and fruit are the chief crops. The dry climate and the nutritious character of the bushes make the Great Karroo a good area for sheep (usually merinos) and angora goats. The principal towns are Graaff-Reinet, Beaufort West and Aberdeen.

The Little Karroo occupies the eastern part of the folded belt, being bounded north by the Swartberg ranges and south by those of the Langeberg; between the two runs the discontinuous Kammanassieberge line. The Little Karroo is about 200 mi. long, and averages 30 mi. from north to south. It contains the basins of the Gourits, Groot, Touws, Olifants and Kammanassie rivers, whose valleys (between 1,000 and 2,000 ft. above sea level) are the only habitable parts, as the interfluvial tracts are high and rugged. Rainfall, mainly of summer type, varies from about 16 in. annually in the mountains to less than 5 in. in some of the valleys. Irrigation is necessary for cultivation; the valleys produce lucerne, wheat, barley and various fruits including grapes. Merino sheep and angora goats yield wool and mohair of high quality; formerly ostrich farming was profitable. Intensive cultivation, especially of lucerne, is practised along the Grobbelaars river, the water coming from limestone foothills of the Swartberg range near the Cango caves, which lie 17 mi. N. of Oudtshoorn, the principal town. *See* South Africa, Republic of: *Physical Geography.* (J. H. Wn.)

KARS, a town and capital of the *il* (province) of Kars in Turkey on the border of the U.S.S.R. It is situated on a dark basalt spur of the Soganli mountains above the deep ravine of the Kars, a tributary of the Aras (Araks) river, 110 mi. E.N.E. of Erzurum and 40 mi. S.W. of Leninakan, U.S.S.R. Pop. (1960) 32,046. The town is divided into two sections: an older and clustered part near the valley of Kars and a newer part to the south dating mainly from the 13th century but showing a modern plan of rectangular streets. At the northwest of the town, overhanging the river, is the ancient citadel, once a strong military post, but completely commanded by the nearby high ground. Coarse woolens, carpets and felt are manufactured, and there is processing of milk products. The town is linked by rail and road with the principal centres of Turkey and with the U.S.S.R.

The seat of an independent Armenian principality during the 9th and 10th centuries, Kars was captured by the Seljuk Turks in the 11th century, by the Mongols in the 13th and by Timur (Tamerlane) in 1387. The citadel was probably built by Sultan Murad III during the war with Persia at the close of the 16th century. It withstood a siege by Nadir Shah of Persia in 1731, and in 1807 it successfully resisted the Russians, surrendering to them, however, in 1828 and again in 1855. The fortress was stormed by the Russians in the war of 1877–78, and on its conclusion was transferred to Russia. Kars was returned to Turkey in 1921.

Kars il is a highland country or plateau, traversed by mountain ranges. Area 7,165 sq.mi.; pop. (1960) 543,600. The northwestern border is formed by the Yalnizcam range, which attains heights of over 9,000 ft. In the centre Allahuekber Dagi rises to 10,246 ft.; in the south the Kara Dag reach 10,282 ft. in Ala Dag; in the southeast another range reaches 10,641 ft. in Asagi Dag. Mt. Ararat (Agri Dagi, 16,945 ft.) itself is on the southeastern border. The passes connecting the valleys often lie at considerable altitudes, the average being 9,000 ft. in the southeast. Cildir Golu (altitude 6,427 ft.) and one other small lake lie toward the northeast. The east side of the province is demarcated by the Arpa Cayi, which receives from the right the Kars river and farther south joins the Aras. The upper Aras valley and the plain of Igdir, at the foot of Mt. Ararat, are the most sheltered and agriculturally the most important parts of the *il.* The Kurucay (Kura) rises to the north within the *il* not far from the Kisirindagi and, after changing direction from west to east, leaves it in the northeast.

The winter is severe with snow which lies for more than five months, making Kars one of the coldest areas of Turkey. The towns Kars, Kagizman (4,620 ft.) and Sarikamis (7,800 ft.) have a mean monthly temperature range of 54° F. (January 10°, July 64°). Rainfall is moderate with a maximum in summer and a minimum in winter. The alpine meadows reach up to 9,000 ft. and afford excellent pasture in spring and summer. The *il* is heavily forested with firs and birches to 7,000 ft. and vines grow up to 3,000 ft. Cereals ripen well, and barley and maize grow up to considerable altitudes. Large numbers of cattle and sheep are bred. Extensive deposits of salt occur at Kagizman and Oltu.

In remote antiquity the district was inhabited by Armenians, the ruins of whose capital, Ani, attest its ancient prosperity. The Turks followed the Armenians, and Kurds invaded the alpine pastures above the valley of the Aras; after them Kabardians, Circassians, Ossetes and Kara-papaks successively found a refuge in these highlands. After the Russo-Turkish War of 1877–78, the region was transferred to Russia by the treaty of Berlin; it was returned to Turkey by treaty with the U.S.S.R. in 1921.

(N. Tu.; S. Er.; E. Tu.)

KARSAVINA, TAMARA (1885–), Russian-born ballet dancer, whose partnership with Vaslav Nijinsky helped to revive the interest in ballet in western Europe, was born at St. Petersburg (Leningrad) on March 10, 1885. The daughter of a famous dancer, Platon Karsavin, she was educated at the Imperial Theatre school, St. Petersburg. As prima ballerina at the Maryinsky theatre she danced in such roles as *Giselle* and Odette-Odile in *Swan Lake,* and was with Sergei Diaghilev's Ballet Russe from its beginning in 1909 until 1922. Between 1909 and 1914 she created the majority of famous roles in the neoromantic repertoire of Michel Fokine, including the waltz in *Les Sylphides,* the young girl in *Le Spectre de la Rose,* Columbine in *Carnival,* the *Firebird,* the dancer in *Petrouchka, Thamar,* and in the later Massine repertoire the miller's wife in *The Three-Cornered Hat* and Pimpinella in *Pulcinella.*

After her retirement Karsavina taught in London for a time, and occupied herself with writing and various dance-educational activities. As a ballerina she combined to an exceptional degree the ability to interpret roles from the classicism of *Swan Lake* to the drama of *Scheherazade.*

Karsavina's autobiography, *Theatre Street*, was published in 1929. (A. L. Hl.)

KARST (Serbo-Croat. KRAS, KRS; It. CARSO), a type of terrain usually characterized by barren, rocky ground, caves, sinkholes, potholes, underground rivers, and the absence of surface streams and lakes. Karst results from the work of underground water on massive soluble limestones. The term was originally applied to the Carso, a limestone area along the Dalmatian coast of Yugoslavia, but, by extension, has been applied to all areas exhibiting similar features. Karst topography is found in widely scattered sections of the world. The classic occurrence is in the Dinaric uplands and karst topography is found in the Causses of France and the Pennine range in England. In the United States it occurs in the middle west, in southwestern Illinois, southern Indiana and the Mammoth cave area of Kentucky, and in north central Florida. Karst areas also are found in Cuba, the Yucatán peninsula of Mexico, the Philippines, parts of Indonesia and at various other places in the tropics.

Limestone (calcium carbonate) dissolves relatively easily in slightly acidic water, which occurs widely in nature. Thick layers of limestone have both horizontal and vertical cracks; rain water percolates along these cracks, dissolving the limestone and carrying it away in solution. Limestone pavements (clints) are produced by the removal of local surface material, and the vertical fissures (grikes) along joints are gradually widened and deepened and in places carved into intricately grooved and jagged terrain called *lapies*. Flowing along cracks underground, the water continues to widen and deepen the cracks until they become underground caverns or cave systems or underground stream channels into which narrow vertical shafts (*ponore*) may open.

Most but not all of the principal cave areas of the world are areas of karst topography. If the cave becomes large enough and the top extends close enough to the surface, the top collapses. This produces depressions called dolines (dolina) or sinkholes into which surface water may flow to disappear underground. Sinkholes are among the most characteristic features of karst. Sinkholes commonly coalesce into much larger depressions called *poljen*, oftentimes flat-floored and sometimes carrying a surface stream. The bottoms of sinkholes and *poljen* usually have a covering of soil which is derived from the insoluble residues (terra rossa) of the limestone. Consequently, since soil and water are available at the bottom of a *polje*, it may be the only part of a karst region where cultivation can be carried on. However, limestones vary notably in their solubility and in the proportion of their insoluble components; hence the general surface of some karst areas, as in southern Indiana, can be farmed.

Over broad areas, surface streams may be totally absent. In fact, in some karst areas with heavy rainfall all precipitation may disappear underground so completely that water even for domestic purposes may be difficult to find; the only source for miles may be a small pool at the bottom of a sinkhole. In other places water may appear at the surface as large springs, flow as a stream across the surface and then disappear again underground.

For discussion of the processes involved in the formation of karst topography *see* CAVE; LIMESTONE. *See* also BALKAN PENINSULA: *Geography*. (W. C. C.)

KARTEL: *see* CARTEL.

KARTTIKEYA, a Hindu deity, in epic mythology SKANDA, god of war. He has been regarded as a deification of Alexander the Great, but this is quite uncertain, and he is unimportant in the early epics. Shiva, it would seem, needing a new battle leader chose Kumara (Skanda), son of Agni, for that post, making him his own son. One of the many myths about his birth says that Shiva was his sole parent and that he was mothered by the Krittikas, the Pleiades, the asterism of battle, whence he was called Karttikeya. In order that he might be suckled by these six nymphs he was endowed with as many faces. According to another tale he was miraculously born as the six sons of as many spinsters and Parvati, Shiva's wife, hugged him in her arms so that he became one, with 6 faces, 12 arms, etc. His vehicle is the peacock. He is well known in south India, where his title, Subrahmanya, is postepic. He has no cult following in modern times. Ganesha is his brother.

KARUN (biblical ULAI; ancient EULAEUS) an important river in southwestern Iran, a tributary of the Shatt al Arab which it joins at Khorramshahr. Its headwaters gather in the heart of the Bakhtiari mountains, at the eastern foot of the glacier-clad Zard Kuh range (14,920 ft.), 100 mi. W. of Isfahan. Its course is extremely tortuous; its total length is 528 mi., whereas the direct distance from its source to the junction with the Shatt al Arab is not more than 180 mi. The whole catchment basin up to Ahvaz has an area of 22,069 sq.mi., of which 7,000 belong to the main tributary, the Dez. Most of the area is mountainous, forming part of the limestone Zagros ranges, which are still partly forested.

The course of the river may be divided into three parts: the upper course from the sources to Gatvand, 15 mi. N. of Shushtar, where the river emerges from the hills (240 mi.); the middle course from Gatvand to Band Qir where it is joined by the Dez (55 mi.); and the lower course from Band Qir through Ahvaz to the Shatt al Arab. In its upper course it is known as the Rud-e Kuh Rang, a powerful stream increasing in volume as it is successively joined by the important tributaries Ab-e Vanak, Ab-e Bazoft, Rud-e Khersan and others. For long stretches it flows rapidly between high precipices that render it useless for irrigation. At Shushtar the river divides into two streams: the Rud-e Gargar, an ancient channel, in part artificial, flows east of the city, and the Shutait flows west. Both are deeply incised and embrace the island of Shushtar with 44 villages and both irrigated and dry farming. They unite again at Band Qir whence the river, engrossed by the Dez, is navigable to its mouth except for about 2 mi. at Ahvaz where a series of rocky shelves cause rapids. The average depth between Band Qir and Ahvaz (46 mi.) is 20 ft., but below Ahvaz, the river is very shallow in places. In summer vessels with a draft exceeding three feet are liable to ground.

Formerly the Karun had a lower course which was separate from and to the east of the Shatt al Arab, via the Khowr-e Musa. There are three old river beds branching off at the left of the Karun which were apparently used successively. They are known as the Shatt al Qadimi ("ancient river"), Shatt al Ama ("blind river") and the Khowr-e Bahmanshir, which contours the island of Abadan on its eastern side. In 1765, however, the river changed to its present course through an apparently artificial channel called the Hafar. According to the geographer al-Maqdisi, it was dug in A.D. 986 to facilitate water communication between Ahvaz and Basra. This change resulted in frontier disputes between the Ottoman empire and Persia which were settled by the treaty of Erzurum (1847), giving Persia access to the eastern bank of the Shatt al Arab and the right to use this waterway.

The Karun up to Ahvaz was opened to international navigation in 1888 when Lynch Brothers of London established a steamer service on it. Boat services were later established between Ahvaz and Band Qir. Shipping on the lower Karun has become increasingly important as a result of the oil drilling and refining industry.

Discharge data for the Karun exist from 1894 when a gauge was first installed at Ahvaz. The average annual discharge is 775 cu.m. per second in normal years but may range from 560 to 1,100 cu.m. per second. Seasonal variation shows lowest water (250 cu.m. per second) to be in October, and highest, as a result of combined precipitation and melt water, in April (3,350 cu.m. per second).

To increase the water supply of Isfahan, Shah Tahmasp I (1524–76) and Shah Abbas I (1587–1629) undertook works to divert the Kuh Rang into the Zayandeh Rud by cutting the low divide between the two basins. The resulting cleft, still visible, is 300 yd. long, 15 yd. broad and 18 yd. deep, but quite inadequate. This plan was revived by modern Iran and in 1954 a dam and a tunnel 3,100 yd. long, with a maximum capacity of 45 cu.m. per second, were completed.

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KARVINA (Ger. KARWIN), a mining town in Severomoravsky *kraj* (region), Czechoslovak Silesia, lies on the eastern side of the Ostrava-Karvina coal basin, about 19 km. (12 mi.) E. of the main mining settlement at Ostrava. Pop. (1961) 53,729. The coal

measures are separated from those at Ostrava by the Orlova fault. Karvina is one of several towns in this region which developed from village nuclei in the 19th century with the exploitation of the Silesian coal mines. What is known as the Army Pit is the most profitable mine, yielding about 12% of the Ostrava-Karvina basin output. The labour force there as elsewhere in the Silesian mines consists partly of peasant immigrants from the adjacent Carpathians, including Slovaks, Poles and smaller groups such as Vlachs (*q.v.*) and Wasserpolaken. The town is linked with the intricate railway network which serves the whole Ostrava-Karvina basin.

(H. G. S.)

KASAI RIVER (Portuguese Rio Cassai) is the chief southern tributary of the Congo river and also a great river in its own right. At Kwamouth, 100 mi. above Stanley pool, it empties into the Congo a volume approaching half that of the main stream. The lower Kasai and Sankuru, flowing westward 500 mi. across the southern Congo basin at 1,000 ft. above sea level, collect numerous affluents that rise on the high plateaus of Angola and Katanga and flow north for 300–500 mi. along strikingly parallel courses. The system drains about 350,000 sq.mi. As it lies south of the equator, the Kasai's regime (unlike that of the lower Congo) reflects the alternate wet and dry seasons. In April, May and December. its discharge approaches 700,000 cu.ft. per second, diminishing in July and August to a quarter of this; the mean discharge is about 500,000 cu.ft. per second.

The Kasai is the longest river in the system, measuring 1,338 mi. from its source to Kwamouth. Its headstream on the Benguela highlands runs east for 250 mi., then turning north for nearly 300 mi. to form the frontier between Angola and the Republic of the Congo. This stretch is interrupted by several rapids and waterfalls, as are the upper courses of the parallel tributaries. The Guillaume falls on the Kwango and the François-Joseph falls, 12 mi. downstream, are impressive. These torrential rivers flow in valleys deeply trenched in sandy plains at about 2,000–3,000 ft. The dissected plains are covered with savanna woodland.

In about latitude 6° S. all the rivers throw themselves over rapids and waterfalls; the Stephanie falls on the Kwilu, the Wissman falls on the Kasai, the François falls on the Lulua and the Wolff falls on the Sankuru are the most important. Below the falls the rivers broaden and deepen and are navigable by large stern-wheelers and by tugs and barges. Regular services are operated and the traffic amounts to 500,000 tons annually. Particularly important is the waterway (510 mi.) from Kinshasa (formerly Léopoldville) to Port-Francqui, the northern terminus of the railway from Katanga and Cape Town, S.Af. Above Port-Francqui navigation is impeded by sandbanks, but shallow-draft boats can reach Charlesville. There the Wissman falls require goods to be carried 40 mi. by rail to the next navigable reach, beginning at Mukumbi and extending 60 mi. upstream to Tshikapa, the diamond-mining centre.

In their lower reaches the rivers of the Kasai system enter the equatorial rain forest. Tall trees and tangled lianas, that form only bankside fringes farther upstream, cover the swampy plains of the central Congo basin. Below the Kwango confluence the Kasai forms Wissman pool and then receives the Fimi-Lukenie, bringing the waters of Lake Leopold II. Thereafter the river is known as the Kwa. It narrows to less than half a mile between high banks before emptying into the Congo.

The headwaters were reached by the Portuguese in the 16th century, and David Livingstone's travels (1854–55) provided much information on the same region. The lower course was unknown until H. M. Stanley saw the Kwa mouth in 1877. In 1882 he ascended the river to the Kwango confluence and, proceeding up the Fimi, discovered Lake Leopold. *See* also Congo River.

(A. T. Gr.)

KASENA, a people living on both sides of the Sissili river in the northern part of Ghana (about 33,000 in the 1960s) and in the adjoining region of Upper Volta (41,500). They speak a Gur language of the Grusi type and consist of three groups. The Kasena Bura in the east live in the vicinity of Navrongo, the seat of a Roman Catholic bishopric, and to the south of the town of Po in Upper Volta; on the west bank of the Sissili stretching as far as Tumu live the Kasena Nagwa and the Kasena Fra, also known as the Aculo or Awuna. Formerly these people lived in independent parishes, on the margins of the Mossi and Mamprusi states; each parish had an Earth shrine that provided sanctions against shedding the blood of other residents. Just before the arrival of the British and French at the end of the 19th century the Kasena were subject to severe attacks of such slave-raiders as Babatu. The Kasena are hoe-cultivators, growing cereals (pennisetum, sorghum and corn [maize]) together with some yams, peanuts and beans; they also keep cattle, sheep, goats, chickens and guinea fowl. Local industries include pottery, fibre spinning and formerly charcoal burning, iron smelting, smithing and ivory cutting; dyeing and treatment of leather, and the dyeing and weaving of cotton have been introduced from the north.

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(Jo. R. G.)

KASHAN, a city and former small province of west central Iran, now within Mazanderan *ostan* (province). It lies on a desert and sand-ridden plain at the eastern foot of the central Iranian range, 150 mi. S. of Teheran on the formerly important caravan route from Isfahan to the north which was much used in later Safawid times. It is bypassed by the main highway from Teheran to Isfahan, but is connected with both cities as well as with Yazd and Kerman. In the early 1960s it was the terminus of the south-eastern branch of the Trans-Iranian railway. The population, which was estimated at 60,952 in 1964, remained stable in the 20th century. Kashan is a famous centre of fine craft industries. It was the most important centre of ceramic art in Persia, producing decorated pottery as well as glazed tiles which were exported throughout the near east under the name of kashi. Its lustrewares were especially famous. Its woolen and silk carpets are among the finest in Iran. Modern industrial development is modest and includes the manufacture of copper utensils, embroidered silks, velvets, brocades, plain stuffs and a kind of velours.

The summer heat is excessive, and water is scarce, being brought down from a spring in the beautiful garden of a former Safawid summer residence in the village of Fin, 4 mi. S.W. of the town. Cultivation therefore is restricted.

Kashan is an ancient city; 2 mi. S.W. is the prehistoric site of Tepe Siyalk. Excavated by R. Ghirshman, it yielded the most ancient remains of settled life hitherto found on the plateau.

(H. Bo.)

KASHGAR (Shu-fu, Su-fu, K'o-shih), a city of Sinkiang Uigur Autonomous Region, China, (pop. [1958 est.] 100,000) and an oasis of the same name, situated at an altitude of more than 4,000 ft. at the west end of the Tarim basin where the mighty Tien Shan and the Muz Tagh Ata range of the Pamirs meet. Between these ranges of over 22,000 ft. altitude, runs the 12,400-ft. high Terek pass (Turug Art Dawan or Pereval Turugart) linking Kashgar with the Soviet Union's Ferghana valley railhead at Andizhan. The entire caravan route requires about eight days. In the south, past the Khotan oasis, runs the trade route over the Karakorum pass (18,290 ft.) to Kashmir. Two low passes (under 3,000 ft.) provide access through the Tien Shan to Urumchi and the Dzungarian basin in northern Sinkiang Uigur Autonomous Region.

The fertility of Kashgar oasis lies in its loess soil, which depends upon river and well water for irrigation. The northern edge is about 5 mi. from the city, beyond which in sharp contrast stretches a great sweep of gravelly desert fanning out from the deeply eroded foothills of the Tien Shan. The average January temperature at Kashgar is −6° C. (22° F.) while the July average is 27° C. (80° F.). The lowest readings in January are around zero and the highest shade temperature in August is about 34° C. (105° F.). The scanty, irregular annual rainfall averages a little more than 3 in. Between the middle of November and the end of February, irrigation is not undertaken because ice obstructs the channels. Strong winds are rare in winter, although the dust from the Takla Makan desert in the east fills the atmosphere and only occasionally in early summer and late autumn is there clear visi-

bility. Cholera, typhus and plague are reported to be unknown, although typhoid fever and smallpox and a mild form of malaria are epidemic. Mosquitoes and sand flies are persistent pests.

Kashgar is the centre for cotton growing in Sinkiang. Its staple food crops are first wheat and maize (corn), followed by barley, rice, millet and legumes. Abundant fruits include peaches, apricots, cherries, mulberries and grapes as well as sweet melons. Silk also is produced. There is some fishing in the Tumen and Kizil Darya rivers flowing through the oasis.

In the 1940s some rich copper ores were mined in a small way in the mountains to the north and northwest of the city. Most of the industry is of the handicraft type, such as the making of homespun cloth, wool rugs, felt, furs, leather goods and pottery. External trade is oriented toward the Soviet Union. Exports include wool, raw silk, hides, sheep intestines, dried fruits, rugs, camel's hair and horsehair. Imports include cotton and wool textiles, granulated sugar, pig iron, petroleum products, matches, tobacco products, leather, paper, liquors and silkworm eggs.

History.—Kashgar actually comprises two cities: the Chinese city called Lai-ning (Shu-lo or Su-lo), and the much larger Uigur city to the west—Kashgar proper (Shu-fu or Su-fu). The name Kashgar comes from *kash* (varicoloured) and *gar* (brick houses). During the Han and T'ang periods it was known as the Shu-lo kingdom. In the 3rd century B.C. a branch of the Indo-Scythians called the Yue-chi (Yüeh-chih; *q.v.*) were forced westward from the Kansu region, drove out the Saka (*q.v.*) and occupied the Kashgar oasis. The Chinese conquered Chinese Turkistan and Kashgar during the 1st century B.C. and the famous Chinese general Pan Chao is said to be buried at Kashgar. Later the Yue-chi reconquered Kashgar. They are credited with introducing Buddhism from India into China.

Turkish and Mongol hordes repeatedly swept through the region in the centuries that followed. Though the Chinese had a garrison in Kashgar in the 8th century, it finally succumbed to the western Turks. In the 10th and 11th centuries Kashgar formed part of the Turkish Uigur kingdom, which was overthrown by the Kara-Kitais, another westward-moving Turkish tribe, in the early 12th century. In 1219 Genghis Khan added the district to his empire and during Kublai Khan's reign Marco Polo visited Kashgar about 1275.

In the 14th century Kashgar was ravaged by the troops of Timur (Tamerlane), and in succeeding centuries it suffered many attacks, once being completely destroyed. The Chinese recaptured it in 1755 and it remained in their hands until the Tung-kan (Dungan) rebellion in 1862.

Following a local insurrection and a Russian intervention at Kashgar, a Muslim general, Yakub Beg, usurped the throne of the king of Kashgar and made himself the ruler. Chinese Gen. Tso Tsung T'ang then led an army into Sinkiang and subdued Yakub Beg. The province, including Kashgar, remained thereafter in Chinese hands through the period of the republican revolution. After the death of Gov. Yang Tseng-hsin in 1928, the Muslim Gen. Ma Chung-ying headed a rebellion in the Tarim that was not finally suppressed until 1937 by Gov. Sheng Shih-ts'ai with Soviet help. This instituted a period of a strong Soviet hand in the affairs of the province until Jan. 1943 when full Chinese control was restored. In the winter of 1949 Chinese Communist troops, reportedly under Soviet 4th army supervision, took over control in Sinkiang, suppressing Muslim resistance. The political and economic system was radically altered. In 1955 Sinkiang was organized as the Sinkiang Uigur Autonomous Region.

See SINKIANG. (H. J. Ws.)

KASHMIR: *see* JAMMU AND KASHMIR.

KASHMIRI LANGUAGE (properly *Kāśmīrī*), the name of the vernacular spoken (by nearly 1,500,000 people according to a 1931 census) in the valley of Kashmir (properly *Kaśmīr*) and in the hills adjoining. By origin it is the most southern member of the Dard group of the so-called Dardic languages (*q.v.*).

The language has lost most of its original Dardic character, and is now a mixed form of speech. Sanskrit has been actively studied in Kashmir for many centuries, and the Kashmiri vocabulary, and even its grammar, are now largely Indian.

Kashmiri has few dialects. The only important varieties are Kishtwārī, spoken in the hills southwest of Kashmir, and Pogul and Rāmbanī of the hills south of the Banihāl pass.

The two principal features are the numerous epenthetic changes of vowels and consonants, and the employment of pronominal suffixes. In both cases the phenomena are perfectly plain, cause and effect being presented in the complicated systems of declension and conjugation. The Indo-Aryan languages (*q.v.*) proper long ago passed through this stage, and a study of Kashmiri explains a number of difficulties found by the student of Indo-Aryan vernaculars.

Vocabulary.—The vocabulary of Kashmiri is mixed. At its basis it has a large number of words which are also found in the neighbouring Shinā, such as connote the most familiar ideas and are in most frequent use. There is also a large Indian element, consisting partly of words derived from Sanskrit vocables introduced in ancient times, and partly of words borrowed in later days from the vernaculars of the Punjab. Finally, there is a considerable Persian (including Arabic) element because of the long Muslim domination of the area. Many of these elements have been considerably altered in accordance with Kashmiri phonetic rules. The difference of religion is reflected in the vocabulary. The Muslims employ Persian and Arabic words with great freedom, while the Hindus use almost entirely words derived from Sanskrit. The literary class being mostly Hindu, Kashmiri literature, taken as a whole, hardly represents the language spoken by the mass of the people.

Alphabet.—The Persian character is quite unsuited for representing the very complex Kashmiri vowel system. Hindus employ the Śāradā alphabet, of Indian origin and akin to the well known Nāgarī. Kashmiri vowel sounds can be recorded very successfully in this character, but there is, unfortunately, no fixed system of spelling. The Nāgarī alphabet has also been used in printed books, no Śāradā types being yet in existence.

Phonology.—There is, as compared with Sanskrit, a considerable extension of the vowel system. Kashmiri possesses the vowels *a, ā, i, ī, u, ū, r, ē, ai, ō, au,* and the nasal symbol ˜, a flat *ă* (like the *a* in "hat"), a flat *ĕ* (like the *e* in "met"), a short *ŏ* (like the *o* in "hot"), and a broad *å* (like the *a* in "all"); also a series of what natives call "*mātrā* vowels," which, though slightly heard, yet exercise a great influence on the sound of the preceding syllable. The back action of these *mātrā* vowels is technically known as *umlaut* or epenthesis, and is the most striking feature of the Kashmiri language.

With one important exception, common to all Dardic languages, Kashmiri employs every phoneme found in the Sanskrit alphabet. The exception is the series of aspirated phonemes, *gh, jh, ḍh, dh* and *bh,* which are wanting in Kashmiri, the corresponding unaspirated phonemes being substituted for them. There is a tendency to use dental phonemes where Hindī employs cerebrals. Cerebral phonemes are, however, owing to Sanskrit influence, on the whole better preserved in Kashmiri than in the other Dardic languages. From the palatals *c, ch, j,* a new series of phonemes has been formed, viz., *ts, tsh* (aspirate of *ts,* that is, *ts* + *h,* not *t* + *sh*), and *z* (as in English, not *dz*).

The palatal sounds *i, e, ū-mātrā* and *y* often change a preceding consonant. Cerebral phonemes (*t, ṭh, d*) change only before *i, ĕ* or *y,* and not before *ū-mātrā.* The others change before *ĕ, y* or *ū-mātrā.*

No word can end in an unaspirated surd consonant. If such a consonant falls at the end of a word it is aspirated.

Declension.—If the phonetic rules are borne in mind, declension in Kashmiri is a fairly simple process. Nouns substantive and adjective have two genders, a masculine and a feminine. Words referring to males are masculine, and to females feminine. Inanimate things are sometimes masculine and sometimes feminine. Pronouns have three genders, arranged on a different principle. One gender refers to male living beings, another to female living beings, and a third (or neuter) to all inanimate things whether they are grammatically masculine or feminine. Nouns ending in ˘ are masculine, and most, but not all, of those ending in ⁱ, ᵘ, *ĕ* or *ñ* are feminine. No rule for nouns ending in consonants can be

formulated except that all abstract nouns ending in *ar* (a very numerous class) are masculine. There are four declensions: masculine nouns ending in a consonant, in *a*, *ĕ* or *ŭ* (very few of these last two); masculine nouns in *ᵘ*; feminine nouns in *ⁱ*, *ŭ* or *ñ* (being the feminines corresponding to the masculine nouns of the second declension); and feminine nouns ending in *ā*, *ĕ* or a consonant.

The noun possesses two numbers, a singular and a plural, and in each number there are, beside the nominative, three organic cases, the accusative, the case of the agent, and the ablative. The accusative, when not definite, may also be the same in form as the nominative.

Other case relationships are indicated by postpositions, some of which are added to the accusative, while others are added to the ablative case. The "genitive" postpositions, and also the "dative" postposition *kyutᵘ*, are adjectives, and agrec with the governing noun in gender, number and case and are declined regularly as substantives, the masculine ones belonging to the second declension and the feminine ones to the third.

Adjectives ending in *ᵘ* (second declension) form the feminine in *ŭ*, with the usual changes of the preceding consonant. Other adjectives do not change for gender. All adjectives agree with the qualified noun in gender, number and case.

Kashmiri makes very free use of pronominal suffixes, which are added to verbs to supply the place of personal terminations. Before these the verbal terminations are often slightly changed for the sake of euphony, and, when necessary for the pronunciation, the vowel *a* is inserted as a junction vowel.

Another set of suffixes is commonly added to verbs, with an adverbial force. Of these *na* negatives the verb, *ā* asks a question, *ti* adds emphasis, and *tyā* asks a question with emphasis. Two or three suffixes may be employed together.

Conjugation.—The conjugation of the verb is mainly participial. Only three of the old tenses, the present, the future and the imperative, have survived, the first functioning as a future, and the second a past conditional. These three may be called radical tenses. The rest, viz., the Kashmiri present, imperfect, past, aorist, perfect and other past tenses, are all participial.

The verb substantive, which is also used as an auxiliary verb, has two tenses, a present and a past. The former is made by adding the pronominal suffixes of the nominative to a base *chu* (*h*), and the latter by adding the same to a base *āṣᵘ*.

As for the finite verb, the modern future (old present), and the past conditional (old future) do not change for gender, and do not employ suffixes, but retain relics of the old personal terminations of the tenses from which they are derived.

For the imperative there are second person singular, *kar*, plur. *kariv;* and third person singular and plural *karin*.

The present participle is formed by adding *ān* to the root. It does not change for gender. From this a present and an imperfect is formed by adding respectively the present and past tenses of the auxiliary verb. There are several past participles, all of which are liable to change for gender, and are utilized in conjugation. In the strong past participle and the pluperfect participle, the final *v* and *y* are only added for the sake of euphony. There are three conjugations. The first includes all transitive verbs. These have both the weak and the strong past participles. The second conjugation consists of 66 common intransitive verbs, which also have both of these participles. The third conjugation consists of the remaining intransitive verbs. These have only the strong past participle. The weak past participle in the first two conjugations refers to something which has lately happened, and is used to form an immediate past tense. The strong past participle is more indefinite, and is employed to form a tense corresponding to the Greek aorist. The pluperfect participle refers to something which happened a long time ago, and is used to form the past tense of narration. As the third conjugation has no weak past participle, the strong past participle is employed to make the immediate past, and the pluperfect participle is employed to make the aorist past, while the new pluperfect participle is formed to make the tense of narration.

The corresponding tenses are formed by adding pronominal suffixes to the weak, the strong or the pluperfect participle. In the last two the final *v* and *y*, being no longer required by euphony, are dropped. In the case of transitive verbs the participles are passive by derivation and in signification, and hence the suffix indicating the English subject must be in the agent case. If the thing made is feminine the participle must be feminine, and similarly if it is plural it must be plural. The past participles of intransitive verbs are not passive, and hence the suffix indicating the English subject must be in the nominative form. These suffixes may be piled one on another.

Tenses corresponding to the English perfect and pluperfect are formed by conjugating the auxiliary verb, adding the appropriate suffixes, with the compound past participle.

The infinitive is formed by adding *-un* to the root. It is declined like a somewhat irregular noun of the first declension. There are three forms of the noun of agency.

The passive is formed by conjugating the verb *yi*, come, with the ablative of the infinitive.

Indeclinables.—Indeclinables (adverbs, postpositions, conjunctions and interjections) must be learned from the dictionary. The number of interjections is very large, and they are distinguished by minute rules depending on the gender of the person addressed and the exact amount of respect due to him.

Literature.—Kashmiri possesses a small literature, which has been very little studied. The very popular *Lallā-vākyāni*, a collection of verses on Saiva philosophy by a woman named *Lallādēvī*, is said to be the oldest work in the language which has survived. Another esteemed work is the *Siva Pariṇaya* of Krishna Rājānaka, a living author.

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Under the title of "The Word of Lalla the Prophetess" (1924) R. C. Temple has provided a metrical translation into English of the Lallā Vākyāni, with notes and an elaborate historical introduction.

See also *Linguistic Survey of India*, vol. i (1927); Sir George A. Grierson, *A Dictionary of the Kashmiri Language*, Asiatic Society of Bengal (1915–32); T. Grahame Bailey, *The Pronunciation of Kashmiri* (1937). (ET. B.)

KASSALA, a province and town of the Republic of the Sudan. Kassala, the eastern province of the republic, stretches from Egypt to the frontiers of Eritrea and Ethiopia. Pop. (1965 est.) 1,452,000. Area 131,527 sq.mi.

In the centre and south lie extensive clay plains with isolated *jabals* ("hills") of basement or basaltic rocks; on the southeast the province is bounded by the Ethiopian foothills. Northward are desert plains diversified by the Red Sea hills or Etbai. (4,000–7,000 ft.) to the east. The coastal plain is arid and featureless with an indented coral coast line. Rainfall decreases steadily from south to north, from 40 in. annually at Gallabat to 28 in. near Gedaref, 13 in. at Kassala, 4 in. at Port Sudan and little or none in the north. Rain occurs in heavy thunderstorms, except on the coast where the slight falls come in autumn and winter. Maximum temperature before the rains may reach 47° C. (117° F.) at Kassala and somewhat less to the south. A second maximum occurs in October; January is the coldest month. Around the silty deltas of Kassala and Tokar, haboobs (dust storms) are common. Vegetation ranges from thick acacia (especially *Acacia senegal* yielding *hashab*, or gum acacia) and tall grass forest in the south, through acacia and short grass scrub to bare desert in the north and in the Red Sea hills. A typical Sudanese grassland and desert fauna is found.

Though Neolithic sites are common, little is known of the later history of the area. The long-established Hadendowa (Hadendoa) people are mentioned in Roman chronicles. Kassala, the provincial headquarters, was established in 1840 and Port Sudan in 1905. Sawakin or Suakin (*q.v.*) is the only ancient town in the province. The southern part of Kassala was depopulated in the 1880s during the Mahdist regime as a result of war, famine and disease. In 1940 the southern frontier areas were occupied by Italian troops who in the following year were ejected by British forces.

At the 1956 census 51% of the provincial population were no-

madic and only 16% lived in towns; nearly 100,000 were recent emigrants from the western part of the republic and west Africa. The Hadendowa, Bisharin, Shukria and Amer or Beni Amer are the main tribal groups. Kassala, Port Sudan, Gedaref, Aroma and Sinkat are the chief towns.

The economy is mainly agricultural. Under flush irrigation the Gash and Tokar deltas produce excellent long-staple cotton and grain; cottonseed is sent to the Gezira (*q.v.*) and the crop is exported through Port Sudan after ginning. The development of open-water reservoirs on the clay plains during the years after World War II facilitated the mechanized cultivation of the southern and central grasslands for durra (a millet) and other crops. Gedaref is the chief agricultural centre. The fishery at Port Sudan is of local importance and ancillary to it are mother-of-pearl and button industries. Vermiculite is mined near Sinkat. A single-track railway built in the 1920s links Kassala town and Gedaref (139 mi. S.S.W.) with Port Sudan and Khartoum, and dry-season roads are widely used on the plains. Air services link Kassala with Khartoum and Port Sudan.

KASSALA, the headquarters town of the province, lies 268 mi. E. of Khartoum by desert road (343 mi. by rail). Pop. (1965 est.) 68,130. Built on a plain at the apex of the inland delta formed by the seasonal Gash river, at an altitude of 1,624 ft., Kassala is sheltered to the east and south by Jabal Kassala (4,415 ft.) and Jabal Mokram (1,949 ft.). The Eritrean frontier lies 15 mi. E. The town is laid out on a rectangular plan with tree-lined paved streets around the central administrative and residential district. Nearby Khatmia is the local centre of the Mirghani family which has considerable religious influence in the eastern part of the republic. In addition to rail and air links, there are truck services to Khartoum and other centres. Kassala has lost some of its importance as a cotton centre to Aroma (31 mi. N.N.E.) but has extensive fruit gardens and a market trade. (L. Be.)

KASSEL (CASSEL), a city of Germany, which after partition of the nation following World War II was included in the *Land* (state) of Hesse in the Federal Republic of Germany. It lies at the western side of the Kassel basin on both banks of the Fulda, a navigable tributary of the Weser, 90 mi. N.N.E. of Frankfurt am Main. The city is the administrative centre of a district. Population (1961) was 207,507. Its business life centres in the Königstrasse, Wilhelmstrasse and Friedrich-Ebert-Strasse. The Friedrichsplatz has buildings on three sides, the fourth affording a view of the countryside; it contains the monument of the landgrave Frederick II (1760–85), the Museum Fridericianum and the new state theatre; nearby is the site of the Ottoneum (1603–05) claimed as the oldest theatre building in Europe, largely rebuilt in 1697 and now a museum of natural history. There are academies of applied arts and music and schools of building and mechanical engineering. The Hessian *Land* museum has prehistoric art collections, and the picture gallery is especially rich in Flemish and Dutch paintings. The Habichtswald park contains the Wilhelmshöhe castle (1798–1803) and the celebrated cascades.

Kassel is a railway centre and the meeting place of lines from Hanover, Berlin, Leipzig and Frankfurt and of many main roads; the Hanover-Munich motorway touches Kassel. The city has long been an industrial centre and its manufactures include locomotives, freight cars, optical and precision instruments and heavy fabrics.

The name of the town (Chassala, Chassela) was first mentioned in A.D. 913 and in the middle ages was usually spelled Casle. As its name was derived from the Latin-Franconian *castella,* it was probably a stronghold of the Franconian kings. It received town rights before 1189 and became the residence of the landgraves of Hesse about 1277. An extension (Neustadt) was added on the right bank of the Fulda, and a further extension in the 14th century, of which the Gothic St. Martin's church (destroyed in World War II) became the centre. Large fortifications were built by the landgrave Philip the Magnanimous (1518–67). In the 17th century the landgrave Karl built for the many Huguenot refugees the Oberneustadt (upper new town) outside the walls. The fortifications were removed from 1767 after they had proved useless in the Seven Years' War, and the old and new towns were connected.

Kassel was the capital of Westphalia (1807–13) and, after the fall of the Hessian state (1866), of the Prussian province of Hesse-Nassau. The city, heavily damaged during World War II, has been rebuilt. (Ro. Fr.)

KASSERINE, a small urban agglomeration and capital of a governorate of the same name in central Tunisia. The town (pop. [1956] 2,705) lies 80 mi. S.W. of Kairouan beside the ancient Roman municipality of Cillium. It is an important market town on the road and railway from Susa to Gafsa, standing 2,050 ft. above sea level at the crossing of two wide depressions. The region was heavily romanized. Kasserine pass to the northwest was the scene of a decisive battle of the Tunisian campaign in World War II when combined U.S.-British forces contained a German flanking attack (Feb. 1943).

The governorate occupies the southwest of the Haut Tell and had a population (1960 est.) of 173,100. It includes the mountain chains of the Dorsale, which carry open forests of Aleppo pines (*Pinus halepensis*), evergreen oaks and junipers, and part of the Hautes Steppes. The chief towns, beside Kasserine, are Thala, Sbeitla and Feriana. It is the territory of the Fraichiche and the Madjeur, two tribal groups, once nomadic, who now raise cattle and grow cereals and alfalfa. There is a factory to transform alfalfa into cellulose. The irrigation of land by the oued el-Hatob (the upper branch of the Zeroud) and its tributary the Derb, together with some large springs, has been developed, particularly since 1936. Around Kasserine are vast olive groves planted by the French. Near Sbeitla (pop. [1956] 3,409) are the ruins of the Roman Sufetula with a capitol, temples, baths, a triumphal arch and an aqueduct. (J.-J. Ds.)

KASSITES, written *Kashshu* by the Babylonians, *Kashshi* by the Assyrians and *Kossaioi* by classical writers, are thought (perhaps wrongly) to have originated in the Zagros mountains of Iran. First mentioned in Elamite texts of the late 3rd millennium B.C., they penetrated into Babylonia in the 2nd millennium B.C., were repulsed by Hammurabi's son, but secured holdings within the Tigris-Euphrates valley on the northern frontiers of Babylonia, and later established the second Babylonian dynasty. No record exists of the decisive invasion or of the first occupation of Babylon. Chronicles and king lists are imprecise and conflicting. The tradition that Kassite kings ruled over Babylonia for 576 years is accepted by some scholars, and it is probable that the first Kassite kings reigned in Babylonia simultaneously with the last kings of the first Babylonian dynasty. A plausible solution of the complex historical problem thus arising is that Gandash, the first Kassite king, began his reign about the middle of the 18th century B.C., but not at Babylon.

The Kassite kings appear to have been members of a small military aristocracy. Their long and secure hold over the Babylonians suggests that they were efficient rulers and not unpopular. Their capital city appears to have been Dur-Kurigalzu; and little is known of their language. Babylonian and Assyrian lexicons supply Semitic equivalents of some Kassite proper names and words. It is not certain that the words are Indo-European, though the names of some Kassite deities recall Indo-European gods; *e.g.,* Buriash, the Greek Boreas, and Shuriyash, the Indian Shuriyah (Surya). Another god was Kashshu after whom, probably, the Kassites are named. The horse, which first came into use in Babylonia under Kassite rule, was perhaps a divine symbol. The evidence of published contemporary documents shows that the traditional language and religion were preserved and promoted by Kassite rulers who made gifts and offerings to Babylonian deities and temples, and recorded their piety in the Babylonian language. One king, Agum II, recovered and restored to Babylon the statues of the Babylonian god Marduk and his consort, Sarpanit, which the Hittites had removed from Babylon to Hana when they ravaged the city about 1590 B.C.

Contemporary Kassite records are few in comparison with the quantities and variety of documents from the previous dynasty. They throw little light on contemporary affairs in Elam, Babylonia and the outer Semitic world. Most records belong to the archive of the *guenna* (provincial governor) of the city of Nippur. Of these, the letters from the kings and high officials to the *guenna,*

and from superior to inferior functionaries, reveal a feudal system during the 14th and 13th centuries B.C. in Babylonia. The *guenna* was the chief landlord, apparently in perpetuity, and the feoffees paid taxes and did corvée. Rations were supplied from the government depot, as were loans of grain with or without tax. The many records of taxes and rents received from holdings in and around Nippur fill in the picture of the system at work. Taxes included all kinds of field produce, wool, hides and fats, from individuals and towns. A feature of Kassite records is that the date is given according to the number of the year of the reigning king, and not, as hitherto, according to some important event occurring about that time. Another innovation under the Kassites was the boundary stone (*kudurru*) of which a few examples have been recovered. This is a block of stone which served as a charter of gift of land by the king to favoured persons. On the stone are engraved the clauses of the contract, the astronomical and other symbols of the gods under whose protection the gift was placed and the curse on those who violate the rights conferred. The interest of the boundary stones is not only economic and religious but also artistic, even if not on a high level.

Other examples of contemporary art are the cylinder seals with inscriptions rather longer than those on seals of earlier times, and with symbols such as the sphinx, suggesting relations with Egypt, and the Greek cross, the winged disk, and various bird and animal forms which reflect foreign influences. But the temples which the Kassite kings built or rebuilt at Ur, Tall al Warka (Erech) and Burj Aqarquf (Dur-Kurigalzu) are mainly in the Babylonian tradition, with occasional details which derive from northern Mesopotamia or, perhaps, from the land of the Kassites. One innovation, noticed in a Kassite temple at Tall al Warka, is the use of molded bricks to form figures in relief on the temple façade.

At Burj Aqarquf terra-cotta figures have been found, including a well-modeled true-to-life head of a lioness and a man's head with painted moustache and full beard. But on the whole, Kassite relics in literature, sculpture and architecture compare unfavourably with what had gone before. In the 12th century B.C. a revived Elam struck the final blow at Kassite power in Babylonia, already weakened by local insurrection. In the 1st millennium B.C., the Kassites withdrew to the Zagros mountains whence they opposed the eastward expansion of Assyrian power and paid tribute to Persia. They were conquered by Alexander the Great but later regained their independence. *See* also BABYLONIA AND ASSYRIA; IRAN.

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(T. FH.)

KASTAMONU, a town and capital of the *il* (province) of Kastamonu in northern Turkey, is situated in the narrow valley of the Gok Irmak (Amnias), 162 mi. N.N.E. of Ankara by road. Pop. (1965) 23,447. The town is noted for its copper utensils but the famous copper mines 36 mi. N., worked from ancient times to the 19th century, have been abandoned. The climate is continental with extremes of heat and cold; in winter the roads are often closed by snow. Main roads link the town with its port, Inebolu on the Black sea, 54 mi. N., and with the rest of Turkey.

The ancient Castamon became an important city in late Byzantine times. It lay on the northern trunk road to the Euphrates and was built around a fortress whose ruins crown the rocky hill west of the town. It was taken by the Danishmand amirs of Sivas early in the 12th century and passed to the Turks (1393).

KASTAMONU IL lies on the Black sea and stretches southward to the Ilgaz mountains. Area 5,062 sq.mi. Pop. (1965) 441,608. It is drained by the Gok, Arac, Devrez and Koca rivers. The chief products are cereals, fruits, opium, cotton, tobacco, wool, ordinary goat hair and mohair, in which there is a large trade. The *il* is rich in minerals, and has many mineral springs and extensive forests. (N. TU.; S. ER.; E. TU.)

KASTELLORIZON (ancient MEGISTE; Italian CASTELROSSO), an island of the Dodecanese, off the southern coast of Turkey, about 129 km. (80 mi.) E. of Rhodes and isolated from the main group. Pop. (1961) 476, all Greek. Area 9 sq.km. (3.5 sq.mi.). Olives and grapes are grown and there is sponge fishing. Kastellorizon was included by the Turks in the privileged group known as the Dodecanese (*q.v.*), but did not form part of the Italian Dodecanese occupied during the Libyan War of 1912. The outbreak of hostilities against Turkey during World War I gave the Italians an opportunity of annexing the island after the French occupation of Dec. 27, 1915. The treaties of Sèvres in 1920 and of Lausanne in 1923 recognized Italian rights. After World War II the island was ceded to Greece with the rest of the Dodecanese. (W. G. F.)

KASTLER, ALFRED (1902–), French physicist and holder of the 1966 Nobel Prize for Physics as discoverer and developer of methods for observing Hertzian resonances in atoms. His work facilitated inferential study of atomic structure based on radiations that atoms emit under excitation by light and radio waves. His method of optical pumping (*see* MAGNETOMETER: *Nuclear Resonance Magnetometer*) was fundamental in the development of the laser (*q.v.*). Born on May 3, 1902, in Guebwiller, Alsace, Kastler went to Paris in 1920 to study at the École normale supérieure, returning to teach there in 1941, and continuing as professor and codirector of the laboratory of physics at the time of the Nobel award. Holder of a doctor's degree in physical science and the *agrégé* in physics, he earlier held faculty posts at the universities of Bordeaux, Clermont-Ferrand, and Louvain (Belg.). He openly opposed atomic bomb development and French military action in Vietnam. He endorsed the actions of conscientious objectors and actively sought the independence of Algeria from France. A member of his country's Academy of Sciences, and an officer of the Legion of Honour, he received the grand prize of the City of Paris in 1963.

KÄSTNER, ERICH (1899–), German satirist, poet and novelist, best-known outside Germany for his books for children, is the chief survivor of the witty, economical, matter-of-fact writing associated with the highbrow cabaret, the Berlin weekly *Die Weltbühne* and the *Neue Sachlichkeit* movement of the mid-1920s. Born in Dresden, on Feb. 23, 1899, he has recorded the pleasures and poignancies of his childhood in *Als ich ein kleiner Junge War* (1957; Eng. trans. 1959). He trained as a teacher, studied at Rostock, Leipzig and Berlin and became a journalist and, from 1927, a free-lance writer. Before 1933 he wrote four volumes of light, but fundamentally serious, satirical poetry (*Herz auf Taille,* 1929; *Lärm im Spiegel,* 1929; etc.), a remarkable tragic novel (*Fabian,* 1931; Eng. trans. 1932) and six children's books, notable for humour and respect for the child's moral seriousness. *Emil und die Detektive* (1929; Eng. trans. 1930) was the most famous. Forbidden by the Nazis to publish in Germany, between 1933 and 1945 he published three light novels in Switzerland. In 1945 he became magazine editor of *Die Neue Zeitung* (Munich) and in 1946 founded a children's paper.

Already conscious of the moral and social implications of his satirical work, after 1945 he tried more constructively to educate his public, without sacrificing elegance and entertainment, or subordinating his judgment to any ready-made social philosophy. His work recalls the Berlin stories of Christopher Isherwood and the satirical verse of Sagittarius but has greater strength and incisiveness. His post-World War II books include *Das doppelte Lottchen* (1950), for children; *Zu treuen Händen* (1950), a comedy; and the play *Die Schule der Diktatoren* (1956).

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(J. W. M. W.)

KASTORIA, a town and *nomos* (department) of Greek Macedonia, 72 km. (45 mi.) S. of Bitola, Yugos. Pop. (1961) 10,162 (town), 47,487 (*nomos*). The town stands on a promontory reaching out from the western shore of Lake Kastoria, 2,060 ft. above sea level. The lake, 29 sq.km. (11 sq.mi.) in area, is formed in a deep hollow surrounded by limestone mountains; it receives its affluents from the north and west, and is drained on the south by a tributary of the Aliakmon. A Byzantine wall crosses the peninsula, and there are many small churches, notably of the Byzantine and Serbian periods, some decorated with important frescoes of the 11th to 14th centuries. Kastoria is the seat of a

metropolitan bishop of the Greek Orthodox Church. In the 17th and 18th centuries it derived prosperity from its extensive trade in furs; there are several fine merchants' houses of that period. The town is an agricultural trade centre, with fisheries on the lake.

Kastoria is identified with the ancient Celetrum, captured by the Romans during the first Macedonian campaign in 200 B.C., and with the later Diocletianopolis mentioned by Procopius. Conquered by the Bulgars in the 10th century, it was restored to the Byzantine empire by Basil II in 1018. In 1083 it fell to the Norman Bohemund of Tarentum, but was soon recovered by Alexius I. In the 13th century it belonged for a while to the despotate of Epirus. It was betrayed to the Serbs in 1331, conquered by the Albanians, then by the Turks in 1386, and became Greek during the Balkan Wars of 1912–13. It was occupied by Italian and German troops from 1941 to 1944. (D. M. N.)

KASUR, a municipality in the Lahore district of West Pakistan. It lies on the north bank of the old bed of the Beas river, 34 mi. S.S.E. of Lahore, on the border opposite the towns of Khem Karan and Husainiwala in India, leading to Amritsar and Ferozepur, respectively. Pop. (1961) 74,546. Kasur consists of an aggregation of 26 fortified hamlets called *kots,* extending over an area of about 4 sq.mi. It is a centre of the wool trade. Industries include the tanning of hides and skins, cotton ginning, weaving, oil pressing and the making of harness and other leather goods. It is connected with the main Lahore-Karachi railway.

Tradition refers Kasur's origin to Kusa, son of Rama and brother of Loh or Lava, founder of Lahore. The historian J. D. Cunningham identified it with one of the places visited by the Chinese traveler Hsüan Tsang in the 7th century A.D. A Rajput city probably occupied the modern site before the earliest Muslim invasion, but Kasur does not appear in history until late in the Muslim period when it was settled by a Pathan colony from east of the Indus, in the reign either of the Mogul emperor Babur or of his grandson Akbar. During the rise of the Sikhs it submitted to Ranjit Singh. (K. S. Ad.)

KASZUBY (Cassubians), a Slavonic people, numbering about 200,000 in the 1960s, in Poland west of the estuary of the Vistula. The bulk of them live in the districts of Wejherowo, Puck, Kartuzy and Koscierzyna, but there are remnants in the districts of Lebork, Bytowo and Chojnice. At the beginning of the 20th century they were divided into two groups, the Kaszuby proper and the Slovincy, but by 1960 the Slovincy, who lived near Lake Gardno, had died out or been germanized. Before World War I the Kaszuby were mainly fishermen and peasants; but the construction of the port of Gdynia on their territory in the 1920s led to great social and cultural changes among them.

Kaszub is the distinct Slavonic dialect of the Drzewianie tribe, who formerly inhabited the country west of the Elbe river. It and its subdialects differ from Polish in the following features: (1) a movable accent, often falling on the first syllable; (2) the hard pronunciation of consonants *c, dz, s* instead of soft *ć, dź, ś;* (3) the exchange of vowels *i* (*y*), *u* for back *ë;* (4) the retention of the archaic -ar- instead of Polish -ro-; (5) the use of soft consonants before -ar-; (6) the disappearance of nasal vowels after soft consonants and before consonants (except *d, n, s, z, r, ł*); and (7) the distinction between long and short vowels. Grammatical construction is similar to Polish. After World War II these dialects became polonized as a result of the development of industry and towns.

The name Kaszuby belonged till the 16th century to Slavonic peoples who lived in southern Pomorze, near Czluchow, Szczecinek and Bialogard, west of the territory now inhabited by Kaszuby. After the germanization of these peoples the name was taken by their eastern neighbours. At the end of the 19th and the beginning of the 20th centuries Prussian policy encouraged the Kaszuby to show separatist tendencies in order to counteract the Polish national movement, but this policy met with very little response, since the majority of the Kaszuby were always conscious of their Polish nationality.

The Kaszuby have a rich folklore, interesting to ethnographers. In the 19th century the not very numerous intelligentsia created a literary language and a comparatively rich literature.

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KATAEV, VALENTIN PETROVICH (1897–), Russian novelist and playwright, whose comedy *Kvadratura kruga* is one of the few Soviet plays to win international renown, was born in Odessa on Jan. 28 (new style; 16, old style), 1897, the son of a schoolmaster and grandson of a priest. In 1915 he volunteered for the army and fought on the Rumanian front and later in the Red army, being twice wounded, shellshocked and gassed. In 1920–22 he belonged in Odessa to a group of talented writers which included I. Ilf, E. Petrov (the pseudonym of Kataev's own younger brother), Y. Olesha, E. Bagritski, S. Kirsanov and others. In 1922 he moved to Moscow and began publishing stories.

His first major work to attract attention was the novel *Rastratchiki* (1927; Eng. trans., *The Embezzlers,* 1929), which combined satire with a plot of adventure. *Kvadratura kruga* (1928; Eng. trans., "Squaring the Circle" in *Six Soviet Plays,* 1934) treats, in almost farcical terms, the predicament of two young married couples faced by housing shortage. It was followed by several other satirical comedies. In *Vremya, vpered!* (1932; Eng. trans., *Time, Forward!,* 1933) Kataev produced a five-year-plan production novel in lighter vein. In *Beleet parus odinoki* (1936; Eng. trans., *Lonely White Sail,* 1937) the central characters are two boys whose adventures in Odessa during the revolution of 1905 are portrayed with fine insight into child psychology. Both in this novel and in its sequel, *Khutorok v stepi* (1956; Eng. trans., *The Small Farm in the Steppe,* 1958), in which one of the boys visits western Europe, Kataev drew very much on his own childhood. The two novels were to become part of a tetralogy of which the third part was still unwritten, while the fourth was *Za vlast Sovetov* (1949). Criticized severely for minimizing the role of the Communist party in the anti-German underground resistance in Odessa, it had to be revised by the author. In his early formation as a writer Kataev was admittedly influenced by Ivan Bunin (*q.v.*) whom he knew in Odessa in 1918–19.

See the *Collected Works,* 5 vol. (1956–58). (G. St.)

KATAGHAN (Qataghan), a major province of Afghanistan, and probably the richest in the country. It consists of the drainage area of the Kunduz river and its tributaries, the Khanabad, the Surkhab and the Andarab, and also the lower part of the Kokcha valley. Its area is about 12,000 sq.mi., and it extends north to the Amu-Darya (Oxus) river, which is also the Soviet frontier, and south to the main range of the Hindu Kush (16,700 ft.) which divides the Andarab valley from the Panjshir; eastward it extends to the Khwaja Mohammed range, and in the west it includes most of the desert stretching between Kunduz and Tashkurghan as well as the Surkhab valley almost as far south as Doab Mekh-i-Zarin, where the river breaks out from the mountain canyon that cuts through the main ridge of the Hindu Kush. In the northeast it includes the island of Darqat, formed by the waters of the Amu-Darya, which is famous for its game. There and elsewhere among the reeds on the banks of that river a small and diminishing number of tigers are said to survive.

The Afghan-Turkistan (Bactrian) plain of which Kataghan forms the eastern end has been occupied since earliest times with the Surkhab valley providing a natural southward exit. Prehistoric sites and mounds dating from all periods abound there: a Buddhist site was excavated at Kunduz and at Sorkh-Kotal, west of Pul-i-Khumri; the French archaeological mission in Afghanistan between 1952 and 1957 found remains of a giant staircase climbing a hill topped by a fire temple, showing strong Greek influence. This probably dates from the period of Kanishka the great king of the Kushans (a branch of the Yuchi). Inscriptions found on the site written in the old Bactrian language but with Greek characters mention Kanishka's name.

The population of the province in 1962 was estimated to be 1,036,392. Most of the people are Uzbeks, though Tadzhiks (Tajiks) live in the main towns and in the Andarab valley, Hazaras in the upper Surkhab valley south of Doshi, and since the 1930s

many Pathans or Pashtuns, mostly from the Kandahar area, have been encouraged to come and settle in the reclaimed lands around Pul-i-Khumri and Kunduz. The principal towns are Baghlan (*q.v.*), the newly built capital of the province (pop. [1962 est.] 30,085), Pul-i-Khumri (25,000) and Kunduz (15,000), fast-growing centres of new industry, and Khanabad (30,000) and Taliqan (10,000), older agricultural centres.

Parts of the province have always been rich in agriculture; the Khanabad region is famous for its rice and wheat. The soil is good everywhere, only needing water to give it life, and modern irrigation schemes have brought much formerly unproductive land under cultivation. The Kunduz river is used so much for irrigation that only a weak flow reaches the Amu-Darya. With the help of the World Health organization the Afghan government has since 1950 largely eradicated malaria from Kunduz and the surrounding areas, and former malarial swamps have been drained to make this region one of the most fertile in the country. The main crop there is cotton. Much of it is processed in the factories built by the Afghan raw cotton company in Kunduz, Taliqan and Hazrat-i-Iman on the Amu-Darya and then woven in the mills of Pul-i-Khumri and Gulbahar; a large quantity is exported to the U.S.S.R. Much sugar beet is grown around Baghlan, which has a large sugar refinery and is also the centre of Afghanistan's infant sericulture industry. Other agricultural products are barley and alfalfa. The province is famous for its fine breed of sheep and horses; the unique game of *buzkashi,* requiring magnificent horses, is played there in winter.

The Afghan raw cotton company's factories in Kataghan were the first industrial enterprise in Afghanistan. Ceramics and soap are also produced at the Kunduz factory. The province is the centre of Afghanistan's coal-mining industry: the mines at Karhar (near Pul-i-Khumri) and Ishpushta (just north of Doab Mekh-i-Zarin) provide the coal for the cotton-weaving factories and for Kabul itself. There are also salt mines near Taliqan.

All the overland trade from the U.S.S.R. and the produce of the rich northern provinces of Afghanistan come to Kabul through Kataghan. The new port built by the Soviets at Qizil Qala on the Amu-Darya receives goods shipped there by barge from Termez, farther down the river, and sends them south to Kabul by a road which the Soviets undertook to reconstruct. By the early 1960s a tunnel had been constructed through the Hindu Kush by the Salang pass on the southern border of Kataghan, to shorten the route from the frontier to Kabul about 100 mi. At Pul-i-Khumri the main road from Kabul to Mazar-i-Sharif branches to the west, and below Kunduz the road to Khanabad, Taliqan and Badakhshan branches to the east. Kunduz has an airfield with services to Kabul and Mazar-i-Sharif. *See* also AFGHANISTAN.

KATERINI, capital town of the *nomos* (department) of Pieria in the district of Macedonia, northeastern Greece, 56 km. (35 mi.) S.W. of Salonika. Pop. (1961) 28,046. It is the commercial centre of the triangular plain of Pieria, a rich tobacco-growing district, whose population expanded with the influx of refugees in the 1920s. The coastal railway makes a loop to connect with Katerini, which lies 4 mi. inland. Its port, Vromoskala, is one of the few landing places along an inhospitable shore of sand dunes and salt flats. Katerini is primarily a market town, especially for tobacco, but it also has flour mills and an impregnating plant for railway ties. (WM. C. B.)

KATHA, a town and district in the Sagaing division of northern Burma. District area 5,229 sq.mi.; pop. (1962 est.) 326,940. The district has undergone many changes of boundary and was much reduced in size. For some time it included the Mogok ruby-mining area, now attached to Shwebo. The district stretches from the main divide between the Irrawaddy and Chindwin valleys on the west to the border of the Shan state on the east. Three forested ranges of hills run through the district, known as the Minwun, Gangaw and Mangin. They separate the three main rivers—the Irrawaddy, the Meza and the Mu. The hill ranges are forested as is, indeed, most of the district. There are valuable reserved forests of teak and the area is one of the strongholds of wild elephant. Along the main railway through the centre of the district are the chief settlements and cultivated lands. To the north lies the Kachin state. The portion of Katha lying east of the Irrawaddy forms geographically the margin of the Shan plateau.

The town of Katha is a river port on the west bank of the Irrawaddy. It is connected by a spur line to the main Rangoon-Myitkyina railway across the Gangaw range, and is the transshipment point for goods to and from Bhamo. (L. D. S.)

KATHAK, one of the four classical dance styles of India. It is the leading dance art of northern India and, like other art expressions of that region, shows the effect of the frequent invasions by foreign peoples. Unlike the dances of the south, which were dedicated to worship, the northern Kathak is performed purely for the entertainment of the spectator.

Originally performed exclusively by men, Kathak is composed of short mimed passages alternated with passages of pure dance. It is in the pure-dance passages that the virtuoso excels, for these passages comprise rapid beating and slapping of the feet in complicated counter-rhythms and are embroidered with fast turns. A complete knowledge of the rhythmic forms is indispensable to the Kathak dancer, for he must indicate to his drummer through a sentence of rhythmic syllables the design of the dance passages he will perform.

The dance is bright and extroverted, without stylized facial expression (*see* KATHAKALI) and with few hand poses. The costume consists of long trousers; from 100 to 300 bells on each ankle; a full-skirted coat; and, generally, a round cap of Persian origin.

See BHARATA NATYAM; MANIPURI. (R. M. Hs.)

KATHAKALI, an ancient dance form indigenous to southwestern India. The technique is based on Bharata's *Natya Shastra.* Kathakali has always been an adjunct of the temple and is performed exclusively by men. Young boys are dedicated to its practice throughout their lives.

Kathakali is a danced drama, its subject matter taken from the Ramayana, the Mahabharata and stories from Saiva literature. Enacted out-of-doors and on bare ground or a rude platform lit by pots of burning oil, the presentation is an all-night function. During the action voices chant the story as mimed by the dancers; incidental dances, accompanied by ear-splitting drumbeats, stud the performance. Roles of women are taken by young boys.

The style of movement is vigorous and florid. Stylized gestures and facial expressions follow the rules of Bharata. The make-up, which takes several hours to apply, is a rice paste used to change the shape of jaw and nose and overlaid with painted designs. Beneath this semimask the quivering brows, vibrating chin and twitching nose and cheeks express the strong emotions of the characters. Gestures are wide and strong, the pointing of a finger being preceded by a sweep of the body and a great circling of the arms.

The advanced artist of Kathakali may improvise his mime within the strict rules of the art.

The costume consists of a full skirt, not unlike a crinoline; a heavy, long-sleeved jacket; numerous garlands and necklaces; and a towering headdress of carved and painted wood.

See BHARATA NATYAM. (R. M. Hs.)

KATHIAWAR, a region of western India, is bounded on the northwest by the vast mud flats and marshes known as the Rann of Cutch and on the east by the Gulf of Cambay separating it from the district of Broach and Surat in Gujarat. Its only land connection is to the northeast, where a narrow neck links it to Rajasthan. Thus isolated Kathiawar has developed its own individuality which can be traced throughout its history.

From the northeast a backbone of Jurassic sandstones extends into the Kathiawar peninsula, but the greater part is masked by trap lavas closely akin to those of the Deccan. The coastal regions are flanked by younger rocks, Tertiary clays and limestones in the west and east, and alluvium and miliolite in the south. This latter is a wind-deposited sand concretion, widely used for building and known as Porbúnder stone. The northeast boundary flanking the Gulf of Cambay is largely alluvial. Much of the region is under 600 ft., but the Girnar hills and the isolated Gir ranges reach heights of 3,666 ft. and 2,110 ft. respectively. The climate is dry and hot, rainfall averaging from 15 to 20 in. a year, and temperatures varying from a winter average of 27° C. (80° F.) to 29° C.

(85° F.) to summer maxima of 43° C. (110° F.). The natural cover is mainly dry thorn forest, but mangrove is common in low-lying parts near the sea. The Gir forests contain the last survivors of the Indian lion, and other wild game abounds. Agriculture is the chief occupation, the principal crops being wheat and millets, and cotton is also important. Bhavnagar (pop. [1961] 171,039) in the east is the only town of any size.

Archaeological research since 1950 shows that the settlement of Kathiawar dates back to the 3rd millennium B.C. At Lothal and other sites settlements of the Harappan civilization have been found, while at Prabhas Patan or Patan Somnath (with legendary association with Krishna, and later a great place of pilgrimage) a complete sequence from late Harappan to early historic times has been reported. In the 3rd century B.C. Kathiawar came under Mauryan influence and at Girnar there are inscriptions of Asoka. Thereafter the area came under Saka domination and in the early centuries A.D. it was ruled by Kshatrapa dynasties, and later by the Valabhis who seized power on the decline of the Gupta empire. Kathiawar early suffered from Muslim attacks culminating in the campaigns of Mahmud of Ghazni and the sack of Somnath (*q.v.*) in A.D. 1024. It later passed under Mogul rule and after 1820 British paramountcy was recognized by the many small states. *See* also BOMBAY (state); GUJARAT.

See *Gazetteer of the Bombay Presidency,* vol. viii, "Kathiawar" (1884). (F. R. A.)

KATHMANDU: *see* KATMANDU.

KATIB CHELEBI (Arabic, HAJJI KHALIFA; full name, MUSTAFA IBN ABDULLAH KATIB CHELEBI HAJJI KHALIFA) (1608–1657), Turkish historian, bibliographer and scholar, was the forerunner of westernization in the liberal and critical thought of Turkey. Born in Istanbul in 1608, the son of a soldier, he became an army clerk and took part in many campaigns in the east, collecting valuable material for his historical works. He had an irregular education, attending various lectures between campaigns. From 1638 onward he settled in Istanbul and devoted all his time to collecting books, studying and compiling his many works. An industrious scholar and prolific writer, his chief works are: *Fezleke,* a reliable history of the Ottoman empire covering the years 1592–1654; *Tuhfet-ül-kibar fi Esfar-il-bihar,* a history of the Ottoman navy; *Cihannüma,* a geographical work which made use, for the first time in Turkey, of European sources; *Mizan-ül-hak fi ihtiyar-il-ehak,* a small but important treatise in which the positive sciences are defended and fanaticism criticized; and *Kashf al-Zunun,* his masterpiece, a bibliographical encyclopaedia, in Arabic, and an invaluable source of information on Arabic, Persian and Turkish books up to his own time.

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KATKOV, MIKHAIL NIKIFOROVICH (1818–1887), Russian journalist, a leading spokesman of reaction from 1863 onward, was born in Moscow on Nov. 13 (new style; Nov. 1, old style), 1818, the son of a modest civil servant. He graduated from the Moscow university in 1838 and studied for a year in Berlin (1840–41). Having taught philosophy at Moscow from 1845 to 1850, he was in 1851 appointed editor of the state-owned daily newspaper *Moskovskiya Vedomosti* ("Moscow News"). At that time Katkov sympathized with the movement for reform which was to characterize the earlier years of Alexander II's reign (from 1855) and for some time he advocated the introduction of liberal institutions; but when the agitation assumed a socialist and nihilist tinge and indulgence was shown to Polish national aspirations, he changed his attitude.

From 1863 Katkov controlled *Moskovskiya Vedomosti,* now leased to him by the government. Under his editorship the newspaper became the voice of the conservative spirit of Moscow as opposed to the more liberal spirit of St. Petersburg. The articles that he published during the Polish insurrection of 1863 were collected under the title *Sobranie statei po polskom voprosie* ("Collected Articles on the Polish Question," 3 volumes, 1887). Katkov was one of the organizers of the Pan-Slav congress in Moscow in 1867, a congress boycotted by the Poles, whom he described as "traitors to the idea of Slav solidarity." He died at Znamenskoe, near Moscow, on Aug. 1 (N.S.; July 20, O.S.), 1887.

See G. Liwoff, *Michel Katkoff et son époque* (1897).

KATMANDU (KATHMANDU), also known as Kantipur, the capital of Nepal, is situated on flat but slightly elevated ground near the confluence of the shallow Baghmati and Vishnumati rivers. Pop. (1961) 121,019. By tradition the town was founded by Manjusri himself and its early name was Manju-Patan, but the present town was founded by Raja Gunakamadeva in A.D. 723. Its modern name is popularly derived from a wooden temple (*kath,* "wood"; *mandir,* "temple" or "edifice") said to have been built from the wood of a single tree by Raja Lachmina Singh in 1596. A building said to be the original still stands in the central square and is used for the accommodation of sadhus (holy men).

In the older parts of the town the streets are narrow and the houses built of hard red brick, three or four stories high with tiled roofs and deep overhanging eaves, many with carved doors and windows; but the two main streets, which were badly damaged in the earthquake of 1934, have been rebuilt in a modern style which lacks the character and beauty of the traditional Newar architecture. The most notable building is the old durbar or palace of the Malla kings, of old red brick with some fine wood carving. Within the precincts of the palace is the Taleju temple (1549), the largest in Katmandu, built by Raja Mahindra Malla. The main gate to the palace is guarded by the figure of the god Hanuman which gives the name of Hanuman Dhoka to the small adjoining square, in which are several temples in the pagoda style and the large black stone figure of Kala Bhairab. Adjoining the palace is the modern durbar hall used by the king for formal occasions.

To the east is the Tundi Khel or parade ground, in the centre of which is a stone platform surrounding a tree, from which important government pronouncements were formerly made first to the army. Between it and the town is a tall watch tower built by Bhim Sen, a former prime minister. On the outskirts of the town are many palaces or durbars built by the Rana family during its heyday. The most imposing of these is the Singha Durbar, once the official residence of the hereditary prime ministers and now the government secretariat. About 3 mi. N.E. is the great white dome of Bodnath, a Buddhist shrine of great antiquity particularly revered by the Buddhists of Tibet, many of whom came there on winter pilgrimage. From another Buddhist temple, Shyambunath, on a wooded hill to the west, there is an excellent view of the town. North of the Tundi Khel is the small Rani Pokhari lake constructed by Raja Pratap Malla or his widowed queen, which was in the past used for trial by the ordeal of immersion. The supreme court and the Trichandra college are on the eastern side of this lake.

Festivals of particular interest in Katmandu are, in spring, the Shivratri (*see* PASHUPATI) and the Machendra Jatra when a tall rath or chariot containing the image of the god Machendra is taken in procession through the town; in late summer the Gai Jatra or festival of the cow, when family parties, the children in gay fancy dress, march through the town calling on relatives; and in early autumn the Indra Jatra when the goddess Devi, represented by a young girl, the Kumari Devi, is carried in procession. During the Indra Jatra of 1768 Prithwi Narain, the Gurkha king, knowing the Newars would be engrossed in their festivities, marched in and captured the town with hardly any resistance, and from that date a contingent of the Nepalese army has always joined in the procession.

An airfield about 3 mi. E. of Katmandu provides communications with other airfields in Nepal and with India, and a motor road runs through dramatic mountains and jungle to the Indian border where it meets the Indian railway system at Raxaul. The old foot trail, until 1952 the sole means of communication between Katmandu and the outside world, is now largely unused.

As well as being the seat of government, Katmandu is the most important business and commercial centre in Nepal and, through its Newar merchant families, has contacts with all important centres in Nepal—formerly also with Lhasa and other towns in Tibet.

Many of the townspeople are agriculturists, the Newar preferring to live in town and walk two or three miles each day to work in his fields. One or two members of the family are left to guard the crops overnight as the harvest approaches. (RI. R. P.)

KATNA (QATNA), an ancient Syrian city lying east of the Orontes (Al 'Asi) river, 17 mi. N.E. of the modern city of Homs. It prospered especially during the 2nd millennium B.C. and was frequently named in the Mari letters as Qatanum. It is marked by the site of Tall Mishrife, excavated in 1924–29 by R. Du Mesnil du Buisson, who discovered a temple there dedicated to the Sumerian goddess Nin-E-Gal. A stone sphinx dedicated by Ita, daughter of Amenemhet II (*c.* 1929–1895 B.C.), was found, as well as several Mycenaean vases of Rhodian origin manufactured prior to 1375 B.C. when the city was destroyed by the Hittite king Suppiluliumas.

See R. Du Mesnil du Buisson, *Le Site archéologique de Mishrifé-Qatna* (1935). (M. E. L. M.)

KATONA, JÓZSEF (1791–1830), Hungarian playwright whose historical tragedy *Bánk bán* achieved its great reputation only after his death, was born at Kecskemét, Nov. 11, 1791. A lawyer, he was interested in the stage and wrote a number of plays of little literary merit. In 1815 Katona wrote *Bánk bán*, which, though he entered it for a literary prize and in 1820 had it printed, remained unnoticed until the mid-1830s. By then, Katona, having abandoned his literary ambitions and become attorney general of his native town, had died there on April 16, 1830.

Bánk bán is reckoned among the best Hungarian dramas. Its central figure, Bánk, the highest dignitary (*bán*) at the court of Andrew II (1205–35) tries, in the king's absence, to prevent a rebellion against the German-born queen Gertrude. Meanwhile her brother Otto tries to seduce Bánk's wife. Bánk unjustly suspects the queen of connivance, and kills her. Bánk's tragic act is motivated by the sight of his wife's madness and by the bitter complaints of the serf Tiborc, victim of exploitation by the queen's German entourage. The conflict between duty and personal grief makes it a poignant drama.

See his selected works, *Katona József, Válogatott müvei* (1953); *see* also Gyulai Pál, *Katona József és Bánk bánja* (1883; rev. 1956). (DS. SR.)

KATOWICE, a town and *wojewodztwo* (province) of Poland. The town, capital of the *wojewodztwo* and the seat of a Roman Catholic bishopric, is located 64 km. (40 mi.) W. of Cracow. From 1953 to 1956 it was called Stalinogrod. Pop. (1960) 269,926. It is the largest town in the Upper Silesian industrial region, centrally situated in the coal basin and part of one of the biggest railway connections in Poland. Important industrial lines, as well as international ones, meet there (to Prague, Paris, Budapest, Berlin and Kiev). It also has an airfield, which connects it with Warsaw.

Katowice, mentioned as a village at the end of the 16th century, did not obtain town rights until 1865. In 1921, at the partition of Upper Silesia, Katowice (German Kattowitz) became part of Poland, from which time its rapid development dates. It is a large industrial and mining centre with several coal mines, iron and zinc foundries and important metal and chemical works. It is also a cultural centre with three establishments of higher education: of economics, pedagogy and music; a section of the Silesian technical college; four theatres, a philharmonic hall and the symphony orchestra of the Polish radio. In the park of culture, laid out between Katowice and Chorzow after World War II, are a planetarium and a stadium seating 80,000 persons.

KATOWICE WOJEWODZTWO, the smallest *wojewodztwo* in Poland (9,518 sq.km. [3,675 sq.mi.]), has the largest population (1960 census, 3,274,512).

The northern region consists of the Silesian highlands and a portion of the limestone belt of the Cracow-Czestochowa highlands, while the southern part extends to the western Carpathians. Both regions are divided by the upper Vistula valley. Deposits in the highlands form one of the richest coal basins in Europe, while Triassic dolomites yield zinc and lead ores which provide raw materials for the most industrialized province of Poland. About one-quarter of the total industrial population in the country inhabits this area. The *wojewodztwo* provides Poland with more than 40% of its electric power, about 90% of its coal, more than three-fourths of its zinc and lead ores, about 95% of its smelted zinc, about 70% of its iron ore and about three-fourths of its raw iron. In addition a considerable part of the heavy engineering of Poland is concentrated there.

The *wojewodztwo* contains four industrial regions: the largest, the Upper Silesian industrial region, and the Rybnik region are in the centre, with the Czestochowa district to the north and the Bielsko-Biala textile region to the south. Its situation on the watershed between the Vistula and the Oder and the absence of larger rivers cause difficulties in supplying water to the industries and towns of the Upper Silesian industrial region. After 1956 a reservoir on the Vistula at Goczalkowice partly solved these problems. Part of the southern area of the *wojewodztwo* is agricultural; it covers the northern slopes of the Carpathians and is rich in forests.

The urban population constitutes 74% of the total. The *wojewodztwo* has 36 towns with over 10,000 inhabitants, the most important of which, besides Katowice, are (1960 pop.): Zabrze (190,049); Bytom (182,578); Chorzow (147,037); Gliwice (135,270); Sosnowiec (*qq.v.;* 131,654); Czestochowa (164,906); and Ruda Slaska (131,667). (K. M. WI.)

KATRINE, LOCH, a fresh-water lake in Scotland, lies in southwest Perthshire except for the western end which is in north Stirlingshire (west of the mid-line of the loch and roughly north of Stronachlachar). It lies approximately west-east, curved in a gently sigmoid shape, about 8 mi. long and up to 1 mi. wide. It is 378 ft. above mean sea level and 495 ft. deep at the maximum depth—a rock basin gouged out by a powerful glacier from the quaternary icecap over the southwest Highlands. The water level was raised artificially by Glasgow city water engineers from its natural level of 364 ft.; the loch has been the main source of the city's water since 1859. The bleak schistose hills around the head of the loch are MacGregor country, including Glengyle, where Rob Roy was born in 1671, and Portnellan, where there is a burial ground of the clan. At the eastern end, however, varied hills of grits and greenish schists close in on the loch. The rugged but wooded Trossachs (*q.v.*) lie between Ben A'an and Ben Venue (2,393 ft.) and there the scenery is particularly beautiful and has romantic associations with Sir Walter Scott's *Lady of the Lake* and the Wordsworths' tour of 1804. The Silver strand on the north shore opposite Ellen's Isle has been submerged by the raising of the water level. (A. T. A. L.)

KATSINA, a town and the capital of a province of that name in Northern Nigeria, lies near the northern federal frontier with the Republic of Niger. Pop. (1963) 90,538. Development in the mid-20th century changed the appearance of Katsina from a place of narrow paths to a town with modern houses and paved streets. The more notable buildings are the Katsina Training college (1957), the provincial secondary school (1954) containing a museum, the administrative offices, the girls' school and the Soro tower. Older buildings include the Lugard hall (1937), Katsina college, in which many of the first Northern Nigeria ministers were educated, and the old Gobarau Tower mosque. The principal occupation is farming; guinea corn and millet are grown for home consumption and peanuts and cotton for trading. Leatherwork is a local craft and hides and skins are exported. The dyeing industry diminished because of the importation of cloth from the United Kingdom. There is a motor road to Kano and to the Republic of Niger; elsewhere the donkey is the main means of transport.

The original inhabitants were the Habe, who were driven out by the nomad Fulani and settled in French West Africa. Hostility between these tribes persists. (M. A. DA.)

KATSURA TARŌ, PRINCE (1847–1913), Japanese army officer and statesman, was born in 1847 in Chōshū. He fought for the imperial cause in the Meiji restoration and later was sent to Germany to study strategy and tactics. In 1886 he was appointed deputy army minister and saw strenuous active duty in the Sino-Japanese war (1894–95), for which he was made viscount. Army minister from 1898 to 1901, he then became premier for the first of three terms. He remained a dominant figure in Japanese political life until his death in 1913. He attained high office as the

protégé of Aritomo Yamagata, military leader and premier, and adhered to his mentor's conservative views. During his first premiership (1901–06) the alliance with Great Britain was concluded (1902) and the Russo-Japanese War successfully fought (1904–05), achievements that brought him the ranks of count and marquess. After that he became increasingly the antagonist of Hirobumi Itō on Korea policy. While Itō strove to erect a moderate rule in Korea, Katsura favoured outright annexation, a goal he achieved in 1910. After the conclusion of his second premiership in 1911 he was elevated to the rank of prince. His third premiership was short-lived, lasting only seven weeks (Dec. 1912–Feb. 1913) and ending amidst riots against his oligarchic methods and his program for greater armaments. He died in Tokyo on Oct. 10, 1913. (F. H. Co.)

KATSURA TREE: *see* CERCIDIPHYLLUM.

KATTEGAT (CATTEGAT; Scand. "cat's throat"), a strait forming part of the connection between the Baltic and North seas. It extends north and south between Sweden and Denmark, and connects north with the Skagerrak and south through the Sound, Great Belt and Little Belt with the Baltic. Length about 241 km. (150 mi.); extreme breadth about 142 km. (88 mi.); area 25,486 sq.km. (9,840 sq.mi.); mean depth not more than about 14 fathoms. *See* BALTIC SEA.

KATWIJK (KATWIJK AAN ZEE), a seaside resort in the province of South Holland, Neth., is located at the mouth of the Oude Rijn (Old Rhine) river, 8 km. (5 mi.) N.W. of Leiden. Pop. (1964 est.) 31,914 (mun.). It has a 17th-century lighthouse and the 15th-century church of St. Andrew. There is a wide beach with a mile-long promenade. Besides tourism, the chief industry is the herring fishery and related trades. Horticulture is practised in the vicinity. Remnants of Roman and Franconian settlements of the 1st and 7th centuries have been excavated. Katwijk aan den Rijn, 1.6 km. (1 mi.) S.E., has a 15th-century church with a monument by Rombout Verhulst. (J. P. v. B.)

KATYDID, the name applied generally in North America to certain large insects of the orthopterous family Tettigoniidae, but properly restricted to members of the subfamily Pseudophyllinae. A katydid may be recognized by the very long, threadlike antennae and the swordlike ovipositor of the female. The group is noted for its loud stridulation—a rasping, repetitive "katy-did"—chiefly given at night, caused by rubbing the filelike underside of the left forewing against a ridge on the upper surface of the right forewing; each species has a characteristic call. The true katydids (Pseudophyllinae), bush katydids (Phaneropterinae), meadow grasshoppers (Conocephalinae) and cone-headed grasshoppers (Copiphorinae) are chiefly green, long-winged, bush, tree and grass inhabitants. The shield-bearers (Decticinae) most often occur on the ground or in low vegetation, are usually nearly wingless and are prodominantly brown or gray. Winged forms infrequently jump, usually moving from place to place in slow flight.

The eggs, frequently flattened and large, are laid in bark, on twigs or inserted in the edges of leaves between the upper and lower surfaces. Most species overwinter in the egg stage, maturing in the north quite late in summer. Katydids feed chiefly on plant matter, but some take a varied diet that includes other insects.

See also ORTHOPTERA; INSECT. (H. J. G.)

KAUFBEUREN, a city in the East Allgäu mountains of Germany, which after partition of the nation following World War II was in the *Land* (state) of Bavaria, Federal Republic of Germany. It is located on the Wertach, 89 km. (55 mi.) S.W. of Munich. Pop. (1961 est.) 34,686. Founded about A.D. 800, it was a free imperial city from 1286 to 1803 when it passed to Bavaria. There are medieval walls and towers, Gothic Blasius chapel with valuable paintings (1480) and a Franciscan convent with the tomb of Kreszentia Höss (a place of pilgrimage). The medieval centre of the city is surrounded by modern residential area and public parks. Industries include textile mills, sawmills, breweries, printing works and the manufacture of office machinery, Gablonz glassware and costume jewelry. Dairy produce is also significant. (F. St.)

KAUFFMANN, (MARIA ANNA) ANGELICA (1741–1807), Swiss-born historical and portrait painter, one of the original members of the Royal Academy, was born at Coire (Chur), Switz., on Oct. 30, 1741. Her father, John Joseph Kauffmann, was a painter. She was a very gifted child and showed marked talents as a musician and painter at an early age; in her 12th year she had become a notability. In 1754 her father took her to Milan; in 1763 she visited Rome, and then passed to Bologna and Venice, where she was feted as much for her personal charms as for her talents. She was induced by Lady Wentworth, wife of the English ambassador, to accompany her to London, and arrived there in 1766. One of her first works was a portrait of David Garrick, exhibited in the same year at "Mr. Moreing's great room in Maiden Lane." She was well received wherever she went, and was particularly favoured by the royal family.

One of her great friends was Sir Joshua Reynolds, with whom her name was romantically linked. In 1766 he painted her, and she returned the compliment with her "Portrait of Sir Joshua Reynolds," aged 46. In 1767 she married an adventurer who posed as a Swedish count (the count de Horn), from whom she was soon separated. During 1766–67 she contributed to the Free Society of Artists a number of pastoral and mythological compositions, and her name is found among the signatories to the famous petition to the king for the establishment of the Royal Academy. In its first catalogue of 1769 she appears with "R.A." after her name (an honour she shared with another lady and compatriot, Mary Moser); and she contributed "The Interview of Hector and Andromache" and three other classical compositions. From this time until 1782 she was an annual exhibitor. In 1773 she was appointed by the Academy, together with Reynolds, George Dance, Benjamin West, James Barry and G. Cipriani, to decorate St. Paul's, and it was she who, with Biagio Rebecca, painted the Academy's old lecture room at Somerset house.

In 1781, after her first husband's death, she married Antonio Zucchi (1728–95), a Venetian artist then resident in England. Shortly afterward she retired to Rome, where her numerous friends included Goethe and J. G. von Herder. She continued to contribute to the Academy until 1797. She died on Nov. 5, 1807, and was honoured with an elaborate funeral under the direction of Antonio Canova. The entire Academy of St. Luke, together with numerous ecclesiastics and virtuosos, followed her to her tomb in S. Andrea delle Fratte, and, as at the burial of Raphael, two of her best pictures were carried in the procession.

During the 1770s, Angelica was one of a team of artists who supplied the painted decorations for Adam-designed interiors, and it is for this work that she is chiefly remembered. She painted numerous portraits and self-portraits, of which the best are to be seen in Munich, in the Uffizi, Florence, and in the National Portrait gallery, London. Her life has been used as the basis of a romance by Léon de Wailly, 1838, and it prompted the charming novel contributed by Mrs. Richmond Ritchie to the *Cornhill Magazine* in 1875 under the title of "Miss Angel."

See Giovanni de Rossi, *Angelica Kaufmann* (1810); Adeline Hartcup, *Angelica* (1954). (Aa. B.)

KAUFMAN, GEORGE S. (1889–1961), U.S. playwright and stage director, who was the most successful craftsman of the U.S. theatre in the era between World Wars I and II, was born in Pittsburgh, Pa., Nov. 16, 1889. After attending public school in Pittsburgh and Paterson, N.J., he found himself miscast as a salesman. He contributed to the satirical column run by Franklin P. Adams ("F.P.A.") in the *New York Mail*, and in 1912, on Adams' recommendation, was given a column of his own in the *Washington Times*. He was with the drama department of the *New York Times*, as writer and then editor, 1917–30.

His first successful play, written in collaboration with Marc Connelly, was *Dulcy* (1921), based on a character created by Adams. He succeeded on his own with *The Butter and Egg Man* (1925), but preferred collaboration. His plays with Connelly included *To the Ladies* (1922) and *Beggar on Horseback* (1924). Among his collaborations with other writers were *Of Thee I Sing* (1931) with Morrie Ryskind and Ira Gershwin (with music by George Gershwin; winner of Pulitzer prize in drama, 1932); *Dinner at Eight* (1932) and *The Land Is Bright* (1941) with Edna Ferber; *The Solid Gold Cadillac* (1953) with Howard Teichmann; and a number of hits with Moss Hart that included *Once in a*

Lifetime (1930), *You Can't Take It With You* (1936; Pulitzer prize in drama, 1937) and *The Man Who Came to Dinner* (1939).

Kaufman once defined satire as "something that closes on Saturday night," but this did not apply to his own brand, in which mordant wit was cushioned with "belly laughs."

He died in New York city, June 2, 1961. (J. Ay.)

KAUFMANN, KONSTANTIN PETROVICH (1818–1882), Russian general of Baltic German extraction, the conqueror of Bukhara, Khiva and Kokand, was born at Majdany, near Deblin, in Poland, on May 3 (new style; April 21, old style), 1818. He received his training in the engineering school in St. Petersburg and then served in the Caucasus. During the Crimean War he commanded a sappers' battalion and participated in the siege of Kars in Turkish Armenia in 1855. Thereafter he held important offices in the war ministry. In 1865 he succeeded the elder M. N. Muraviev as governor general in Lithuania, where he continued the policy of "depolonization" already inaugurated. In 1867 he became governor general of Turkistan. As governor he enjoyed remarkable freedom of action in his dealings with the central Asian states, and his administration marked the completion of the Russian absorption of the area. His first advance was against the khanate of Bukhara, and in 1868 he captured the city of Samarkand. In 1873 the khanate of Khiva and in 1875 that of Kokand were reduced to vassalage. These conquests brought Russia close to the British colonial interests in Afghanistan and occasioned strong protests from Great Britain, particularly since the Russian government had previously given assurances that Khiva lay outside the Russian sphere of influence. Although Alexander II refused to sanction further plans for advance supported by Kaufmann, little was done to prevent local Russian commanders from proceeding on their own account. Thus Kaufmann was still engaged in expansionist activities when he died, at Tashkent, on May 16, 1882. (B. J.)

KAULBACH, WILHELM VON (1805–1874), German painter and illustrator who gained his greatest fame as a muralist, was born in Arolsen, Oct. 15, 1805. From 1822 he studied under Peter von Cornelius at the Düsseldorf Art academy. When Cornelius became director of the Bavarian Academy in Munich in 1825 he brought Kaulbach with him. In 1849 Kaulbach succeeded Cornelius in the directorship of the academy, an office held until his death in Munich on April 7, 1874. His prodigious output included melodramatic illustrations to *Reynard the Fox* (1841) and the poetry of F. Klopstock, Goethe and Shakespeare. As a muralist, he had facility in covering acres of walls in Munich and Berlin. His vast history paintings, such as the "Destruction of Jerusalem," the "Battle of the Huns," the "Crusaders" and the "Reformation," make up in heroic pose what they lack in artistic imagination. The fact that he was one of the most renowned artists of his time testifies more to the capriciousness of the history of taste than to the intrinsic merit of his work.

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KAULBARS, ALEKSANDR VASILIEVICH (in German, WILHELM, FREIHERR VON KAULBARS) (1844–1929), Russian general and explorer of central Asia, was born of Baltic German extraction in St. Petersburg on May 23 (new style; May 11, old style), 1844, the younger brother of N. V. Kaulbars (*q.v.*). As a general staff officer he traveled in central Asia between 1869 and 1873. He explored the Tian-Shan and was a member of Count Agenor Goluchowski's expedition in the Amu-Darya region. His important contributions to the knowledge of these regions were published in the *Proceedings* of the Russian Geographical society (1874–88). From 1882 to 1883 Kaulbars was war minister in Bulgaria under Alexander (*q.v.*) of Battenberg. In 1894 he was commander of the Plock army corps in Poland, but three years later he was given the command of a cavalry corps. In 1900 he served in China. In 1904 he became commander of the Odessa army corps. In 1904–05 he held an army command in the Russo-Japanese War, after which he returned to the Odessa command, retiring in 1909.

Kaulbars died in Paris in 1929.

KAULBARS, NIKOLAI VASILIEVICH (in German, REINHOLD, FREIHERR VON KAULBARS) (1842–1905), Russian general of Baltic German extraction, chiefly remembered for his role in the affairs of Bulgaria (*q.v.*), was the elder brother of A. V. Kaulbars (*q.v.*). He was born in St. Petersburg on June 3 (new style; May 22, old style), 1842. During the Russo-Turkish War of 1877–78 he served on a divisional staff. After the congress of Berlin he was a member of the Turkish-Montenegrin boundary commission. In 1881 he was appointed military attaché in Vienna. In 1886 he was sent to Bulgaria, in fact in order to consolidate Russian interests there after the fall of Alexander of Battenberg, but ostensibly in order to assist the Bulgars. He tried to postpone the election of Ferdinand of Saxe-Coburg-Gotha as prince of Bulgaria by the national assembly, but his tactless behaviour merely alienated the Bulgars. He was put in command of the Warsaw army corps in Poland in 1889, but was transferred to the Helsinki army corps in Finland in 1891. In 1899 he was appointed the head of the intelligence department of the Russian general staff. He died in St. Petersburg on Dec. 3, 1905.

KAUNAS (Ger. KAUEN; Pol. KOWNO; Rus. KOVNO), a city in the Lithuanian Soviet Socialist Republic, U.S.S.R., is located at the confluence of the Neman (Nemunas) and Viliya (Neris) rivers, 55 mi. W.N.W. of Vilnius. Pop. (1959) 214,348. The old town at the river confluence contains many ancient churches representing a variety of architectural styles, among them the basilica (1413), the Vytautas church (1400), the church of the Holy Trinity (1634) and the Jesuit church and monastery (1666). From Napoleon hill Napoleon is said to have watched his troops cross the Neman into Russian territory in 1812. A river port and railroad junction of considerable importance, Kaunas has numerous industries including metal goods, textiles, paper, furniture and foodstuffs. It is the seat of a state university. Kaunas was first established in 1030 as a fortress and acquired a municipal charter in 1408. Lying on the highroad to the east and at a vital navigation point, it was repeatedly attacked and destroyed by the Teutonic Knights. At the third partition of Poland in 1795 it was given to Russia. With the traditional Lithuanian capital of Vilnius in Polish hands, Kaunas was the *de facto* capital of independent Lithuania between World Wars I and II, and its industrial development dates largely from this period. The formerly large Jewish population was almost entirely eliminated during the German occupation of 1941–44. After World War II Kaunas, with the rest of Lithuania, was incorporated into the U.S.S.R.

KAUNITZ, WENZEL ANTON VON (1711–1794), prince von Kaunitz-Rietberg from 1764, was Austrian state chancellor from 1753 to 1792 and the principal adviser on foreign affairs of the Holy Roman empress Maria Theresa and her sons. He was born in Vienna on Feb. 2, 1711, the second son of the aulic councilor Maximilian Ulrich, Graf von Kaunitz, and his wife Marie Ernestine, Gräfin von Rietberg. He was at first destined for the church, but his inclinations did not lie in that direction. After a short study of law at Leipzig and the usual grand tour of western Europe and Italy, he was appointed to the aulic council (*q.v.*), in which he spent five trouble-free years (1735–40). In 1740 he entered the diplomatic service, the only career that corresponded to his gifts. In 1742, during the War of the Austrian Succession, Kaunitz was sent as ambassador to the court of Charles Emmanuel of Sardinia at Turin, at that time the high school of diplomacy. There he learned those hard principles of unscrupulous power politics which he was to apply later as chancellor. In 1744 Maria Theresa sent him as political adviser to the regents of the Austrian Netherlands, Prince Charles of Lorraine and his wife Maria Anna, Maria Theresa's beloved sister. In 1748 he represented Austria at the peace congress of Aix-la-Chapelle. There he first conceived the plan of freeing the Habsburg monarchy from its dependence on the maritime powers, Great Britain and the United Provinces of the Netherlands—a dependence painfully obvious at the congress—and of allying Austria with France and Russia in order to destroy the growing power of Prussia. The empress approved of his program in 1749, and he was sent to Paris as ambassador in 1750 with the task of initiating this new foreign policy. Having gained Maria Theresa's full confidence, he was made head of Austrian

state chancery in 1753; and on May 1, 1756, Austria and France concluded the so-called first treaty of Versailles, the defensive alliance which led to the fruition of all his long efforts. It was Kaunitz's diplomatic masterpiece first to have bound France to Austria, against all the traditions of French policy, and then, when the Seven Years' War (*q.v.*) broke out, not only to bring France, against all French interests, to fight for Austria against Prussia, but also to make even the Russians use their power for interests quite alien to their own.

With the accession of the emperor Joseph II, Kaunitz ceased to be the almost independent director of Austria's foreign affairs, but he remained the crown's most important adviser, to whose influence must be ascribed the steady continuation of the anti-Prussian policy. The French Revolution terminated the system of alliance for which he stood; and the emperor Leopold II's treaty of Reichenbach (July 27, 1790) changed Austria's relations with Prussia. When Francis II came to the throne, Kaunitz was pushed into the background. His resignation was accepted on Aug. 19, 1792, and he died in Vienna on June 27, 1794.

See G. Küntzel, *Fürst Kaunitz-Rietberg als Staatsmann* (1923); A. Novotny, *Staatskanzler Kaunitz als geistige Persönlichkeit* (1947); F. Walter, *Männer um Maria Theresia* (1951). (FH. WR.)

KAURI PINE (*Agathis australis*), a coniferous tree native of New Zealand, where it is found in diminishing numbers in the North Island. The stands are rapidly disappearing because of use of the trees as timber and destruction by fires. It is a tall resiniferous tree, usually ranging from 80 to 100 ft. in height, with a trunk 4 to 10 ft. in diameter, but reaching 150 ft., with a diameter of 15 to 22 ft.; it has a straight columnar trunk and a rounded bushy head. The thick bark falls off in large flat flakes. The leaves, which persist for several years, are very thick and leathery; on young trees they are lance shaped, 2 to 4 in. long and $\frac{1}{4}$ to $\frac{1}{2}$ in. broad, but on mature trees they are shorter and broader. The ripe cones are almost spherical, erect and two to three inches in diameter; the broad, flat, rather thin cone scales fall from the axis when ripe. Each scale bears a single compressed seed with a membranous wing. The timber is remarkable for its strength, durability and the ease with which it is worked. The resin, kauri gum, is an amber-like deposit dug in large quantities from the sites of previous forests, in lumps generally varying in size from that of a hen's egg to that of a man's head. The colour is of a rich brown or amber yellow, or it may be almost colourless and translucent. Because of its peculiar qualities of hardness and durability, the resin, called Kauri copal or Kauri gum, is used in making varnishes and lacquers.

KAUTSKY, KARL (1854–1938), the leading Marxist theoretician of the German Social Democratic party before World War I, was born in Prague, Oct. 16, 1854, of a Czech father and a German mother. He studied history and science in Vienna, where he joined the Austrian Social Democratic party as a student. In 1880 he published a pamphlet steeped in Darwinian ideas on the relation between the growth of population and social progress. Going to Zurich in 1880, he became a convinced Marxist under the influence of Eduard Bernstein; and in London he made the acquaintance of Friedrich Engels. All his subsequent writings aimed at diffusing and popularizing Marxist ideas. In 1883 he founded the Stuttgart scientific socialist journal *Die Neue Zeit*, which he edited (chiefly from London in the 1880s) until 1917. He achieved his greatest success with the book *Karl Marx' ökonomische Lehren* (1887; frequently reprinted). His proposals formed the basis for the theoretical part of the "Erfurt program" (1891) of the German Social Democratic party. Several of his works tried to apply Marxist methods to the writing of history, among them the essay written in London, *Thomas More und seine Utopie* (1888). His friendship with Engels, close but not untroubled, lasted for more than a decade; and after Engels' death (1895) Kautsky was generally recognized as the most important protagonist of Marxist doctrine. The German Social Democrats accepted his pronouncements as decisive in ideological quarrels, and his authority was also recognized by the other parties of the Second International; hence he has been called the pope or *praeceptor mundi* of international socialism.

Kautsky's conception of history, analyzed critically, turns out to differ considerably from that of Marx and Engels. His interpretation narrowed the revolutionary dialectical Marxism to an undialectical pseudoscientific metaphysics of evolution. At the decisive points his interpretation of Marx kept within the limits of his pre-Marxist political education; it presented a synthesis of enlightened progressive thought and social Darwinism. This synthesis dominates even his late two-volume philosophical work *Die materialistische Geschichtsauffassung* (1927). The revolutionary Marxist terminology was emasculated into a theoretical, nonobligatory verbal radicalism; this is the ideology called "orthodox Marxism," which should more correctly be called Kautskyanism, as it is in reality an offshoot of social Darwinism. This ideology determined the general drift of the "Erfurt program" and corresponded to the ambiguous position of the Social Democratic party in the German empire: it affirmed the "implacable" protest of the Social Democrats against the existing social and political structure but at the same time justified their political passivity, since the victory of socialism was expected to come about through an inevitable "evolution" and by "the force of circumstances."

However, just because it did not oblige anybody to doing anything practical, Kautskyanism proved valuable: it served as an ideology of integration which could embrace all the various factions within the party. Hence it is easy to understand why Kautsky opposed so bitterly the "revision" of Marxism demanded by Bernstein and the "reformists." Yet the official radicalism of the majority, which Kautsky provided with intellectual arguments, scarcely disguised a virtual policy of gradualism.

In the last years before World War I Kautsky was the spokesman of the "Marxist centre" and actively opposed the left wing of the Social Democrats which pressed for an effective, revolutionary policy and threatened to split the party. In this struggle too he rescued his revolutionary terminology, maintaining that the Social Democratic party was "a revolutionary party but not a party which makes revolutions," while according to his "Marxist convictions the revolution is a natural phenomenon whose coming can neither be hastened nor delayed."

When the German Social Democratic party was split over the voting of credits for World War I, Kautsky's pacifist conviction led him to join the Independent or Minority Social Democrats. After Lenin had seized power in Russia, Kautsky began his intellectual fight against Bolshevik despotism. Similarly, after revolution had broken out in Germany, he warned the revolutionary movement against deviation into left-wing, radical tendencies. When the Independents themselves veered to the left he grew increasingly isolated. However, after the most of the Independents had joined the Communist party, the Majority and Minority wings of the Social Democratic party reunited—a result for which Kautsky had laboured from the start. After 1924 Kautsky lived in Vienna, occupied with literary work. When the German army occupied Vienna in 1938 he was forced to flee. He died in Amsterdam on Oct. 17, 1938. His autobiography is printed in *Volkswirtschaftslehre der Gegenwart in Selbstdarstellungen*, vol. i (1924).

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KAVA (CAVA OR AVA), a nonalcoholic, euphoria-producing beverage, made from the root of the pepper plant, principally *piper methysticum*, in most of the South Pacific islands. It is yellow-green and opaque in appearance. The flavour is bitter but it leaves a pleasant, clean taste in the mouth.

Consumption of the beverage takes place in the kava ceremony, which is rigidly prescribed and includes the ritual making and drinking of kava and eating the ceremonial feast. Occasions for the kava ceremony can be social—a gathering of chiefs, a visit of a chief from a neighbouring island, a gathering before battle or before pigeon snaring—or ceremonial—the conclusion of a public assemblage presided over by a chief or king, the inauguration of a new chief, a meeting with a god or gods for divination, etc.

In the preparation of kava, the roots are first chewed. The material is then placed in a bowl, water or coconut milk is poured over it and the mixture is thoroughly stirred. The woody matter is then removed and the resulting liquid is ready for consumption, which proceeds according to ritual. Intoxication follows in about 20 minutes (for those not inured to its use) and is of a melancholy, silent and drowsy character. The active ingredient in the beverage is apparently alkaloidal in nature. It seems likely that the substance is present as a glycoside, which is split into the free alkaloid and sugar by one of the enzymes in saliva. (H. J. GN.)

KAVADH (KOBAD), name of two kings of the Sasanian dynasty in Iran.

KAVADH I (reigned A.D. 488–496 and 498 or 499–531), son of Firuz (*q.v.*), was a far-sighted and energetic ruler, though best known for an unhappy association with the heterodox religious sect of Mazdak, son of Bamdad. Time spent in youth as a hostage in the hands of the Hephthalites (*q.v.*) after their first defeat of his father gave Kavadh valuable military experience and connections, which he later turned to good use. After the deposition of his uncle Balash in A.D. 488 he was called to the throne, but at first was largely dependent on the feudal chief Zarmihr (elsewhere called Sokhrà, perhaps the family name). He contrived to eliminate this over-powerful protector, but the consequent hostility of the nobles, with tribal unrest in Armenia and western Iran, led to his deposition in favour of a brother, Jamasp. Kavadh was incarcerated in the "Castle of Oblivion" in Susiana. Thence he escaped (in a romantic version his wife takes his place in the dungeon), and helped by a nobleman, Siyavush (Seoses), fled to the Hephthalites. Their king gave to Kavadh in marriage a daughter by the Persian princess Firuzdukht (the daughter of Firuz captured in the disaster of A.D. 484), with a powerful army to recover the Persian throne. This Kavadh accomplished without opposition in A.D. 498 or 499. He next applied to the Byzantine emperor Anastasius I for subsidies with which to placate his auxiliaries. Payment being refused, he led his troops against Anatolia, and seized the cities of Theodosiopolis (Erzurum) and Amida (Diyarbakir). Under an eventual armistice Kavadh returned Amida against a heavy indemnity. When Justin I succeeded at Constantinople in A.D. 518 Kavadh's main concern was to ensure the succession of his favourite son, Khosrau (later Anushirvan), by a peace under which he would be adopted and sponsored by the emperor. Justin rebuffed the proposal and a new breach resulted. In A.D. 526 the general Belisarius was involved in fighting against the Persian king. Kavadh was by this time deeply influenced by the sect of the Mazdakites, who by preaching community of wives and property angered the traditionalists (*see* MAZDAKISM). The sectaries are represented as favouring the succession of the prince Kaus, while Khosrau enjoyed the support of his father and the Zoroastrian clergy. Kavadh, at last persuaded of the harmfulness or danger of the Mazdakites, had them assembled, as for a meeting, and then shockingly massacred with their leader. Having already drafted the fiscal reforms which won fame for his successor, Kavadh died on Sept. 13, 531. His written testament sufficed to place Khosrau on the throne.

KAVADH II SHIRUYA (Siroes), a son of Khosrau II, was crowned in Feb. 628 in opposition to his father, who persisted in war with Heraclius (*q.v.*) despite heavy defeats. His father and 18 brothers were executed and negotiations with Heraclius opened in his name, but Kavadh died after six months, by plague or poison.

See, for Kavadh I, A. Christensen, *Le Règne du roi Kawadh I et le communisme mazdakite* (1925) and *L'Iran sous les Sassanides*, rev. ed. (1944). (A. D. H. B.)

KAVAFIS (CAVAFY), **KONSTANTINOS PETROU** (1863–1933), Greek poet, developed an individual style in his poetry which struck a new lyric note not only for Greece, but for the whole of Europe. He remained uninfluenced by the main currents of contemporary Greek literature. In his evocations of the Greek and, in particular, of the Hellenistic past he blended reflection, sensuality and irony and gave them the solidity and variety which he found in his own cosmopolitan surroundings, for he was born at Alexandria on April 17, 1863, and spent most of his life there. He wrote much, but published little—about 200 poems in all. The work of Kavafis falls into two groups, poems written before 1910, when he was still absorbing the influence of the romantics, the Parnassians and the Symbolists; and those written after 1910, which represent the most important part of his output. Thus he could say with some justification: "I am a poet of old age." His language is a strange mixture of the refined and stilted Greek, the *katharevousa*, inherited from the Byzantines, and the *demotic* or spoken tongue.

His style is relaxed, almost conversational; it avoids exaggerated imagery and is realistic. In honouring courage and character he draws his examples from history, religion and politics. The dramatic handling of his material enables him to enter strange recesses of the human soul, but his skepticism was not morbid and his poetry does not preach the futility of life. He died in Alexandria on April 29, 1933. After his death his influence became strongly felt in Greece.

BIBLIOGRAPHY.—Kavafis' poems were first published without date before World War II and reprinted in 1949; Eng. trans., *The Poems of C. P. Cavafy*, by J. Mavrogordato (1951). *See* also C. M. Bowra, *The Creative Experiment* (1949). (CE. A. T.)

KAVALLA, a walled town and seaport of Greek Macedonia, lies on the Bay of Kavalla at the northern edge of the Aegean sea, 121 km. (75 mi.) E. of Salonika. It is the capital of the *nomos* (department) of Kavalla and seat of the metropolitan bishop of Philippi, Neapolis and Thasos. Pop. (1961) 44,517 (town), 140,751 (*nomos*). The town is built on a promontory stretching south into the bay, and opposite the island of Thasos. There is a harbour on each side of the promontory, which is surmounted by a medieval castle. Numerous Roman and Byzantine remains have been found in the neighbourhood, of which the chief is the large aqueduct on two tiers of arches which connects the promontory with the mainland. The immediate hinterland is a rich tobacco-growing country, and Kavalla is the main centre of the tobacco industry in eastern Macedonia. It is on the road from Salonika to Alexandroupolis and is connected by a branch line to the railway linking these towns.

Kavalla has been identified with Neapolis, the port where Brutus stationed his fleet before the battle of Philippi, and at which St. Paul landed when on his way from Samothrace to Philippi (Acts xvi, 11). Under the name of Christoupolis it was one of the most important Macedonian fortresses of the Byzantine empire. It fell to the Turks in 1387, but passed to Greece after the Balkan War of 1912–13. From 1916 to 1918 the town was occupied by Bulgarian troops, who committed numerous atrocities. It was coveted by Bulgaria as a maritime outlet, and during the negotiations over the peace treaty of Neuilly (1919) with Bulgaria, Eleutherios Venizelos offered to connect Kavalla with the already existing narrow-gauge railway in the Struma valley, running from the Bulgarian side of the frontier to Sofia. No action was taken, however. In 1941, after the German invasion of the Balkans, it was again occupied by Bulgaria, but was restored to Greece in 1944. (D. M. N.)

KAVIRONDO, the area stretching around the northeastern corner of Lake Victoria from Mt. Elgon to the Tanzania border in east Africa. The peoples with whose territory Kavirondo most nearly coincides are the group of related Bantu speakers that includes, from north to south, the Gisu (Gishu, Gesu) and Samia of the Bugishu and Bukedi districts of Uganda; the Luhya (*q.v.*), a term of recent coinage referring to the Vugusu, Wanga, Tsotso, Tiriki, Marama, Nyala, Kabras, Hayo, Marach, Holo and Logoli of Elgon Nyanza and North Nyanza districts of Kenya; and the Gusii (Kisii) of South Nyanza district of Kenya. The Kulya (Kuria, Tende) peoples, extending southward into Tanzania, are probably members of the group linguistically, though their culture has been influenced by that of the Masai. Besides the Bantu peoples, who numbered (not counting the Kulya) more than 1,000,000 in the 1960s, there were in the area numerous Nilotic peoples, including about 757,000 Luo (Lwo, Jaluo) living around the Kavirondo gulf. Smaller groups of Nilo-Hamites, such as the Nandi, Sebei and Kipsigis, live in and around the area. All these peoples have intermarried and mutually influenced one another (*see* NILOTES).

The Bantu peoples of Kavirondo are primarily cultivators of millet, sorghum, plantain and maize (corn), though livestock are seen everywhere and are of major importance among the Vugusu. The most important modern cash crops are maize among the Luhya groups and coffee among the Gusii and Gisu. Land shortage has stimulated labour migration, especially among the Luhya.

The most important social unit among the Bantu peoples was the patrilineal descent group and in most tribes political authority did not extend beyond it. The Tiriki, however, who were in close contact with the Nandi, had a developed system of age grades. The largest scale political unit in the area was achieved by the Wanga, who produced a dynasty of paramount chiefs; one chief, Mumia, was able to extend his authority over neighbouring peoples with the help of Swahili traders and British officials.

See also LUO; VICTORIA, LAKE; KENYA; TANZANIA, UNITED REPUBLIC OF; UGANDA.

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KAW (AKHA), a hill people of Keng Tung, the most eastern of the Burma Shan states. Ethnically they are closely related to the Lahu (Muhso) and Kwi who are classed as Yi (*q.v.*) by the Chinese, and also to the Lisu (*q.v.*), who are usually classed as Kachin (*q.v.*). The 1931 census of Burma listed 40,407 Kaw, 27,184 Lahu and 3,832 Kwi. Their languages belong to the Tibeto-Burman family. Similar people are also found on the eastern side of the Mekong river in Laos where they are usually classed among the Kha (pop. [1955 est.] 258,000). Kha is a term used by the Thai-speaking peoples of this region to denote all non-Thai and means roughly hill barbarian; similarly Muhso is Thai for hunter. French sources distinguish more than 80 varieties of Kha but despite striking and picturesque differences of costume the various names do not denote distinct tribal groups.

Like most of their neighbours, Kaw subsist mainly by the cultivation of dry rice on temporary hillside clearings. For hunting they make use of crossbows and poisoned arrows. No precise details of social organization have been reported but K. G. Izikowitz' study of the neighbouring Lamet indicates the general style of ecology and technological adaptation. J. H. Telford remarks on the general similarity of Kaw and Kachin. Whereas the Thai of the valleys are Buddhists living by irrigated rice agriculture, the Kha, living at altitudes of 1,500 to 6,000 ft., have a religion embodying various forms of ancestor worship. In the 1960s economic conflicts between the hill people and the more sophisticated valley dwellers constituted a major factor in the political instability throughout the area. *See* also BURMA; SHAN STATE; KHA.

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KAWABATA YASUNARI (1899–), Japanese novelist whose melancholy lyricism represents a remarkably successful adaptation of an ancient Japanese strain, was born near Osaka on June 11, 1899. The loneliness of which most of his mature writing is a description must derive in some measure from an unusually lonely childhood. He was orphaned in infancy and soon lost his grandparents as well.

His first published writings appeared shortly after his graduation from Tokyo Imperial University. "The Izu Dancer" (*Izu no Odoriko;* 1925) made his name for him; it tells of a university student who finds brief consolation in the company of a strolling dancer—an outcast. The school of writing with which Kawabata was early associated has been held to derive from postwar French literature. Doubtless there is an affinity in the abrupt transitions and in imagery which frequently startles by mixing incongruous impressions and juxtaposing the beautiful and the ugly; but the same qualities are present in Japanese prose of the 17th century and the linked verse of the 15th century. It is to this last that Kawabata's fiction seems to draw nearer in later years.

As with linked verse, it moves in brief, lyrical episodes and is without a clear beginning, middle, and end. The beauty is that of the links, not the form as a whole. Kawabata's method of composition may help account for this peculiarity: his best novel, *Snow Country* (*Yukiguni;* 1947), the story of a forlorn country geisha, was begun in 1935 and completed, after two unsuccessful attempts at a conclusion, 12 years later; and *Thousand Cranes* (*Sembazuru*), a series of episodes centred upon the tea ceremony and hagridden by the past, was begun in 1949 and never really completed. *The Sound of the Mountain* (*Yama no Oto;* 1949–54) has to do with the comfort an old man who cannot abide his own children gets from his daughter-in-law.

The following of Kawabata's works may be read in English translation (unless otherwise noted, the translator is Edward Seidensticker): *Snow Country* (translation 1957); *Thousand Cranes* (1959); excerpts from "The Izu Dancer," *The Atlantic,* vol. 195, no. 1, pp. 108–114 (1955); excerpts from *The Sound of the Mountain,* in *Japan Quarterly,* vol. xi, no. 3, pp. 309–329, and no. 4, pp. 446–467 (1964); "The Mole" (*Hokuro no Tegami;* 1940), *Japan Quarterly,* vol. ii, no. 1, pp. 86–93 (1955); "The Moon on the Water" (*Suigetsu;* 1953), translated by George Saito, in Ivan Morris (ed.), *Modern Japanese Stories* (1961); and "One Arm" (*Kataude,* 1963), *Japan Quarterly,* vol. xiv, no. 1, pp. 60–70 (1967). (E. G. SE.)

KAWAKAMI HAJIME (1879–1946), probably the leading Marxist theoretician of Japan during his lifetime, was born on Oct. 20, 1879, in Iwakuni, Yamaguchi prefecture. His father had been a low-ranking samurai (warrior) of the Choshu clan, which played an important role in the Meiji restoration. As a consequence, he began his life under the influence of the strongly nationalist ideology prevailing in Japan at that time, an ideology from which he never entirely escaped. After receiving his degree in economics from Tokyo Imperial University in 1902, he published a series of articles entitled "A Discourse on Socialism" ("Shakai-shugi Hyoron"), which excited much controversy, and translated into Japanese E. R. A. Seligman's *Economic Interpretation of History,* the first analysis of dialectical materialism to appear in that language. He later became an instructor of economics at Kyoto Imperial University and then studied in Europe (1913–15) for a doctorate in law; this helped to elevate him to a full professorship in economics at Kyoto, a post he held until 1928, when his political activities forced his resignation. Kawakami's reputation as a social critic was enhanced by the publication of his *Tales of Poverty* (*Bimbo Monogatari;* 1917), an account of some of Japan's economic ills. While at Kyoto University he also began publishing his own magazine, *Studies on Social Problems* (*Shakai Mondai Kenkyu*), which he used as a vehicle to educate students and workers in Marxist economics.

During the 1920s Kawakami gradually moved more directly into politics, including running unsuccessfully for the National Diet as a candidate of the Proletarian Party. He also became engaged in the activities of the outlawed, hence underground, Japan Communist Party. His arrest for illegal political activities under the so-called Peace Preservation Laws ended his active involvement in politics. Upon his release from jail in 1937 he began writing his *Autobiography* (*Jijoden,* 4 vol.; 1947–48), a masterpiece in which he clearly indicates his deep commitment to various causes and ideologies beginning with Tolstoian nationalism, through humanitarianism, and, after much searching, arriving at authentic Marxism. His writing, including *Outline of Economics* (*Keizaigaku Taiko;* 1928) and the "Introduction" to the Japanese edition of *Das Kapital* (*Shihon Ron,* 5 vol.; 1927–29), played a crucial role in guiding the development of theoretical economics in Japan during the 1920s and 1930s. He died of malnutrition during the terrible winter of 1945–46, on Jan. 30, 1946. Four volumes of his poetry were published posthumously in 1946. (H. H. BA.)

KAWASAKI, a major Japanese industrial city and port, located on Tokyo bay between and continuous with Tokyo and Yokohama, is the centre of the Keihin industrial area. The city expanded rapidly during the 1930s, was almost completely destroyed in World War II and has since been rebuilt. Three industrial zones have developed: heavy industry along the coast, the machine and tool industry in the centre of the city and light chemical industries in the northwest. Pop. (1965) 854,776. (C. A. MR.)

KAY, JOHN (1704–1764?), English machinist and engineer, inventor of the "flying shuttle," was born on July 16, 1704, near Bury, Lancashire, the son of a woolen manufactory owner. Educated abroad, he returned to England while still quite young and was placed in charge of his father's mill. His mechanical ability enabled him to make many improvements in dressing, batting and carding machinery, and he received his first patent when he was 26 years old. The patent that brought him fame, however, was the one that he received three years later, on May 26, 1733, for a "New Engine or Machine for Opening and Dressing Wool" that incorporated his famous "new invented shuttle . . . running on four wheels . . . a small pull at the cord casts the new invented shuttle from side to side." The rapidity with which the shuttle could operate gave it the name of "flying shuttle."

The weavers were quick to adopt the new invention but organized a protective club to avoid the payment of a royalty to Kay. After he lost most of his money in litigation to protect his patent, Kay moved to France. In 1764 his son, Robert, wrote to the London Society of Arts and Manufactures seeking a premium for his father for the invention, but his efforts were as unavailing as those of Kay himself. The details of Kay's later years are obscure. He is said to have died in France in 1764 or thereafter, in obscurity and want, having received little for the invention that proved to be of great importance to the weaving industry and so increased yarn consumption that it spurred the invention of spinning machines.

(G. R. Co.)

KAY, ULYSSES SIMPSON (1917–), U.S. composer, whose music is characterized by lyricism, distinctly thematic textures, and tonal orientation (though latterly his music became more chromatic), was born in Tucson, Ariz., on Jan. 7, 1917. His father was a barber; his mother, a sister of the New Orleans jazz trumpeter Joe ("King") Oliver. Oliver encouraged him in music, and the young Kay was soon playing jazz saxophone. However, jazz failed to sustain his interest, and he turned to serious music. He was educated at the University of Arizona (B.A., 1938), the Eastman School of Music (M.Mus., 1940), the Berkshire Music Center (1941), Yale University (1941–42), and Columbia University (1946–49). His principal teachers were Bernard Rogers and Paul Hindemith.

Following naval service during World War II as a performer, composer, and arranger for dance bands, Kay settled in New York City. Significant scores from this period include his Suite for Strings (1947), Concerto for Orchestra (1948), and music for the film *The Quiet One* (1948). A Prix de Rome and a Fulbright Fellowship enabled him to live in Italy from 1949 through 1952. In 1958 he was a member of the first group of American composers to participate in a cultural-exchange mission to the Soviet Union. He was awarded a Julius Rosenwald Fellowship, a grant from the National Institute of Arts and Letters, and a Guggenheim Fellowship. He served as visiting professor at Boston University and the University of California at Los Angeles, and from 1953 he was consultant to Broadcast Music, Inc. During much of his career Kay composed for films and television; a notable example of his work for television is *An Essay on Death* (1964), a tribute to Pres. John F. Kennedy. Among his orchestral works are a Serenade for orchestra (1954), "Fantasy Variations" (1961), "Umbrian Scene" (1963), and "Markings" (1966), a tribute to Dag Hammarskjöld. He also wrote string quartets and other chamber music; choral works, including the cantatas "Song of Jeremiah" (1947), "Phoebus Arise" (1959), "Choral Triptych" (1962), and "Inscriptions from Whitman" (1963); organ and piano music; short band pieces; and two operas, *The Boor* (1955; after Chekov) and *The Juggler of Our Lady* (1956).

See N. Slonimsky, "Ulysses Kay," in *American Composers Alliance Bulletin* (Fall, 1957). (L. R. Ba.)

KAYAH STATE, of the Union of Burma, formerly known as Karenni states (*q.v.*), is bounded on the north by the Shan state, on the southeast by Thailand and on the southwest by the Karen state. Area 4,506 sq.mi.

The country consists of a series of chains of hills, intersected by deep valleys, through which run from north to south the two main rivers, the Salween and its tributary the Pawn, and their feeder streams. It is crossed by several tracks, passable only for pack animals. The principal peak east of the Salween is on the Loi Lun ridge (7,112 ft.). The Pawn is unnavigable because of its rocky bed, but the Salween is navigated by large native craft.

The population was formerly classed by the Burmese as Karen-ni ("red Karen"); it consists of small tribal groups, distinct in language and custom but little studied. The Padaung, Bre and Zayein are among the more important. Little of their history is known, but probably Bawlake was originally the chief state of the whole country, though Kantarawadi under Papawgyi early became the most powerful. The latter's ruler Sawlapaw, having defied the British government, was deposed in 1889. Sawlawi was then appointed *myoza*, and received a sunnud, or patent of appointment, on the same terms as the chiefs of the Shan states (*see* Shan State). The independence of the western Karenni states, Kyebogyi and Bawlake, had been guaranteed by the British government in a treaty with King Mindon Min in 1875. They were, however, formally recognized as feudatories in 1892 and were presented with sunnuds.

The constitution of the Union of Burma of Sept. 24, 1947, proclaimed that the three above-mentioned states (total pop., 1941, 70,493) should form a constituent unit of the union and be known as the Karenni state. It was constituted on Jan. 14, 1952, and its name changed to Kayah state. It comprises the four substates of Kantarawadi, Bawlake, Kyebogyi and Mong Pai, pop. (1962 est.) 103,252. Care should be taken not to confuse Kayah state, formerly Karenni, with the Karen state (*q.v.*). The chief town is Loi-kaw, which was provided with an airstrip in 1959–60. Loi-kaw and Mawchi are both linked by road with Toungoo and other roads were under construction in the early 1960s, though the hilly forested country was making their building difficult. The Mawchi mines in Bawlake were an important source of tungsten and in 1939 produced 3,530 long tons of tungsten concentrates (WO_3); *i.e.*, 16% of the world's output. For 15 years following World War II conditions were too disturbed to permit regular working.

(L. D. S.)

KAYAK: *see* Boat.

KAYAN, an indigenous people of central Borneo, grouped with the Kenyah (*q.v.*) or under the general name Bahau. In Sarawak the Kayan (pop. [1960 census] 7,899) are settled in the headwaters of the Baram, Bintulu and Rajang rivers, together with Kenyah and allied peoples. In Kalimantan (Indonesian Borneo) the Kayan live mainly near the headwaters of the Mahakam and Kapuas rivers. The total Bahau population was estimated about 70,000 in the 1960s. In many of the Kayan communities it is said that they came from the Apo Kayan, near the remote headwaters of the Kayan river, a region now occupied by Kenyah. According to A. C. Haddon, Kayan belong to a brachycephalic proto-Malay race. They have a distinctive language that is known as Busang in the Kapuas and Mahakam regions. The Kayan live on the banks of rivers—navigable by canoes—in long houses that individually may contain 50 or more family apartments. The extensive quarters of the chief, often decorated with carvings and murals, are in the centre of the house. Several houses may be grouped to form a village. The Kayan have a subsistence economy based on shifting cultivation, hill rice being grown on clearings in the rain forest. Sago is a subsidiary crop; fishing, hunting and the collection of forest produce are other important economic activities. Many of the Kayan are skilled blacksmiths and they are noted for their fine craftsmanship and traditional art. Kayan society is cognatic but has a class system, class endogamy being marked among the aristocrats. Both men and women may become chiefs although male chiefs are in the majority. Formerly the Kayan practised head-hunting and were in frequent conflict with the Iban and other Dayak tribes. The Kayan have an elaborate traditional religion with a pantheon of gods, a wide range of animistic beliefs and such ritual institutions as shamanism (*q.v.*), augury and hepatomancy. Many Kayan of Sarawak are Christians. *See* also Borneo: *The People.*

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KAYE, NORA (NORA KOREFF) (1920–), U.S. dramatic ballerina, is noted for her penetrating interpretations of the leading roles in Antony Tudor's *Pillar of Fire* and *Lilac Garden,* Agnes de Mille's *Fall River Legend* and Jerome Robbins' *The Cage.*

Born in New York city, she studied at the Metropolitan Opera Ballet school and danced in the opera ensemble. After further training under Michel Fokine and George Balanchine, she joined the Ballet Theatre at its formation (1939). Her first major success came in 1942 with her creation of the role of Hagar in *Pillar of Fire.* As a dramatic dancer Kaye is unrivaled. (LN. ME.)

KAYSER, HEINRICH GUSTAV JOHANNES (1853–1940), German physicist whose name is associated with his work in spectroscopy, was born at Bingen on the Rhine on March 16, 1853. He was educated at Strasbourg and Berlin and was assistant in the Physical institute, Berlin (1878–85); professor in the Technische Hochschule, Hanover (1885–94); and professor of physics at Bonn (1894–1920). His early research work was on sound, and he published papers on the determination of the ratio of the specific heats of air by measuring the velocity of sound in air, effect of intensity on the velocity of a sound wave, the velocity of sound in wood and other similar subjects. Much of his work on spectroscopy was done in conjunction with C. D. T. Runge. Kayser and Runge carefully mapped a large number of spectra of the elements, using a Rowland grating, and discovered the existence of series in the spectra of the elements. They developed a formula connecting the wave length of the lines with constants depending on the element. About the same time J. R. Rydberg used the data of other workers and developed a similar formula.

Kayser died at Bonn on Oct. 14, 1940. He wrote *Lehrbuch der Spectralanalyse* (1883); *Lehrbuch der Physik für Studierende* (1890); *Handbuch der Spectroskopie,* 8 vol. (1900–34); *Tabelle der Schwingungszahlen* (1925); and *Tabelle der Hauptlinien der Linienspektra aller Elemente nach Wellenlänge geordnet* (1926).

KAYSERI (ancient CAESAREA MAZACA), a town and capital of the *il* (province) of the same name in central Turkey. Pop. (1965) 126,913. The town lies in a flat plain at the foot of Erciyas Dagi (Mt. Argaeus; 12,848 ft.), an extinct volcano. As successor to Roman and medieval cities, it has a well-preserved citadel, built of volcanic stone on a Roman foundation in the 13th century, and many important monuments, mostly of the Seljuk period, in one of which, the Huand Hatun Medresesi, the local museum is housed. Other Seljuk monuments include the Huand Hatun Camii and other mosques and *medreses,* as well as numerous circular or octagonal *turbes* (tomb chambers), the best known being the Doner Kumbet. South of the citadel is the old town with its impressive covered bazaar and Great Mosque (Ulu Cami); the more modern quarter is disposed around a boulevard running north from the central square to the railroad station. Kayseri is linked by railway to Istanbul, Erzurum and Adana, but the direct motor road from Ankara to Adana bypasses it. Its industries include textiles, cement, sugar and especially carpets; and there is an aircraft factory.

Twelve miles northeast of the town on the Sivas road is the site called Kultepe (*q.v.*), where excavations have recovered tens of thousands of clay tablets inscribed in cuneiform writing from the business archives of an Assyrian commercial colony (*karum*) outside the ancient city of Kanesh, dating from the first half of the 2nd millennium B.C., and from the city itself. They are the earliest written records found in Turkey and give a detailed picture of the commercial life of the period.

Mazaca, the residence of the kings of Cappadocia, was later called Eusebea (perhaps after Ariarathes Eusebes), and named Caesarea, probably by Claudius. The site shows only a few traces of the ancient town. Caesarea Mazaca was taken by Tigranes (early 1st century B.C.) and destroyed by the Persian king Shapur I after his defeat of Valerian in A.D. 260. In the 4th century St. Basil the Great (who was born there), when bishop, established an ecclesiastical centre on the plain about 1 mi. to the northeast, and this gradually supplanted the old town. A portion of Basil's new city was surrounded with strong walls and turned into a fortress by Justinian. The town was captured by the Seljuk sultan Alp Arslan in 1064 and by the Mongols in 1243, before passing to the Osmanli Turks.

KAYSERI IL has an area of 6,533 sq.mi. and a population (1965) of 536,912. Situated on the central Anatolian plateau, where it is drained by the Kizil Irmak (Halys), it has a continental climate. Principal agricultural products are rye and millet and fruits, including raisins and apricots. Lignite and iron are mined. Stock raising is of some importance. (S. H. LL.)

KAZAKH (KAZAK, QAZAQ), a Turko-Mongol people inhabiting mainly the Kazakh Soviet Socialist Republic and the adjacent parts of the Sinkiang-Uighur Autonomous Region of China. The Kazakhs emerged in the 15th century from an amalgam of Turkic tribes who entered Transoxiana around the 8th century and of Mongols who entered the area in the 13th century. Kazakhs speak a Turkic language but are Mongoloid in physical type (*see* TURKIC PEOPLES; TURKIC LANGUAGES). There are about 3,600,000 Kazakhs in the Soviet Union (77% in Soviet Kazakhstan) and about 400,000 in Sinkiang.

The Kazakhs were pastoral nomads (*q.v.*) dwelling the year round in portable dome-shaped tents (yurts) constructed of dismountable wooden frames covered with felt, and migrating seasonally to find pasturage for their livestock. The horse was the prestige animal, and the wealthy had herds numbering in the thousands. Sheep and goats constituted the basic livestock, however; some camels were kept and in the 19th century cattle were raised for sale to the Russians. The diet consisted largely of milk products supplemented by mutton. Fermented mares' milk (kumiss) and horse flesh were highly esteemed, but usually available only to the prosperous. Felt made the tent snug inside and out and was used for cloaks. Hides provided clothing, containers and thongs; horsehair was braided into rope, while horn was used for ladles and other utensils. Metal objects, such as the iron pot that hung from a tripod over the fire in every yurt, were made from imported metals by itinerant smiths and in the 19th century garments came to be made from imported cloth of printed cotton and silk.

Kazakhs believed themselves to be descended from a progenitor who had three sons from whom sprang the main divisions of the Kazakhs: the Great, Middle and Little hordes (*ordas*) that occupied the eastern, central and western parts respectively of what is the Kazakhstan of modern times. These *ordas* were subdivided into smaller groups; the basic unit was the extended family, embracing married sons and their wives and children, who camped together. Groups at various levels in the tribal hierarchy had chiefs, but only rarely was the Kazakh nation, or even one of the *ordas,* united under a single chief.

Nomadic life was gradually curtailed by encroachment on the pasture lands. In the 19th century an increasing number of Kazakhs along the borders began to plant some crops. After the Revolution in Russia (1917) wealthy Kazakhs fled with their herds to Sinkiang or Afghanistan, and the remaining nomads were settled on cattle-breeding collective farms. By 1934 only one nomadic group remained in the Soviet Union. There were many nomadic Kazakhs in Sinkiang in the 1960s, however; several hundred of them, the remnant of a much larger group that had fled with incredible hardship across the mountains to Kashmir, undertook a new pastoral life in Turkish Anatolia.

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KAZAKH SOVIET SOCIALIST REPUBLIC (KAZAKHSKAYA SOVETSKAYA SOTSIALISTICHESKAYA RESPUBLIKA or KAZAKHSTAN), a republic of the U.S.S.R. formed on Aug. 26, 1920, as an autonomous republic within the Russian Soviet Federated Socialist Republic, and on Dec. 5, 1936, as a union republic. Situated in the southwest of Soviet Asia, it is bounded on the north and west by the Russian S.F.S.R., on the south by the Turkmen, Uzbek and Kirgiz soviet socialist republics, and on the east by Sinkiang-Uigur Autonomous Region of the People's Republic of China. In territory Kazakhstan is the next largest republic in the union to the Russian S.F.S.R., the total area being 1,048,300 sq.mi.

Physical Features.—Kazakhstan is essentially a steppe area in a region of increasing desiccation. Much of it is characterized by salt lakes, some temporary and rapidly drying, by closed inland

drainage basins and by rivers which lose themselves in the desert sands. The country can be divided into three natural regions: the low Caspian depression and Turan lowlands in the west, higher uplands in the centre, and a high mountain belt in the east and southeast.

Western Kazakhstan comprises the Caspian depression and the Turan lowlands separated by the Mugodzhar hills, the southernmost spur of the Urals, with Mt. Bogtybay (2,152 ft.) as the highest peak. Although the level of the Caspian sea is about 85 ft. below that of the Black sea, in the southwestern corner of Kazakhstan there are two even lower depressions, one of 230 ft. and another of 433 ft. This part of the country comprises also the western half of the Ust-Urt plateau (Plato Ustyurt), a waterless and desolate desert. The Turan lowlands lying east and north of the Aral sea include the Turgay tableland. Western Kazakhstan is watered by the Ural (Yaik) and Emba rivers emptying into the Caspian, and the Irgiz and Turgay rivers which flow into the salt lake of Chelkar-Tengiz. The latter is separated from the Aral sea by the Kara-Kum (Black Sands) desert, not to be confused with a desert of the same name in Turkmenistan. The rivers, frozen from November to mid-March, are full in spring, but otherwise are shallow and not navigable. The Ubagan and the Turgay thus flow in opposite directions although together their valleys form a long, narrow depression called the Turgay gates (Turgayskiye Vorota), the highest point of which is only about 300 ft. above sea level. This suggested to Soviet engineers the idea of building a dam on the Irtysh (*q.v.*) north of Tobolsk to divert toward the Turgay steppe and the Aral sea (*q.v.*), the huge masses of water otherwise lost in the Arctic ocean. During the glacial period the Turgay steppe was covered by the Caspian-Aral sea.

Central Kazakhstan is part of the Hercynian upland consisting of a series of moderately high, deeply eroded short ranges and a few separated granite, porphyry or slate hill formations, Kyzylray (5,134 ft.) and Chingiz-Tau (4,268 ft.), north of Lake Balkhash (*q.v.*), being the highest. The Ishim (*q.v.*) river has its source in the centre of the upland, flows west, then north, and empties into the Irtysh; the Nura, which has intermittent connections with the Ishim southwest of Tselinograd, discharges into Lake Tengiz. In the south, between the lower Syr-Darya river and Lake Balkhash, lies the vast Bet-Pak-Dala, a plateau 450 ft. above sea level, the surface of which consists of cracked clay. Two rivers, the Sary-Su in the west of Bet-Pak-Dala, and the Chu in the south, flow respectively to the southwest and to the west, but lose so much water through evaporation and ground permeability that they disappear without reaching the Syr-Darya. South of the Chu lies a smaller Muyun-Kum desert.

Eastern and Southeastern Kazakhstan is composed of parts of four higher mountain massifs of central Asia extending westward, and three wide valleys lying between them. On the north is the Altai massif, and farther south the Tarbagatay range, reaching 9,813 ft. Farther south still is the Dzhungarskiy Alatau rising to 14,642 ft. and the Tien Shan (Tyanshan) system. Between Altai and Tarbagatay lies Lake Zaysan, 1,266 ft. above sea level, through which flows the Irtysh; between Tarbagatay and the Alatau are the Alakol' and Sasykkol' lakes on the route from the Dzungarian Gate (Dzhungarskiye Vorota), the historic main invasion route from Mongolia and China. Farther south, between Alatau and the Tien Shan, flows the Ili river, one of the rivers which gave the geographical and historical region of Semirechye ("seven rivers") its name, and which have their sources in the Alatau and Tien Shan and discharge into Lake Balkhash. The rivers of eastern Kazakhstan are suitable for hydroelectric power stations and irrigation. However, only the Irtysh is navigable and this is frozen for five months. In the north is a narrow belt of black earth, covering about 7% of the country, where agricultural settlements on a larger scale are possible.

Climate.—The climate is everywhere continental and dry. The January temperatures, except in the extreme south, are below freezing point. At Ural'sk, in the west, the average January temperature is −16° C. (3° F.), and the July temperature 23° C. (73°). At Semipalatinsk, in the east, frosts of −42° C. (−44°) are not uncommon, while in the summer the temperature may reach 50° (122°). In western and central Kazakhstan the average July temperatures vary between 19° C. (67°) in the north and 28° C. (82°) in the south. The temperature of the desert sands sometimes reaches 70° (158°). In the eastern mountain valleys the climate is more healthful and Alma-Ata (2,405 ft.) has an average temperature of −8° C. (17°) in January and 23° C. (74°) in July. Precipitation varies according to seasons and regions. From November to March it is about 12 in. in the north, from 2 to 4 in. at Aral'sk and there is only a trace in the south; from April to October it is about 10 in. in the north and from 1.2 to 3 in. in the south; in the mountainous areas, it is from 12 to 16 in. in winter and from 28 to 32 in. in summer.

Vegetation and Animal Life.—There are forests of fir, pine and spruce in the mountains, birch and aspen groves in the lower altitudes and clusters of poplar, willow and pseudo-acacia along the streams. Shrubs such as the wild cherry and dwarf almond grow on the hilly slopes, wormwood covers the clayey soil of the centre and saxaul, an oddly shaped, gnarled and apparently leafless tree, grows in the sandy steppes. In the forests there are bears, and wild boars exist in the thickets surrounding the lakes. There are also the caracal lynx (*Felis caracal*), Pallas's cat (*F. manul*), the steppe fox, the sable, the saiga antelope, the jerboa and two kinds of marmot. Among the characteristic birds are woodcocks and owls in the forests, pheasants and eagles on the steppes, wild geese, cranes, herons and lapwings around the lakes. There are many locust-breeding grounds, also scorpions and tarantulas, in the deserts. In the Aral Sea and Lake Balkhash fish are abundant, especially sturgeon and carp in the former and white perch and a carplike fish called *marinka* in the latter.

History.—(For the origin of the Kazakhs *see* KAZAKH; TURKIC PEOPLES.) Russian domination over the Kazakh lands began in 1731 when the Little Horde under its leader Abulkhair submitted to Russia. The Russians had already built three forts on the Irtysh river and the fighting which went on between Kazakhs and Kalmyks weakened both and facilitated further Russian penetration. During the period 1783 to 1797 the Kazakhs of the Little Horde under Srym Datov rose against the Russians and against Nur Ali Khan, son of Abulkhair, who was pro-Russian. After the Napoleonic Wars, the Russians continued their conquest of Kazakh lands. At that time they referred to the Kazakhs as Kirgiz in order to distinguish them from the Cossacks (in Russian *Kazaki*), while the real Kirgiz were described as Kara-Kirgiz. In 1830 the Russians built a fort at Akmolinsk (now Tselinograd) and began to settle Russian and Ukrainian peasants on the land. This resulted in a series of resistance movements, the most important being that of the Middle Horde led by Kenesary Kasymov who was eventually killed in 1847 by the Kirgiz near Issyk-Kul lake. In 1853 the Russians took Ak-Mechet (now Kzyl-Orda) and founded the fortress of Verny (now Alma-Ata). The country was broadly described as the "steppe region" and was divided into four provinces: Ural'sk, Turgay, Akmolinsk, Semipalatinsk.

Under the tsarist government there was no question of eventually granting self-determination to the Kazakhs; but a small nationalist movement started at the beginning of the 20th century, and after the 1905 Revolution Kazakh deputies were elected to the first and second *duma* (parliament). The first Kazakh newspaper, *Aykan,* appeared in 1910, followed by *Kazakh* in 1913. When in 1916 the government ordered the mobilization of all males between 19 and 43 for auxiliary army service, the Kazakhs rose under Abdulghaffar and Amangeldy Imanov. The revolt was suppressed by Russian troops with heavy loss of life. In Nov. 1917 Kazakh nationalists led by Ali Khan Bukei (Bukeikhanov) demanded full autonomy for Kazakhstan and in 1917 a nationalist government known as the Alash Orda was formed. In 1919–20 the Red army defeated the "White" Russian forces and occupied Kazakhstan, and on Aug. 26, 1920, a Kazakh (still erroneously described as Kirgiz) autonomous soviet socialist republic was formed with a temporary capital at Orenburg. In 1925 the name of the republic was changed to Kazakh and the capital was moved first to Kzyl-Orda, and in 1929 to Alma-Ata. From 1927 onward the Soviet government pursued a vigorous policy of transforming the nomads into a settled population and of Russian and Ukrainian coloniza-

tion. Kazakh protests against the latter led to the execution of Kulumbetov, a Kazakh deputy premier, and 18 other leading Kazakhs for "bourgeois nationalism."

In 1936 Kazakhstan became a soviet socialist republic, and in June 1937 the Kazakh Communist party, then containing 51,440 members, held its first congress. During World War II a Kazakh, Zhumabay Shayakhmetov, was appointed first secretary of the Kazakh Communist party. He was replaced in 1954 by a Russian, P. K. Ponomarenko, on account of his unsatisfactory attitude toward the New Lands campaign launched in the year. This campaign, involving a further large influx of Russians and Ukrainians into Kazakh territory, has been a major event in Kazakh history. Also of great significance was the selection of the Karaganda area in the flinty desert of central Kazakhstan near Baykonur, about 150 mi. N.E. of the Aral sea, as the site of the cosmodrome where Soviet cosmonauts and space vehicles are launched into space for exploration and orbital flights around the earth.

Population and Administration.—According to the 1959 census, the population of the republic was 9,309,847 including 2,794,966 Kazakhs (30.0%), 3,974,229 Russians (42.7%), 762,131 Ukrainians (8.2%), 191,925 Tatars (2.1%), 136,570 Uzbeks (1.5%), 107,463 Belorussians (1.2%), 74,019 Koreans (0.8%), 59,840 Uigurs (0.6%), 53,102 Poles (0.6%), 38,362 (0.4%) Azerbaijanis and 9,980 Dungans (0.1%). There has been a remarkable fall in the Kazakh population since the 1926 census when the number was given as 3,968,289. No official reason has ever been given for this decrease, but it is believed to be caused partly by excess of deaths over live births and partly to emigration into China. There has been a very great increase in the urban population, that of the capital, Alma-Ata (*q.v.*), having risen from 45,395 in 1926 to 456,481 in 1959. Other main towns are Karaganda (397,083), Semipalatinsk (156,110), Chimkent (153,241), Petropavlovsk (131,453), Ust'-Kamenogorsk (150,371), Ural'sk (103,914) and Tselinograd (*qq.v.;* 102,276).

The government of the Kazakh S.S.R. is the standard one for union republics. It consists of a supreme soviet and of a council of ministers headed by a president. Of the 450 deputies elected on March 1, 1959, 309 were members or candidate members of the Communist party, 141 were nonparty and 146 were women. There is a presidium of the supreme soviet consisting of a president, deputy president, secretary and 16 members, about half of whom are Kazakhs.

Control over every form of administrative, economic, social and cultural activity is exercised by the Communist party, which on Jan. 1, 1960, contained 318,000 members and candidates for membership. The bureau of the executive committee consists of 9 members of whom at least 5 were Russians in 1960.

In Dec. 1960 a new territorial administrative unit, Tselinnyy Kray ("virgin lands region"), was formed out of the five provinces in which the New Lands campaign operated, namely, Tselinograd, Kustanay, Kokchetav, Pavlodar and North Kazakhstan. Following this precedent two more *krays,* West Kazakhstan and South Kazakhstan were established in May 1962.

The three *krays* mentioned above, however, were later abolished by decree of the Supreme Soviet, the West and South Kazakhstan *krays* in December 1964 and the Tselinnyy Kray in 1965. The Kazakh S.S.R. is divided into 15 *oblasts:* Aktyubinsk, Alma-Ata, Chimkent (formerly South Kazakhstan Oblast'), Dzhambul, East Kazakhstan, Gur'yev, Karaganda, Kokchetav, Kustanay, Kzyl-Orda, North Kazakhstan, Pavlodar, Semipalatinsk, Tselinograd (formerly Akmolinsk) and Ural'sk (formerly West Kazakhstan Oblast'). In the early 1960s there were 44 towns and 140 settlements of town type. The capital of the republic is Alma-Ata.

Although it is described as "fully sovereign" Kazakhstan has no individual diplomatic, economic or consular representation outside the Soviet Union.

In the early 1960s there were more than 10,400 primary, seven-year and middle schools with nearly 2,000,000 pupils. The principal higher-education establishments are the Kazakh S. M. Kirov State university (founded 1934) at Alma-Ata, and the Alma-Ata agricultural, medical, teachers' training, mining and veterinary institutes. The Kazakh Academy of Sciences was founded in 1946. The republic has more than 6,300 libraries, 20 museums and 30 parks of culture and recreation.

Economy.—The republic's economy was controlled in the 1960s by a republican economic council (Sovnarkhor), administering seven regional councils. Before the Revolution and for some years afterward livestock breeding formed the most important part of the republic's economy. In agriculture this has now yielded its place to food grains; but industry, both light and heavy, has been so greatly developed that it is now given first place in the country's economy.

Agriculture.—In 1913 only 10,374,000 ac. of arable land were under cultivation; by 1953 this area had increased to 16,796,000 ac. Because of the grain shortage in the U.S.S.R. the Soviet government decided to treble the cultivated area of Kazakhstan. By the early 1960s about 54,600,000 ac. were said to be under grain.

Livestock breeding maintained its dominant position until 1928, but production then decreased. From 1953, however, there was a renewed upward trend. Between 1953 and 1960 large horned cattle increased from 4,135,000 to 5,543,000; pigs from 500,000 to 1,776,000; and sheep and goats from 18,378,000 to 28,067,000. By the early 1960s there were in the republic about 1,500 *kolkhozy* ("collective farms") and 850 *sovkhozy* ("state farms").

Mining and Industry.—The country is rich in mineral deposits, particularly of nonferrous metals. It is the biggest producer of lead in the Soviet Union and holds second place in the production of copper. Coal production, mainly at Karaganda, rose from 85,000 tons in 1920 to 4,150,000 tons in 1938 and more than 32,000,000 tons in the early 1960s. Oil production in the Ural-Emba basin was 117,600 tons in 1913, 649,500 tons in 1938 and now exceeds 1,600,000 tons. The main copper deposits are at Dzhezkazgan and Kounradskiy, and those of lead and zinc at Leninogorsk, Zyryanovsk and in the Karatau range, which is also rich in phosphates. There are large deposits of chromite near Aktyubinsk, of nickel at Batamshinskiy, and of manganese at Marganets. There are steel works at Temir-Tau, copper foundries at Balkhash and Karsakpay and lead foundries at Leninogorsk and Chimkent. A large hydroelectric power station at Ust'-Kamenogorsk, on the Irtysh, started production in 1953. The chemical industry has been greatly developed particularly in respect of phosphates for fertilizers. Production of fertilizers rose from 22,300 tons in 1950 to more than 500,000 tons in the early 1960s.

Communications.—There are more than 6,000 mi. of railways. During the fifth five-year plan (1951–55) the following lines were built: Mointy-Chu, Tselinograd-Pavlodar, Zashchita-Zyryanovsk. The track was doubled on 500 mi. of the Tselinograd-Kartaly line; 370 mi. of narrow-gauge line and 200 mi. of broad-gauge were laid in the virgin lands region. During the sixth five-year plan (1956–60) the following lines were laid: Alma-Ata to Gosgranitsa, Gur'yev-Astrakhan, Yesil'-Turgay, Omsk-Ekibastuz, Kustanay-Kokchetav, and a second track on the line Barnaul-Semipalatinsk.

The main motor roads are: Alma-Ata to Frunze, Chimkent to Tashkent, Gur'yev to Ural'sk, Semipalatinsk to Pavlodar to Omsk, Karaganda to Tselinograd via Temir-Tau, and the "Vostochnoye Kol'tso" ("eastern ring"): Ust'-kamenogorsk-Kokpekty-Georgiyevka-Ust'-kamenogorsk. There is water transport on the Caspian and Aral seas, on lakes Balkhash and Zaysan and on the Irtysh, Syr-Darya, Ural, Ili, Ishim and Karatal rivers. Civil aviation has been greatly developed.

See *Istoriya Kazakhskoy S.S.R.,* 2 vol. (1943, 1959); P. Alampiev, *Soviet Kazakhstan* (1958). (G. E. WR.)

KAZAN, the capital of the Tatar Autonomous Soviet Socialist Republic of the U.S.S.R., stands on the left bank of the Volga, at its confluence with the small stream Kazanka and at the point where the Volga alters its course sharply from eastward to southward, 450 mi. E. of Moscow. Pop. (1959) 646,806. The town stretches for about 12 mi. along hills much dissected by ravines. Formerly a low flood plain, 2½ mi. wide and often inundated, separated Kazan from the Volga, but with the completion in 1957 of the giant Kuibyshev barrage, the waters of its 370-mi.-long reservoir now reach the edge of the town itself.

Ancient Kazan (Iski Kazan) was founded in the 13th century by the Tatars of the Golden Horde, after the overthrow of the

Bulgar kingdom on the middle Volga, and was located about 28 mi. upstream on the Kazanka. The town was transferred to the mouth of the Kazanka at the end of the 14th century. In the 15th century the khanate of the Golden Horde began to break up and Kazan became the capital of an independent khanate. It developed as an important trading centre, controlling as it did the Volga route from Muscovy to the Caspian and central Asia and the Kama route to the Urals, the Kama flowing into the Volga only about 50 mi. downstream from Kazan. Annual fairs were held on an island in the Volga, opposite the town. In 1469 Ivan III captured Kazan, but the puppet khan he established, Makhmet Amin, in 1504 organized a massacre of all Russians in the town. In the 16th century Kazan was engaged in conflict with the khanate of the Kasimov Tatars, who allied themselves with the grand dukes of Muscovy. In 1552 Ivan IV, the Terrible, captured Kazan after a long siege and subjugated the khanate.

Thereafter the town became the main Russian centre on the Volga below Nijni-Novgorod (now Gorki) and an advanced base for the extension of Russian power south and east into the Trans-Volga and Urals. The old Tatar fortress was rebuilt as a Russian kremlin, which survives. The trading importance remained and, indeed, greatly increased as Siberia was opened up. In the 18th century industry developed, especially in leather goods and shipbuilding. Kazan and the "government" (province) of which it was the administrative centre sent large quantities of naval timber to the Baltic. By the end of the century there were about 30,000 inhabitants. Kazan was seized by Emelyan Ivanovich Pugachev (*q.v.*) in his revolt of 1773–74 and much of the city was burned to the ground. Catherine II (the Great) rebuilt it on a gridiron pattern. From the 18th century dates the cathedral of St. Peter and St. Paul. By the end of the 19th century Kazan was one of the chief manufacturing towns of Russia, with a population in 1897 of 130,000. By 1917 this was 200,000, of whom perhaps 15% were Tatars (a percentage that had doubled by 1959). In 1920 it became the capital of the Tatar A.S.S.R.

Since the Revolution industrial growth has continued even faster. In its wide range of industries some ancient ones still flourish on a large scale—leather working, shoemaking, fulling and felting and the preparation of furs. New industries include oil refining, using petroleum from the Second Baku (*q.v.*), the vast oil-bearing region between the Volga and the Urals, electrical and precision engineering and chemicals (photographic film and carbolic acid). Linen and foodstuffs are also produced. Power is supplied by the Volga hydroelectric plants and Kazan's own thermal plant, while natural gas is piped from Minnebayevski, 190 mi. to the east. Kazan is a major transportation centre on the Moscow–Sverdlovsk–Trans-Siberian trunk railway with a busy river port and an airport.

Kazan is also a major cultural and educational centre. The Kazan V. I. Ulyanov (Lenin) state university was founded in 1804. The mathematician Nikolai Ivanovich Lobachevski (*q.v.*) was its rector from 1827–46 and among those who studied there were Leo Nikolaevich Tolstoi, Mili Alekseevich Balakirev and Lenin; the latter was expelled for his part in student disturbances. There are also a branch of the Academy of Sciences, a conservatoire, medical, veterinary, agricultural, aviation, chemical-technological, petroleum engineering, pedagogic and economic institutes. Kazan has a theatre of Tatar opera and ballet, theatres of Tatar and Russian drama, a philharmonic society and a noted Tatar museum. Zelenodolsk, 25 mi. W., is an industrial centre (shipyards, woodworking and sawmilling, rail ties) developed since the 1930s. (R. A. F.)

KAZAN RIVER, in Keewatin district, Northwest Territories, Can., rises in Kasba lake, near the Saskatchewan border, at an elevation of 1,130 ft. It flows northeastward 455 mi. across the Barren Grounds (*q.v.*) to Baker lake which drains into Hudson bay through Chesterfield inlet. The river's channel is shallow, bouldery and interrupted by rapids and cascades; it widens into many small lakes, and drains lakes Ennadai, Angikuni and Yathkyed. The name Kazan is Indian for "white partridge." (B. V. G.)

KAZANTZAKIS, NIKOS (1885–1957), Greek writer, achieved his greatest success as a novelist. Born in Crete on Dec. 2, 1885, he was educated in Athens and later in Paris, where he read law. Endowed with unusual breadth of vision, Kazantzakis read and wrote a great deal, leaving an impressive volume and variety of work. He published philosophic essays (the most important is the *Salvatores Dei*), tragedies, travel books and epic and lyric poetry. His *Odyssey,* a philosophic poem of 33,333 lines, which contains many striking passages, is an outline in epic form of the author's spiritual journey through life. He translated into Greek certain western classics, notably Dante's *Divine Comedy* and Goethe's *Faust.* With his novels he won an international reputation and a number of his books (*Alexis Zorbas, Christos Xanastavronetai, Kapetan Michales, Phtochoules tou Theou* and *Telephtaios Peirasmos*) have been translated into many European languages. It is possible to follow in his writings influences varying from primitive mysticism to the most advanced realism, kneaded together by the power of Kazantzakis' personality; a vein of pessimism, occasionally amounting almost to nihilism, can be traced. Kazantzakis is one of the great masters of the modern Greek language, the vigour and variety of which he illustrated with remarkable skill. He died on Oct. 26, 1957, at Freiburg, Germany, and was buried on Nov. 5 in Crete.

Alexis Zorbas was translated as *Zorba the Greek* by C. Wildman (1952) and *Christos Xanastavronetai* as *Christ Recrucified* (U.S. ed., *The Greek Passion*) by J. Griffin (1954). The *Odyssey* was translated by Kimon Friar (1958). (Ce. A. T.)

KAZBEK, one of the highest mountains of the Caucasus in northern Georgian Soviet Socialist Republic, U.S.S.R., 16,558 ft. above sea level, is surpassed only by the Elbrus, Shkhara, Dykh-Tau, Koshtan-Tau and Dzhangi-Tau mountains. It stands in the centre of the main range of the Greater Caucasus (Bolshoi Kavkaz), just west of the Georgian military highway to Tbilisi. The mountain is an extinct volcano with a double conical form and lava flows up to 1,000 ft. thick. It is covered by ice fields from which rise headstreams of the Terek. Kazbek has been celebrated in the poetry of Aleksandr Pushkin and M. Y. Lermontov. In the village of Kazbegi at the foot the Georgian writer Aleksandr Kazbegi was born. The village stands on the site of a Bronze Age settlement. (R. A. F.)

KAZERUN, the chief town of Kazerun *shahrestan* in southwestern Iran, in the *ostan* (province) of Fars, is situated on a plain among high limestone ridges on the north-south trunk road, 70 mi. W. of Shiraz and 96 mi. N.E. of Bushire. Pop. (1964 est.) 43,660. The town is extensive and has well-built houses. The water supply is from wells. Daryacheh-ye Famur, a brackish lake teeming with fish, lies 8 mi. E. The town is surrounded by groves of date palms, citrus orchards and wheat and tobacco fields. Rice, cotton and vines are also grown. Wild almond trees are numerous in the mountains and the nuts are harvested. Horses and mules are bred in the district, mostly by Kashgai nomads.

The ruins of the ancient city of Shahpur (12 mi. N.) have Sassanid bas-reliefs and, in a lofty cave, a statue of Shapur I. Southeast of Kazerun on a high mound are the ruins of Qal'eh-ye Gabr, the castle of the fire worshipers. (H. Bo.)

KAZINCZY, FERENC (1759–1831), Hungarian man of letters whose reform of the language and attempts to improve literary style had great influence, was born at Érsemlyén, Oct. 27, 1759, of a well-to-do family of the nobility. He learned German and French as a child and entered the famous Protestant college at Sárospatak in 1769. While there he published his first book, a small geography of Hungary (1775). Later he studied law, and became a civil servant. Imbued with the ideas of the Enlightenment, he was at home in the progressive administration introduced by Joseph II, but during the reactionary period under Francis I, he joined the opposition. Although he played only a minor part in the conspiracy organized by the liberal abbot Ignáz Martinovics, he was arrested (Dec. 1794) and condemned to death. His sentence was commuted to imprisonment and he was released in June 1801, a middle-aged man standing on the threshold of a new life which it was his intention to devote entirely to the improvement of Hungarian literature. He had already tried his hand at translations, including Salomon Gessner's *Idylls* (1788), *Hamlet* (1790) and works by such varied authors as Metastasio, Lessing, Klop-

stock, Molière and Goethe. Kazinczy gradually realized that only by creating a demand for quality and by teaching authors how to satisfy it could Hungarian literature be raised to contemporary European standards. The task was difficult, as political and social conditions were not such as to encourage the development of a living culture and the tastes of even the small reading public were unrefined. Although attempts to remedy this had been made by others, and by Kazinczy himself before his imprisonment—he had launched two short-lived periodicals, *Magyar Museum* (1788) and *Orpheus* (1790)—these had been unsuccessful. His longing for progress, denied political outlet, was now turned wholly to the service of literature and, living with his wife and seven children on the small income from his estate, he tried, through a voluminous correspondence with other writers and his own writings—biting epigrams, published in *Tövisek és virágok* (1811) and many sonnets, a poetical form which he introduced into Hungary—to banish from literature everything vulgar and uncouth. He also had a strong dislike of popular poetry.

His position as self-styled censor involved Kazinczy in endless controversies. His most famous battle was fought to improve the language: he initiated reforms of grammar, spelling and style which made Hungarian an outstanding medium for literary expression. He was one of the committee set up in 1828 to found the Hungarian academy, and was elected a member in 1830.

Although the development of Hungarian literature was not ultimately in line with Kazinczy's ideas, and by the time of his death at Széphalom, Aug. 21, 1831, the leadership had already passed to Károly Kisfaludy, representing the ideals of romanticism, his influence cannot be overestimated. Without him, modern Hungarian would never have evolved as a literary medium, and later writers, who drew their strength from the untapped reserves of peasant life, would have lacked their essential equipment of language and style.

Of many editions of Kazinczy's works, the first, in five volumes, edited by L. Abafi, appeared in 1879–84. His letters were edited in 21 volumes by J. Váczy (1890–1921). (Ds. Sr.)

KAZVIN (Qazvin), a city of Iran in the Central (Teheran) *ostan* (province), lies in a wide and largely fertile plain at the southern foot of the Elburz range, 90 mi. N.W. of Teheran. Pop. (1964 est.) 88,096. It is a regional and road centre, connected by road and railway with Teheran and Tabriz and by good roads with Rasht and Bandar-e Pahlavi (on the Caspian sea) and with Hamadan. Grain, pistachios and vines are the principal products of its region, besides carpets, and it has a transit trade. There are textile and flour mills and oil presses. The city was founded by Shahpur II in the 4th century and was a flourishing place in early Muslim times when it was used as a base for the islamization of the fierce inhabitants of Deylaman and Gilan. Harun al-Rashid showed it favour. Though ruined by the Mongol invasion in the 13th century, it revived again under the Safawids. Shah Tahmasp I (1524–76) made it his capital; Abbas I adorned it with several buildings but transferred the seat of government to Isfahan. (H. Bo.)

KEA: *see* Parrot.

KEAN, EDMUND (1787–1833), one of the greatest English actors, was born in London, March 17, 1787. His father is presumed to have been Edmund Kean, an architect's clerk, and his mother Ann Carey, an actress. He made his first stage appearance in his fourth year as Cupid in J. G. Noverre's ballet of *Cymon*. At seven he was sent to school, but ran away to sea. Liking this even less, however, he got free from his ship by counterfeiting deafness. His uncle Moses Kean, a general entertainer, encouraged him to study Shakespeare, and Miss Tidswell, an actress who had known him from infancy, taught him to act, taking entire charge of him when his uncle died. He was adopted by a wealthy couple, but ran away to the stage. When only 14 he played leading characters such as Hamlet, Hastings and Cato at York for 20 nights. He then joined a strolling company attached to Richardson's show and had the honour of reciting before George III. He joined Saunders' circus, where as an equestrian he broke both his legs. However, he learned music from Charles Incledon, dancing from D'Egville and fencing from Angelo. In 1807 he played at Belfast opposite Mrs. Siddons, who disliked him but thought he acted well. In 1808, while a member of Beverley's strolling players, he married Mary Chambers of Waterford, Ire. Kean and his family endured a life of privation for years, until in 1814 he went to Drury Lane theatre as an experiment to try and mend his fortunes. There, on Jan. 26, 1814, as Shylock, he roused the audience to uncontrollable enthusiasm. His subsequent appearances as Richard III, Hamlet, Othello and Macbeth established him as the greatest tragedian of his day and perhaps of any other. He appeared for the first time in New York on Nov. 29, 1820, and his North American tour was an immense success. On his return to England his wildness of character got him into difficulties. After he had been corespondent in the divorce case of *Cox* v. *Kean* his wife left him and the public attacked him violently both at home and in the United States, where he returned in 1825. His last performance in New York city was on Dec. 5, 1826, and after his return to England the public hostility had vanished. But his great powers were failing, and the process was hastened by his irregular habits. His last appearance on the stage was at Covent Garden, on March 25, 1833, when he played Othello to the Iago of his son Charles. At the words, "Villain, be sure," in scene 3 of act iii, he suddenly broke down, and crying in a faltering voice, "O God, I am dying. Speak to them, Charles," fell insensible into his son's arms. He died at Richmond, Surrey, on May 15, 1833.

BY COURTESY OF THE TRUSTEES OF THE BRITISH MUSEUM, PHOTOGRAPH JOHN R. FREEMAN & CO.

EDMUND KEAN IN "RICHARD III"; ENGRAVING BY R. COOPER, 1822, FROM A PAINTING BY G. CLINT

It was in the impersonation of the great Shakespearean characters that the varied beauty and grandeur of the acting of Kean were displayed in their highest form, although probably his most powerful performance was in the part of Sir Giles Overreach in Massinger's *A New Way to Pay Old Debts*, the effect of his first impersonation of which was such that the pit rose en masse, and even the actors and actresses themselves were overcome by the terrific dramatic illusion. His only personal disadvantage as an actor was his small stature. Kean specially excelled as the exponent of passion. In Othello, Iago, Shylock and Richard III, his identification with the personality, as he had conceived it, was as nearly as possible perfect. Coleridge said, "Seeing him act was like reading Shakespeare by flashes of lightning." The range of character in which Kean attained supreme excellence was narrow, but no one except Garrick has been so successful in so many great impersonations.

Kean's eccentricities at the height of his fame were numerous. Sometimes he would ride recklessly on his horse Shylock throughout the night. He was presented with a tame lion with which he might be found playing in his drawing room. The prizefighters Mendoza and Richmond the Black were among his visitors. The Irish statesman Henry Grattan was his devoted friend.

Bibliography.—H. W. Hillebrand, *Edmund Kean* (1933); Giles W. Playfair, *Kean* (1939) and *Kean: the Life and Paradox of the Great Actor* (1950); M. Willson Disher, *Mad Genius: a Biography of Edmund Kean* (1950).

Charles John Kean (1811–1868), younger son of Edmund Kean, was born at Waterford, Ire., Jan. 18, 1811. Educated at Eton, he was offered in 1827 a cadetship in the East India company's service, which he would have accepted if his father had agreed to settle an income of £400 on his mother. On his father's refusal, the son, too, became an actor, making his first appearance at Drury Lane theatre, Oct. 1, 1827, as Norval in Home's *Douglas*. He visited the United States in 1830 and on returning to London made a success at Covent Garden in 1833 as Sir Edmund Mortimer in Colman's *The Iron Chest*. He then devoted his activities to the

provinces. Returning to Drury Lane in Jan. 1838 he made an outstanding success as Hamlet. In 1842 he married the actress Ellen Tree (*see* KEAN, ELLEN) and with her visited the United States again, during 1845–47. In England once more, he appeared with much success at the Haymarket theatre. In 1850, in partnership with Robert Keeley, he became lessee of the Princess' theatre, London. There he rose to the head of his profession and added much to the artistic production of both Shakespearean and modern plays. Never a great tragic actor, Kean was at his best in melodramatic roles such as the king in Boucicault's adaptation of *Louis XI* and in *The Corsican Brothers*. He returned to London in 1866 in broken health, after an extended tour abroad, and died on Jan. 22, 1868. (W. J. M.-P.)

KEAN, ELLEN (née TREE) (1805–1880), English actress, considered one of the finest actresses of her day (her best part having been that of Gertrude in *Hamlet*), was born of English parents in southern Ireland in Dec. 1805. She first appeared as an actress in Covent Garden in May 1823, as Olivia in Shakespeare's *Twelfth Night*. From 1824 to 1826 she performed at Bath, from 1826 to 1829 at Drury Lane and from 1829 to 1836 at Covent Garden. During 1836–39 she traveled in America, playing in Covent Garden again on her return (1839–42). In 1842 she married the actor Charles John Kean, and the two were closely associated for the remainder of his life. In 1845 they returned to America, touring the country and taking the leading roles in many of the plays in their extensive repertory. In 1850 Kean and a friend leased the Princess' theatre, where he and his wife filled most of their engagements thereafter. In 1868, when Kean died, his wife retired from the stage. She died in London, Aug. 20, 1880.

KEANE, JOHN JOSEPH (1839–1918), U.S. Roman Catholic archbishop and educator, was born in Ballyshannon, County Donegal, Ire., on Sept. 12, 1839. When he was seven years old his family settled in the United States. In 1866 he was ordained a priest and made a curate of St. Patrick's, Washington, D.C.; in 1878 he was consecrated bishop of Richmond, Va. During service at Washington and Richmond, Bishop Keane founded churches and schools for Negroes and established the Confraternity of the Holy Ghost. From 1887 to 1896 he was rector of the Catholic University of America, Washington, D.C., which he did much to build. He was then called to Rome and raised to archiepiscopal rank, serving in 1897–99 as canon of St. John Lateran, assistant at the pontifical throne, and consultor to the Congregations of Propaganda and of Studies. In 1900 he was appointed archbishop of Dubuque, Ia., resigning this see in 1911. Archbishop Keane actively participated in the Catholic temperance movement and in the Americanism and Cahenslyism controversies. A selection of his writings, largely on educational subjects, edited by M. F. Egan, was published under the title *Onward and Upward,* in 1902. He died in Dubuque on June 22, 1918.

See Patrick H. Ahern, *The Life of John J. Keane* (1955).
(P. H. A.)

KEARNEY, a city of Nebraska, U.S., and the seat of Buffalo county, is located 135 mi. W. of Lincoln, the capital, in the south-central portion of the state just north of the Platte river at an altitude of 2,146 ft. The east–west transportation route provided by the Platte river valley attracted the railroads as it had the overland wagon trails, and Kearney owes its origin to the junction of the Burlington with the Union Pacific railroad. Kearney Junction was established at the meeting point in 1872 and incorporated as Kearney in Dec. 1873.

The town was named for Fort Kearny, a military post that had been maintained 6 mi. S.E. of the present city on the Oregon trail from 1848 until 1871. The fort had been named for Gen. Stephen Watts Kearny. Popular usage added an "e" to the spelling.

Kearney had some of the aspects of a cow town in the 1870s and was the scene of an occasional conflict between cowboys and townspeople. An abortive movement was launched to locate the national capital at Kearney on the strength of its midway position between the Atlantic and Pacific oceans. The surrounding area developed into farming communities and Kearney grew slowly until the latter 1880s when promoters created a short-lived "boom." In a frantic period of expansion, factories, including a cotton mill, were built and an electric street railway was constructed. The projects collapsed in the 1890s.

Kearney is in a productive agricultural region in which many of the farms are irrigated. Corn, alfalfa, soybeans, sugar beets, potatoes, small grains and livestock are shipped from there. A growing industrial development produces a variety of products, many related to agriculture. The Burlington and Union Pacific railways pass through the city, and Kearney is also served by national and state highways and a commercial airline. The state tuberculosis hospital, the state industrial school for boys and Kearney State Teachers college are located there. (*See* also NEBRASKA: *Education.*) For comparative population figures *see* table in NEBRASKA: *Population.* (D. F. D.)

KEARNY, PHILIP (1814–1862), U.S. Army officer, was born in New York City on June 1, 1814. He graduated from Columbia College in 1833 and received a cavalry commission in 1837, serving on the frontier under his uncle, Gen. Stephen Watts Kearny. In 1839 the War Department sent him to France to study cavalry tactics, and upon his return he prepared a standard cavalry manual for the U.S. Army. In the Mexican War he lost his left arm at Churubusco while leading a charge of a cavalry company he had personally raised and equipped. He resigned from the Army in 1851 and, after spending some time in Europe, settled in what is now Kearny, N.J. In the Italian War of 1859 he served with French cavalry at Magenta and Solferino, and was the first American to be awarded the Cross of the Legion of Honour. During the American Civil War he was first a brigade and then a divisional commander of infantry in the Army of the Potomac, saving the day for the Federals at Williamsburg and Seven Pines during McClellan's peninsular campaign. Reconnoitering at Chantilly on Sept. 1, 1862, he unintentionally entered the Confederate lines and was killed attempting to flee. His chivalric bearing and supreme courage inspired enthusiasm in his subordinates and led Gen. Winfield Scott to call him the "perfect soldier." (L. H. Fi.)

KEARNY, STEPHEN WATTS (1794–1848), U.S. soldier who played a leading role in the winning of the west, particularly during the Mexican War, was born on Aug. 30, 1794, in Newark, N.J. He left Kings college (now Columbia university) to serve in the War of 1812 and spent most of the next 30 years on frontier duty with the army. After 1836 he was the commander responsible for maintaining law and order over most of the Great Plains region.

At the beginning of the Mexican War in May 1846 Kearny was ordered to lead an expedition from Ft. Leavenworth, Kan., to conquer New Mexico and to seize California for the United States. His 1,700-man army of the west captured Santa Fe on Aug. 18. During the following month he established a civil government in New Mexico, deputizing lawyers from his command to translate and codify the provincial laws, bringing them into consonance with American constitutional law. The resulting Kearny code, the basis of New Mexico law, was proclaimed on Sept. 22.

On Sept. 25 Kearny started for California. Having been informed that Commodore R. F. Stockton and Lt. Col. J. C. Frémont (*qq.v.*) had already conquered California, he took only 120 dragoons with him. He arrived in southern California in early December to discover that the Mexican-Californians had risen against Stockton and Frémont, and controlled almost the entire province. Marching to San Diego to join Stockton, on Dec. 6 Kearny's men fought a violent, inconclusive action against a larger force of Mexicans at San Pasqual. They joined Stockton's sailors and marines outside San Diego on Dec. 10.

Stockton, who had proclaimed himself governor of California, refused to accept Kearny's authority. To preserve harmony in a desperate situation, and because Stockton's men constituted the bulk of available American forces, Kearny accepted this situation, and led the combined army-navy command from San Diego to Los Angeles, defeating the Mexicans at San Gabriel, on Jan. 8, 1847, and at the Mesa, just outside Los Angeles, on Jan. 9. This latter victory broke the back of Mexican-Californian resistance, and an uneasy peace was established.

Kearny's controversy with Stockton was now complicated by the insubordination of Frémont, who persuaded Stockton to appoint him governor. With the arrival of reinforcements, Kearny was

finally able to impose his will on Frémont, carefully avoiding force or bloodshed. At the same time he pacified California, establishing a stable and efficient civil government. Kearny returned to Fort Leavenworth, arriving on Aug. 22. Frémont, under protest, accompanied him. Kearny then placed Frémont under arrest, preferred charges and sent him to Washington, D.C.

Frémont's trial lasted from Nov. 2, 1847, to Jan. 31, 1848; the defense counsel was his father-in-law, Sen. Thomas Hart Benton. During the trial Benton and Frémont assailed Kearny's bravery, integrity and military ability. The court, nevertheless, found Frémont guilty of mutiny, disobedience and improper conduct, sentencing him to dismissal. The court added that Kearny's "honor and character are unimpeached."

Kearny was then ordered to Mexico, where he was military commander of Veracruz and later of Mexico City. After recovering from a severe attack of yellow fever he returned to the United States in poor health. In Sept. 1848 he was promoted to the rank of major general, confirmed by the senate despite Benton's 13-day diatribe. Kearny died on Oct. 31, 1848. *See* also KEARNEY.

See D. L. Clarke, *Stephen Watts Kearny, Soldier of the West* (1961); Bernard De Voto, *The Year of Decision—1846* (1943). (T. N. D.)

KEATS, JOHN (1795–1821), one of the three great poets, with Shelley and Byron, of the second generation of English Romantics. (*See* ENGLISH LITERATURE: *The Romantic Period.*) He was born in London on Oct. 31, 1795, the son of a livery-stable keeper. His family was of modest station and he had relatively little formal education. However, there was always the closest sympathy between himself and his sister, Fanny, and two brothers, George and Tom; and his schooling gave him most of what he needed. He went to a school at Enfield kept by the Rev. John Clarke, whose son Charles Cowden Clarke (*q.v.*) did much to encourage his literary aspirations. After the death of their father in 1804 and of their mother in 1810, their grandmother, with whom they and their mother had lived at Edmonton, put the affairs of Keats and his brothers and sister in the hands of a guardian, Richard Abbey. At Abbey's instigation Keats was apprenticed to a surgeon at Edmonton in 1811. He broke his apprenticeship in 1814, and went to live in London where he worked at Guy's and St. Thomas' hospitals. His literary interests had declared themselves early, and after 1817 he devoted himself entirely to poetry. From this time till his early death his history is largely the history of his work.

Early Works.—Cowden Clarke had sent the young Keats to Spenser and the Elizabethans, and they were his earliest loves. His best early poem is the sonnet "On First Looking Into Chapman's Homer" (1815). Clarke also introduced him to Leigh Hunt (*q.v.*), liberal journalist, lively miscellaneous essay-writer and also a poetaster of a glib and sentimental kind. Keats made friends in Hunt's circle, notably J. H. Reynolds and Benjamin Haydon (*q.v.*), the painter, and he owed much to it of companionship and literary encouragement; but he also acquired there a slipshod and somewhat vulgar conception of poetry which he later found it necessary to outgrow. His first book, the *Poems* of 1817, was written largely under "Huntian" influence. This is evident in a rather relaxed sentiment, and in the use of a loose form of the heroic couplet, with much overflow and light, sometimes disyllabic. rhymes. The most interesting poem in this volume is "Sleep and Poetry," the middle section of which contains a prophetic view of Keats's own poetical progress. He sees himself as at present plunged in the delighted contemplation of sensuous beauty; but realizes that he must leave this for an understanding of "the agony and strife of human hearts." The same poem also includes in little the Romantic version of English poetical history, in which the greatest glories go to the Elizabethans; the Augustan age is an unfortunate interregnum and the ancient splendours are to be revived by the modern school. Otherwise the volume is remarkable only for some delicate natural observation, and obvious Spenserian influences.

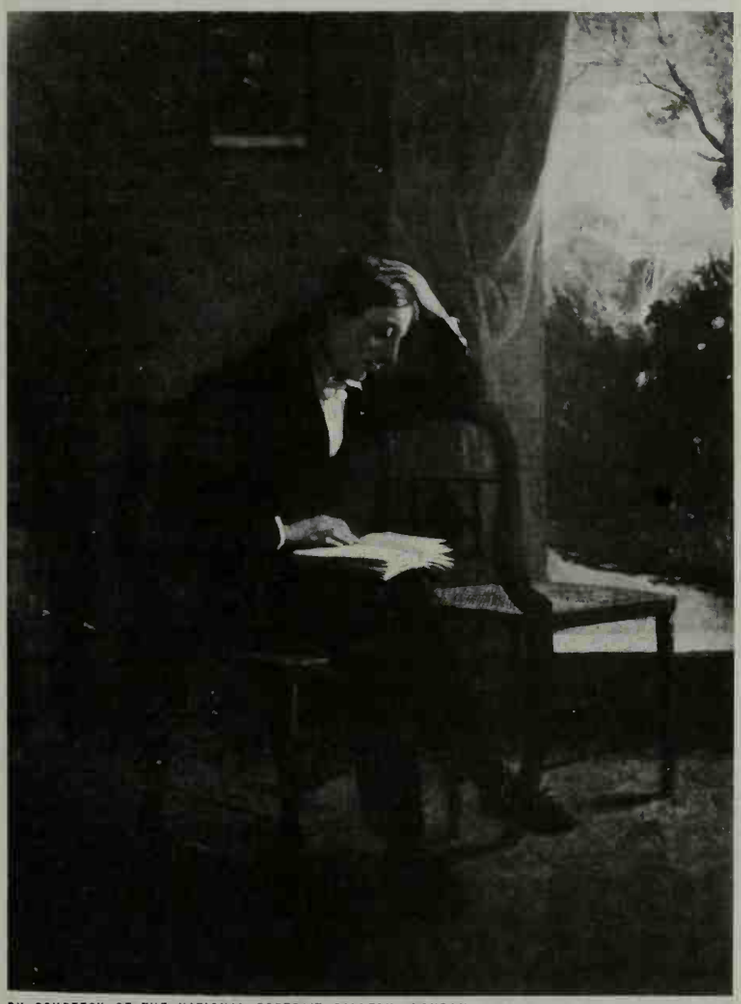
Endymion.—In 1817 Keats left London briefly for the Isle of Wight and Canterbury, and began work on *Endymion,* his first long poem. On his return to London he moved into lodgings in Hampstead with his brothers. *Endymion* appeared in 1818. It is a version of the Greek legend of Diana's love for Endymion, a mortal shepherd, but Keats lays the emphasis on Endymion's love for Diana rather than on hers for him. The tale in fact is transformed into an expression of the widespread Romantic theme of the attempt to find in actuality a love that has been glimpsed in vision. This is realized through fantastic and discursive adventures and luxuriant description. In his wanderings in quest of her Endymion is guilty of an apparent infidelity to his visionary moon-goddess, and falls in love with an Indian maiden to whom he is attracted by human sympathy. But in the end Diana and the Indian maiden turn out to be the same. The poem has thus an allegorical meaning clearly connected with what is said in the middle section of "Sleep and Poetry." Keats was dissatisfied with the poem as soon as it was finished, and in the preface, a remarkable piece of self-criticism, he anticipates all the objections that could be justly made against its unformed youthful sentiment.

Attack on Early Poems. Relationship With Fanny Brawne.—In the summer of 1818 Keats went on a walking-tour in the Lake district and Scotland with his friend Charles Brown, and exposure and overexertion brought on the first symptoms of the tuberculosis of which he was to die. On his return to London a brutal criticism of his early poems appeared in *Blackwood's Magazine,* followed by a similar attack on *Endymion* in the *Quarterly.* Contrary to popular belief, Keats's attitude to this was robust, and he went on writing steadily all the time. But there were family troubles. Keats's brother Tom had been suffering from tuberculosis for some time, and in the autumn of 1818 the poet nursed him through his last illness. About the same time he met Fanny Brawne, a near neighbour in Hampstead, with whom he was soon to be hopelessly and tragically in love. The relation with Fanny had a decisive effect on Keats's development. She seems to have been an unexceptional young woman, of firm and generous character, and kindly disposed toward Keats. But he expected more, perhaps more than anyone could give, as we can see from his overwrought letters. Both his uncertain material situation and his failing health in any case made it impossible for his love to run a normal course. After Tom's death (George had already gone to America), Keats moved into Wentworth place with Brown; and in April 1819 Fanny Brawne and her mother became his next-door neighbours. In about Oct. 1819 Keats became engaged to Fanny.

The Year 1819.—"Isabella," an adaptation of the story of the "Pot of Basil" in Boccaccio's *Decameron,* had been written in 1817–18, soon after the completion of *Endymion,* and again Keats was dissatisfied with it. It was during the year 1819 that all his greatest poetry was written—"Lamia," "The Eve of St. Agnes," the great Odes ("On Indolence," "On a Grecian Urn," "To Psyche," "To a Nightingale," "On Melancholy" and "To Autumn") and the two versions of *Hyperion.* This poetry was composed under the strain of illness and growing passion for Fanny Brawne; and it is an astonishing body of work, marked by careful and considered development, technical, emotional and intellectual. "Isabella," which Keats himself called "a weak-sided poem," continues some of the emotional weaknesses of *Endymion;* but "The Eve of St. Agnes" may be considered the perfect culmination of Keats's earlier manner. Written in the first flush of his meeting with Fanny Brawne, before sickness and misunderstanding had begun to cast their shadows, it is full of a dreamy sensuous happiness. It is pictorial romantic narrative, of a kind that was to have immense influence in the 19th century, and that the 20th century has been inclined to undervalue. Its clear pictorial quality looks forward to the Pre-Raphaelites. All the senses are alert in this poem, and their reports are presented with unrivaled delicacy. But there is no marked intellectual advance. "Lamia" is another narrative, and a deliberate attempt to reform some of the technical weaknesses of *Endymion.* Keats has studied Dryden, and now makes use of a far tighter and more disciplined couplet, of a firmer tone and more controlled description. The implied theme, however—"Do not all charms fly at the mere touch of cold Philosophy?"—does not accord with the ripest phase of Keats's thought.

The Odes.—The Odes are Keats's most distinctive poetical achievement. They are essentially lyrical meditations, owing little or nothing to former neoclassic conceptions of the ode (*q.v.*). All were composed between March and June 1819 except "To Au-

tumn," which is from September. Though they are not formally connected, traces of a common theme can be found in them—the theme of transience and permanence, contemplated in a variety of aspects. The subject was forced upon him by the painful death of his brother and his own failing health; it is profoundly thought and felt, but it is not argued about. Keats believed that "man should not dispute or assert, but whisper results to his neighbour"; and he admired what he called Negative Capability, "that is, when a man is capable of being in uncertainties, mysteries, doubts, without any irritable reaching after fact and reason." "On Indolence" enshrines a moment when sensuous happiness seems to be complete and sufficient and its own justification. But it is only a moment; and in the "Ode to a Nightingale" a visionary happiness in sharing the bird's life is contrasted with the dead weight of human grief and sickness, the transience of youth and beauty—strongly brought home to Keats in recent months by his brother's death. A kind of resolution is found in the song of the nightingale, seen as a symbol of art which outlasts the individual mortal life. This theme is taken up more distinctly in the "Ode on a Grecian Urn." Keats had always been profoundly affected by Greek mythology, mostly in a Renaissance dress; here we have a direct influence from Greek plastic art—more probably the Elgin marbles, to which Haydon, who had fought to get them housed in the British museum, had introduced him, and on which he had earlier written a sonnet, than any actual vase that he had seen. At all events, the figures depicted on the urn become for him the symbol of an enduring beauty, "all breathing human passion far above." And the message that the urn leaves with us is the celebrated "Beauty is truth, truth beauty." The "Ode on Melancholy" recognizes that sadness is the inevitable concomitant of sensuous happiness; the transience of joy is a part of its nature. But the rich, slow movement of this and the other odes suggests an enjoyment of such intensity and depth that it makes the moment eternal. The "Ode to Autumn" is essentially the record of such an experience. Autumn is seen not as a time of decay, but as a season of complete ripeness and fulfillment, a pause in time when everything has reached fruition, and the question of transience is hardly raised. These poems, with their rich and exquisite sensuous detail and their meditative depth, are among the greatest achievements of the Romantic age. With them should be mentioned the ballad "La Belle Dame Sans Merci," of about the same time, and revealing the obverse destructive side of the idyllic love seen in "The Eve of St. Agnes."



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KEATS, PORTRAIT BY JOSEPH SEVERN, 1821

Hyperion.—This poem exists in two versions, the second being a revision of the first with the addition of a long induction in a new style which makes it into a different poem. The poem was begun in the autumn of 1818, and all that there is of the first version (the poem is a fragment) was finished by April 1819. In September Keats wrote to Reynolds that he had given up *Hyperion* but he appears to have continued working on the revised version, *The Fall of Hyperion,* and the writing of the induction, during the autumn of 1819. The detailed chronology is not clear; but the two versions of *Hyperion* cover the period of Keats's most intense experience, both poetical and biographical. The poem is his last attempt, in the face of increasing illness and frustrated love, to come to terms with the conflict between absolute value and mortal decay that appears in other forms in his earlier poetry. The subject is the supersession of the earlier Greek gods, the Titans, by the later Olympians; and it was apparently intended that it should be treated in the epic manner. The desire to write something unlike the luxuriant wandering of *Endymion* is clear, and Keats puts himself to school to Milton. The poem opens with the Titans already fallen, like Milton's fallen angels. Hyperion the Sun-god is the one hope of further resistance, like Milton's Satan. And the opening scene is followed by a council like that in Book II of *Paradise Lost.* There are numerous Miltonisms of style too, though a closer examination will show that they are detachable rather than organic. They are in fact detached in the revised version, as Keats felt unhappy with them; and the basis of the writing is revealed after all as a more austere and disciplined version of Keats's own manner. There is not enough of the narrative to make its ultimate direction clear; but the general tenor seems to be that the supersession of the old gods by the new is just ". . . for first in beauty must be first in might." It seems also that the hero was to be the young Apollo; and Apollo is the god of poetry. So, as *Endymion* was an allegory of the fate of the lover of beauty in the world, *Hyperion* was perhaps to be an allegory of the poet as creator. Certainly this theme is taken up explicitly in the new induction to the second version.

This added opening places the existing *Hyperion* in the setting of a vision—a vision experienced by the poet himself. It is one of the most remarkable pieces of writing in Keats's work, and only an excessive concentration on the luxuriant sensuous side of his art can have given rise to the 19th-century opinion that it was written in the decline of his powers. The blank verse has a new energy and rapidity, and the vision is presented with a spare grandeur, rising to its height in the epiphany of the goddess Moneta, who reveals to the dreamer the function of the poet in the world. It is his duty to separate himself from the mere dreamer, and to share in the sufferings of humankind. The theme is not new to Keats; it appears in his earliest poetry; but it is here realized far more intensely. Yet with the threat of approaching death upon him Keats cannot advance any farther in the direction that he foresees as the right one, and the poem remains a fragment.

Last Years.—There is no more to record of Keats's poetical history. His last, unfulfilled, ambition was to write "a few fine plays." The poems "Isabella," "Lamia," "The Eve of St. Agnes," *Hyperion* and the Odes, were all published in the famous 1820 volume, the one that gives the true measure of his powers. It appeared in July, by which time Keats was evidently doomed. He had been increasingly ill throughout 1819 and by the beginning of 1820 the evidence of tuberculosis was clear. He realized that it was his death warrant, and from that time sustained work became impossible. His friends Brown, the Hunts and Fanny Brawne and her mother proved assiduous, and they nursed him through the year. Shelley, hearing of his condition, wrote offering him hospitality in Pisa; but Keats did not accept. When he was ordered

south for the winter Joseph Severn undertook to accompany him to Rome. They sailed on Sept. 18, and on the way landed briefly at Lulworth, on the Dorset coast, where Keats wrote his last sonnet, "Bright Star, Would I Were Steadfast as Thou Art." From Naples they went to Rome, where on Dec. 10 Keats had a relapse. Faithfully tended by Severn to the last, he died there on Feb. 23, 1821.

Letters.—The prime authority both for Keats's life and for his poetical development is to be found in his letters. This correspondence with his brothers and sister, Fanny, with his close friends and with Fanny Brawne gives the most intimate picture of the admirable integrity of Keats's personal character, and enables us to follow closely the development of his thought about poetry—his own and that of others.

A celebrated letter to Reynolds in which human life is compared to a mansion of many apartments repeats the lesson of "Sleep and Poetry." Another distinguishes the true poetical character from "the Wordsworthian or egotistical sublime": he writes of his own kind of imagination "it has no self—it is everything and nothing . . . It has as much delight in conceiving an Iago as an Imogen. What shocks the virtuous philosopher delights the camelian poet." We find everywhere a profound thoughtfulness combined with a quick, sensitive, undidactic response. Spontaneous, informal, deeply thought and deeply felt, these are probably the best letters written by any English poet. Apart from their interest as a commentary on his work they have the right to independent status.

Reputation and Poetic Stature.—Keats's reputation grew steadily throughout the 19th century; though as late as the 1840s Holman Hunt, the Pre-Raphaelite painter, could refer to him as "this little-known poet." His influence is found everywhere in the decorative romantic verse of the Victorian age, from the early Tennyson onward. His general emotional temper and the minute delicacy of his natural observation were deeply sympathetic to the Pre-Raphaelites, who both echoed his poetry in their own and illustrated it in their paintings. Though his friends were political liberals Keats stands apart from the social and revolutionary enthusiasms of his age. His devotion was to his art; and he was steadily seeking a way by which that devotion might become more inclusive. His 19th-century followers on the whole attached their affections to the more superficial aspects of his work; and it has been largely left for the 20th century to realize the full range of his achievement. It is impossible to say how much has been lost by Keats's early death. What his work, incomplete as it is, begins to show is a way of reconciling the claims of art as an autonomous realm with those of art as the interpreter of a more comprehensive human experience.

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KEBLE, JOHN (1792–1866), Anglican priest, theologian and poet, shared with J. H. Newman and E. B. Pusey the leading role in the origins of the Oxford movement (*q.v.*), and by the quality of his life and character exercised a profound influence on the Church of England during the 19th century. Born on April 25, 1792, at Fairford, Gloucestershire, Keble was the second son of an old-fashioned Tory high churchman, John Keble. His whole life was molded by devotion to his father and to the religious tradition in which he grew up. As a boy, Keble showed outstanding intellectual ability; a scholar of Corpus Christi college, Oxford (1807), he obtained double first class honours (1810) and was elected a fellow of Oriel college (1811), at that time the centre of the intellectual life of the university. In 1815 he was ordained deacon and in 1816 priest. Despite his affection for Oxford, in 1823 he withdrew from the university in order to assist his father with his parochial work. During the following years Keble often had undergraduate pupils to live with him during the summer vacations, and the impression that he then made on a number of outstanding young men was to prove of great importance in later years. In 1827 he published *The Christian Year,* a volume of poems for the Sundays and festivals of the church year. This book achieved an enormous circulation and did more than any other one book to make the ideas of the high church movement widely known. Keble was professor of poetry at Oxford, 1831–41; his lectures, published in 1841, reveal clearly the affinity between Keble's thought and that of the romantics.

It was in 1833 that Keble came prominently into the public view, when, on July 14, he preached the assize sermon in the university church. The title of the sermon was "National Apostasy," and its occasion the decision of the Liberal government to suppress ten Irish bishoprics. The action of the government, in itself entirely reasonable, called forth from Keble a strong and uncompromising assertion of the church's divine right and of its supernatural origin, derived by its apostolic descent from the Lord himself. Newman always considered this sermon as marking the beginning of the Oxford movement, and his judgment has been generally endorsed. From 1833 to 1845, when Newman entered the Roman Catholic Church, Oxford was the scene of a brilliant and creative movement for the renewal of Catholic thought and practice within the Church of England. The movement has been called Tractarian, on account of its best-known publications, the 90 *Tracts of the Times,* of which Keble wrote 9. The actual direction of the movement tended to be in the hands of Newman and a group of younger men. But Keble stood behind them as an inspiration and guide. The same years saw an outburst of theological activity, both in the reprinting of 17th-century Anglican theology and in the editing and translating of the Fathers of the Church. In both these works Keble took part, in 1836 producing an edition of the works of R. Hooker and in 1838 sharing in the inauguration of *The Library of the Fathers.*

The fact that the whole of this movement did not collapse in 1845 when Newman left the Church of England is due above all to the constancy of Pusey and Keble. While to many the movement had appeared revolutionary, to Keble it had seemed only the expression in fuller form of the convictions in which he had been brought up. In 1835, after the death of his father, he married, and in 1836 became vicar of Hursley, near Winchester, where for the rest of his life he continued to live and work as a country parson.

Keble's influence was not due so much to his considerable intellectual ability as to the singular quality of his character. His unbending religious convictions and great strictness with himself, combined as they were with a remarkable spontaneity and sensitivity, created an impression at once unworldly and yet attractive.

Keble died in Bournemouth on March 29, 1866. In 1869 Keble college, Oxford, was founded in his memory.

See G. Battiscombe, *John Keble* (1963). (A. MACD. A.)

KECSKEMÉT, a town in central Hungary and administrative centre of Bács-Kiskun *megye* (county), lies about 105 km. (65 mi.) S.E. of Budapest. Pop. (1960) 66,842 (mun.). It is surrounded by flat, sandy farming country and to the southeast is the noted Bugác *puszta,* or wasteland, with arid, salt-impregnated soils. Kecskemét dates back to the days of the Arpád dynasty (*see* HUNGARY: *History*) and in the 14th century it was one of the specially privileged towns. Part of the Franciscan church dates from Arpád times and the Reformed church was built in the 17th century by permission of Sultan Mohammed IV. The dramatist József Katona (1791–1830) was born at Kecskemét.

The town developed rapidly with the vigorous farming of the 19th century and the population steadily increased, but municipal rather than private estates became noted for certain crops, especially fruits. The town's famous "dawn market" in the summer months begins at midnight to keep the fruit fresh. Sugar beet is grown; the sandy neighbourhood also produces vines resistant to phylloxera, and from the town's vineyards wines of good quality are made. Prior to the collectivization policies of the 1950s the Kecskemét municipality owned the Bugác steppe, where the big, white Hungarian draft cattle were reared.

The railway and road from Budapest to Szeged go through Kecskemét as does the railway from Budapest via Cegléd; good roads from the Danube and Tisza valleys converge on the town.

Agricultural machinery, textiles, leather work and the distilling of apricot brandy are among its industries. (H. G. S.)

KEDAH, a state of the Malaysia federation in northwestern Malaya with a constitutional sultan, was under Thai suzerainty until 1909 when it accepted a British adviser. Area 3,660 sq.mi. Pop. (1961 est.) 783,993. Kedah includes to its east ranges so uniformly steep and thickly forested that they virtually isolate the state from Perak and Kelantan and from south Thailand. The developed part is a lowland about 10 mi. broad between these ranges and west coast. Two short rivers (Kedah and Muda) cross the plain bringing occasional floods from the mountains. The north Kedah plain is of young alluvium in parts, with tall fresh-water swamp forest, but a few rocky "islands" of limestone jut through.

Malay agriculture developed first along the Kedah-Muda streams and then along the foothill margins, working out into the swamps which were drained and brought under paddy mostly during the 19th century by the Malays; at mid-20th century vast works were being engineered for draining and irrigating 75,000 ac. at Kubang Pasu. The sector of the lowlands round the Muda is hillier and was first used for rubber estates early in the 20th century. The western plain now contains almost the entire acreage of paddy and rubber, and produces about 190,000 tons of rice and 61,000 tons of rubber each year, carrying over 100,000 workers on the paddyfields and 38,000 workers on the rubber estates. Coconuts are grown for domestic use. The shallow coast is dangerous, yet a considerable tonnage of fish is landed by Chinese at the mouth of the Kedah river for transport by truck to Butterworth. The plain has arterial road and rail connections south into the tin and rubber region of Malay drawing this old Malay state into commerce. Some rice moves into internal trade and small Chinese rice mills stand along the highway.

The rubber-growing zone has many Tamil Indians who form 20% of the population of Sungei Patani. The state is 68% Malay in population, only 13% of the rural population being Chinese and Indian though Chinese are prominent in all the market towns. Alor Star, the state capital (pop. [1957] 52,915) lies in the centre of the paddy growing area and is unapproachable from the sea 12 mi. away. About 20 mi. offshore are the spectacular islands of Langkawi (pop. [1957] 16,617), of little commercial significance, linked to Kuala Kedah by occasional launch services.

(E. H. G. D.)

KEDIRI, a former residency (regency) in the province of East Java, Indon., bounded east by Malang, west by Madiun, north by Surabaja and Bodjanegara and south by the Indian ocean. Area 2,555 sq.mi. Pop. (1957 est.) 3,420,451. The central area is hilly, with high mountains (Mt. Wilis, 8,409 ft., and Mt. Kelud, 5,679 ft.), and in the extreme south low limestone hills shut off nearly all the coast from the interior. There are no harbours in the south and access to the sea is northward by the navigable Brantas river. The interior has fertile plains bordering the Brantas. Rice, sugar cane, cotton, cassava, maize, peanuts, coconuts and soybeans are grown; estate crops are coffee, cocoa, quinine, tobacco and indigo. Teak is obtained from the forests. Sugar and tapioca are processed.

From the 11th to the 13th century this region was a separate kingdom, comprising the western half of the kingdom of Erlangga (d. 1049). Originally known as Pandjalu, it was later named Kediri, from its capital. Under Raja Djojobojo of Kediri (mid-12th century) Djanggala, the eastern part of Erlangga's kingdom, was seized, but in 1222 Kediri was defeated by the raja of Singosari and incorporated into his territory. Remains of this period include a wall from Mt. Kawi to south of Karangkates, and a statue of the Hindu God Ganesha, the "remover of obstacles." Kediri became a residency in 1830, after the war in central Java. (*See* JAVA: *History.*)

Kediri town (pop. [1961] 158,918), the capital of the residency from 1830, stands on the Brantas and is a centre of the sugar industry. There are Hindu temple remains in the neighbourhood. Other towns are Blitar (62,972), with the ruins of Panataram temple (Hindu) nearby, Tulungagung (31,767), Kertosono and Papar. These towns are linked by the Surabaja-Tulungagung railway. Steam tramways link the small towns of Wates, Para and Kepung.

KEELER, JAMES EDWARD (1857–1900), U.S. astronomer, best known for his spectroscopic studies of Saturn's rings and his observations of nebulae using a reflecting telescope. He was born in LaSalle, Ill., Sept. 10, 1857. At an early age he developed an interest in astronomy and showed great ingenuity in constructing his own instruments and in making observations. For five years after his graduation from Johns Hopkins university, Baltimore, Md., he served as assistant to Samuel Pierpont Langley at the Allegheny observatory, with an interruption of one year for study in Germany.

From 1886 until 1891 Keeler was on the staff of the Lick observatory, first as assistant to the Lick trustees, and later as astronomer in charge of the spectroscopic program. Among the outstanding results of his work were the measurement of the line-of-sight velocities of the Orion nebula and 13 planetary nebulae. The measures showed that these objects have motions similar to those of the stars and are, therefore, members of our stellar system. In 1891 Keeler went to the Allegheny observatory as director, and while there he demonstrated by means of the spectroscope that the rings of Saturn revolve about the planet like a multitude of small independent satellites.

In 1898 he returned to the Lick observatory as director, and undertook photographic observations of nebulae with the recently acquired Crossley reflector. This work established the reflecting telescope as the supreme instrument for photographing faint celestial objects. Among the results of the program was the discovery that the spiral form is dominant among the nongaseous nebulae now known as external galaxies. He died on Aug. 12, 1900.

For a complete bibliography see *National Academy of Science Biographical Memoirs,* vol. v, p. 233 (1905). (C. D. S.)

KEELING ISLANDS: *see* COCOS (KEELING) ISLANDS.

KEELUNG, Formosa: *see* CHI-LUNG.

KEEN, WILLIAM WILLIAMS (1837–1932), U.S. surgeon, a specialist in surgery of the brain and the nervous system and a pioneer in performing successfully new and difficult operations in this field, was born at Philadelphia, Pa., Jan. 19, 1837. He graduated from Brown university (1859) and Jefferson Medical college (1862), and served as a surgeon during the American Civil War. After study abroad, he started practice in Philadelphia, where he conducted the Philadelphia School of Anatomy (1866–75); lectured on pathological anatomy at Jefferson Medical college (1866–75); and was professor of surgery at Woman's Medical college (1884–89) and at Jefferson (1889–1907). Keen wrote several surgical and other works, and was editor of many works including Gray's *Anatomy* and Keen's *Surgery.* He died June 7, 1932.

KEENE, CHARLES SAMUEL (1823–1891), English black-and-white artist, book and magazine illustrator, was born at Hornsey on Aug. 10, 1823. His earliest known design is the frontispiece to *The Adventures of Dick Boldhero,* etc. In Dec. 1851 he made his first appearance in *Punch* and, after nine years of steady work, was called to a seat at the famous table. It was during this period of probation that he first gave evidence of those transcendent qualities which make his work at once the joy and despair of his brother craftsmen. On the starting of *Once a Week,* in 1859, Keene's services were requisitioned, his most notable series in this periodical being the illustrations to Charles Reade's *A Good Fight* (afterward rechristened *The Cloister and the Hearth*) and to George Meredith's *Evan Harrington.* There is a quality of conventionality in the earlier of these which later disappears. In 1872 Keene made the acquaintance of Joseph Crawhall, who had been in the habit for many years of jotting down any humorous incidents he might hear of or observe, illustrating them at leisure for his own amusement. These were placed unreservedly at Keene's disposal, and inspired at least 250 of his most successful drawings in the last 20 years of his connection with *Punch.* A list of more than 200 of these subjects is given in G. S. Layard's *The Life and Letters of Charles Keene of "Punch."* In 1881 a volume of his *Punch* drawings was published as *Our People.* He died on Jan. 4, 1891. (G. S. L.; X.)

KEENE, LAURA (MARY MOSS) (*c.* 1820–1873), English-U.S. actress, first important woman theatre manager in the United

States, was born in London, and served her apprenticeship with Mme Vestris, the singer-actress-manager. J. W. Wallack saw her at the Olympic theatre in 1851 and engaged her for his New York company. She made a successful debut at Wallack's in 1852 but soon left, first to manage a Baltimore theatre, then to tour as far as San Francisco and Australia. She returned to New York in 1855 and opened the Metropolitan theatre as Laura Keene's Varieties.

In 1856 she began eight years of management in her own theatre with a first-rate company. She was admired for her acting of elegant ladies in classical English comedy and of pathetic heroines in contemporary melodrama.

One of her successes was Tom Taylor's *Our American Cousin,* in which E. A. Sothern as Lord Dundreary and Joseph Jefferson as Asa Trenchard made their first great hits. Her company was playing this play at Ford's theatre, Washington, D.C., the night Pres. Abraham Lincoln was assassinated. In 1872 she helped found and edit a short-lived monthly magazine, *The Fine Arts.* Her early marriage to John Taylor ended in separation; after Taylor's death she married John Lutz, her business manager. She died at Montclair, N.J., Nov. 4, 1873. (B. Ht.)

KEEP, an English term corresponding to the French donjon for the strongest portion of the fortification of a castle, the place of last resort in case of siege or attack. It was either a single tower or a larger fortified enclosure, sometimes approximately round, and then known as a shell keep, as in Berkeley castle, or Windsor. The most famous of the Norman keeps of England is the White Tower of London of the 11th century, supposedly designed by Gundulf, bishop of Rochester.

KEEWATIN, the most easterly district of the three divisions of the Northwest Territories of Canada. It is bounded on the east by Hudson bay and Foxe channel, on the west by the district of Mackenzie (longitude 102° W.) and on the south by Manitoba (latitude 60° N.). Area 228,160 sq.mi. Pop. (1961) 2,345.

The district is wholly within the Canadian shield physiographic division, and only the extreme southwest of it is forested, and that sparsely. The remainder is a tundra area, with frequent rock outcrops and many lakes and marshes. It lies well to the north of any present area of development. Before the present boundaries of the three prairie provinces were established the name was applied to a more extensive region. *See* Northwest Territories.

KEF, LE (Arabic El-Kef, "the rock"), a town of Tunisia, is situated on the High Tell 170 km. (105.6 mi.) S.W. of Tunis and 35 km. (21.7 mi.) from the Algerian frontier. Pop. (1956) 14,743 (mun.). The town occupies the site of the ancient Sicca Veneria, a Carthaginian town which became a Roman colony, and is built in the form of an amphitheatre on the southwestern slopes of the Jebel Dyr at the foot of a rock which is crowned by a Turkish kasbah, built from ancient ruins and restored by the French. There are crumbling remains of a rampart, fragments of Roman baths and a temple and large, ancient cisterns which were fed by the same spring that now supplies the town. The Arab town contains several mosques and there are remains of a Christian basilica, excavated by the French, of which the apse is intact and the narthex serves as a church. The Roman colony extended beyond the present town to the south; its name was derived from a temple dedicated to an oriental goddess, identified by the Romans with Venus. By the middle ages Le Kef was just a large village, but Turkish rule and the creation of a frontier between the regencies of Tunis and Algiers made it an important stronghold. It was occupied without incident by the French Logerot expedition sent from Algeria in April 1881. The town is a regional market place and a road junction occupying a position of strategic importance on the route to Algeria. The mining railway passes 30 km. (18.6 mi.) to the south.

Le Kef Governorate (pop. [1960 est.] 269,000; area 3,112 sq.mi.) includes the *délégations* (administrative districts) of Le Kef, Le Sers, Maktar, Robaa, Siliana and Tadjerouine and covers most of the High Tell, except for the areas round Teboursouk in the northeast and Thala in the south. It includes the wooded mountains of the Ouargla in the northwest; the grain and cattle-raising areas of the plains of the Kef, Krib, Zouaourine, Sers and Siliana, with the intervening ranges; the central region of the Dorsal chain with its forests and mountain villages to the east; and the mining region of the frontier belt to the west, with iron (Djerissa), phosphates (Kalaâ Djerda) and lead. (J.-J. Ds.)

KEH-LAO, an ethnic group of southwest China living in remote mountain valleys of Kweichow province. Their total population, combined with that of the neighbouring and related Mu-lao people, was estimated at about 5,000 in the 1960s. They are also reported to live in small numbers in northwest Hunan province; a few families have migrated to Indochina. The Keh-lao are of small stature, with broad faces and wide, low-bridged noses; the Mongolian (epicanthic) fold is absent or only slight. As remnants of the once widespread Lao people whose history dates to the Han dynasty (202 B.C.–A.D. 221), the Keh-lao are related to the Tu-lao of Yünnan province, and are regarded as belonging to an Austroasiatic stratum (represented by the Wa [*q.v.*] and the Puman and Palaung of Yünnan). Spoken in different dialects, the monosyllabic Keh-lao language is an isolating type (*see* Language; Austroasiatic Languages). Together with the languages of the Hainan Li, and the aboriginal Laqua and Lati (*q.v.*) of northwestern Indochina, it has been grouped into the Kadai language family, bridging Thai and Indonesian.

Numerous place names indicate the former wide distribution of the Keh-lao; most of their territories were yielded to invading Chung Chia, Miao and Chinese. Considerably sinicized in the 1960s, they were living either as tenants of Chinese and practising wet-rice agriculture or, where they tilled their own stony and remote lands, were planting maize as a staple. The traditional costume of short coat, poncho-style tunic (both embroidered) and pleated hemp skirt was no longer being worn; formerly the Keh-lao understood the technique of batik (*see* Textiles). However, such ancient Lao practices as tooth breaking and haircutting as initiation rites were still well remembered.

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(I. de B.)

KEIGHLEY, a municipal borough of the West Riding of Yorkshire, Eng., 10 mi. N.W. of Bradford by road. Pop. (1961) 55,852. It is in a deep valley near the confluence of the Worth and the Aire and is served by the Leeds and Liverpool canal, which affords water communication with both Liverpool and Hull. The parish church of St. Andrew, dating from the time of Henry II, was much modernized in 1710, rebuilt with the exception of the tower in 1805 and again rebuilt in 1878.

The grammar school was founded in 1713, and from it were established in 1871 a trade school for boys and a grammar school for girls. The technical school was founded in 1870. The principal manufactures are woolen goods, spinning machinery, looms and machine tools. The town was incorporated in 1882 and considerably extended in 1938. It includes the quaint village of Haworth (*q.v.*), famous as the home of the Brontë family.

KEIGWIN, RICHARD (d. 1690), British naval officer and officer of the East India company, leader of "Keigwin's rebellion," was a son of Richard Keigwin of Penzance, Cornwall. On May 4, 1673, as a lieutenant in H.M.S. "Assistance," he led the assault on the Dutch-held island of St. Helena in the South Atlantic, the landing place still being known as "Keigwin's rock." In 1676 he went to Bombay as a free merchant, but soon entered the East India company's service. As commandant in 1679 he distinguished himself in battle against the Maratha navy. In 1683 discontent with the company's economies broke into revolt which Keigwin headed. For nearly a year he ruled Bombay vigorously in the king's name, but finally he surrendered the island to the company on the king's orders, in Nov. 1684, after obtaining a free pardon for himself and his followers, and returned to England in 1685. As commanding officer of H.M.S. "Assistance" he was killed on June 21, 1690, while leading the assault on the island

of St. Kitts in the Leeward islands.

See R. Strachey and O. Strachey, *Keigwin's Rebellion* (1916).

(T. G. P. S.)

KEIHIN, the collective name for the ports of Tokyo and Yokohama and the industrial area centring on Kawasaki (*q.v.*) that developed along the 25 mi. coast line between the two cities. *See* TOKYO; YOKOHAMA.

KEISER, REINHARD (1674–1739), German composer of operas and church music, was baptized at Teuchern, near Weissenfels, on Jan. 12, 1674. He received his early education from his father, an organist, afterward attending the Thomasschule in Leipzig. About 1697 he settled in Hamburg and became the most celebrated opera composer of his day. His many operas include *Octavia* (1705), written to compete with Handel's lost opera *Nero; Der angenehme Betrug,* with arias by Christoph Graupner (1707; revived in an arrangement by F. Tutenberg, 1931); *Croesus* (*c.* 1710); and the comic opera *Der laecherliche Printz Jodelet* (1726; revived 1930). In 1700 he started a series of winter concerts in Hamburg that took the form of a combination of concert and banquet. In 1712 he married a well-known singer, Barbara Oldenburg, and in 1728 became cantor and canon of Hamburg cathedral. He died in Hamburg on Sept. 12, 1739.

Keiser's outstanding gifts for melody foreshadow the *style galant.* Each of his operas, based on a mythological or historical subject, contains a profusion of arias, originally in German but later in Italian. With his colleagues Johann Mattheson and G. P. Telemann, he attempted to establish at Hamburg a distinctively German form of baroque opera. His early operas were entirely in German but gradually, with the return of Italian arias, his newly established style declined. In *Die verdammte Staat-Sucht* (1703) there were 56 German arias as opposed to 11 in Italian. In his last opera, *Circe* (1734), there were 21 German arias and 23 in Italian, some written by Leonardo Leo, J. A. Hasse and Handel. Though he long remained a favourite with the public, his aims remained unfulfilled. In his later years he turned to church music, written in a more severe style, including oratorios, motets, cantatas and psalms.

See R. Petzoldt, *Die Kirchenkompositionen und weltlichen Kantaten Reinhard Keisers* (1935); H. C. Wolff, *Die Barockoper in Hamburg,* 2 vol. (1957).

KEITEL, WILHELM (1882–1946), German army officer, who was chief military adviser to Adolf Hitler in World War II, was born at Helmscherode in central Germany on Sept. 22, 1882. Keitel had staff assignments in World War I and mostly administrative duties in the *Reichswehr* thereafter. In Feb. 1938, when Hitler took personal command of the armed forces, Keitel was appointed to the new post of chief of the armed forces high command, equivalent to minister of war. He held that post until the end of the war. Keitel participated in all major conferences, dictated the armistice terms to the French in June 1940, and signed operational orders, including those requiring the shooting of hostages and other acts considered illegal under international law. He was a member of the "court of honour" which brought about the death sentences of many high-ranking officers in connection with the unsuccessful plot to assassinate Hitler, July 20, 1944. After the war he was convicted by the International Military Tribunal in Nürnberg of planning and waging a war of aggression, of war crimes and of crimes against humanity. He was hanged on Oct. 16, 1946. Keitel was generally regarded as a weak officer who had little tactical military experience and served chiefly as Hitler's lackey.

(P. N. T.)

KEITH, the name of a Scottish family that derived its name from the barony of Keith in East Lothian, said to have been granted by Malcolm II, king of Scotland, for services against the Danes. Possession of the Keith lands and of the office of great marshal (marischal) of Scotland (afterward hereditary in the Keith family) was confirmed by Robert I the Bruce to Sir Robert Keith, who commanded the cavalry at the battle of Bannockburn and was later killed in the battle of Neville's Cross (1346). At the close of the 14th century Sir William Keith, by exchange of lands with Lord Lindsay, obtained Dunnottar in Kincardineshire where he built the castle that became the Keith stronghold. Between 1446 and 1458 a later Sir William Keith was created Lord Keith and earl marshal; these titles remained in the family until forfeited in 1716.

WILLIAM (d. 1581), 4th earl marshal, was one of the guardians of Mary Stuart. Later he was an adherent of the Reformation; he retired to Dunnottar in 1567, gaining the sobriquet "William of the Tower," and was reputed to be the wealthiest man in Scotland. His daughter married the regent Moray. His grandson GEORGE (*c.* 1553–1623), 5th earl marshal, one of the most cultured men of his time, was educated at King's college, Aberdeen, and under Theodore Beza at Geneva. He was a firm Protestant and took an active part in church affairs. He acted as special ambassador to Denmark to arrange the marriage of James VI with the Princess Anne. In 1593 he founded and endowed Marischal college in the University of Aberdeen. From an uncle, the last abbot of Deer, he inherited the title of Lord Altrie about 1590.

WILLIAM (*c.* 1614–71), 7th earl marshal, was a covenanter and the most powerful opponent of the marquess of Huntly. He cooperated with the marquess of Montrose against the Gordons and signed the bond of Cumbernauld in 1640, but took no active steps until 1648, when he joined the duke of Hamilton in his invasion of England, escaping after the rout at Preston. In 1650 he entertained the future Charles II at Dunnottar where in 1651 the Scottish regalia were left for safekeeping. Taken prisoner in the same year and committed to the Tower of London, he was excluded from Cromwell's Act of Grace. He was made a privy councilor at the Restoration and died in 1671. Sir John Keith (d. 1715), brother of the 7th earl, was created hereditary knight marshal of Scotland at the Restoration and earl of Kintore in 1677—a reward for his share in preserving the regalia which were secretly conveyed by the minister's wife from Dunnottar to Kinneff kirk, when the castle was besieged by Cromwell's troops. From him are descended the earls of Kintore (now chiefs of the name of Keith) whose seat is at Keith hall in Aberdeenshire.

GEORGE (*c.* 1694–1778), 10th earl marshal, was, like his brother Francis, a zealous Jacobite, taking part in the rising of 1715, after which he escaped to the continent. In 1716 he was attainted, his estates and titles being forfeited to the crown. He lived at first in Spain, and after 1745 in Prussia, where he and his brother enjoyed the friendship of Frederick the Great. Frederick employed him in diplomacy and George is said to have conveyed information to the earl of Chatham, for which he received a pardon from George II. In 1761 he visited London.

From the Keith family through the female line was descended the distinguished British admiral George Keith Elphinstone, afterward Viscount Keith (*q.v.*), whose titles became extinct at the death of his daughter Margaret, Baroness Keith, in 1867.

(T. I.)

KEITH, SIR ARTHUR (1866–1955), Scottish anatomist and physical anthropologist, a leading specialist on fossil man, was born Feb. 5, 1866, at Old Machar, Aberdeen. Educated at Aberdeen university, University college (London) and Leipzig university, he received doctoral degrees in medicine, science and law. He became professor at the Royal College of Surgeons in 1908, was president of the Royal Anthropological institute (1912–14), professor of physiology at the Royal institution (1917–23) and rector at the University of Aberdeen (1930–33). While continuing his medical research, he became expert at reconstructing early hominid forms, working particularly on fossils from Europe and north Africa, and on the important skeletal groups from Mt. Carmel, Palestine (Israel). Chiefly a morphologist, Keith tended to overemphasize the "tooth and claw" or competitive factor in his writings on evolution, and confused culturally conditioned attitudes with inherited traits in his interpretation of racial and national prejudices as inborn. Sir Arthur died Jan. 7, 1955, at Downe, Kent.

Keith's major works include *The Human Body* (1912); *Antiquity of Man* (1915; 2nd ed., 1925); *Nationality and Race* (1920); *New Discoveries Relating to the Antiquity of Man* (1931); *A New Theory of Human Evolution* (1948); *An Autobiography* (1950).

KEITH, ARTHUR BERRIEDALE (1879–1944), eminent British constitutional lawyer and Sanskrit scholar, was born at

Portobello, Edinburgh, on April 5th, 1879. Educated first at Edinburgh, he continued a brilliant academic career at Balliol college, Oxford, where he studied classics, Sanskrit and Pali. In 1901 he passed first into the civil service, where he developed his interest in law, being called to the bar at the Inner Temple in 1904. Throughout his career the two interests of Sanskrit and law continued to exercise equal attraction for him. From 1914 until his death, Keith was professor of Sanskrit and comparative philology in the University of Edinburgh. He was a member of a number of important commissions, such as the Committee on Home Administration of Indian Affairs (1919). He published both works on constitutional law and history and works on Indian literature and philosophy, including Vedic translations. In 1922 the University of Edinburgh created for him a lectureship in the constitution of the British empire, which he held concurrently with the chair of Sanskrit. He died in Edinburgh on Oct. 6, 1944. Keith's works included: *Responsible Government in the Dominions,* 3rd ed., two volumes (1928); *A History of Sanskrit Literature* (1928).

(J. Br.)

KEITH, GEORGE KEITH ELPHINSTONE, Viscount (1746–1823), British admiral, distinguished in the Napoleonic Wars, fifth son of the 10th Lord Elphinstone, was born at Elphinstone near Stirling, Scot., on Jan. 7, 1746. He entered the navy in 1761 and served as a midshipman under John Jervis, later Earl St. Vincent, who became his lifelong friend. He was promoted lieutenant in 1770 and captain in 1775. He served throughout the American Revolutionary War by land and sea, distinguishing himself at the capture of Charleston, S.C. At the outbreak of the French Revolutionary Wars he served under Lord Hood at the capture of Toulon and was rewarded by being promoted rear admiral in 1794 and vice-admiral in 1795. In that year he was sent out to capture the Cape of Good Hope and in 1796 he made his fortune with the prize money won at the capture of a Dutch squadron at Saldanha bay. On his return in 1797 he was created Baron Keith in the peerage of Ireland. At the time of the naval mutinies he was sent to suppress the outbreaks at the Nore and at Plymouth (1797). In 1798 he went out to the Mediterranean as second-in-command to St. Vincent. He has been blamed for the escape of the French fleet under Etienne Eustache Bruix, but this was the result of circumstances beyond his control. When ill-health compelled St. Vincent to resign, Keith became commander in chief, to the annoyance of Nelson who was then a junior admiral. In 1800 Genoa surrendered because of Keith's close blockade, but he was compelled to withdraw after the defeat of the Austrians at Marengo. In 1801 he and Gen. Sir Ralph Abercromby drove the French out of Egypt. On the renewal of war in 1803 he was appointed to the North sea station, which extended from Selsey to Scotland. Until he resigned in 1807 he thus bore the main responsibility for the defense of the shores of Great Britain against Napoleon's invasion schemes. From 1812 to 1815 he commanded the channel fleet, and it was to a ship under his command, H.M.S. "Bellerophon" (Capt. Frederick Maitland), off Rochefort, that Napoleon surrendered after Waterloo. Under Keith's personal supervision he was transferred to the "Northumberland" for the voyage to St. Helena. Keith then retired from the sea and died in 1823. He married Jane Mercer in 1787 and Hester Thrale (Samuel Johnson's "Queenie") in 1808. In 1814 he had been created a viscount of the United Kingdom. He died at Tulliallan, Fifeshire, on March 10, 1823. Though he never fought a pitched battle at sea, Keith reached the highest rank and occupied the most responsible posts in the navy because of his ability as an administrator.

See the *Keith Papers,* ed. by W. G. Perrin and C. Lloyd, published by the Navy Records Society, 3 vol. (1927–55). (C. C. L.)

KEITH, WILLIAM (1838–1911), U.S. painter, best known for his California landscapes, was born at Old Meldrum, Aberdeenshire, Scot., on Nov. 21, 1838, and settled in California in 1859. Encouraged by critical approval and sales of his first landscapes, Keith spent the years 1869–70 in study abroad. For 40 years thereafter his San Francisco studios produced thousands of conventional woodland scenes and serene mountain landscapes, composed from his field sketches of the Sierra Nevada, California live oaks and the Yosemite. His work reveals his debt to both Constable and Corot and reflects his appreciation of George Inness (the Elder), with whom Keith is properly compared. He died at Berkeley, Calif., on April 13, 1911. There are two Keith galleries in California, at St. Mary's College, Moraga, and at the Oakland Art museum. He is also represented in the collections of the Metropolitan museum, the Corcoran gallery, and the Cleveland Art museum.

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KEITH, a small burgh of Banffshire, Scot., lies in Strath Isla, 50 mi. N.W. of Aberdeen by road. Pop. (1961) 4,208. The town, regularly planned, consists of Old and New Keith, on the east bank of the Isla, linked to Fife-Keith on the west bank by two bridges (one dating from 1609). Old Keith fell into gradual decay; New Keith was founded about 1750 by the 5th earl of Findlater; and Fife-Keith grew up after 1816. In the Roman Catholic church there is an altarpiece presented by Charles X of France. James Gordon Bennett, founder of the *New York Herald,* was born at Newmill, 1½ mi. N. Keith is an important agricultural centre. The principal industry is the manufacture of tweeds and woolen goods. Oatmeal and cereals are prepared and there is a large distillery. Keith was long famous for its Summer Eve fair, a name derived from that of St. Summarius, patron saint of the town.

KEKCHI, an American Indian group speaking the Quiché-Kekchi form of Maya, located mostly in the Alta Verapaz department of Guatemala and estimated to number 136,000 in the 1960s. Kekchi speakers in Izabal and El Petén departments and British Honduras may raise this to 200,000. The Kekchi are predominantly oriented to rural settlement; only 6% are town dwellers. Originally the Kekchi and neighbouring Indians (*see* Quiché) resisted efforts to bring them under Spanish rule, and the area became known as the "Land of War." In 1537 the Dominican missionary Bartolomé de las Casas gained permission to attempt peaceful subjugation of the region over a five-year period. This was so successful that an additional ten-year tenure was granted in 1539. Charles V named the area Verapaz ("True Peace") in recognition of Dominican success. Kekchi christianization was complete by the early 1550s, and Charles V executed a royal cedula (1555) approving Dominican methods and closing the area to Spanish exploitation and rule; Dominican control continued until 1821. Some authorities maintain that the Dominican organization of the Kekchi served as a model for the South American missionary states. Exploitation of the area following independence was slowed by poor communication and absence of valuable raw materials. The introduction of plantation coffee cultivation brought national economic policies that placed the Kekchi under the power of Ladino and German plantation owners during the late 19th century. The Kekchi have maintained a rural orientation with great emphasis still placed on the cultivation of small fields. They are for the most part monolingual, and, though there is increasing ladinization, they retain a clearer Indian identity than most Mesoamerican Indians. *See* also Guatemala; Maya Indians, Indian, Latin-American.

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KEKULÉ VON STRADONITZ, FRIEDRICH AUGUST (1829–1896), German chemist who laid the groundwork for the modern theory of structure in organic chemistry, was born at Darmstadt on Sept. 7, 1829. He entered the University of Giessen with the intention of becoming an architect but after coming under the influence of Justus von Liebig decided to become a chemist. It seems probable that his early training in architecture helped him conceive the structure theories he later proposed. He received his doctorate from Giessen in 1852 and then studied in Paris, where he met Charles F. Gerhardt, from whose type theory

of organic structure he later developed his own ideas. He next spent some time in London and in 1856 became a lecturer at the University of Heidelberg, where he worked out his first major theories. In 1858 he became professor of chemistry at Ghent and in 1865 he moved to Bonn, where he spent the rest of his life and received the title of nobility by which he added von Stradonitz to his name. He died in Bonn on July 13, 1896.

During 1850–58 organic chemistry had fallen into a state of great confusion. Although Edward Frankland had proposed the doctrine of valence in 1852 and Hermann Kolbe was writing a form of structural formula that included the main ideas of later formulas but was based on false assumptions, most chemists were unable to comprehend how a large number of carbon atoms could be accommodated in an organic compound. In 1858 Kekulé showed that carbon was tetravalent and was able to link with itself to form long chains, and this opened the way to an understanding of the nature of aliphatic compounds. The theory was announced almost simultaneously, but independently, by the Scottish chemist A. S. Couper, who in some respects wrote formulas that resembled more closely those used by later chemists than did the formulas written by Kekulé. The details of modern structural theory were worked out later by A. M. Butlerov and soon were accepted by all chemists.

The problem of the structure of benzene and the numerous ring compounds related to it remained unsolved. In 1865, by a brilliant inspiration, Kekulé realized that the structure of benzene could be explained by assuming that a chain of six carbon atoms could be closed into a ring. All the facts of organic chemistry known up to that time now fell into place. After Wilhelm Körner, Kekulé's assistant, showed how the position of substituents in the ring could be determined, the whole field of aromatic chemistry was opened. The great German dye industry of the latter half of the nineteenth century was based on this work.

Kekulé wrote a textbook of organic chemistry, *Lehrbuch der organischen Chemie,* that was published in four volumes in 1861–87. He also carried out valuable work on mercury fulminate, unsaturated acids and thio acids. However, it is on his ability to visualize the combinations of carbon compounds that his fame rests.

See CHEMISTRY: *History of Chemistry: Organic Compounds (1858–1900)*; CHEMISTRY: *Organic Chemistry: The Structure of Organic Molecules (Kekulé-Couper)*; *see* also references under "Kekulé von Stradonitz, Friedrich August" in the Index.

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KELANTAN, a state of the Malaysia federation in northeastern Malaya, under a constitutional sultan. Area 5,780 sq.mi. Pop. (1965 est.) 636,812. Kelantan is almost entirely formed by the long valley of the Kelantan river and about 79% is forested; mountainous jungles form its boundary with Thailand in the north, with Perak on the west and with Pahang on the south. Until 1909 and again during the Japanese occupation (1942–45) the state was under Thai suzerainty, but its people are Malay by race and Muslim by religion, more homogeneously so than in any other Malayan state.

Its agricultural economy centres on the paddy fields of the Kelantan river delta, the density per used square mile being 340 persons. The state has about 174,000 ac. under paddy and 103,000 under rubber, producing 72,000 tons of rice and 22,000 tons of rubber in a normal year. Along the sandspits and lagoons of the coast much coconut is grown in conjunction with inshore fishing, despite the shallow seaward approaches which oblige even small coastwise steamers to anchor half a mile offshore. During the wet season (October–January) strong northeasterly winds whip up heavy seas, preventing all sea-borne activity.

Historically Kelantan was colonized by Javanese who came by canoe, and the state retains a dialect, customs and traditions different from those of Malays in surrounding states, Kelantanese having been isolated by their difficult hinterland uncrossed by roads. On the delta movement is restricted by the Kelantan distributaries which periodically flood, a great risk in November and December when rainfall averages an inch a day on the delta and two inches in the hills. The state capital, Kota Bharu ("new fort"), stands on the east levee of the main channel of the Kelantan, inaccessible from the sea which is 8 mi. away and the focus of a fan of short roads, the valley road ending at Kuala Krai and the coast road only negotiable to Trengganu. A ferry links Kota Bharu to the west-bank road to the outport at Tumpat and to a single-track railway running south to Gemas and the Malayan railway and also to Sungei Golok, the Royal Thai railway connection to Bangkok and west Malaya. *See* also MALAYSIA.

(E. H. G. D.)

KELHAM FATHERS, the name by which the SOCIETY OF THE SACRED MISSION is known, was started in 1891 by Herbert H. Kelly as an Anglican religious community whose members take the vows of poverty, chastity and obedience. The society's main aim is the training of men for mission work at home and abroad in close co-operation with the local diocesans. The mother house at Kelham, near Newark, Nottinghamshire, contains a theological college where boys are received from the age of 15. The training leads either to ordination or to lay service. A similar house and college were founded at Adelaide in Australia in 1947. The society also maintains a number of smaller branch houses in England and South Africa, some with charge of parishes. From its beginning the society has been closely concerned with work for Christian unity.

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KELLER, GOTTFRIED (1819–1890), the greatest German-Swiss narrative writer of the realistic school. Keller's brilliant imagination drew upon a deep and humorous sympathy with men and things; and his shrewd knowledge of the world, combined with his creative gift, gave him his standing in German-speaking countries and beyond. He was also a notable lyric poet, some of his poems belonging to the permanent heritage of German literature.

Keller was born on July 19, 1819, in Zürich, the son of a turner. After being expelled from the secondary school he became a landscape painter, but an unsuccessful one, for two years' study in Munich (1840–42) could not disguise that his talent was slight. Necessity drove him back to Zürich and in 1843 he discovered his gift for the lyric, publishing three years later a volume of poems largely on nature and the spirit of the age. From 1848 to 1850 he was able with the help of the Zürich government to study in Heidelberg, concentrating on philosophy under L. Feuerbach. From 1850 to 1855, being ambitious to write for the stage, he lived in Berlin so that he could study the theatre. There, besides some drafts for plays which were never worked up, he wrote the four-volume novel *Der grüne Heinrich* (1854–55; Eng. trans. *Green Henry,* 1960), in which he painted a largely autobiographical picture of the childhood and development of an artist. In 1879–80 he published it in a revised version with a new, happy ending.

While still in Berlin he completed the first volume of *Die Leute von Seldwyla* (1856), stories full of deep insight into the life of the people. The most famous is the beautiful and tragically intense "Romeo und Julia auf dem Dorfe." A second volume appeared in 1874 (Eng. trans. of both volumes, *The People of Seldwyla,* 2nd ed. 1931). When Keller returned to Zürich in 1855 he lived for a time as an independent writer and was then from 1861 to 1876 clerk to the canton. In spite of his extensive duties—he was an exemplary civil servant—he published in 1872 the charmingly gay *Sieben Legenden* (Eng. trans., *Seven Legends,* 2nd ed. 1931). In 1878 there followed *Züricher Novellen,* the material for which he took from Zürich's social history. *Das Sinngedicht* (1881) is a cycle of love stories closely knit together in a surrounding "frame." In 1883 Keller published his *Gesammelte Gedichte* and in 1886 his last novel, *Martin Salander,* a work showing his concern for truth in human and political life. Before his death Keller had already achieved a great reputation. He died in Zürich on July 15, 1890. His *Gesammelte Werke* appeared in 10 volumes in 1889.

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KELLER, HELEN ADAMS (1880–), a U.S. blind deaf-mute, whose education and training represent the most extraordinary accomplishment ever made in the education of persons so handicapped, was born at Tuscumbia, Ala., on June 27, 1880. By severe illness, at the age of 19 months, she was deprived of sight and hearing and soon became mute. When she was about six years old her parents appealed to Alexander Graham Bell (*q.v.*) for counsel regarding her education, and as a result, Anne Mansfield Sullivan (later Mrs. John A. Macy) began on March 2, 1887, to instruct the child. Miss Sullivan, then 20 years old, formerly blind but partially cured of blindness, was a graduate of the Perkins School for the Blind at Boston, Mass. Within a month she had imparted the gift of language to her pupil. Under Miss Sullivan's constant teaching and with instruction at the Horace Mann School for the Deaf, Boston, and the Wright-Humason Oral school, New York city, Miss Keller not only learned to read, write and talk, but became exceptionally proficient in the ordinary educational curriculum. In 1900 she entered Radcliffe college, from which she graduated *cum laude* in 1904. Miss Sullivan, whose ability as a teacher was almost as marvelous as the talent of her pupil, was a devoted companion until her death in 1936.

Miss Keller wrote many books and articles, among the most important being *The Story of My Life* (1902), *Optimism* (1903), *The World I Live In* (1908), *Song of the Stone Wall* (1910), *Out of the Dark* (1913), *My Religion* (1927), *Midstream* (1929), *Peace at Eventide* (1932), *Helen Keller's Journal* (1938) and *Let Us Have Faith* (1940). Her best biographies are her own writings. (M. E. F.)

KELLERMANN, BERNHARD (1879–1951), German novelist who achieved international success with *Der Tunnel* (1913; Eng. trans., *The Tunnel,* 1915), a sensational technical-utopian novel. He was born at Fürth, Bavaria, on March 4, 1879, and was a painter before settling down as an independent writer. His early novels, *Yester und Li* (1904), *Ingeborg* (1906) and *Der Tor* (1909; Eng. trans., *The Fool,* 1925), are in the neo-romantic impressionist manner. *Der neunte November* (1920; Eng. trans., *The 9th of November,* 1925) was inspired by the German revolution of 1918, and *Das blaue Band* (1938) was based on the "Titanic" disaster. Kellermann also wrote a number of travel books and was a war correspondent in World War I. From 1945 onward he was a leading figure in the German Democratic Republic's cultural league. He died at his home near Potsdam on Oct. 17, 1951. (H. M. WA.)

KELLERMANN, FRANÇOIS CHRISTOPHE, DUC DE VALMY (1735–1820), French general of the *ancien régime* who made his name in the French Revolutionary Wars (*q.v.*) and became one of Napoleon's marshals, was born May 28, 1735, at Strasbourg in Alsace, of a family of the judicial nobility. An officer in one of the new mixed units of light infantry and cavalry from 1752, he did well in the Seven Years' War and was sent on a mission to Poland and to the Tatars of eastern Europe in 1765. In 1772 he defended Cracow with the French auxiliaries of the insurgent Confederation of Bar. The duc d'Orléans (the future Philippe Égalité) secured him to form a new hussar regiment in 1782. He was a general by seniority in 1788, noted as a good and very active officer. He spoke bad French with a strong Alsatian accent.

The first governments of the Revolution took little notice of Kellermann, who as a regular officer did not approve of the volunteer forces. After the fall of the monarchy, however, Lazare Carnot vouched for his loyalty to the Revolution; and on Aug. 28, 1792, Kellermann was at Metz as general in chief of 22,000 men, mainly regulars, of the army of the Moselle. He was reluctant to march to help Gen. C. F. Dumouriez in the plains of Champagne and even more reluctant to pass under his orders, but was compelled to do so (Sept. 4). Placed by Dumouriez at Valmy in a position which he did not think strong, he found the Prussian army on his front on Sept. 20. The Prussians did not launch the expected infantry attack; cannonading began instead, and in this the French artillery matched the Prussian. Kellermann rode round with his hat on the point of his sword, and his troops felt that he was an obstinate man who would stay where he was. The Prussians retired. The battle of Valmy had cost the French 240 casualties.

In Nov. 1792 Kellermann was sent to command the army of the Alps, whose previous commander, Gen. A. P. de Montesquiou-Fézensac, had deserted it after seizing Savoy from the Sardinian royal forces. In summer 1793 he was called away to help in the reduction of rebellious Lyons, but had to return to deal with the Sardinian counterinvasion of Savoy from Piedmont. On going back to the siege of Lyons, however, he found himself mistrusted by the committee of public safety in Paris (Edmond Dubois-Crancé, who had believed in him, had been replaced by Georges Couthon as *représentant en mission*). Recalled to Paris, he was imprisoned in Nov. 1793.

Kellermann was released after the reaction of Thermidor (July 1794) and was sent back to command the army of the Alps and also the army of Italy in spring 1795. His battle of Vado against the Austrians and Sardinians in June was a well-judged withdrawal from exposed positions. In Oct. 1795, however, B. L. Schérer was given command of the army of Italy; and by 1797 Kellermann's army of the Alps ceased to exist.

Henceforth Kellermann was employed on inspection and organization. After the *coup d'état* of Brumaire (Nov. 1799) he was made a senator. He proved so good an administrator that Napoleon kept him in charge of reserve forces, mainly at Mainz, until 1814, in spite of his age. He was the first of the four senators who were made marshals in 1804, and was created duc de Valmy in June 1808. He voted for Napoleon's abdication in 1814 and took no part in the Hundred Days. Under the second Restoration he sat in the chamber of peers until his death in Paris on Sept. 13, 1820.

His son FRANÇOIS ÉTIENNE KELLERMANN (1770–1835) was one of Napoleon's best cavalry officers: he made the decisive charge at Marengo (1800). It was he who signed the convention of Sintra (1808) with the British in Portugal (*see* MARENGO, BATTLE OF; PENINSULAR WAR). He also had a cavalry corps in France in 1814 and at Waterloo. (I. D. E.)

KELLGREN, JOHAN HENRIC (1751–1795), Swedish poet and critic, an outstanding literary personality of the Gustavian period of Swedish literature, was born at Floby, Västergötland, Dec. 1, 1751. He studied at Turku (Åbo) where he was appointed lecturer in aesthetics in 1774. With Carl Lenngren, the husband of Anna Maria Lenngren, he founded in 1778 the powerful literary journal *Stockholmsposten,* of which he was editor from 1780 to 1784 and from 1788 until his death. In 1785 he became private secretary to King Gustavus III, and when Gustavus founded the Swedish Academy (1786), was one of the first 18 members. He died in Stockholm, April 20, 1795.

Kellgren's first poems (elegant odes showing French influence) appeared in 1773, but he won fame with his satiric poem *Mina Löjen* ("My Smiles"; 1778), in which, a true spokesman of the Enlightenment, he combines Voltaire's skill in mockery with Pope's power of attack. His principal poem of this period, *Våra Villor* ("Our Illusions"; 1780), while proclaiming the transience of human ideals, claims that the imagination, by providing ideals toward which men may strive, enriches life. In the 1780s he wrote a number of verse dramas, on themes suggested by Gustavus III. This collaboration culminated in *Gustaf Vasa* (1786), a successful patriotic opera in which the powerful choruses express both the king's concern for national greatness and the poet's feeling for liberty. In 1787, in a spirit of enlightened rationalism,

he began his attack in both prose and verse on the superstitious practices of the court and upper classes and the vulgarized Swedenborgianism, with its emphasis on animal magnetism, which was spreading among the *bourgeoisie,* and achieved considerable success in purifying Swedish society. Later, his work acquired greater profundity, and *Den nya skapelsen* ("The New Creation"; 1789), his greatest poem, exalts the power of the imagination in describing a rich experience of love. Formally, its strength lies in its blend of romantic imagery and a form of classical simplicity and purity. In his prose of this later period, especially in the trenchant articles contributed to the *Stockholmsposten* after 1790, he expresses a vision of Sweden as an enlightened, unified society, and appeals to his literary contemporaries to strive for an age when their aim shall be to guide popular taste and to pursue lasting fame and honour rather than ephemeral popularity.

Kellgren's *Samlade Skrifter* in three volumes, revised by himself, appeared in 1796 (new ed., 1884–85). A critical edition, by S. Ek, A. Sjörding and O. Sylwan, was begun in 1922: text in six volumes (1923–47); commentary (1936–).

See O. Sylwan, *J. H. Kellgren,* 2nd ed. (1939); S. Ek, *Skämtare och Allvarsmän* (1952), and in *Ny Illustrerad Svensk Litteraturhistoria,* II (1956). (S. E.)

KELLOGG, FRANK BILLINGS (1856–1937), U.S. diplomat and lawyer who helped formulate the Kellogg pact (*q.v.*) to outlaw war, was born at Potsdam, N.Y., on Dec. 22, 1856. In 1865 he went to Minnesota with his parents. He studied law, was admitted to the bar in 1877 and practised in St. Paul. After the turn of the century he undertook antitrust prosecutions for the U.S. government. Success in the Standard Oil trust case in 1911 marked him as one of the country's leading lawyers, and he became president of the American Bar association in 1912. In 1916 he won election to the U.S. senate, where he served until 1923. He was ambassador to Great Britain from 1923 to 1925.

Kellogg served as secretary of state in the cabinet of Pres. Calvin Coolidge from 1925 to 1929. Toward Mexico, where U.S. property had been expropriated, he acted with forbearance. In China, which was going through a period of revolutionary turmoil, he refused to use force to defend American interests. Toward Europe he pursued a general policy of isolation. He helped bring about a naval conference at Geneva, Switz., in 1927 with Great Britain and Japan to limit the auxiliary categories of vessels (cruisers, destroyers, submarines) but the conference failed because of British refusal to give the United States parity in cruisers.

Kellogg's greatest diplomatic achievement was the Kellogg pact (or Pact of Paris) by which the nations of the world renounced and outlawed war as an instrument of national policy and promised to settle disputes by peaceful means. Kellogg received the Nobel peace prize for 1929 and served as a member of the Permanent Court of International Justice, 1930–35. He died on Dec. 21, 1937, in St. Paul, Minn.

KELLOGG PACT, also known as the KELLOGG-BRIAND PACT and PACT OF PARIS, inspired by the American outlawry of war movement, originated officially in a proposal of June 20, 1927, by Aristide Briand, French minister of foreign affairs, that the U.S. and France conclude a bilateral treaty renouncing war as an instrument of national policy and agreeing not to seek the settlement of any dispute or conflict except by peaceful means. In reply, the U.S. secretary of state, Frank B. Kellogg, suggested that a multilateral pact to the same effect be opened to ratification by all nations. The treaty was formally proclaimed on July 24, 1929, and subsequently ratified by 63 nations. *See* WAR; INTERNATIONAL LAW, PUBLIC; *see* also references under "Kellogg Pact" in the Index.

KELLS (CEANANNUS MÓR), a market town and urban district of County Meath in the Republic of Ireland, is situated on the Blackwater, 39 mi. N.W. of Dublin by road. Pop. (1961) 2,193. The house of St. Colmcille (or Columba), originally an oratory but later converted into a church, was built about 807. The bell tower of the present church (otherwise modern) was rebuilt in 1578. Near the church is a round tower, about 95 ft. in height, and there are several ancient crosses, the finest being that now erected in the market place. Kells was originally a royal residence; the ancient name Ceanannus is of doubtful derivation but *kenlis,* whence came Kells, means head fort. There Conn of the Hundred Fights resided in the 2nd century, and there was a palace of Dermot, king of Ireland in 544–565. Other places in Ireland named Kells are probably derived from *cealla,* "church."

In the 6th century Kells was granted to St. Colmcille and became a centre of learning. The town owes its chief ecclesiastical importance to the bishopric founded about 807 and united to Meath in the 13th century. The *Book of Kells* (*see* ILLUMINATED MANUSCRIPTS), an illuminated copy of the Gospels in Latin and containing also local records, was probably written there, and possibly in part at Iona, in about the 8th century and is preserved in the library of Trinity college, Dublin. It is said to be the finest extant example of early Christian art of its kind.

The dun, or fortification, of Dimor is the principal erection of a series of defenses on the hills about 6 mi. W. of Kells.

KELLY, HOWARD ATWOOD (1858–1943), U.S. physician and surgeon, noted especially for his contributions to the practice of gynecology and for the invention of a number of useful diagnostic tools, was born at Camden, N.J., on Feb. 20, 1858, and received his M.D. degree from the University of Pennsylvania in 1882. He developed a gynecologic dispensary clinic at the Episcopal Hospital, Philadelphia, Pa., during his internship there, and later founded the Kensington Hospital for Women in that city. He was professor of obstetrics at the University of Pennsylvania, 1888–89, and professor of obstetrics and gynecology at Johns Hopkins University and gynecologist-in-chief to Johns Hopkins Hospital from 1889 to 1919. In 1892 he established a sanatorium, later the Howard A. Kelly Hospital, Baltimore, Md.

Kelly was a pioneer in the use of radium for treatment of cancer and in the use of cocaine for local anesthesia. He devised an improved cystoscope, a rectal and vesical speculum, and an operative technique, which bears his name, for fixation of the uterus to the abdominal wall, correcting retroposition. A prolific writer, he contributed about 500 articles to medical journals and wrote books on various aspects of medicine. He died on Jan. 12, 1943.

KELLY, HUGH (1739–1777), Irish dramatist, critic, and journalist, who for a time was Oliver Goldsmith's rival in the London theatre, was born, most probably, in Dublin. In 1760, encouraged by traveling English actors whom he had met in his father's Dublin tavern, he emigrated to London. Within a year he was contributing regularly to *The Gazetteer, The Lady's Museum,* and *Owen's Weekly Chronicle;* from 1761 to 1765 he edited *The Court Magazine.* His "Babler" essays in *Owen's* were later collected and reprinted in several editions. *Thespis* (2 vol.; 1766–67) confirmed his reputation as a sound but highly controversial critic. In 1767 he published a short epistolary novel, *Memoirs of a Magdalen; or, the History of Louisa Mildmay.* As editor of *The Public Ledger,* a London daily, he was, during the Wilkes troubles, a prominent spokesman for the ministries of George III.

The resounding triumph of his first play, *False Delicacy* (1768), staged with the patronage of David Garrick and in competition with Goldsmith's *The Good-Natur'd Man,* cost him Goldsmith's friendship and begot the enduring resentment of Samuel Johnson, who had attended the rehearsals and written the prologue for Goldsmith's play. For weeks, before the openings, the town talk had been of the impending test of strength between the two authors and their sponsors. The presentation of Kelly's second comedy, *A Word to the Wise* (1770), was thwarted by his political enemies, who rioted against him for three nights in the Drury Lane Theatre. A blank verse tragedy, *Clementina* (1771), was unsuccessful; but a third comedy, *The School for Wives* (1773), and an afterpiece, *The Romance of an Hour* (1774), were well received. Kelly's reputation as a dramatist derived from his blend of comic and satiric scenes with earnestly sentimental materials. After the failure of a final comedy, *The Man of Reason* (1776), he retired from the theatre to practise law; he had been called to the bar in 1773. He died in his home in Gough Square, London, on Feb. 3, 1777. (T. K. O'L.)

KELLY, NED (EDWARD) (1855–1880), the most famous of the Australian bushrangers (*q.v.*), was born at Beveridge, near

Wallan Wallan, Victoria, in June 1855. He was the third child and eldest son of John Kelly, who had been transported from Belfast to Tasmania in 1842, and Ellen Quinn. Ned Kelly was associated with the bushranger Harry Power in 1870 and served jail sentences for horse and cattle stealing before he was 21. In April 1878 he wounded a constable who was attempting to arrest his brother Dan on similar charges and both men then took to the hills. There they were joined by Joe Byrne and Steve Hart, the other two members of what came to be known as the Kelly gang. In Oct. 1878 the gang surprised a patrol party of four policemen and shot and killed three of them. Despite a government price of up to £2,000 each on their heads, Kelly and his gang roamed the borderland of Victoria and New South Wales for two years, holding up banks and townships. After they had shot a police informer, Aaron Sherritt, in June 1880, the gang took possession of the township of Glenrowan, tearing up the railway line outside the town in anticipation of a special trainload of police being sent to deal with them. The train crew was warned by the local schoolmaster Tom Curnow and the police reinforcements were able to surround the hotel where the gang had established themselves. In the fighting that followed three members of the gang died inside the hotel, but Ned Kelly, who emerged in an improvised suit of armour, was shot in the legs and captured. He was tried at Melbourne and was executed there on Nov. 11, 1880.

Ned Kelly is not always regarded in Australia as a mere criminal: often he evokes some feeling of sympathy as a symbol of protest against arbitrary authority and privilege.

See Frank Clune, *The Kelly Hunters,* with bibliography (1954).

(J. F. C.)

KELP, a popular name for any of the large seaweeds belonging to the order Laminariales of the brown algae (Phaeophyta). These are the largest of all algae, certain Pacific and Antarctic forms, the giant kelps (*Macrocystis* and *Nereocystis* species), being more than 100 ft. in length.

Other kelps, common in the colder seas, include species of *Alaria, Laminaria* and *Pelagophycus.* Several species of kelps are of economic importance (*see* ALGAE: *General Features*).

The term kelp also applies to the ash produced by incineration of various kinds of coarse seaweeds. Until early in the 19th century the ash obtained from seaweed was an important source of potassium and iodine; recovery of these elements from seaweeds is now unprofitable (*see* IODINE: *Sources*). The kelp ash industry, formerly centred on the coast of Brittany in France and on the west coasts of Ireland and Scotland, still exists at relatively low ebb in Japan. Seaweeds burned for kelp ash included both those cast ashore in windrows after storms and those cut from rocks at low tide. *See* ALGAE: *Survey and Classification: Brown Algae.*

EDGAR AUBERT DE LA RÜE

GIANT KELP GROWING ON THE SHORE OF ONE OF THE KERGUELEN ISLANDS, ANTARCTIC OCEAN

See also V. J. Chapman, *Seaweeds and Their Uses* (1950).

(G. M. S.; X.)

KELSEN, HANS (1881–), Austrian-U.S. legal scholar, creator of the "pure theory of law," was born on Oct. 11, 1881, at Prague and educated in Heidelberg, Berlin and Vienna. Author of the Austrian constitution of 1920 and judge of the Austrian supreme constitutional court (1920–30), he served for 30 years as a professor at Vienna, Cologne, Geneva and Prague German university before emigrating to the U.S. in 1940. He taught at Harvard, the University of California and the Naval War college.

Kelsen's "pure theory of law" was first presented in his fundamental work, *Hauptprobleme der Staatsrechtslehre* (1911). Historically it has a certain relation to John Austin's "analytical jurisprudence," although Kelsen became acquainted with Austin's work for the first time in 1940. The pure theory of law is a formal-logical analysis of the law, considered as a system of norms, based philosophically on the strict distinction between "is" and "ought." It is a normative and positive doctrine, opposed both to sociologism (law as a fact) and to natural law. But it is a critical positivism, showing the limitations of the positivistic approach; hence his "basic norm" is a presupposed norm, giving validity to the whole legal order. His positivism is a formal analysis of the legal norm, of its elements and of the architecture of the legal order. It reaches a climax in a grandiose vision of unity achieved in a pluralism of legal orders through a supraordinated international law.

Kelsen's concentration on the form of law recognizes the legitimacy of sociological investigations and the study of values in reference both to the contents and the making of law. Equally, his philosophical relativism of values is entirely compatible with his strong stand for democracy and the ideals of western culture.

A complete bibliography appears in Kelsen, *Théorie pure du droit* (1953). *See* also *General Theory of Law and State* (1945); *The Law of the United Nations* (1950–51); *Principles of International Law* (1952); *Society and Nature* (1943); *What Is Justice?* (1957).

(J. L. Kz.)

KELSO, a small burgh and market town of Roxburghshire, Scot., on the left bank of the Tweed by its junction with the Teviot, is 43 mi. S.E. of Edinburgh and 23 mi. S.W. of Berwick-upon-Tweed by road. The railway station is south of the town and the Tweed. Kelso lies at the head of the Merse, the rich agricultural plain south of the Lammermuirs. Pop. (1961) 3,968. An ancient market town with a large market square, Kelso was a stop for coaches on the London-Edinburgh route. Like many of its neighbouring towns, Kelso suffered from border warfare. It had a burghal status quite early, and was confirmed a burgh of barony in 1634.

The abbey was founded in 1128 by David I for monks from Tiron in Picardy, whom he transferred from Selkirk, where they had been installed 15 years before. It was dedicated to the Virgin and St. John. The abbey, completed toward the middle of the 13th century, became one of the most powerful in Scotland, claiming precedence over the other monasteries and disputing the supremacy with St. Andrews. The abbey suffered damage in numerous English forays, was pillaged by the 4th earl of Shrewsbury in 1522, and was reduced to ruins in 1545 by the earl of Hertford (afterward the Protector Somerset). In 1602 the abbey lands passed into the hands of Sir Robert Ker of Cessford, 1st earl of Roxburghe. The transept of the abbey church was covered over and made into a parish church after the Reformation and remained as such until 1771, and one vault was long used as the town jail. The abbey was presented to the nation in 1919 by the duke of Roxburghe who retained burial rights in the cloisters. Restoration was undertaken by the ministry of works. The remains include most of the tower, nearly the whole of the walls of the south transept, less than half of the west front, the north and west sides of the north transept and a remnant of the chancel. The predominant feature is the great central tower, which, as seen from a distance, suggests a Norman keep.

The Tweed is crossed at Kelso, where several great floods have taken place, by a bridge of five arches constructed in 1803 by John Rennie. It is said to have been his test for the old Waterloo bridge in London. Buildings include the burgh chambers, Tait hall (1935) and the Cross Keys hotel, a social centre in coaching days; a school occupies the site of the one which Sir Walter Scott attended in 1783. The public park lies in the east of the town and the racecourse at Berrymoss to the north of it. Trade in Kelso is largely agricultural; the Kelso ram sales in Springwood park have a reputation far beyond the border. The ancient St. James's fair is held on Aug. 5. James and John Ballantyne, friends of Scott, set up a press about the end of the 18th century, from which were issued, in 1802, the first two volumes of the *Minstrelsy of the Scottish Border.* James Ballantyne also founded, in 1797, the *Kelso Border Mail* as a rival to the *Kelso*

Chronicle. The latter is the oldest border newspaper, founded in 1783. In 1949 the *Mail* and the *Chronicle* were amalgamated under the title *The Border Counties and Kelso Chronicle and Mail*.

On the peninsula formed by the junction of the Teviot and the Tweed stood the formidable castle and flourishing town of Roxburgh from which the shire took its name. No trace exists of the town, and all that is left of the castle are a few ruins shaded by ancient ash trees. Built by the Northumbrians, after the consolidation of the kingdom of Scotland it became a favoured royal residence; the town beneath its protection reached its most prosperous days under David I and formed a member of the Court of Four Burghs with Edinburgh, Stirling and Berwick. It possessed a court of justice, a mint, mills and, what was remarkable for the 12th century, a grammar school. Alexander II was married and Alexander III was born in the castle. During the long period of border warfare, the town was repeatedly burned and the castle captured. The castle was finally razed to the ground in 1460. During the siege the king, James II, was killed nearby by the explosion of a huge gun called "the Lion." On the fall of the castle the town was abandoned in favour of the rising burgh of Kelso.

About 1 mi. W. of Kelso is Floors or Fleurs castle, a seat of the duke of Roxburghe. The mansion as originally designed by Sir John Vanbrugh in 1718 was severely plain, but in 1849 W. H. Playfair converted it into the Tudor style.

Sandyknowe or Smailholm tower, 6 mi. W. of Kelso, dating from the 15th century, is a fine example of a border peel. Two miles northeast of Kelso is the pretty village of Ednam (Edenham, "the village on the Eden"), the birthplace of the poet James Thomson, to whose memory an obelisk, 52 ft. high, was erected on Ferniehill in 1820.

KELVIN, WILLIAM THOMSON, Baron (1824–1907), British physicist, discoverer of the second law of thermodynamics and inventor of telegraphic and scientific instruments, was born at Belfast, Ire., on June 26, 1824. At the age of 11 he entered the University of Glasgow, where his father was professor of mathematics. Leaving Glasgow without taking a degree, in 1841 he entered Peterhouse, Cambridge, and in 1845 took his degree as second wrangler and won the Smith's prize. At that time there were few facilities for the study of experimental science in Great Britain. Thomson therefore had recourse to Paris, and worked in the laboratory of Regnault (*see* Regnault, Henri Victor), who was then engaged in his classical researches on the thermal properties of steam. In 1846, on the death of Meikleham, he accepted the chair of natural philosophy in the University of Glasgow, which he filled for 53 years.

One of Thomson's earliest papers dealt with the age of the earth. His calculations on the conduction of heat showed that at some time between 20,000,000 and 400,000,000, probably about 100,000,000, years ago the physical conditions of the earth must have been entirely different from those which now obtain. This led to a long controversy with geologists.

In 1847 Thomson first met James Prescott Joule, whose views of the nature of heat strongly influenced Thomson's mind. In 1848 Thomson proposed his absolute scale of temperature, which is independent of the properties of any particular thermometric substance, and in 1851 he presented to the Royal society of Edinburgh a paper on the dynamical theory of heat, which reconciled the work of N. L. Sadi Carnot with the conclusions of Count von Rumford, Sir H. Davy, J. R. von Mayer and Joule, and placed the dynamical theory of heat and the fundamental principle of the conservation of energy in a position to command universal acceptance. It was in this paper that the principle of the dissipation of energy, briefly summarized in the second law of thermodynamics (*q.v.*), was first stated.

Although his contributions to thermodynamics may properly be regarded as his most important scientific work, it is in the field of electricity, especially in its application to submarine telegraphy, that Lord Kelvin is best known to the world at large. From 1854 he is most prominent among telegraphists. The stranded form of conductor was due to his suggestion; but it was in the letters which he addressed in that year to Sir G. G. Stokes, and which were published in the *Proceedings of the Royal Society* (1855), that he discussed the mathematical theory of signaling through submarine cables, and enunciated the conclusion that in long cables the retardation due to capacity must render the speed of signaling inversely proportional to the square of the cable's length. Thomson set to work to overcome the difficulty by improvement in the manufacture of cables, by the production of copper of high conductivity and the construction of apparatus which would readily respond to the slightest variation of the current in the cable. The mirror galvanometer and the siphon recorder, which was patented in 1867, were the outcome of these researches. Thomson's work in connection with telegraphy led to the production in rapid succession of instruments adapted to the requirements of the time for the measurement of every electrical quantity, and when electric lighting came to the front a new set of instruments was produced to meet the needs of the electrical engineer.

When W. Weber in 1851 proposed the extension of C. F. Gauss's system of absolute units to electromagnetism, Thomson took up the question, and, applying the principles of energy, calculated the absolute electromotive force of a Daniell cell, and determined the absolute measure of the resistance of a wire from the heat produced in it by a known current. In 1861 Thomson induced the British association to appoint its first famous committee for the determination of electrical standards. The oscillatory character of the discharge of the Leyden jar, the foundation of the work of H. R. Hertz and of wireless telegraphy, were investigated by him in 1853.

It was in 1873 that he undertook to write a series of articles for *Good Words* on the mariner's compass. He wrote the first, but so many questions arose in his mind that it was five years before the second appeared. In the meanwhile the compass went through a process of complete reconstruction in his hands, a process which enabled both the permanent and the temporary magnetism of the ship to be readily compensated, while the weight of the 10-in. card was reduced to one-seventeenth of that of the standard card previously in use, although the time of swing was increased. Thomson also invented his sounding apparatus, whereby soundings can be taken in shallows and in deep water. Thomson's tide gauge, tidal harmonic analyzer and tide predicter are famous, and among his work in the interest of navigation must be mentioned his tables for the simplification of Sumner's method for determining the position of a ship at sea. Thomson published more than 300 original papers bearing upon nearly every branch of physical science. The firm of Kelvin and White, in which he was a partner, was formed to manufacture his inventions. In 1866 Thomson was knighted. He was raised to the peerage in 1892 with the title of Baron Kelvin of Largs. In 1890 he became president of the Royal society and in 1902 received the Order of Merit.

Much of Kelvin's time after his retirement (1899) was given to writing and revising the lectures on the wave theory of light which he had delivered at the Johns Hopkins university, Baltimore, Md., in 1884 (published 1904). In 1904 he was elected chancellor of the University of Glasgow.

Kelvin died on Dec. 17, 1907, at his residence, Netherhall, near Largs, Scot., and was buried in Westminster Abbey.

In addition to the Baltimore lectures, he published with P. G. Tait a standard but unfinished *Treatise on Natural Philosophy* (1867). A number of his scientific papers were collected in his *Reprint of Papers on Electricity and Magnetism* (1872), and in his *Mathematical and Physical Papers* (1882, 1883 and 1890), and three volumes of his *Popular Lectures and Addresses* appeared in 1889–94.

See also references under "Kelvin, William Thomson" in the Index.

See Andrew Gray, *Lord Kelvin* (1908); S. P. Thompson, *Life of Lord Kelvin* (1910), which contains a full bibliography.

KEMAL, NAMIK (1840–1888), Turkish writer and poet, who greatly influenced the Young Turk and nationalist movements, and the westernization of Turkish literature. An aristocrat by birth, he was educated privately and later learned French in Istanbul where, as a result of his articles in the newspaper *Tasvir-i*

Efkâr, he incurred the displeasure of the authorities. He fled to London and there, with the help of the poet Ziya Pasha, published the revolutionary newspaper *Hürriyet.*

Later, returning to Istanbul, he continued his revolutionary writings in the *Ibret* and produced his patriotic play *Vatan.* This led to his imprisonment in Cyprus (1873–77). After his release and a further period of virtual exile he died as governor of Chios (1888). His writings comprised poems, plays, articles, historical works and novels, including *Intibah* (1874) and *Cezmi* (1880). Patriotism and hatred of tyranny were themes common to all his writings, and his style, though more restrained in the articles, was normally passionate and romantic. (F. I.)

KEMAL ATATÜRK, MUSTAFA (1881–1938), Turkish army officer and president of Turkey (1923–38), was born in Salonika, Greece, the son of a customs officer. He decided early on a military career and went to the Harbiye staff college in Istanbul. He was an exceptional student in mathematics and as a tribute to his ability was given the name Kemal, which means "perfection" in Arabic. In 1906, with the rank of captain, he was sent to the Damascus cavalry regiment. In Sept. 1907 he was appointed to the staff of the 3rd army in Salonika. In April 1909 he was on the staff of Mahmud Shevket Pasha, the army commander, when the army marched on Istanbul to depose the sultan Abdul-Hamid II. In 1911 Mahmud Shevket, then war minister, brought him to the war office. In 1911 the Italo-Turkish War broke out, and Mustafa Kemal served for some months in Libya, returning to Istanbul in Oct. 1912, when four Balkan countries attacked Turkey. He was then appointed chief of staff of a division at Gallipoli. When the Balkan allies started fighting among themselves, he was with the force that retook Adrianople (Edirne) for Turkey. He was then sent as military attaché to Sofia.

World War I.—At the outbreak of World War I, Kemal considered that Turkey should remain neutral and doubted the possibility of German victory over Great Britain, France and Russia. On the other hand, he did not want to see Russia strengthened. He was given command of the 19th division at Gallipoli and was put under Gen. Otto Liman von Sanders, the German inspector general. It is generally accepted that the Turkish success at Gallipoli was largely inspired by Kemal's courage and clear-sightedness.

Kemal spent the winter of 1915–16 in Istanbul. His relations with Enver Pasha, then war minister, grew steadily worse. He also made no secret of his dislike of the Germans. Enver so feared his influence that in March 1916, to get him away from Istanbul, he appointed him to command the XVI army corps in eastern Anatolia. There, in the autumn of 1916, Kemal fought a successful campaign against the Russians in the region of Lake Van.

Meanwhile, trouble was starting for Turkey in the Arab provinces. Kemal was sent to take command of the 2nd army at Diyarbakir. In Dec. 1917 he wrote a report on the military and political situation on the eastern front. It was an outspoken piece of writing: the Germans should not, he said, be put in command of Turkish armies but should be there as advisers only; it was useless to go on trying to defend the non-Turkish parts of the empire; withdrawal to the Turkish parts was necessary to organize the defense of the motherland in Anatolia; no single Turkish soldier should be sacrificed for the empire any more but saved for Turkey. Enver Pasha rejected the report and sent Kemal home on indefinite sick leave. As the military situation grew worse, Kemal was again appointed to command: this time the 7th army in Palestine. He succeeded in extricating this army and withdrew to Aleppo. There he prepared defense lines 10 mi. N. of the city, which he evacuated on Oct. 26, 1918. He brought all the eastern armies back to the frontiers of Anatolia.

The National Movement and the Greco-Turkish War.—Meanwhile Turkish resistance collapsed elsewhere, an armistice was signed at Mudros and a new Turkish government was formed to carry out the terms of this armistice. Kemal now returned to Istanbul, where he threw himself into politics and organized resistance to the Allies. The new sultan, Mohammed VI, respected Kemal but wanted to get him out of Istanbul and so appointed him inspector general of the armies in eastern and northeastern Anatolia. The Allies tried to stop this appointment, but failed; and on May 9, 1919, Kemal arrived in Samsun. From there he moved inland to Amasya. He was joined by Rauf Bey and, along with two others, signed a declaration calling for an independent Turkish nation free from foreign control. It was decided to call a conference of all organizations sympathizing with this idea. The conference met at Erzurum and Kemal was elected chairman of it. Another conference was then held at Sivas and approved of a "national pact" to create an independent Turkey.

Early in 1920, delegates to a national assembly began to arrive in Ankara, which became the centre of resistance. On April 23 the assembly elected Kemal its president. During the summer of 1920 he became the dominant figure in Ankara and organized resistance to the terms of the treaty of Sèvres and to the Greeks who were now invading western Anatolia. Kemal then appointed Ismet Pasha (*see* INÖNÜ, ISMET) to be second-in-command under him against the Greeks. He decided to evacuate a large tract of country and withdraw to a line on the Sakarya river. His action proved effective. Ismet won the battle of Inönü and halted the Greek advance. In 1921 the Greeks were defeated at the battle of the Sakarya and an armistice was signed at Mudanya on Oct. 11, 1922. (*See* GRECO-TURKISH WAR [1921–22].)

On his return to Ankara, Kemal received a vociferous welcome and was given the title of ghazi (victorious). Even so, he regarded the crises as not yet over and, after some difficulty, succeeded in getting the national assembly to let him have dictatorial powers renewable every three months. Meanwhile, in Nov. 1923, a peace conference had met in Lausanne, where Ismet represented Turkey. Between them Kemal and Ismet succeeded in getting nearly everything that they wanted, and Turkey's position as an independent nation was recognized internationally once more. (*See* LAUSANNE, CONFERENCES OF.)

The Turkish Republic.—A new national assembly was then elected and met on Aug. 11, 1923. Kemal was again elected its president. A new constitution was passed empowering him to appoint his own prime minister. Considering that the time was ripe for further changes, he proposed to the national assembly the abolition of the sultanate and the declaration of a republic. The assembly hesitated but finally agreed, electing Kemal president of the republic (Oct. 30), an office he held until his death. He also founded at that time the Republican People's party out of various societies and groups that had started the National Liberation movement and became its president too. Seeing the danger of religious reaction through the influence of the mullahs, he got the assembly to accept a law on March 3, 1924, abolishing the caliphate and the dervish sects, declaring Turkey a secular republic and exiling the members of the imperial family.

Kemal now became a powerful but very lonely man. He had nearly unlimited political power, for which he was not well qualified, because his genius was military. Yet he tried to keep his mind open and to listen to the views of others. He was determined that the old Ottoman empire should go and that the country should be completely modernized and that women should be emancipated. There was much opposition, and he was all the more lonely because his mother and his cousin, Fikriye, for whom he had great affection, both died at this time; moreover he divorced his wife, Latife, a woman from Izmir. Without family, without religious belief, without friends, he only had Ismet as his prime minister and confidant and his burning belief in Turkey's future as an independent nation—as well as the unswerving support of the mass of the people, including the peasants.

In 1924 Kemal passed through a severe crisis, in which he showed a certain ruthlessness in condemning to death some of his former colleagues and members of the Committee of Union and Progress; but when the immediate crisis was past, he threw himself with renewed energy into modernizing Turkey. He abolished the Arabic alphabet, introduced the Latin one and started a big campaign, in which he took part personally, to fight illiteracy among the people. He also introduced the use of surnames in the western style for Turks, taking for himself that of Atatürk ("Father of Turks") in Nov. 1934. In his ceaseless efforts he finally wore himself out. The hard life that he had lived in his many campaigns and the hârd drinking in which he had at times indulged

had undermined his health. On Nov. 10, 1938, he died at Dolmabahche palace, in Istanbul. His death was a signal for unprecedented national mourning.

Mustafa Kemal Atatürk was largely responsible for bringing Turkey through the greatest crisis in its history. His methods were dictatorial, but it is doubtful if he could have achieved what he did without them; and he always sought the possibility of bringing back democratic forms. He even went so far as to create an opposition in the national assembly. He successfully re-established Turkey's international position and ended the age-long enmity with the Greeks. He made treaties of friendship with the U.S.S.R., with his Balkan neighbours and also with Iran, Afghanistan and Iraq. Finally he re-established on a firm basis Turkey's friendship with the two western democracies, France and Great Britain, which had been broken in World War I. *See* also TURKEY: *History.*

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KEMBLE, the name of a family of English actors and actresses, of whom the most famous were Sarah Siddons (*q.v.*) and her brother John Philip Kemble, the eldest of the 12 children of ROGER KEMBLE (1721–1802), a strolling player and manager, who in 1753 married an actress, Sarah Ward.

JOHN PHILIP KEMBLE (1757–1823), the second child, was born at Prescot, Lancashire, on Feb. 1, 1757. He was educated for the Roman Catholic priesthood at a seminary near Wolverhampton and at the English college at Douai, France. But he had no vocation and on his return to England joined a theatrical company, his first appearance being as Theodosius in Lee's tragedy at Wolverhampton on Jan. 8, 1776. In 1778 he joined the York company of Tate Wilkinson, appearing at Wakefield, at Hull and at York.

Kemble played Hamlet in Dublin on Nov. 2, 1781, and was engaged at Drury Lane theatre, where he made his debut on Sept. 30, 1783, in the same part. The Drury Lane public was moderately enthusiastic, but his performance with his sister, Mrs. Siddons, in *Macbeth* (March 31, 1785), established him as a popular favourite. He married (Dec. 8, 1787) Priscilla Hopkins Brereton (1756–1845), the widow of an actor and herself an actress.

Kemble's appointment as manager of Drury Lane in 1788 gave him full opportunity to dress the characters less according to tradition than in harmony with his own conception of what was suitable. In his own version of *Coriolanus,* which was revived during his first season, the character of the "noble Roman" exactly suited his powers. His tall and imposing person, noble countenance and solemn and grave demeanour were uniquely adapted for the Roman characters in Shakespeare's plays. Kemble excelled in declamation, but physically he was incapable of giving expression to impetuous vehemence and searching pathos.

Because of the eccentricities of Richard Brinsley Sheridan, the proprietor of Drury Lane, Kemble withdrew from the management, and, although he resumed his duties at the beginning of the season of 1800–01, he finally resigned connection with it at the close of 1802.

In 1803 he became manager of Covent Garden theatre, in which he had acquired a sixth share for £23,000. The theatre was burned down on Sept. 20, 1808, and the raising of the prices after the opening of the new theatre, in 1809, led to riots, which practically suspended the performances for three months. Kemble was saved from ruin only by a loan, afterward converted into a gift, of £10,000 from the duke of Northumberland. Kemble's last performance was as Coriolanus on June 23, 1817. His retirement was probably hastened by the rising popularity of Edmund Kean. He died at Lausanne on Feb. 26, 1823.

See Harold H. Child, *The Shakespearian Productions of J. P. K.* (1935); Herschel Baker, *J.P.K.: the Actor and His Theatre* (1942).

GEORGE STEPHEN KEMBLE (1758–1822), the second son of Roger, was rather an indifferent actor, eclipsed by his wife and fellow player, Elizabeth Satchell Kemble (*c.* 1763–1841), and a man of such proportions that he played Falstaff without padding. He managed several theatres, including Drury Lane.

CHARLES KEMBLE (1775–1854), the youngest brother of John and Stephen, was born at Brecon, South Wales, on Nov. 25, 1775. He, too, was educated at Douai. He made his first recorded appearance at Sheffield as Orlando in *As You Like It* in 1792. His first London appearance was on April 21, 1794, as Malcolm to his brother's Macbeth. Ultimately he won independent fame. His Laertes and Macduff were hardly less interesting than his brother's Hamlet and Macbeth.

In comedy he was ably supported by his wife, Maria Theresa de Camp (1774–1838), whom he married on July 2, 1806. His visit, with his daughter Fanny, to North America during 1832 and 1834 aroused much enthusiasm. The later period of his career was clouded by money embarrassments in connection with his joint proprietorship in Covent Garden theatre. He formally retired from the stage in Dec. 1836, but his final appearance was on April 10, 1840. For some time he held the office of examiner of plays. He died on Nov. 12, 1854.

ELIZABETH WHITLOCK (1761–1836), who was a daughter of Roger Kemble, made her first appearance on the stage in 1783 at Drury Lane as Portia. In 1785 she married Charles E. Whitlock, went with him to America and played with much success there. She had the honour of appearing before President Washington. She retired about 1807 and died on Feb. 27, 1836.

FRANCES ANNE KEMBLE (Fanny Kemble; 1809–1893), actress and author, was Charles Kemble's elder daughter; she was born in London on Nov. 27, 1809, and educated chiefly in France. She first appeared on the stage on Oct. 25, 1829, as Juliet at Covent Garden. Her attractive personality at once made her a great favourite, her popularity enabling her father to recoup his losses as a manager. She played all the principal women's parts, notably Portia, Beatrice and Lady Teazle; Julia in Sheridan Knowles's *The Hunchback,* especially written for her, was perhaps her greatest success. In 1832 she went with her father to North America, and in 1834 she married there a southern planter, Pierce Butler. They were divorced in 1848. In 1847 she returned to the stage, and later, following her father's example, appeared with much success as a Shakespearean reader. In 1877 she returned to England, where she lived until her death in London on Jan. 15, 1893.

Fanny Kemble was a popular figure in London society. Besides her plays, *Francis the First,* unsuccessfully produced in 1832, and *The Star of Seville* (1837), a volume of *Poems* (1844) and a book of Italian travel, *A Year of Consolation* (1847), she published a volume of her *Journal* in 1835 and another (dealing with life on the Georgia plantation) in 1863, and also a volume of *Plays* (1863), including translations from Dumas and Schiller. Her various volumes of reminiscences contain much valuable material for the social and dramatic history of the period.

See M. A. Armstrong, *Fanny Kemble: a Passionate Victorian* (1938).

ADELAIDE KEMBLE (1814–1879), Charles Kemble's second daughter, was an opera singer of great promise, whose first London appearance was made in *Norma* on Nov. 2, 1841. In 1843 she married Edward John Sartoris, a wealthy Italian, and retired after a brief but brilliant career. She wrote *A Week in a French Country House* (1867).

Mention may also be made of Charles Kemble's grandson, HENRY KEMBLE (1848–1907), a popular London actor.

KEMÉNY, ZSIGMOND, BARON (1814–1875), Hungarian novelist whose difficult style has prevented full appreciation of his gifts as a portrayer of character and of atmosphere. He was also prominent as a journalist and politician. He was born at Alvinc in June 1814 of a family which included among its ancestors a prince of Transylvania. By his father's early death he lost many of the advantages of his birth; but his private means and title gave him easy access to political life. This he approached through journalism, first in his native Transylvania, and from 1847 on the staff of the *Pesti Hirlap.* In 1855 he became editor of the *Pesti Napló* and made it influential in Hungarian politics. A partisan of Ferencz Deák, Kemény prepared the way for the compromise (1867) between Hungary and the Habsburgs. His mind, always eccentric, became unbalanced, and in 1868 he had to abandon the editorship of his paper. He died at Pusztakamarás, Dec. 22, 1875.

Kemény wrote a number of historical novels: *Gyulai Pál* (1847),

Özvegy és leánya (1855; "The Widow and her Daughter"), *A rajongók* (1858; "The Fanatics") and *Zord idö* (1862; "Grim Times"). These were praised by critics, but little appreciated by the public. They make heavy reading, since emphasis is on description rather than action and the style is difficult. Their atmosphere is, moreover, depressing. His heroes, entangled in personal and historical conflicts, move, inexorably, toward destruction. Kemény's masterly motivation and fine evocation of the historical background are not enough to make his novels popular. His social novels, *e.g., Férj és nö* (1852; "Husband and Wife"), show an exaggerated romanticism, but are also, basically, works of minute psychological analysis. (Ds. Sr.)

KEMEROVO, an *oblast* (established 1943) in the Russian Soviet Federated Socialist Republic of the U.S.S.R., includes part of the Kuznetsk basin industrial area in the mountain foothills of western Siberia. Area 36,873 sq.mi. The axis of the *oblast* is the roughly north-south valley of the Tom, headstreams of which rise in the Shoriya uplands in the south of the *oblast*. East of the Tom valley the land rises to the mountains of the Kuznetski Alatau, which reach 7,146 ft. (2,178 m.) in Mt. Verkhni Zub. To the west is the considerably lower Salair ridge (Salairski Kryazh), which does not exceed 2,000 ft. In the north the land falls away to the great West Siberian lowland and the steppe vegetation appears there, but the natural cover of most of the *oblast* is thick coniferous forest, giving way higher up to mountain meadow pastures.

The population (mostly Russians, also Shorians) by the 1959 census was 2,785,906 (77.6% urban), making this the most densely populated part of Siberia, with 76 persons per square mile. In all, 2,160,794 persons live in 17 towns and 46 urban districts. The largest are the great steel town of Novokuznetsk (376,730), the administrative centre of Kemerovo (277,671), Prokopyevsk (281,958), Leninsk-Kuznetski (132,156), Kiselevsk (130,002), Anzhero-Sudzhensk (115,628), Belovo (106,894), and the new coal town of Mezhdurechensk (54,513). This large urban population reflects the great mineral wealth and industrial development of the *oblast,* which is a major area for coal mining and iron and steel production. Coal Measures underlie the whole *oblast* between the two flanking ranges, and are mined from Osinniki and Kaltan in the south to Anzhero-Sudzhensk in the north. The coal has a rather high ash content and many pits have associated enriching plants. About 40% is suitable for coking. On the basis of these coal supplies, since the start of the five-year plans in 1928, large-scale heavy industry has developed. Iron and steel production uses ores from the south of the *oblast,* round Temir-Tau and Tashtagol, and from the adjoining Khakass Autonomous *oblast* to the east. Lead, zinc, barium, arsenic and gold are also exploited, but quantities of these are not large. Associated with the coal and iron and steel production is a wide range of heavy engineering, machine-building and chemical industries. The forests of the *oblast* are intensively exploited to supply pit props and other industrial needs. The Trans-Siberian railway, which crosses the northern part, gives access to other parts of the U.S.S.R. From it, at Yurga, a line runs south through the industrial area as far as Tashtagol, with branches to Kemerovo, Novosibirsk, Guryevsk and Barnaul. A new line from Novokuznetsk crosses the Kuznetski Alatau to Abakan in the Khakass Autonomous *oblast.* (R. A. F.)

KEMEROVO, a town and the *oblast* centre in the Russian Soviet Federated Socialist Republic of the U.S.S.R., stands on the Tom river, near the foothills of the Kuznetski Alatau range about 2,000 mi. E. of Moscow. Pop. (1959) 277,671. It is one of the largest cities of the Kuznetsk basin industrial area. A major coal-mining centre, with pits in and round the town, Kemerovo is also one of the most important chemical towns of the U.S.S.R., producing nitrogenous fertilizers, plastics, paint, pharmaceutical goods and various coke by-products. Its engineering industries make coal-mining equipment and agricultural machinery, especially threshers and grain driers. Sawmilling and timberworking are based on timber rafted down the Tom, and pit props form a large part of the output. Kemerovo stands on a branch railway linking Barzas to the main Kuzbass axial line from Novokuznetsk to the Trans-Siberian railway at Yurga. The town's education facilities are particularly directed to serving the needs of local industries, with mining and medical institutes and mining and coke-chemical technical schools. The village of Kemerovo was founded in the 1830s and the modern town was called Shcheglovsk until 1932. (R. A. F.)

KEMI, a town of Finland in Lapin *lääni* (Lapland county), lies on the Gulf of Bothnia at the mouth of the Kemi river 55 mi. N.N.W. of Oulu. Pop. (1960) 28,847. It is a major centre for the pulp and timber industries. The Isohaara hydroelectric power station distributes electricity not only for the whole of north Finland but also for part of the south. Kemi is also a seaport handling most of the export trade of the Gulf of Bothnia and has air connections to Helsinki and Rovaniemi. Town rights were granted in 1869, and the railroad connecting with Tornio and Oulu was completed in 1903. (E.-S. Ku.)

KEMMERER, EDWIN WALTER (1875–1945), U.S. economist whose principal contributions were in monetary matters. As adviser to 14 governments reorganizing their currencies, he was known as the "money doctor." Born at Scranton, Pa., on June 29, 1875, and educated at Wesleyan university, Middletown, Conn. (A.B., 1899) and Cornell university, Ithaca, N.Y. (Ph.D., 1903), he taught economics at Purdue university (1901–03), at Cornell (1906–12) and Princeton (1912–43). He served as financial adviser to the U.S. Philippine commission in 1903 and was chief of the division of currency, Philippine Islands, 1904–06. He was financial adviser to the governments of Mexico, 1917, and Guatemala, 1919; chairman of the Commission of American Financial Advisers in Colombia, 1923, Chile, 1925, Poland, 1926, Ecuador, 1926–27, Bolivia, 1927 and China, 1929. In 1926 he was president of the American Economic association. He served on the Gold Standard Inquiry committee for the Union of South Africa, 1924–25, and as expert on currency and banking to the Dawes committee, 1925. He died at Princeton, N.J., on Dec. 16, 1945.

The best known of his many books is *The ABC of the Federal Reserve System* (1918). (Fk. L. K.)

KEMP, JAMES FURMAN (1859–1926), U.S. geologist, who specialized in the study of ore deposits, was born in New York city on Aug. 14, 1859. He graduated from Adelphi academy, Brooklyn (1876), and later studied in Amherst and at Columbia university. After studying at Leipzig and Munich, he returned to the U.S. to become a member of the teaching staff at Cornell university (1886–91). In 1891 he was called to Columbia university, where he remained until his death, at Great Neck, L.I., on Nov. 17, 1926.

While at Cornell, Kemp was one of a group of 13 who organized the Geological Society of America and was president in 1921. He was considered a leading authority on ore deposits, and was the author of a number of textbooks and many scientific papers.

KEMPE, JOHN (*c.* 1380–1454), English cardinal, archbishop of Canterbury and chancellor, was born about 1380 near Ashford, Kent, and educated at Merton college, Oxford. Having become doctor of laws, he practised as an ecclesiastical lawyer with such distinction that in 1415 he was made dean of the court of arches. After several diplomatic missions in the royal service, Kempe was made chancellor of the duchy of Normandy. He was consecrated bishop of Rochester at Rouen on Dec. 3, 1419. In 1421 he was transferred to Chichester and then to London. During the minority of Henry VI, Kempe held a prominent position in the English council as a supporter of Henry Beaufort. In 1426 he was appointed archbishop of York and succeeded Beaufort as chancellor. His main task as chancellor was to keep Humphrey of Gloucester in check, and his resignation, Feb. 28, 1432, was a concession to Gloucester. Still enjoying Beaufort's favour, he was sent in 1435 to the congress of Arras, where a settlement with France was unsuccessfully attempted under the auspices of the papal legates. Kempe continued to support the peace treaty and led a second embassy to the conference of Calais in 1438. In 1439 he was created cardinal. Although he supported Suffolk over the king's marriage with Margaret of Anjou, they later fell out over the nomination of Kempe's nephew to the bishopric of London. In 1450 Kempe was again chancellor and pronounced final sentence on Suffolk. He suppressed Cade's rebellion and for four

years maintained the king's authority against the Yorkists. In July 1452 he was rewarded with a promotion to Canterbury, receiving the title of cardinal bishop of Santa Rufina from Pope Nicholas V. His political influence declined with the rise of Richard of York, and his fall seemed imminent when he died on March 22, 1454. He was buried at Canterbury in the choir.

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KEMPENER (KEMPENEER), **PETER DE** (PEDRO CAMPAÑA) (1503–1580), Flemish religious painter and designer of tapestries, was chiefly active in Seville, Spain, where he was called Pedro Campaña. Born in Brussels, he traveled in Italy and was in Bologna in 1529, working on a triumphal arch for the entry of Charles V; he visited Venice and probably Rome, where he must have studied the works of Michelangelo and Raphael.

By 1537 Kempener had settled in Seville and apparently remained there until shortly before 1563, when he was appointed director of the tapestry factory in Brussels. Kempener's most important works are in Seville cathedral—the "Descent from the Cross" (1547) and the "Purification of the Virgin," an altarpiece with portraits of the donor and his family (1555). His style, combining Italianate composition with Flemish realism and genre, considerably influenced the school of Seville. He was greatly admired by Francisco Pacheco, master of Velázquez, who described him as an architect and sculptor as well as a painter.

See D. Angulo Iñiguez, *Pedro de Campaña* (1951). (E. Hs.)

KEMPENFELT, RICHARD (1718–1782), British admiral, whose death is commemorated in Cowper's poem "The Loss of the Royal George," was born in London, at Westminster, in 1718, the son of Magnus Kempenfelt, a Swede. His first naval service was at the siege of Porto Bello in 1739. From 1740 to 1780, when he was promoted to rear admiral, he saw service in the East Indies and many other parts of the world. In 1781 he gained a brilliant victory with an inferior force over a French fleet under the comte de Guichen off Ushant. In 1782 Kempenfelt hoisted his flag on board the "Royal George," which formed part of the channel fleet under Lord Howe. In Aug. 1782, when the fleet was refitting at Portsmouth, the shifting of weights on board the "Royal George" when she was heeled over for cleaning caused part of her bottom to fall out because of rotten timbers and she sank with 800 men on board, including the admiral. As an officer, Kempenfelt was noted for the care he took of the health of his men by the "divisional" system, as well as for his introduction of French tactical ideas and signals into the British navy. (C. C. L.)

KEMPTEN, a city of Germany which after partition of the nation following World War II was in the *Land* (state) of Bavaria, Federal Republic of Germany. It is situated on the Iller river in the heart of the Allgäu mountains 80 mi. S.W. of Munich. Pop. (1961) 43,116. The major railway junction of the Allgäu and centre of the Allgäu dairy industry, Kempten is one of the oldest towns of Germany. During the Celtic period the town was known as Cambodunum and under the Romans its commerce was developed. The Benedictine abbey, founded in the middle of the 8th century and richly endowed by Hildegard, the wife of Charlemagne, was raised to the status of a principality in 1348. The town, which became an imperial city in 1289, was in constant conflict with the abbey and after 1525 became solidly Protestant. A new town grew up round the Catholic foundation after the Thirty Years' War and in 1714 gained its civic rights. The imperial city and the abbatial town were united in 1818 after they had both come under the jurisdiction of Bavaria in 1803.

Industries include butter and cheese exchanges of the Allgäu, textile factories, paper factories, engineering works and light industries, and breweries. Places of interest are the stone town hall (1474); St. Mang's church (Evangelical, 1426, restored); St. Laurence's church (Roman Catholic, 1652); the ducal residence (1651–74, with treasure rooms of the rococo period); and a museum with an extensive Roman collection. (F. Zo.)

KEN, THOMAS (1637–1711), English bishop and hymn writer, was one of the seven bishops who in 1688 refused to publish James II's Declaration of Indulgence. Born at Berkhamsted, Hertfordshire, in July 1637, Ken was educated at Winchester college and New college, Oxford. After ordination about 1661 he held several preferments, becoming in 1669 prebendary of Winchester. In 1674 he compiled a *Manual of Prayers* for the boys of Winchester college, to the seventh edition of which, in 1700, were added Ken's familiar hymns, "Awake, my soul, and with the sun" and "Glory to Thee, my God, this night."

In 1679 Ken was appointed chaplain to Princess Mary of York, wife of William of Orange. In 1680 Charles II made him a royal chaplain. Soon after this he made his famous refusal to vacate his house in Winchester to accommodate Nell Gwyn, the king's mistress. In 1683 Ken, with Samuel Pepys, accompanied Lord Dartmouth's expedition to Tangier, and two years later he was nominated bishop of Bath and Wells. The Monmouth rebellion occurred that same year (1685), and Ken was among those who ministered to the defeated duke before his execution.

When James II, in 1688, issued his Declaration of Indulgence, Ken was one of the bishops who, refusing to publish it in their dioceses, were sent to the Tower of London, tried and triumphantly acquitted. In spite of this Ken loyally supported James when William of Orange landed at Torbay and, after James had fled to France, suffered deprivation in 1691 as a nonjuror rather than swear allegiance to William. Ken died at Longleat, the house of his Oxford friend Thomas, Viscount Weymouth, where he had spent the 20 years of his retirement, on March 19, 1711.

Ken was gentle and generous in disposition, fearless in opposing what he deemed to be wrong, loyal where his word was pledged. Not a scholar of the first rank, and a poet of only moderate inspiration, Ken could yet lay claim to greater qualities of mind and spirit. He was a loving pastor and a faithful friend. In an age of excessive political and ecclesiastical opportunism, he stands out for disinterested and uncompromising integrity.

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KENDAL, EHRENGARDE MELUSINA, DUCHESS OF (1667–1743), mistress of the English king George I who had considerable political influence during his reign. She was a close friend of Robert Walpole, who said that she was "as much queen of England as ever any was." The daughter of Gustavus Adolphus, count of Schulenburg (d. 1691), she was born at Emden on Dec. 25, 1667, and was later attached to the household of the electress Sophia. She became George's mistress about 1690, followed him to England in 1714, and usually managed to retain precedence over his other principal mistress, Charlotte Sophia, baroness von Kilmannsegge, afterward countess of Darlington. Titles were freely bestowed on her: in 1716 she was created duchess of Munster in the peerage of Ireland; in 1719 she was created duchess of Kendal, countess of Feversham and baroness of Glastonbury; and in 1723 the emperor Charles VI made her a princess of the empire. In England she was mainly renowned for her cupidity and lack of good looks. Her thin somewhat wooden figure caused her to be nicknamed "the Maypole" (in contrast to her more corpulent rival who was dubbed "the Elephant"). She was very unpopular with the people of London and invariably met with ribaldry and abuse when she rode through the streets. Her desire for money was apparently insatiable. She made a fortune out of buying and selling South Sea stock, and freely used her influence with the king to sell titles and public offices. She also sold patent rights, one of which gave rise to the introduction of Wood's halfpence into Ireland. After George's death she lived at Kendal house, Isleworth, Middlesex, until her death on May 10, 1743. She had two daughters by the king: Petronilla Melusina (*c.* 1693–1778), who was created countess of Walsingham in 1722 and married the great earl of Chesterfield; and Margaret Gertrude (1703–73), countess of Lippe.

KENDAL, WILLIAM HUNTER (WILLIAM HUNTER GRIMSTON) (1843–1917), English actor who, with his wife, MARGARET (MADGE) BRUNTON ROBERTSON (1849–1935), did much as an actor, manager and trainer to raise the standards of the profes-

sion. He was born in London on Dec. 16, 1843, the son of a painter. He made his first stage appearance in Glasgow in 1862, and joined the Haymarket company in London in 1866, playing in everything from burlesque to Shakespeare. In London he met Madge Robertson, the sister of the dramatist T. W. Robertson and a splendid actress with a distinguished career. After their marriage in 1869 the Kendals appeared together on the stage and were inseparable. Their joint management with Sir John Hare at the St. James's brought fame and prosperity to that theatre, and during those years (1879 to 1888) many of their notable successes were made, such as *The Squire*, *Impulse*, *The Ironmaster*, *A Scrap of Paper* and *The Elder Miss Blossom*. For many years they toured the provinces and the United States and trained many actors and actresses who afterward attained eminence. Mrs. Kendal was a better actress than her husband was an actor, but they made a wonderful pair. He died in London in 1917; she was made a dame of the British Empire in 1926 and died in 1935. (W. J. M.-P.)

KENDAL, a market town and municipal borough in Westmorland, Eng., 22 mi. N. of Lancaster by road. Pop. (1961) 18,599. The largest town in the county and its administrative centre, Kendal stands on the main road from London to Scotland via Carlisle and on the river Kent about 3 mi. S.E. of the Lake District National park. Four road bridges cross the river at Kendal, which is irregularly built of gray limestone. The unusually large parish church, the oldest part dating from 1200, has five aisles and a square tower. The county hall was opened in 1939. In the town hall are paintings by George Romney, who died in Kendal, and a book of devotions that belonged to Catherine Parr; the clock tower contains a carillon. The museum has a good geological collection. The grammar school was founded in 1525, and Sandes hospital for widows was built in 1659. Castle dairy, in Wildman street, was rebuilt in 1564 and is preserved as a Tudor house.

The outline of a Roman fort is traceable at Watercrook. On Castle How, an artificial mound probably of pre-Norman origin, an obelisk was raised in 1788 in memory of the revolution of 1688. The barony and castle of Kendal, held by Turold, were granted by William I to Ivo de Taillebois, but the barony was divided into three parts in the reign of Richard II, one part with the castle passing to Sir William Parr, ancestor of Catherine Parr who was born there. After the death of Catherine's brother, William, his share of the barony reverted to Elizabeth I. The castle, which is east of the town, was in ruins by 1586. Burgesses in Kendal are mentioned in 1345, and the town received charters in 1472 and 1484; it was incorporated in 1575 and further charters were granted in 1636 and 1684. A weekly market on Saturday, granted by Richard I to Roger Fitz Reinfred, was bought by the corporation from the lords of the manor in 1885 and 1886. There were many fairs recorded from the 14th century onward. The woolen manufactures of Kendal have been noted since 1331 when a Flemish weaver settled there; the borough motto, *Pannus mihi Panis,* commonly translated "Wool is My Bread," recalls the former importance of wool. Although the coarse cloth known to Shakespeare as Kendal green is no longer made, carpets and cards for wool and cotton are manufactured and there are woolen and paper mills outside the town. Other industries include boots and shoes, water turbines and pumps, laundry machinery and a quarry and lime works. There has been a tobacco and snuff trade since the 16th century, when cotton goods were exchanged for tobacco with America and the West Indies. The Elizabeth Levens hall with ornamental gardens is 5½ mi. S., and 3 mi. S. is Sizergh castle with a 14th-century peal tower and a Tudor great hall.

KENDALL, EDWARD CALVIN (1886–), U.S. biochemist, who, with Philip S. Hench (*q.v.*), isolated cortisone, was born March 8, 1886, at South Norwalk, Conn. He received his Ph.D. in 1910 from Columbia university. From 1910 to 1914 he made investigations concerning the thyroid, and in the latter year joined the Mayo clinic staff as head of the section of biochemistry. From 1915 to his retirement in 1951, Kendall was head of the division of biochemistry in the Mayo clinic acting also as head of the laboratory of biochemistry from 1945 to 1951. Later he was visiting professor of chemistry at Princeton.

Prior to his work with cortisone Kendall had isolated the active constituent (thyroxin) of the thyroid gland and had crystallized glutathione and established its chemical nature. From the thyroid gland he turned his attention to the adrenal cortex, and in 1948 he achieved partial synthesis of the adrenal hormone cortisone. Another of his products from the adrenal cortex was hydrocortisone. For their work in isolating cortisone and applying it clinically in the treatment of rheumatoid arthritis, Kendall and Hench received the Nobel prize in physiology and medicine in 1950, with Tadeusz Reichstein (*q.v.*) of Switzerland.

See also ADRENAL GLANDS; HORMONES; STEROIDS.

(J. R. EN.; X.)

KENDALL, (THOMAS) HENRY (CLARENCE) (1839–1882), one of the first Australian poets to find inspiration in his country's landscape, was born at Kirmington, New South Wales, April 18, 1839, and baptized Thomas Henry, but seems to have later taken the name Clarence. He began to publish poems in 1857 and his first collection appeared in 1862. He entered the civil service in 1863, and was transferred to the colonial secretary's office in 1866 through the interest of Henry Parkes (*q.v.*), a lifelong friend. After Parkes lost office, Kendall moved to Melbourne to make his living by writing. He struggled against poverty and alcoholism, but after a period of homeless wandering (1872–73) and breakdown began to succeed. In 1881 he became inspector of forests but died at Sydney, Aug. 1, 1882.

Leaves from an Australian Forest (1869) and *Songs from the Mountains* (1880) contain his best work: despite unevenness, it sometimes achieves high lyrical quality. His poems were edited with introduction by P. J. Holdsworth (1886); selections were edited by T. Inglis Moore (1957). (C. M. H. C.)

KENDREW, JOHN COWDERY (1917–), British chemist, co-winner with M. F. Perutz (*q.v.*) of the 1962 Nobel prize for chemistry for his elucidation of the structure of myoglobin, a protein in muscles that stores oxygen and gives it up to the muscle cells when needed. He was born at Compton, Berkshire, Eng., on March 24, 1917, and was educated at the Dragon school, Oxford, at Clifton college, Bristol, and at Trinity college, Cambridge, receiving his doctorate in 1949. During World War II he was attached to the ministry of aircraft production. He became reader (lecturer) at the Royal institution, London, in 1954, deputy director of the Medical Research council's unit for molecular biology at Cambridge in 1954 and scientific adviser to the British ministry of defense in 1960. He was made a fellow of the Royal society in 1960.

Myoglobin comprises a polypeptide chain of 151 to 153 amino acid residues and an iron-containing heme group that is concerned with the capacity to bind oxygen. The structure of myoglobin was elucidated by X-ray diffraction analysis. Special techniques were devised for producing a spatial (three-dimensional) representation of molecules as large as proteins, and in Kendrew's myoglobin studies (1959) nearly 10,000 X-ray reflections were used to provide the mathematical data that gave a resolution of 2 Å. Later work by Kendrew with 25,000 reflections was designed to produce a resolution of 1.4 Å. (D. T. EL.)

KENILWORTH, an ancient town and urban district of Warwickshire, Eng., on a tributary of the Avon 5 mi. N. of Warwick and 6 mi. S.S.W. of Coventry by road. Pop. (1961) 14,449.

The town is famous for the ruins of its castle, begun in the 12th century, whose walls originally enclosed seven acres. The 16th-century gatehouse is now a dwelling. Caesar's tower in the keep, the only portion built by Geoffrey de Clinton in the 12th century and still extant, has walls 16 ft. thick. Remains of the outer walls with four towers, the great hall built by John of Gaunt, and the Leycester buildings, added for domestic purposes by Robert Dudley, earl of Leicester, who also built the gatehouse, also survive. Sir Walter Scott's novel *Kenilworth* describes the castle in the time of Elizabeth I. Near the castle are the ruins of an Augustinian priory founded in 1122 and afterward made an abbey. The Norman doorway of St. Nicholas' church is thought to have been the entrance of the former abbey church. The Abbey fields (60 ac.) are a public pleasure ground.

Kenilworth (Chinewrde in Domesday Book) was granted by

Henry I to Geoffrey de Clinton, a Norman whose son probably built the castle and whose grandson released his right to King John. The castle remained with the crown until Henry III granted it to Simon de Montfort, earl of Leicester, then governor. The *Dictum de Kenilworth* was proclaimed there in 1266. After the battle of Evesham the rebel forces rallied at the castle, which after a siege of six months was surrendered. It was in the great hall that Edward II was made to resign the crown in 1327. Through John of Gaunt the castle came to Henry IV and remained in royal hands until granted by Elizabeth I in 1562 to Robert Dudley; on his death in 1588 it again reverted to the crown. Later it was held by the Careys and the Hydes. During the Civil War the castle was dismantled by the soldiers of Oliver Cromwell and from that time abandoned. It was given to the nation by Lord Kenilworth in 1937. The only mentions of Kenilworth as a borough occur in a charter of Henry I to Geoffrey de Clinton and in the charters of Henry I and Henry II to the church of St. Mary of Kenilworth. The chief local industry is agriculture.

KENITES, a clan closely related to the Midianites and Amalekites (*qq.v.*), frequently mentioned in the biblical narratives about the early history of Israel. The name was derived from Cain, whose descendants they were believed to be (Gen. iv). Since small deposits of copper and iron ore occur in the area south of the Dead sea, it is probable that Israelite traditions connected them with the archaeologically attested metalworking in that area. Egyptian reliefs of the 19th century B.C. picture Asian nomads with blacksmiths' tools arriving in Egypt. It is probable that Kenites were a pariah people who eked out a livelihood as shepherds and traveling tinkers.

After Moses' murder of an Egyptian overseer, he took refuge with Jethro (*q.v.*), "the priest of Midian," and married his daughter, Zipporah. Judg. i, 16 identifies the father-in-law of Moses as a Kenite (*see* Ex. ii, 11–22; iii, 1). Jethro subsequently established peaceful relationships with the Israelites, and suggested a legal organization which Moses accepted (Ex. xviii). Kenites accompanied the Israelites in the desert (Num. x, 29–32), but refused to join them in the occupation of Palestine. Judaeans, Amalekites and Canaanites had Kenites living in their midst (Judg. i, 16; I Sam. xv, 6; Judg. iv, 11, 17).

In view of the close relationship indicated, suggestions have been made that Yahweh, the God of Israel, was originally the Kenite tribal deity, but this is highly speculative. It is possible that the narrative about Cain in Gen. iv indicates a tradition that the Kenites were under the protection of Yahweh, though not under Israelite religious law. By the time of David, Kenites seem to be almost a part of Judah (I Sam. xxvii, 10; xxx, 29), and in subsequent history disappear entirely, though I Chron. ii, 55 seems to connect them with the Rechabites (*q.v.*). (G. E. Me.)

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KENITRA (Mina Hassan Tani; formerly Port-Lyautey), a seaport of Morocco on the left bank of the Sebou river 10 mi. from the mouth, and 24 mi. N.E. of Rabat by rail and road. Pop. (1960) 86,775. Prior to the French protectorate (1912–56) Kenitra ("the little bridge") was a fort held by Moroccan troops; the town and the port date from 1913. In 1933 the town was named Port-Lyautey after Marshal L. H. G. Lyautey (*q.v.*) but reverted to its old name after Moroccan independence. It was renamed Mina Hassan Tani in 1962. In World War II, U.S. troops landed there on Nov. 8, 1942, suffering losses in the Sebou estuary from opposing fire from the fort at Mehdia. A U.S. naval and air base was maintained there until 1963.

The northern hinterland consists of the Gharb or Rharb plain, formerly an unhealthy swamp but now fertile cultivated land (cereals, vines, citrus fruits, vegetables, rice). In the south the Mamora forest, chiefly of cork oaks, yields cork, tannin and timber. This produce, together with lead and zinc ores from the Midelt region, is shipped through the port, which can accommodate ships of up to 13 ft. draft and 300 ft. length alongside quays which extend to about 1,300 yd. After Casablanca and Safi it is the third largest port of Morocco. The main imports are coal, agricultural machinery, iron and steel, building materials and petroleum fuels. The industrial quarter lies upstream of the port area, with manufactures of paper, tobacco and fertilizers and with textile mills and fish-processing plants. A favourite resort is the Chênaie park formed in the fringe of the Mamora forest south of the town, with a racecourse and sports stadium. (A. Am.)

KENMURE, WILLIAM GORDON, 6th Viscount (d. 1716), Scottish Jacobite, remembered for the inept part he played in the 1715 rebellion, was the son of Alexander (d. 1698), 5th viscount. Alexander was suspected of sympathizing with the covenanters in the reigns of Charles II and James VII, and he fought at Killiecrankie in 1689 for King William. His eldest son was of the opposite persuasion and was in his youth at the exiled Stuart court in France. But as a Protestant he found its Catholic atmosphere uncongenial. His Jacobitism, however, remained and cannot entirely be attributed to the influence of his wife Mary Dalzell, who was sister to the 6th earl of Carnwath, since the marriage did not take place until 1711. Kenmure had no military ability but was nonetheless obliged to lead the rising of 1715 in southern Scotland. At Lochmaben on Oct. 12, he proclaimed King James VIII but seemed unable to think of a second step. Finally, on Oct. 18, he crossed the border with a small force of about 200 men to join the Northumberland rebels under Thomas Forster (*q.v.*). The joint force of about 1,400 foot and 600 horse entered Scotland and was reinforced by a Highland detachment. The leadership of Kenmure in Scotland and later of Forster in England was feeble, and after an abortive march into Lancashire, Forster surrendered at Preston on Nov. 14. Kenmure was tried with several other rebel lords, but only he and the earl of Derwentwater were executed—on Tower hill on Feb. 24, 1716. By a stratagem the estate was preserved by Kenmure's widow, although the title was forfeited. It was revived for a descendant in 1824, but became dormant in 1847.

See A. and H. Tayler, *1715: the Story of the Rising* (1936). (W. Fe.)

KENNEDY, the name of a famous and powerful family that settled in southwest Scotland by the 13th century. Groups of Kennedys settled in other districts, even in Orkney, the Hebrides and Ireland, but the name is most closely associated with southern Ayrshire and Wigtownshire. The landed families of the name are generally thought to have sprung from the Kennedys of Dunure, but those of Blairquhan, Bargany and Bennan may have originated separately. John Kennedy of Dunure (fl. 1346–83), was probably descended from the earls of Carrick and was confirmed in the chiefship of the clan by Robert II in 1372. His grandson, James (d. 1408), married Mary, daughter of Robert III, and one of their sons, Gilbert (d. *c.* 1479), was created Lord Kennedy in 1457 or 1458. Another son, James (*c.* 1406–65), bishop of St. Andrews, was a distinguished statesman under James II and James III. The poet Walter Kennedy was one of Lord Kennedy's sons.

David (d. 1513), 3rd Lord Kennedy, was created earl of Cassillis in 1509 and fell at the battle of Flodden. His grandson, Gilbert (1515–58), 3rd earl, was one of the nobles who intrigued with Henry VIII but he returned to his allegiance after the battle of Pinkie (1547) and was made lieutenant of the South (1548–50) and lord treasurer (1554–58). His son, Gilbert (d. 1576), 4th earl, was a staunch Roman Catholic who fought for Mary Stuart at Langside and supported her cause long after her imprisonment in England. He was accused by contemporaries of torturing Alan Stewart, commendator of Crossraguel abbey, to extort a title to the abbey lands.

In the time of John (1568–1615), 5th earl, the rivalry between the houses of Cassillis and Bargany for supremacy in Carrick culminated in the murder of Gilbert Kennedy of Bargany by Cassillis in 1601 and the murder of the earl's uncle, Sir Thomas Kennedy of Culzean, in revenge in 1602. Thereafter the Cassillis faction was supreme. During the 17th century the Kennedy power greatly declined. Most of the Kennedys were strong covenanters. John (d. 1668), 6th earl, was a prominent leader of the Scots against Charles I and attended the Westminster assembly in 1643. His son John (d. 1701), 7th earl, joined the resistance to Charles

II and had 1,500 of the Highland Host quartered on his estates in 1678. Debts and fines forced him to sell his Wigtownshire and part of his Ayrshire lands. John (1700–59), 8th earl, died childless and the Cassillis title went, after long litigation, to Sir Thomas Kennedy of Culzean (d. 1775). He and his brother David (d. 1792), 10th earl, built the present Culzean castle to Robert Adam's designs. Archibald (1770–1846), 12th earl, was created marquess of Ailsa in 1831 and was ancestor of Archibald David (1925–), 7th marquess, who succeeded to the title in 1957.

The Kennedys of Kirkhill, later styled of Dunure, produced Thomas Kennedy (d. 1754) lord advocate and baron of the exchequer, Thomas Kennedy (d. 1819), agriculturalist and builder of Dunure harbour, and Thomas Francis Kennedy (1788–1879), who was a prominent Whig member of parliament. (JA. F.)

KENNEDY, JOHN FITZGERALD (1917–1963), 35th president of the United States, the youngest man and the first member of the Roman Catholic faith to be elected to that office, was born May 29, 1917, in Brookline, Mass., a suburb of Boston. On Nov. 22, 1963, he became the fourth U.S. president in history to die by an assassin's bullet when he was shot by a sniper in Dallas, Tex.

Family Background.—Kennedy was descended from immigrants who left Ireland when that country was racked by the potato blight and other economic ills. His great-grandfather, Patrick Kennedy, emigrated from New Ross in Ireland about 1850 and settled in East Boston. Patrick became the father of four children, the youngest of whom, Patrick J. Kennedy, entered the liquor trade, started a saloon and then branched out into Democratic party politics at a time when the Irish were beginning to gain control of the political life of Boston. More successful in Boston politics was another son of Irish immigrants, John F. Fitzgerald, who steadily climbed the local political ladder from city councilman to member of congress, ultimately winning election as mayor of Boston. The two men, often allied politically, were further united in 1914 when Kennedy's eldest son, Joseph P., married Fitzgerald's daughter, Rose. The couple had nine children, the second of whom was named John Fitzgerald Kennedy.

Joseph P. Kennedy, the father of the future president, was a man of great vigour and drive. Graduating from Harvard in 1912, he decided against a political career and instead entered banking. During the 1920s he made a large fortune in the motion-picture industry, real estate and other activities. Always somewhat hostile to the conservative Republicans who dominated Massachusetts politics and business and who often ostracized Irish Catholics, Kennedy increasingly operated outside Boston, chiefly in New York and California. He supported Franklin D. Roosevelt's candidacy for president in 1932 and later served in important posts in the New Deal. In 1937 he was appointed ambassador to Great Britain.

Youth.—John Kennedy began life in a lower middle-class section of Boston and gradually moved to more substantial homes in the Boston and New York city areas as his father prospered. He grew up in a happy, lively family, supervised by maids and nurses, with more and more young sisters and brothers to play with. He first attended local private schools; at the age of 13 he left home for Canterbury, New Milford, Conn., a Catholic boarding school taught by laymen. After a year at Canterbury he went to a nonsectarian school, Choate, in Wallingford, Conn. He was a normal youngster, enjoying a variety of sports, occasionally getting into small mischief and continually being urged by his father to work harder and to improve his grades. At 18 he entered Princeton but his freshman year was cut short by illness, and the following autumn he transferred to Harvard.

In his first two years at Harvard Kennedy was more interested in athletics than in his classes, but in the last two years he seemed to grow intellectually. He received better grades, took part in university club activities and as a major in government became absorbed in an undergraduate thesis on the failings of British foreign policy in the 1930s. Several things may account for the trend of Kennedy's interests at Harvard. His father had long impressed upon him the importance of history and politics by discussing current affairs at the dinner table. Too, Kennedy had done a great deal of traveling during his school and college years, culminating early in 1939 in living at the U.S. embassy in London, where he could watch the darkening war clouds at first hand, and in a long trip through eastern Europe, Russia and the near east. Finally, he was subjected to the influence of some of the leading historians and political scientists at Harvard, most of them internationally minded, at a time when Nazi aggression was forcing young men throughout the world to turn from their personal concerns to the threat of Hitlerism. Kennedy's studies and observations came to a focus his senior year in his thesis, which described Britain's slow response to German rearmament as due to the narrow self-interest of business and labour, the influence of pacifism and the excessive economizing of government budget-balancers. Shortly after the fall of France in 1940 this thesis was published in Britain and the United States as a book, *Why England Slept,* and became a best seller in both countries.

Graduating *cum laude* from Harvard in June 1940, Kennedy attended Stanford university, Stanford, Calif., graduate school of business for a few months and traveled in South America. Late in 1941 he enlisted in the U.S. navy and, as commander of a motor torpedo (PT) boat, took part in operations against the Japanese navy in the Solomon Islands in the southwest Pacific. In this area in Aug. 1943 a Japanese destroyer rammed and sank his PT boat. Kennedy and the other survivors, after a desperate swim of three miles, managed to find refuge on a small, unoccupied island, from which they were rescued several days later by friendly natives. Awarded the navy and marine corps medal and the Purple Heart, Kennedy was invalided home as a result of his injuries and a subsequent attack of malaria.

Congressional Career.—Discharged from the navy in April 1945, Kennedy had still not decided upon a career. It had been generally assumed that his older brother, Joseph P. Kennedy, Jr., would enter politics, but Joseph, a naval pilot, was killed in 1944 in an attack against German submarine pens on the Belgian coast. It was partly because of this loss that John decided on a political career. He entered political life in East Boston, where his grandfathers had been active several decades before. Early in 1946 he announced his candidacy for the Democratic nomination for congress in the 11th congressional district, a water-front area populated largely by immigrants. Backed by navy and Harvard friends, Kennedy campaigned so long and so hard that he readily defeated the veteran city politicians seeking the Democratic nomination, and he went on to vanquish his Republican opponent without difficulty in this heavily Democratic area.

Kennedy entered the house of representatives in Jan. 1947 at a time when the house was Republican for the first time in 16 years. He was only 29 years old. Representing a low-income district, from the first he supported the New Deal-Fair Deal social welfare policies of Pres. Harry S. Truman. Both in Washington and in his district he fought for public housing programs, higher federal minimum wage levels, broadened social security programs and protection for labour's right to organize. On foreign policy, however, he took a position somewhat independent of President Truman. He backed the Truman doctrine for financial and military aid to Greece and Turkey, as well as the Marshall plan authorizing aid to western Europe, but he also criticized what he felt to be Truman's indecisive interference in China, without, however, making clear just what alternative policy he favoured. He based his views not so much on an isolationist philosophy as on the belief that the European nations should make a greater contribution to recovery and defense than they were doing. During these first years in congress, however, Kennedy was less concerned about domestic and foreign policy than he was about servicing the special needs of people in his district.

So vigorous was the young congressman in his legislative and district activities that he easily won renomination and re-election to his house seat in 1948 and 1950. He felt rather limited in the lower chamber, however, and he decided to run in 1952 against Republican Sen. Henry Cabot Lodge for the latter's seat in the U.S. senate. It was a daring step, for he was not well known outside the Boston area, and Lodge was a formidable campaigner. But Kennedy entered the contest early, campaigned day after day

for many months, enlisted the help of thousands of volunteers throughout the state, including his own large and personable family and narrowly defeated Lodge in Nov. 1952. He won in the face of a heavy vote for Dwight D. Eisenhower for president in Massachusetts and in the nation.

During his early years in the senate Kennedy followed much the same legislative course as he had in the house. He paid special attention to the interests of textile workers, longshoremen, fishermen and other major groups in Massachusetts; as a member of the senate committee on education and public welfare he worked hard on social and economic legislation; and he continued to keep in close touch with his Massachusetts constituents. In Sept. 1953 he married Jacqueline Lee Bouvier, of a wealthy Rhode Island family. The following year the senator was compelled to enter the hospital for treatment of a war-aggravated spinal disorder that had been giving him increasing pain. Surviving two dangerous operations, Kennedy was laid up for over six months. During his convalescence he wrote *Profiles in Courage* (1956), a study of American politicians who had shown exemplary political courage in taking positions that were unpopular with their constituents. Kennedy contended that in choosing legislators the voters consciously wanted leaders who would not simply work for the voters' narrow interests but who would rather do the right thing for the nation's long-term good. The book sold widely and was awarded the Pulitzer prize for biography in 1957.

Recovering from his illness by the spring of 1955, Kennedy, like the politicians he described in his book, seemed to become more concerned with problems of the nation and the world and less preoccupied by state and sectional matters. Some of his critics, however, contended that Kennedy lacked the courage of the heroes of his book. They cited in particular his failure to take a position on a motion before the senate to censure Sen. Joseph R. McCarthy of Wisconsin for certain activities that were deemed harmful to the dignity of the senate. Actually, Kennedy had been prepared to speak and vote for censure, but he was in the hospital with his back injury when the vote finally was taken. For some time afterward the senator refused to state how he would have voted, but eventually he went on record retroactively as favouring the censure motion.

Kennedy's entrance onto the national political scene came in Aug. 1956 shortly after Adlai E. Stevenson was nominated for the second time to run against President Eisenhower. When Stevenson decided to throw the choice of his running mate open to the delegates instead of making it himself, Kennedy, who had been conducting a halfhearted campaign, redoubled his efforts. In a contest witnessed by millions of television viewers, Kennedy almost won the vice-presidential nomination, only to be defeated by a fellow senator, Estes Kefauver of Tennessee.

Not long after the defeat of Stevenson and Kefauver by Eisenhower and his running mate, Richard M. Nixon, Kennedy decided to run for the presidency in 1960. Once again he used his tested formula of starting early and campaigning hard. Each weekend after the senate completed its deliberations he flew to some city to make appearances. Even during his campaign for re-election as senator from Massachusetts in 1958, which he won by 874,608 votes (the largest margin ever accorded to any candidate in either party in Massachusetts), he found time to stump for Democratic candidates in other states. Kennedy did a great deal of writing for magazines and newspapers; countless articles were written about him as an unusually young and vigorous candidate; and pictures of his attractive wife and himself appeared on the covers of popular periodicals. He also drew special notice because of his Catholicism. The only previous major party Catholic nominee, Alfred E. Smith, had been defeated in 1928, and there was wide speculation that Kennedy's religion was an insurmountable barrier to his nomination and election as president. Although Kennedy's candidacy was unannounced, it was plain for all to see; between 1956 and 1960 he became one of the best-known political figures in the United States.

In the senate during this period, Kennedy took an increasingly liberal and internationalist position. While continuing to back expanded social welfare programs, he spoke up more strongly in favour of civil rights and individual liberty. In 1957 he supported a civil rights bill that would authorize the federal government to enforce the racial desegregation of all-white schools. He urged the repeal of provisions requiring certain persons seeking federal aid or services to sign noncommunist affidavits. He also showed himself to be something of a traditionalist as to procedure; for example, he aroused the opposition of some civil rights supporters when he refused to vote to enable the bill to bypass an anti-civil rights senate committee, and again when he supported an amendment to the civil rights bill requiring jury trials in certain criminal contempt cases.

Kennedy was especially active and articulate in foreign policy during these years. He adhered sufficiently to the Democratic party foreign policy line to gain a position on the senate committee on foreign relations; he supported foreign economic and military programs; and like other Democrats he urged the expansion of aid programs in the underdeveloped nations of Asia, Africa and South America. On other matters he followed a more independent course. Perhaps the most notable example was his speech to the senate criticizing French policy in Algeria and urging, in effect, that the French grant independence to the Algerians—a speech received with dismay by leading Democrats as well as by Republicans. The Massachusetts senator showed a particular interest in the intensifying problems of Asia and Africa. He urged that the United States grant extensive economic aid, especially to India, as a means of demonstrating that democratic societies could develop their economies more effectively and humanely than could communist nations. Other important foreign policies favoured by Kennedy included: development of closer economic and cultural relations with Poland and other communist satellite nations, more emphasis on the UN and other world agencies for administering aid programs in underdeveloped nations and more generous economic aid to Latin America. On the issue of negotiating with the Russians he contended that the U.S. must negotiate with Moscow but could do so effectively only from a position of economic, military, technological and educational strength.

Election as President.—By the time Kennedy formally announced his candidacy for the Democratic nomination for president, in Jan. 1960, he had become the acknowledged front-runner among the several aspirants. He never lost his leading position. He won all the presidential primary contests in which his name was entered, and gained the endorsement of many state conventions. His selection on the first ballot of the Democratic national convention in Los Angeles in July 1960 testified to the enormous work that Kennedy and his workers had accomplished in four years, to his arresting political personality and to the tremendous publicity he had won in magazines and newspapers. Above all, his nomination was a tribute to his ability at political organization —an ability that was soon tested in a broader arena. In the presidential campaign Kennedy benefited from the wider popularity of the Democratic party and from the aid of thousands of political volunteers.

In the Nov. 8 election, Kennedy won a plurality of fewer than 150,000 of the nearly 70,000,000 popular votes cast. He carried most of the traditionally Democratic southern states and most northern industrial areas but lost nearly all the western states. In the electoral college he received 303 votes to 219 for Republican Richard M. Nixon. Sen. Harry F. Byrd of Virginia, who had not been a candidate in the election, received 15 electoral votes. Kennedy was inaugurated on Jan. 20, 1961.

Presidency.—The new president set the tone of his administration in an inaugural address that pledged his best efforts to help the "peoples in the huts and villages of half the globe" to help themselves, proposed that the free world never fear to negotiate with the communist world but never negotiate out of fear, and urged Americans to "ask not what your country can do for you—ask what you can do for your country."

The high calibre of his cabinet and other major appointments and the boldness and breadth of his legislative proposals won the president wide political support during the early months of his administration. His zest, energy and wide-ranging interests, combined with the attractiveness of the young family in the White

House, also helped produce the atmosphere of a political honeymoon.

Foreign problems brought this first phase to an end by early summer. An attempt to aid Cuban *émigrés* to invade Cuba and overthrow its dictator, Fidel Castro, ended in failure when the administration declined to back the invasion with full military support. Communist and guerrilla forces in Laos and Vietnam intensified their operations without major counteraction by the United States. The Berlin crisis came close to explosion when the East German communist regime sealed off West Berlin with a wall; hostilities were averted but the deadlock over the city tightened. On the other hand, the president launched a well received Alliance for Progress to promote economic development and social reform in Latin America; increased economic aid to other underdeveloped areas; created a Peace Corps (*q.v.*); and gave to the armed forces greater power and versatility. He won a major legislative victory when congress gave its approval to a program to reduce tariffs and stimulate international trade.

The administration's domestic efforts also brought mixed results. Forthright executive action along a broad front helped produce an economic revival in 1961 but it lost momentum in 1962. The president made vigorous use of his executive authority and influence in opposing a rise in steel prices in April 1962. He won the approval of congress for legislation to expand federal housing activities, raise minimum wages and broaden welfare programs. On most of his major new proposals, however, the president was defeated. In spite of its Democratic majority, congress refused to support a general aid-to-education bill, tax reform, medical care for the aged under social security, a new farm program, creation of a new cabinet-level department of urban affairs and authority to finance long-term loans to underdeveloped nations by borrowing from the treasury.

President Kennedy entered into the 1962 election campaign in behalf of congressional candidates who were likely to support the policies of his administration, but his speaking tour was abruptly cut off two weeks before the election when intelligence reports revealed that Soviet long-range missiles and other offensive weapons were being installed on the island of Cuba. The president immediately returned to Washington, addressed the nation by radio and television to explain the nature of the threat to the nation's security, and announced a naval "quarantine" of Cuba to prevent the arrival of additional weapons. He called upon the Cuban government and the Soviet Union to remove all offensive weapons from the island at once. After a brief period of tension the Soviet ships carrying additional weapons turned back and Premier Nikita Khrushchev announced that rockets and missiles already in Cuba would be withdrawn. Negotiations in which U Thant, acting secretary-general of the United Nations, took part, continued for some time in an effort to work out details for the verification of the removal of the weapons, and the administration was subjected to continuing criticism on the ground that large numbers of Soviet troops remained in Cuba months later.

In Jan. 1963 President Kennedy sent a budget message to congress calling for a total of $98,800,000,000 in expenditures during the fiscal year beginning July 1, 1963, and anticipating a large deficit. The president proposed a substantial reduction in income tax rates to stimulate the economy, and that reforms be made in the tax laws. He also called for federal aid for dealing with the problem of mental health and for a medical care program for the aged financed through social security taxes. All of these proposals were received with some coolness in a congress dominated by a coalition of conservative Democrats and Republicans. Some Democratic leaders urged the president to challenge the conservative coalition, but he clung to the traditional presidential methods of influencing congress, partly because he wanted to keep the nation as united as possible on foreign policy.

These methods were most successful during 1963 in connection with the test-ban treaty. The treaty, initialed in Moscow in August and formally ratified by the U.S. and the U.S.S.R. in September, obligated the signatories to conduct no further tests of nuclear devices in the atmosphere, in space or under water. Its supporters hailed it as a major advance toward lessening cold war tensions and eliminating the harmful effects of radioactive fallout.

WIDE WORLD

JOHN F. KENNEDY AT A PRESS CONFERENCE, 1961

President Kennedy visited Texas on a speaking tour in November, arriving in Dallas on Nov. 22. At about 12:30 P.M., as the presidential motorcade proceeded from the Dallas airport to a luncheon, three shots rang out. Two bullets struck and killed the president. Texas Gov. John B. Connally who, with Mrs. Kennedy and Mrs. Connally, was riding with the president in an open car was wounded. The president's death was officially announced at about 1:30 P.M., whereupon Vice-Pres. Lyndon B. Johnson, who had been riding in another car of the motorcade, took the presidential oath of office and returned to Washington. Meanwhile, Dallas police apprehended Lee Harvey Oswald, 24 years old, a self-styled Marxist, and charged him with the murder. There was evidence that he had fired the fatal shots from a sixth-floor window of a building overlooking the assassination scene. On Nov. 24, as Oswald was being transferred to the Dallas county jail, a man identified as Jack Ruby (1911–67), a night-club operator, shot and fatally wounded him. The shooting took place in the basement of the Dallas police department building in full view of a nationwide television audience.

President Kennedy's body, after lying in state for one day beneath the Capitol rotunda, was buried in Arlington National cemetery on Nov. 25.

Warren Commission.—On Nov. 29, President Johnson appointed a commission to investigate the circumstances surrounding the assassination of Kennedy and the shooting of Oswald. The chairman of the commission was the chief justice of the United States, Earl Warren; the other members were two U.S. senators, Richard B. Russell of Georgia and John Sherman Cooper of Kentucky; two members of the house of representatives, Hale Boggs of Louisiana and Gerald R. Ford of Michigan; and two men from private life, Allen W. Dulles, former director of the Central Intelligence agency, and John J. McCloy, former president of the International Bank for Reconstruction and Development. After months of investigation the commission submitted its findings to President Johnson in Sept. 1964, and they were immediately made public. The commission reported that the bullets that had killed President Kennedy were fired by Lee Harvey Oswald from a rifle pointed out a sixth-floor window of the Texas School Book Depository. The commission also reported that it had found no evidence that either Oswald or Ruby was part of any conspiracy, foreign or domestic, to assassinate President Kennedy. (This conclusion of the commission was later challenged in a number of books and articles.) The commission described in detail its investigation of Oswald's life to provide a basis for determining his motives but did not itself attempt to analyze Oswald's motives. The commission also proposed strengthening the Secret Service organization; adopting improved procedures for protecting the president; and enacting legislation to make killing the president or vice-president a federal offense. The report was published by the U.S. Government Printing office under the title *Report of the President's Commission on the Assassination of President John F. Kennedy* (1964).

(J. MacG. B.; X.)

Family.—President and Mrs. Kennedy had a daughter, Caroline Bouvier (b. 1957), a son, John F., Jr. (b. 1960), and an infant son, Patrick Bouvier, who died (Aug. 9) two days after birth on Aug. 7, 1963. The president had three brothers and five sisters.

JOSEPH P. KENNEDY, JR. (1915–1944), was killed in World War II.

ROBERT FRANCIS KENNEDY (1925–), born in Brookline on Nov. 20, 1925, graduated from Harvard in 1948 and from the Uni-

versity of Virginia law school in 1951. He entered public service as an attorney for the criminal division of the U.S. department of justice (1951–52), resigning to manage his brother's campaign for the U.S. senate. He served on the staffs of several senate committees, from 1957–60 as chief counsel of the select committee on improper activities in the labour or management field. In 1960 he managed his brother's presidential nomination and election campaigns. He was appointed attorney general of the United States in 1961 and became the administration's chief strategist in civil rights activities and in antitrust and antiracketeering litigation. He continued in the cabinet under President Johnson until 1964, when he resigned to campaign in New York for the U.S. senate; he was elected in November of that year. By 1966, when he campaigned for many Democratic candidates, he had emerged as a major national leader and a spokesman for the liberal wing of his party.

EDWARD MOORE KENNEDY (1932–) was born in Brookline on Feb. 22, 1932, and graduated from Harvard in 1954 and from the University of Virginia law school in 1959. He managed his brother John F.'s campaign for a second term in the senate, in 1958, and with Robert helped to win John F.'s presidential nomination and election in 1960. In 1962 Edward was elected to fill the last two years of his brother's unexpired term in the senate, and he was elected to a full term in 1964. Edward and Robert Kennedy became the second pair of brothers to serve in the U.S. senate at the same time, the other brothers being Dwight Foster of Massachusetts and Theodore Foster of Rhode Island, 1800–03.

ROSEMARY KENNEDY (1918–) suffered from mental retardation.

KATHLEEN KENNEDY (1920–1948), married in 1944 to William Cavendish, marquess of Hartington (d. 1944), was killed in an airplane crash in France in 1948.

EUNICE KENNEDY (1921–) was married in 1953 to R. Sargent Shriver, Jr., first director of the Peace Corps and head of federal antipoverty programs.

PATRICIA KENNEDY (1924–) was married, 1954–66, to Peter Lawford, a motion-picture actor.

JEAN KENNEDY (1928–) was married in 1956 to Stephen E. Smith.

BIBLIOGRAPHY.—Most of Kennedy's speeches will be found in the *Congressional Record* (1947–60). Allan Nevins (ed.), *The Strategy of Peace* (1960) is a collection of his major foreign-policy pronouncements; James M. Burns, *John Kennedy: a Political Profile* (1960), covers his life through 1959; Joseph McCarthy, *The Remarkable Kennedys* (1960) deals with the whole family. Two estimates of Kennedy as president appeared in 1963: Hugh Sidey, *John F. Kennedy, President,* was generally favourable; Victor Lasky, *J.F.K.; the Man and the Myth,* was critical. *See* also Pierre Salinger and Sander Vanocur (eds.), *A Tribute to John F. Kennedy* (1964); Arthur M. Schlesinger, Jr., *A Thousand Days, John F. Kennedy in the White House* (1965); Theodore C. Sorensen, *Kennedy* (1965); Evelyn Lincoln, *My Twelve Years with John F. Kennedy* (1965).

KENNETH, the name of two kings of the Scots.

KENNETH I, MACALPIN (d. 858), the first king of the united Scots of Dalriada (*q.v.*) and the Picts, and so of Scotland north of a line between the Forth and the Clyde. Of his father, Alpin, little is known, though tradition credits him with a signal victory over the Picts by whom he was killed three months later (*c.* 834). Kenneth succeeded him in Dalriada and ruled in Pictavia also, ruling for 16 years, but perhaps only in Dalriada for the first 6 of these. The period is obscure. Part of Pictavia may have come to Kenneth by inheritance, and the whole later as a result of conquest. The Dalriadic records of these conquests echo the hyperbolic panegyric poetry of the Dalriadic bards. The gradual union of the two kingdoms from 843 doubtless owes much to intermarriage. By the Pictish marriage custom inheritance passed through the female. Nevertheless Kenneth probably made some conquests among the eastern Picts, and possibly invaded Lothian and burned Dunbar and Melrose. After attacks on Iona by Vikings he removed relics of St. Columba, probably in 849 or 850, to Dunkeld, which became the headquarters of the Scottish Columban church. He died in 858 at Forteviot, not far from Scone in Pictish territory, and was buried on the island of Iona.

KENNETH II (d. 995), son of Malcolm I, became king (971) of the united Picts and Scots in succession to Indulf's son Cuilén, who had been slain by the Britons of Strathclyde. Kenneth began his reign by ravaging the Britons, probably as an act of vengeance, though his forces suffered severe losses. The Pictish chronicle has an obscure reference to his fortifications to protect the approaches to some fords, probably across the Forth; and to two plundering raids into Northumbria, in which he secured a royal captive. On the other hand his name is included among a group of northern and western kings said to have made submission to the Anglo-Saxon king Edgar in 973, perhaps at Chester; and the chronicler Roger of Wendover (*Flores Historiarum,* under the year 975), who has preserved much ancient material, states that shortly afterward Kenneth received from Edgar all the land called Lothian; *i.e.,* between the Tweed and the Forth. This is the first mention of the Tweed as the recognized border between England and Scotland. The records for his reign are meagre, but he presented the "great foundation" of Brechin to the church and in 977 he slew Olaf (Amlaimh) son of Indulf, probably a rival heir to the throne by the law of tanistry. Kenneth was slain, apparently by his own subjects, at Fettercairn in the Mearns in 995.

BIBLIOGRAPHY.—W. F. Skene, *Chronicles of the Picts and Scots* (1867), *Celtic Scotland,* 2nd ed. (1886–90); A. O. Anderson, *Early Sources of Scottish History* (1922); H. M. Chadwick, *Early Scotland* (1949). (N. K. C.)

KENNINGTON, a well-populated district in the south of London, Eng., within the London Borough of Lambeth (*q.v.*). It contains Kennington Oval, the ground of the Surrey County Cricket club, and Kennington park, anciently the common, the site of a gallows until the end of the 18th century and meeting place of the Chartist demonstrators in 1848. No trace remains of the ancient royal palace of Kennington where the Black Prince is supposed to have lived. Viscount Montgomery of Alamein was born in St. Mark's vicarage in 1887.

KENO: *see* BINGO.

KENOSHA, a city of southeastern Wisconsin, U.S., situated on Lake Michigan at the estuary of the Pike river, about 30 mi. S. of Milwaukee; the seat of Kenosha county. The city was founded in 1835 at the time of the first main American settlement of southeastern Wisconsin.

The population was mainly of New England and New York derivation. After being known both as Pike Creek village and Southport, it was incorporated as a city with the name Kenosha (an Indian word meaning "pike" or "pickerel") in 1850, by which time about one-third of its population of 3,448 was foreign born. One hundred years later its population had grown to 54,368 and in 1960 it was 67,899. Population (1960) of the Kenosha standard metropolitan statistical area (Kenosha county) was 100,615. Most of Kenosha's relatively large foreign-born population came from Italy, Germany, Poland, Lithuania, Russia, Denmark and Czechoslovakia.

Kenosha in the 1840s pioneered in creating the first effective free public-school system in Wisconsin, and it was the first Wisconsin city to adopt the council-manager form of government, in effect from 1922 to 1958.

The city is an important industrial centre, producing automobiles, furniture, mattresses, hosiery, tools and brass, copper and various other metal products. Three-fourths of all wage earners in the city work in manufacturing plants. The city is the location of an extension centre of the University of Wisconsin. It has a pleasant location overlooking Lake Michigan and possesses a fine city centre and a substantial recreational area. For comparative population figures *see* table in WISCONSIN: *Population.* (RE. H.)

KENSETT, JOHN FREDERICK (1816–1872), U.S. painter of the Hudson River school, who established a reputation as one of the country's leading landscape painters, was born on March 22, 1816, at Cheshire, Conn. He was trained as an engraver by his father, Thomas Kensett, and his uncle Alfred Daggett, of New Haven, Conn. In 1838 he went to New York city to work for a bank note company; but two years later, in company with Asher B. Durand, John W. Casilear and Thomas P. Rossiter, he went to Europe to study painting. He remained abroad for seven years, traveling and studying in England, France, Germany and Italy.

Returning to America in 1847, he was elected to the National Academy in 1849. He made his home in New York city but spent much time on painting trips to the mountains of New York and New England, the New England coast and once as far afield as Colorado.

Kensett died in New York city on Dec. 14, 1872. The contents of his studio were sold at auction soon after his death for $150,000. Many of his works are in the Metropolitan museum, New York city.

See F. A. Sweet, *Hudson River School and the Early American Landscape Tradition* (1945). (D. H. W.)

KENSINGTON AND CHELSEA, one of the 32 London boroughs constituting Greater London, Eng., is bounded west by Hammersmith, north by Brent, east by the City of Westminster, and south by the Thames. This inner London borough was established on April 1, 1965 under the London Government Act 1963 by the amalgamation of the former Metropolitan Borough of Chelsea with the Royal Metropolitan Borough of Kensington (*see* LONDON). By the grant of Queen Elizabeth II the borough became a royal borough in 1965. Area 4.6 sq.mi. (12 sq.km.). Pop. (1965 est.) 216,810. The borough comprises three parliamentary constituencies: North Kensington, South Kensington, and Chelsea. The chief administrative offices are in the Town Hall, Kensington.

The parish churches are St. Mary Abbots (Kensington, 1869) on a site that has borne a church for many centuries, and St. Luke's (Chelsea, 1820–24). Chelsea Old Church suffered heavy damage from bombs in 1941 but was rebuilt and reconsecrated as the Church of All Saints in 1958.

The borough includes Notting Hill, Earl's Court, Brompton, and part of Knightsbridge. South Kensington lies between Earl's Court and Brompton. Chief thoroughfares are Harrow Road (the northern boundary), Holland Park Avenue, Kensington High Street, Cromwell Road, Fulham Road, and King's Road (named in 1713 after Charles II). Southbound roads join with the Chelsea, Albert, and Battersea bridges over the Thames. Chelsea Embankment stretches for more than a mile between Chelsea and Battersea bridges with Cheyne Walk at its west end. Kensington High Street, Knightsbridge, and Sloane Street are famous shopping centres, and King's Road is known for its varied and often Bohemian life. Portobello Road street market, North Kensington, is a hunting ground for antique collectors.

Many new buildings have been erected since World War II and much redevelopment was taking place in the mid-1960s. As part of slum clearance schemes, massive residential tower blocks have appeared in the north. An area at Notting Hill Gate has been transformed by the erection of tall blocks of flats and modern shopping accommodation. The Central Library (1960), in Hornton Street, is one of the largest public library buildings in London. The Commonwealth Institute (1962), in Kensington High Street, replaced the former Imperial Institute and has a hyperbolic paraboloid copper-sheathed roof. Other new buildings include the West London Air Terminal and Baden Powell House (headquarters of the Boy Scout Organization), both in Cromwell Road, the Carlton Towers Hotel at Knightsbridge, the Royal Garden Hotel (1965) beside Kensington Gardens, and new college buildings for the Chelsea Polytechnic in King's Road and Manresa Road.

Other buildings, important for their size or associations, are the motor works of the Rootes Organization in the northwest; Charles House, a huge civil service office block on the west border, adjacent to Olympia; and Holland House, built by Sir Walter Cope (1605–1607), later acquired by marriage by Henry Rich, 1st earl of Holland (1624) after whom it is named. Holland House was damaged by bombs in 1940, acquired as public property after the war, restored on a smaller scale, and its extensive gardens opened as a public park. Kensington Palace is an enlargement of Nottingham House (pre-1660), bought by William III in 1689 and rebuilt by Sir Christopher Wren, William Kent, and others. It was the royal palace of William III, Anne, George I, and George II. Queen Victoria was born there (1819) and it is still lived in by members of the royal family. The London Museum occupies part of the state apartments but was scheduled to move to the City of London in the 1970s and merge with the Guildhall Museum. The main building (1937) of the Earl's Court Exhibition area is on the southwest border of the borough. South Kensington is the site of the well-known (Brompton) Oratory of St. Philip Neri, the British Museum of Natural History, the Science Museum and Library, the Victoria and Albert Museum, the Geological Museum, the Institut Français de Londres, and the Royal College of Science.

Ranelagh (*q.v.*) in the second half of the 18th century and Cremorne Gardens in the mid-19th were famous places of entertainment. Cremorne Gardens were closed in 1877 and the site was built over, but Ranelagh, although out of fashion by 1805, lives on in the grounds of the Royal Hospital, and its gardens are used for the annual flower show of the Royal Horticultural Society. The Chelsea Royal Hospital (*q.v.*) for invalid soldiers (now army pensioners), initiated by Charles II but largely the conception of John Evelyn (the diarist), was built between 1682 and 1692 and is one of Wren's masterly achievements. Beside the Royal Hospital is the Botanic Garden, one of the oldest in the country, given to the Society of Apothecaries by Charles Cheyne, lord of the manor of Chelsea in 1673. Cottonseed from the garden sent in 1732 helped to establish the American cotton industry. North of the hospital stands the Duke of York's Headquarters (1801) founded originally as a school for children of regular soldiers. Crosby Hall, with new buildings adjacent to it, was opened in 1927 as an international hostel for university women. It was built by Sir John Crosby in Bishopsgate in 1446 and was moved thence intact to a site on Sir Thomas More's former garden in Chelsea in 1910 to save it from demolition.

The names Chelsea (Caelichyth, *c.* 785), Kensington (Chenesit', 1086), Brompton (1290), Notting Hill (Knottynghull, 1356) are of Anglo-Saxon origin, though the last may be a Middle English borrowing from Old Norse. The Manor of Chelsea was, in early times, in the possession of Westminster Abbey but little is known of its history until Tudor times. Henry VIII acquired it, together with the estate of Sir Thomas More, in 1536 and gave it to his wife, Catherine Parr. It passed afterward to the Howards and the Cheynes and came later to the Cadogan family. The history of Kensington can be traced from the reign of Edward the Confessor. After the Norman Conquest it became the property of the De Veres, later earls of Oxford. The manorial court of the De Veres is preserved in the name of Earl's Court. Aubrey de Vere made a grant in the 12th century to the abbot of Abingdon and the memory of the submanor remains in the name of St. Mary Abbots, the parish church.

Many famous names are connected with the borough which has long been and remains a favourite quarter for artists, writers, musicians, and statesmen. A very short selection of those of the past includes Erasmus, Holbein, Saint-Évremond, Sir Isaac Newton, Sir Hans Sloane, Joseph Addison, Sir Richard Steele, Jonathan Swift, T. G. Smollett, François Chateaubriand, Sir David Wilkie, J. M. W. Turner, Leigh Hunt, Thackeray, Macaulay, D. G. Rossetti and nearly all the "pre-Raphaelite brotherhood," Thomas Carlyle, Algernon Swinburne, Lord Leighton, James Whistler, Oscar Wilde, William Frith, P. W. Steer, John Sargent, G. K. Chesterton, John Galsworthy, T. S. Eliot. Sir Winston Churchill spent his last years at his home in Hyde Park Gate, Kensington.

As development of the district did not take place until the mid-19th century, there are few traces of industry. The celebrated Chelsea china factory, founded in 1745, moved to Derby within 40 years. The present major occupation is retail merchandising, although there are many administrative offices and, in the north, a few factories.

See William Gaunt, *Chelsea* (1954) and *Kensington* (1958) (although these are little more than brief introductions, both give bibliographical sources, the first in its preface, the second in an appendix).

(ST. C. H.)

KENT, EARLS AND DUKES OF. The first holders of the English earldom of Kent were ODO, bishop of Bayeux, and HUBERT DE BURGH. The title was revived in July 1321 for EDMUND OF WOODSTOCK (1301–30), youngest son of Edward I. Edmund supported his brother Edward II until 1326, when he joined the queen in France. He returned with her to England in 1327 and supported Edward's deposition, but, soon involved in a

conspiracy against the queen and her lover Mortimer, was arrested and was executed on March 19, 1330. His elder son EDMUND (1326–31) was recognized as earl of Kent in Dec. 1330, but died before Oct. 5, 1331. He was succeeded by his brother JOHN (1330–52), who died childless in Dec. 1352, and the title then passed to their sister JOAN (*c.* 1328–85), "the fair maid of Kent."

Joan married first (*c.* 1339) Sir Thomas de Holand (d. 1360) and secondly (1361) Edward the Black Prince, by whom she was the mother of Richard II. Her eldest son by Holand, THOMAS DE HOLAND (*c.* 1350–97), was styled earl of Kent in 1380. He was marshal of England from 1380 to 1385 and was high in the favour of Richard II. He died on April 25, 1397, and was succeeded by his elder son THOMAS (1371–1400) who in Sept. 1397 was created duke of Surrey. He was degraded from his dukedom in Nov. 1399 and was beheaded on Jan. 7 or 8, 1400, for conspiring against Henry IV. Thomas' brother EDMUND (1383–1408) was allowed to succeed to the earldom of Kent, but the title became extinct on his death (Sept. 15, 1408).

It was revived in 1461 for WILLIAM NEVILLE (*c.* 1405–63), Lord Fauconberg in right of his wife, and a younger son of Ralph Neville, 1st earl of Westmorland, by his second wife Joan Beaufort, daughter of John of Gaunt. William made a valuable contribution to the future Edward IV's victory at Towton (March 1461) and was rewarded by being made steward of the household, earl of Kent (Nov. 1461) and admiral of England (July 1462). He died without legitimate male issue on Jan. 9, 1463, when his title became extinct.

The earldom was next bestowed (May 30, 1465) upon EDMUND GREY (1416–90) (*see* GREY OF WILTON and GREY OF RUTHYN). His son GEORGE (d. 1503), 2nd earl, married (1483) Anne, sister of Elizabeth Woodville, consort of Edward IV. George died on Dec. 16, 1503, and was succeeded by his son RICHARD (d. 1523), 3rd earl. His descendant HENRY (1594–1651), 10th earl, was speaker of the house of lords from 1647 until its abolition in 1649. He died on May 28, 1651, and was succeeded by his eldest surviving son ANTHONY (1645–1702), 11th earl, whose son HENRY (1671–1740), 12th earl, was created earl of Harold and marquess of Kent in 1706 and duke of Kent on April 28, 1710. These titles became extinct at his death without male issue on June 5, 1740.

EDWARD (1767–1820), fourth son of George III, was created duke of Kent in 1799. Born in London on Nov. 2, 1767, he subsequently made his career in the army and saw service at Gibraltar, Canada and the West Indies, where he was renowned as a severe disciplinarian. Like most of his brothers he was not on good terms with his father, and for most of his life was heavily in debt. In 1817 the death of the prince regent's daughter, Princess Charlotte, caused some anxiety about the future succession to the throne, and the duke felt it his duty to forsake the lady who had been his mistress for many years and to contract a lawful marriage. This he did in 1818 with Princess Victoria of Saxe-Coburg, the widow of the prince of Leiningen. Their only child was Queen Victoria. Edward died at Sidmouth in 1820.

GEORGE (1902–42), fourth son of George V, was created duke of Kent on Oct. 9, 1934, shortly before his marriage to Marina (1906–), daughter of Prince Nicolas of Greece. He was killed on active service during World War II when the aircraft in which he was traveling crashed in Scotland on Aug. 25, 1942. He was succeeded by his elder son EDWARD (1935–).

KENT, JAMES (1763–1847), U.S. jurist, whose decisions and written commentaries on U.S. law strongly influenced Anglo-American legal development, was born in Fredericksburgh, N.Y., July 31, 1763. On his graduation from Yale college in 1781 he studied law at Poughkeepsie, N.Y., where he practised from 1785 to 1793. In 1793 he moved to New York city, where in the same year he was made a professor of law at Columbia college through recognition of his ability by John Jay and Alexander Hamilton. He lectured at Columbia until 1798, when he became a justice of the supreme court of New York. He became chief justice of this court in 1804 and chancellor of the New York court of chancery in 1814, a position he held until compulsory retirement in 1823. Kent's opinions appear in William Johnson's *Reports for New York* (1799–1823). Because Kent undertook to base all decisions possible on the learning of the old English common law, these reported cases were used as the basis of law in other states. Kent was an admirer of Lord Mansfield (*q.v.*), and his own commercial cases reported in Johnson's reports reflect Mansfield's influence.

On his retirement from the chancellorship in 1823, Kent resumed his professorship at Columbia. Out of these lectures came Kent's *Commentaries on American Law*, 4 vol. (1826–1830), which ran into six editions under his own editorship and won for him a high and influential place wherever Anglo-American law was studied. Kent's *Commentaries* were cited by English courts and counsel as much as by U.S. courts and counsel.

He admired the Roman or civil-law system; and in topics in his *Commentaries* where common-law precedent was weak or lacking, Kent turned to Roman law for first principles. Common-law courts citing Kent thus adopted many Roman law principles. Thus the statement in the Napoleonic code concerning the water rights of riparian owners was stated as a basic principle by Kent, and this was adopted as the English common law in such cases as *Embrey* v. *Owen* (6 *Ex.* 353 [1851]).

Kent's *Commentaries* substantially differed from Blackstone's *Commentaries on the Laws of England* (4 vol., 1769) in content and organization. Blackstone, for example, devoted only 45 pages to business contracts, whereas Kent devoted almost one of his four volumes to commercial contract subjects.

Kent was a militant Federalist and a strong conservative both in politics and law. He expressed his own position best in his criticism of the attempt of his friend Edward Livingston (*q.v.*) to prepare a penal code for Louisiana on the lines of the humanitarian reforms proposed in England by Jeremy Bentham: "I think Lord Hardwicke or Lord Mansfield or Burke or Pitt possessed ten times as much practical good sense and sound wisdom as William Godwin and Jeremy Bentham." Kent died at New York on Dec. 12, 1847.

See J. T. Horton, *James Kent: a Study in Conservatism, 1763–1847* (1939). (A. DM.)

KENT, ROCKWELL (1882–). U.S. painter, whose starkly realistic paintings and dramatic illustrations made him one of the best-known artists of his time, was born at Tarrytown Heights, N.Y., on June 21, 1882. He studied architecture at Columbia university but turned to painting and was a pupil of William M. Chase, Robert Henri, Kenneth Hayes Miller and Abbott Thayer. In the course of a varied career he worked as an architectural draftsman, as a lobsterman and carpenter on the coast of Maine and as a ship's carpenter. He explored the waters about Tierra del Fuego in a small boat, and lived in Newfoundland, Alaska and Greenland. He drew upon these experiences for his paintings and travel books.

COLLECTION OF THE WHITNEY MUSEUM OF AMERICAN ART, NEW YORK

"THE TRAPPER" BY ROCKWELL KENT. IN THE WHITNEY MUSEUM OF AMERICAN ART, NEW YORK

Among his notable works in public collections are "Snow Roller" (Phillips gallery, Andover, Mass.), "The Trapper" (Whitney museum, New York city), "Maine Winter" (Metropolitan Museum of Art, New York city), "Deer Season" (Art Institute of Chicago) and "Mother and Children" (Brooklyn museum). He illustrated works of Melville, Shakespeare, Chaucer and many others.

His writings include *Wilderness* (1920), *Voyaging* (1924), *N by E* (1930), *Rockwellkentiana*, with Carl Zigrosser (1933), *This Is My Own* (1940) and an autobiography, *It's Me O Lord* (1955). (D. H. W.)

KENT, ROLAND GRUBB (1877–1952), U.S. classical scholar and authority on Indo-European linguistics, was born in Wilmington, Del., on Feb. 24, 1877. He was educated at the Friends' school there, and then at Swarthmore college and at the Universities of Berlin and Munich, at the American School of Classical Studies in Athens, and at the University of Pennsylvania (Ph.D. 1903). First lecturer, and then assistant professor, he was professor of comparative philology (later of Indo-European linguistics) from 1916 to 1947 at Pennsylvania. He took an active part in the foundation and organization of the Linguistic Society of America (1925). His interests were chiefly in classical and Iranian studies, especially linguistics; but he was no narrow specialist, as the list of his published writings, *Language*, vol. 29, pp. 4–13 (1953), shows. He edited the *De lingua latina* of Varro (2 vol., 1938, 1949); among his other works are *Old Persian*, a grammar with texts and vocabulary (1950) and two rather mechanical textbooks, *The Sounds of Latin*, 3rd ed. (1945) and *The Forms of Latin* (1946). Like all good scholars he knew his own mind; but he was kindly withal. Kent died on June 27, 1952, in Bryn Mawr, Pa. (J. WH.)

KENT, WILLIAM (*c.* 1686–1748), a major English architect, interior designer, painter and landscape gardener, was born at Bridlington, Yorkshire, in 1686. Said to have been apprenticed to a coach painter in Hull, at the age of 20 he came to London. Various Yorkshire patrons, impressed by his talent, sent him to study painting in Rome, where he stayed from 1709 to 1719, and where he met his future patron and friend, the earl of Burlington. Burlington brought Kent back to England in 1719 and employed him in decorative painting at Burlington house, Piccadilly, London. Through Burlington's influence he was commissioned to decorate the Cupola room at Kensington palace, London. In 1725 his patron secured him the post of master carpenter in the office of works. In 1735 he was appointed master mason and deputy surveyor and in 1739 portrait painter to the king.

Kent's development as an architect began about 1724, when he undertook to edit *Designs of Inigo Jones*, which included designs by Burlington and himself and was published in 1727. This book shows that Kent's early work was confined to designing features of interior decoration, and it was in this capacity that he worked at Burlington house and Chiswick house, London (1727), and Houghton hall, Norfolk (1726–31).

Kent's architecture accords with the strictest principles of Burlington's Palladianism; and although the style had already been formalized before the start of Kent's career, he became its most brilliant exponent. English Palladianism looked back to classical Roman architecture and sought its model in the work of the 16th-century north Italian architect Andrea Palladio (*q.v.*) and that of his English follower Inigo Jones. Burlington, aided by Kent, determined to restore English taste to sound and moral classical principles, which he considered lost since the time of Jones. A major part of their scheme was to rebuild London's public architecture, thereby setting an example which would raise both the taste and the prestige of the nation. The royal mews, Trafalgar square (1732); the treasury buildings, Whitehall (1734–36); and the Horse Guards building, Whitehall, executed between 1750 and 1758, after Kent's death, were all part of this plan, together with designs for other important buildings never executed, such as those for the houses of parliament (1732–39), a national memorial temple and a royal palace in Hyde park. Among other public buildings built by Kent and later demolished were the queen's library, St. James's palace, London (1737), and Kew palace, Surrey (1730).

Kent's domestic architecture was largely inspired by Palladio's villas in the neighbourhood of Vicenza, Italy, depending for its effect on good proportion and grouping, the solidity of the buildings being emphasized but given life by the use of niches, recessed windows and rusticated stonework. No. 44 Berkeley square, London (1742–44), shows in its interior Kent's ability to create a palatial effect in a comparatively small house. Holkham hall, Norfolk, started in 1734 for Thomas Coke, earl of Leicester, was Kent's masterpiece. Kent designed not only the house but also the interior decoration and the furniture, being the first English architect to plan a house in one unified scheme. Kent's furniture, in an Italianate baroque style, heavily carved and gilded with boldly exaggerated motifs, was perfectly suited to the heavy magnificence of his architectural interiors. Though later neoclassic architects, such as Robert Adam, were to criticize Kent's work as "immeasurably ponderous," his influence on them was considerable, and the splendour of Holkham is an overwhelming answer to such criticism, both in its general conception and final detail.

Despite the inconsistency with Palladian principles, Kent was one of the first architects of the 18th-century Gothic revival. He made alterations and additions in the Gothic style to Esher place, Surrey (*c.* 1730), to Rousham hall, Oxfordshire (1738–41), and built the east range of the clock court at Hampton court, Surrey, in the Tudor style (1732).

As a landscape gardener, Kent freed the English garden from formality, introducing a new romantic design, in which the wildness of nature was contrasted with the classical severity of his architecture. His gardens at Rousham hall, Oxfordshire, and Stowe house, Buckinghamshire, where winding paths and open vistas lead to small classical temples scattered informally in wooded glades, show how Kent sought to bring the natural landscape within the garden.

Kent's versatility as a designer included a number of monuments, Gothic screens at Westminster hall (1739) and Gloucester cathedral (1741), stage scenery, a royal state barge, and illustrations for Spenser's *The Faerie Queene* and John Gay's *Fables*. Kent died on April 12, 1748, and was buried at Chiswick, London.

See Margaret Jourdain, *The Work of William Kent* (1948); H. M. Colvin, *A Biographical Dictionary of English Architects* (1954). (J. E. LE.)

KENT, a southeastern county of England, is bounded northwest by Greater London, north by the Thames and its estuary, east and southeast by the English Channel, southwest by Sussex, and west by Surrey. Area (geographical) 1,524.9 sq.mi. (3,949 sq.km.); (administrative) 1,432.5 sq.mi. (3,710 sq.km.).

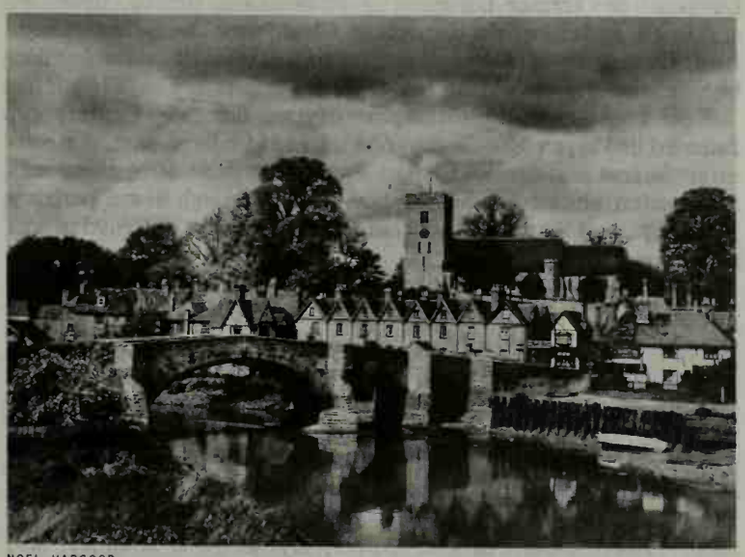
Physical Features.—Kent is divided from west to east by the chalk hills of the North Downs, which near Westerham reach a height of more than 800 ft. (244 m.) but are lower toward the east. At three points the Downs have been cut through by rivers: in the west by the Darent, which joins the Thames at Dartford; near Maidstone by the Medway, which enters the Thames at Sheerness; in the east by the Stour, which cuts through the Downs between Ashford and Canterbury. The area between the North and South Downs is called the Weald. Its northern edge is formed by the Gault and Lower Greensand which, emerging from below the chalk, run across the county as bands of varying width from Westerham to the coast between Folkestone and Hythe. The Lower Greensand forms a ridge, variously known as the Greensand Hills, Quarry Hills, and Ragstone Ridge, which rises at Toys Hill, southwest of Westerham, to 801 ft. To the south of these hills the Weald Clay forms a further broad band. The southwest of the county is crossed by a line of hills, the continuation of the Forest Ridge of Sussex, which have a height varying from 200 ft. to 500 ft. (60–150 m.) and consist of the Hastings beds, the oldest rock formations exposed in the county.

Along the Thames the coast is alluvial and generally low and marshy, embankments being necessary in several places to prevent inundation. At a few points, however, as at Gravesend, the river shore is of chalk sufficiently high to be secure from flooding. The Isle of Sheppey is divided from the mainland by the Swale (bridged at Kingsferry); low clay cliffs form its north coast. The marshes extend along the Swale to Whitstable, whence

stretches a low line of clay and sandstone cliffs toward the Isle of Thanet, a chalk outlier. There the chalk cliffs are lofty and grand, extending round the North Foreland southward to Pegwell Bay. The North Foreland, the Promontorium Acantium of the Romans, is the most easterly part of Kent and has been the site of a lighthouse since 1636. The coast from Sheppey to Margate and south of Ramsgate is skirted by numerous flats and sands, and there are extensive sandbanks off the coast north of Thanet and east of Deal, including the dangerous Goodwin Sands. The lower valley of the Stour and the depression from Sarre to Reculver is composed of alluvium and marks the course of the Wantsum which used to separate Thanet from the mainland. South of Deal the coast rises again into chalk cliffs, the eastward termination of the North Downs. These cliffs continue round the South Foreland (300 ft. [90 m.] high, with a lighthouse) to Folkestone, where they fall away and are succeeded west of Sandgate by a flat, shingly shore. To the south of Hythe this shore borders the wide expanse of Romney Marsh, overlooked by a line of abrupt hills, the eastern end of the Lower Greensand. Romney Marsh, drained by many channels, seldom rises more than a dozen feet above sea level. At its southeastern extremity, and at the extreme south of the county, is the shingly promontory of Dungeness. Within historic times much of this marsh was covered by the sea, and the valley of the River Rother, entering the sea at Rye harbour, was represented by a tidal estuary for some distance inland.

Archaeology, History, and Architecture.—Kent, from its commanding geographical position facing the continent, has from the earliest times attracted invasion, settlement, and transit. Large-scale commercial excavations for brick earth, chalk, and gravel have disclosed abundant relics of its prehistory. Particularly important are the Paleolithic flint tools from the stratified Thames and Stour river terraces and the skull of Swanscombe man, who lived in the great interglacial period. Many thousands of Neolithic flint tools testify to an agricultural population which was widespread except in the forested Weald. Antiquities of that period include the well-known Kits Coty House, on the slope of the Downs above Aylesford. This and other megaliths of the Medway Valley and a long barrow at Chilham in east Kent all have affinities with the Netherlands and northern Germany. Continental influences are seen again in the distribution of Beaker pottery and in the types of late Bronze Age pottery and implements. The Belgic invaders left their mark in the notable hill fort of Bigbury near Canterbury, while at Oldbury near Ightham is another fort used about the same time by the older inhabitants. The Belgic urn fields at Swarling near Canterbury and at Aylesford have given their names to a recognized Iron Age culture.

Julius Caesar, in the course of his Gallic campaigns, made expeditions across the English Channel in 55 and 54 B.C. Each time he landed near Deal and on the second occasion marched across the county, capturing a hill fort, probably Bigbury, on the way. No permanent Roman settlement was then made and, as a result of the tribal wars that soon followed, Kent was for a time in the kingdom of the Belgic Cunobelinus (Cymbeline) who had his capital at Colchester. In A.D. 43 Claudius took advantage of the turmoil following Cunobelinus' death to land in Kent and begin the subjugation of Britain. Richborough (*q.v.*), then at the southern end of the Wantsum channel, was the chief supply port, with additional bases at Dover and Lympne, while Canterbury was an administrative centre. Roads were built radiating from Canterbury (Durovernum): Watling Street to Dover (Dubris) and to London via Rochester (Durobrivae) and Springhead (Vagniacae); Stone Street to Lympne (Portus Lemanis); and other roads to Richborough (Rutupiae) and Reculver (Regulbium) at the northern end of the Wantsum. A Roman theatre and baths have been excavated at Canterbury (*q.v.*) and many Roman villas have been discovered, the most notable being at Darenth and at Lullingstone, which is also the earliest known place of Christian worship in Britain.



NOEL HABGOOD

AYLESFORD VILLAGE ON THE RIVER MEDWAY WITH ITS 14TH-CENTURY BRIDGE; NORMAN CHURCH OF ST. PETER IS IN THE BACKGROUND

During the later 3rd century, when the coast was troubled by Saxon raids, the Romans built new forts at Richborough, Reculver, Dover, and Lympne. There are still extensive remains of the first of these. After the departure of the Romans early in the 5th century the so-called Jutes landed at Ebbsfleet and extended their rule first to east Kent and then to all southeastern England. They brought with them the Frankish laws which subsequently formed the basis of many early Kentish laws. These, including the custom of gavelkind (*q.v.*), remained the established law of the county even after the Norman Conquest. Kent was one of the seven kingdoms of Anglo-Saxon Britain and retained its identity, though not always its independence, until 825 when it was absorbed by Wessex. (*See* also KENT, KINGDOM OF.)

King Aethelberht in 597 welcomed the mission led by Augustine to convert the English. Augustine founded an abbey, richly endowed and later known by his name, outside the walls of Canterbury; it came to rank as the second Benedictine house in all Europe but little of the buildings except the foundations have survived. A few years later he founded a second monastery, likewise endowed, within the walls and made its church, Christ Church, the cathedral of his diocese of Canterbury. In 604 a second diocese was formed in Kent with its cathedral at Rochester (*q.v.*). There was a lapse into paganism under Aethelberht's successor, Eadbald, in 616, but following his conversion monasteries were founded at Dover, Folkestone and Lyminge, and later at Minster in Sheppey and Minster in Thanet.

By 765 Kent had become subject to the kings of Mercia, and so it remained until, in 825, Mercia and Kent were absorbed in the kingdom of Wessex. According to the chronicles, Danish raids laid waste much of north and east Kent during the next 50 years. Canterbury and Sandwich were pillaged then, and again in the 20 years following 993 when even Archbishop Alphege was among the victims. In 1013 an invading army led by Sweyn Forkbeard, king of the Danes, landed at Sandwich.

Dover, because of its strategic value, was the first town secured by William I after the Battle of Hastings. The ancient laws and liberties of Kent were allowed to continue. In 1067 a Kentish rebellion was crushed by Odo, bishop of Bayeux, who was made earl of Kent and given large estates in the county. In 1088 he joined in a conspiracy against William II which resulted in his banishment. The Normans built castles at several places in the county, of which those at Dover (*q.v.*) and Rochester are the most notable remaining. The rebuilding of Rochester and Canterbury cathedrals on a grander scale was begun, but the only Norman work now surviving is the nave of the former. The small church of Barfreston with its elaborate carvings is one of the finest examples of Norman architecture in England. Among important monastic remains are the buildings attached to Canterbury cathedral, the ruins of St. Augustine's Abbey, Canterbury, and of the Carmelite priory at Aylesford (*q.v.*), now reoccupied by members of that order.

In 1170 Thomas Becket, archbishop of Canterbury, was murdered in his cathedral. The miracles reported as occurring at his

tomb led to his speedy canonization, and a constant stream of pilgrims came to Canterbury bringing offerings to his shrine and trade to the places along the route. These offerings paid for the rebuilding of the eastern parts of the cathedral by 1184. Their numbers were greatest when, in the late 14th century, Geoffrey Chaucer wrote the *Canterbury Tales*. An earlier pilgrim, William, a baker from Perth, was murdered in 1201 near Rochester and buried in the cathedral there. His tomb also became a centre of pilgrimage, and the offerings made there paid for the rebuilding, in the 13th century, of the eastern parts of the cathedral and of the church of Stone near Dartford, which is outstanding for the delicacy of its details. Old Soar Manor at Wrotham, a knight's house, was built about 1290, while the earliest parts of both Penshurst Place and Ightham Mote date from the mid-14th century. Cooling Castle has a 14th-century gatehouse, and an unspoiled bridge of this period is at East Farleigh.

During the conflict between King John and the barons, Rochester Castle was captured by the king in 1215 and Dover Castle was besieged by the barons without success in 1216. In the next year the navy of the Cinque Ports (*q.v.*) defeated a French force that was supporting the barons. Four of the five head ports and many of the members forming this confederacy lay in Kent, which remained of considerable importance for national defense until the 16th century.

Many refugee Flemings settled in the Weald during the 14th century and helped to establish a clothing industry. The Peasants' Revolt of 1381 traditionally began at Dartford. The leader, Wat Tyler, who may have been Kentish, took Rochester Castle before his fruitless march on London. In 1450 another Kentish insurrection was led by Jack Cade in support of the complaints of the county's yeomen. He won a battle at Sevenoaks but was not successful in his march on London. Between the Conquest and the 14th century the earldom of Kent was held by several families (*see* KENT, EARLS AND DUKES OF).

Fine examples of the Perpendicular Period can be seen in the nave, tower, and cloisters of Canterbury Cathedral. Among many parish churches those at Maidstone and Cranbrook are, respectively, good early and late products of the style. Hever Castle, the home of the Boleyn family, though much altered, was built mostly in the mid-15th century. Sissinghurst Castle, with its Tudor tower, is a fragment of a large early 16th-century mansion.

With the Reformation, the numerous religious houses in Kent were dissolved and most of their estates broken up. The shrine of St. Thomas at Canterbury was destroyed and the pilgrimages came to an end. During the reign of Henry VIII defensive coastal castles were built at several places, the best preserved being that at Deal (*q.v.*). Naval dockyards were established at Chatham (*q.v.*) under Elizabeth I and at Sheerness (*q.v.*) in 1665. In 1554 Sir Thomas Wyat of Allington near Maidstone led a rising in protest against the Spanish marriage of Mary I. Under Elizabeth I many French and Walloon weavers were allowed to settle at Canterbury, Sandwich, and Maidstone and practise their trade. Several great country houses were built at that period including Cobham Hall and the greater part of Knole near Sevenoaks.

During the Civil War Kent was held for Parliament and there was little fighting in the county except a brief royalist rising in 1648 which was broken by General Fairfax at Maidstone. It was at Dover that Charles II landed on his restoration in 1660. In 1667, Sheerness, Gravesend, and Chatham were attacked by a Dutch fleet and much damage was done. James II, when making his escape from England in 1688, set sail first from Sheerness, and afterward successfully from Rochester.

The best 17th-century churches are those at Groombridge (1623) and Tunbridge Wells (1682–90), while good examples of secular buildings are Chilham Castle (1616), Groombridge Place (*c.* 1660), and Broome Park in Barham (1635–38).

Of 18th-century churches there are good examples at Mereworth (1744–46), Deal (1715), and Gravesend (1731). Of civil buildings the most important is Mereworth Castle (1723), a fine Palladian-style mansion by Colin Campbell.

In the 19th century the threat of invasion by Napoleon led to the construction of additional fortifications at Chatham and Dover, of the Royal Military Canal between Hythe (*q.v.*) and Appledore, and of the so-called Martello towers along the coast. New industries developed in place of weaving, including papermaking, the manufacture of cement and bricks, and, after World War I, coal mining. The coming of the railways brought prosperity and increased population, especially to the coastal resorts.

During World Wars I and II, particularly the latter, Kent suffered as a result of proximity to the continent, and for the same reason its ports were of great value. In both wars the port of Richborough was developed and extensively used for war supplies, and large sections of the Mulberry (artificial) Harbour used in the invasion of the continent were constructed there in World War II. Since the war an atomic power station has been built on the promontory of Dungeness.

Of 19th- and 20th-century architecture there are few outstanding examples. The church at Strood (*c.* 1814) was the first by Sir Robert Smirke. There are early 19th-century churches by Decimus Burton at Riverhead, Tunbridge Wells and Southborough, and a good example of town planning, the Calverley Estate (1828–52), at Tunbridge Wells. A. W. N. Pugin regarded as his finest work the unfinished St. Augustine's Abbey (1846–51) at Ramsgate, which was built near his own house, the Grange. The church at Speldhurst (1871) has windows by Sir Edward Burne-Jones. An early work by William Butterfield is St. Augustine's College, Canterbury (1844). The airport buildings at Ramsgate (1935–37) and the County Library building at Maidstone (1964) are good examples of modern work.

Population and Administration.—The proximity of London and the extension of its suburbs into the county have greatly influenced the growth of population. In 1889 the area and population of Kent were reduced by the transfer of the northwestern part to the County of London. The population of the administrative county remaining after this and a few other minor changes has, with the city of Canterbury, been as follows: 808,736 (in 1891); 1,141,666 (1921); 1,564,324 (1951); 1,701,851 (1961). By the extension of the Greater London boundary in 1965 the population was reduced by about 450,000.

The origin of the expressions "Kentish men" (people living north and west of the Medway) and "men of Kent" (those living south and east of the Medway) probably lies in the very early division of Kent into two kingdoms or tribal areas.

The ancient county of Kent included Charlton, Eltham, Greenwich, Kidbrooke, Lee, Lewisham, Plumstead, Woolwich, and most of Deptford. A small area on the north shore of the Thames was part of Woolwich. All these places were incorporated in the new county of London in 1889 and formed into the metropolitan boroughs of Deptford, Greenwich, Lewisham, and Woolwich, now the London boroughs of Lewisham, Greenwich, and part of Newham (*qq.v.*). Penge, which had been part of Surrey, was added to Kent in 1900. Under the London Government Act 1963 (*see* LONDON) the former boroughs of Beckenham, Bexley, Bromley, and Erith, and the urban districts of Chislehurst and Sidcup, Crayford, Orpington, and Penge were formed into the new London boroughs of Bexley and Bromley (*qq.v.*).

Kent contains the greater part of two dioceses, Canterbury, founded in 597, and Rochester, 604. In 1845 a large part of Rochester diocese was transferred to Canterbury. In 1904 there was a reversion almost to the old boundaries, though some parishes became part of Southwark diocese and the deanery of Croydon was transferred to Canterbury.

From about the 15th century the county was divided for the administration of justice, and separate courts of quarter sessions were held at Canterbury and Maidstone for east and west Kent. This division ceased in 1965 and there is now only one court of quarter sessions for Kent although sittings are still held at both centres. The shire moot and later the county court met on Penenden Heath near Maidstone, the county town. For purposes of assize the county lies in the southeastern circuit. Maidstone is the assize town, though Rochester was also used in the 18th century. The Cinque Ports of Dover, Hythe, New Romney, and Sandwich were exempt from the normal administrative and judicial arrangements of the county. Canterbury in 1461 was given the

status of a separate county which the city retained till it was made a county borough in 1889, the only one in Kent. Formerly, separate assizes were held for the city. The drainage area of Romney Marsh also formed a separate judicial liberty until 1889. Nine boroughs have separate commissions of the peace and seven have separate courts of quarter sessions. By the Representation Act of 1918 the county was divided into 11 parliamentary divisions, increased to 19 in 1949 and reduced by the London Government Act to 13. After April 1, 1965, there were 19 municipal boroughs, 11 urban districts, and 294 rural parishes grouped into 18 rural districts. (J. M. P. F.; Fx. H.)

Agriculture, Industries, and Communications.—Cherries are said to have been imported from Flanders and first planted in Kent in the reign of Henry VIII, and from that period the culture of fruits (especially apples and cherries) and of hops spread rapidly over the county. Orchards of all kinds are found chiefly in the Medway Valley and in north Kent. More than half of the English acreage devoted to hops is in the county. Market gardening is extensively practised, mainly for London markets. Barley, much of it of high quality for malting, is the most important arable crop, followed by wheat, oats, and potatoes. About half the agricultural land is under grass. Cattle are grazed in considerable numbers on the marshlands, and dairy farms are numerous.

Kent is one of the chief counties in England for sheep rearing; a breed peculiar to the district, known as Kent or Romney Marsh, has been exported to many countries.

The county is well wooded. New plantations of conifers and hardwoods are replacing the older oak and beech. Important research and educational centres are East Malling Research Station, National Fruit Trials at Faversham, Wye College, and the Farm Institute at Hadlow, near Tonbridge. (R. Dn.)

Among the principal industries are papermaking (one of the first paper mills in England was set up at Dartford before 1588), carried on along the Darent, Medway, and neighbouring streams; engineering, chemical, and other works along the Thames; and manufactures of plastics, bricks, tiles (made at Wye in the 14th century), pottery, and cement, especially on the lower Medway and the Swale. Chalk and ragstone are quarried. There are large oil refineries on the Isle of Grain, and at Ashford are railway workshops. Several industries are connected with the government establishment at Chatham. Deep-sea fishing occurs all round the coast. Shrimp, sole, and flounder are taken in great numbers along the north coast and off Ramsgate. The principal oyster beds, some of which were known in Roman times, are near Whitstable, Faversham, Queenborough, and Rochester. The coal area (about 206 sq.mi.) runs inland from south of Ramsgate to near Canterbury, and thence southward to the coast east of Folkestone.

The county is served by British Rail's Southern Region whose principal lines radiate from London leading through Chatham and Canterbury to Dover, with a branch from Faversham to the seaside resorts of Margate and Ramsgate; and through Tonbridge and Ashford to Folkestone, Dover, and Sandwich. A third line links Ashford to London via Maidstone. Motorways bypass Maidstone and the Medway towns. Dover and Folkestone are ports for traffic with the continent and an air ferry service was begun after World War II with Ferryfield near Lydd as its English terminal. There are municipal airfields at Ramsgate and Rochester. The county is practically without inland water communications, excluding the Thames. (J. M. P. F.; Fx. H.)

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KENT, KINGDOM OF, one of the kingdoms of Anglo-Saxon England, the dimensions of which seem to have corresponded with those of the present county. According to tradition, the first Anglo-Saxon settlers, led by Hengist and Horsa (*see* Hengist and Horsa), landed at the invitation of the British king Vortigern at Ebbsfleet in Kent, an event dated by Bede between 446 and 454. The *Anglo-Saxon Chronicle,* perhaps using a lost list of Kentish kings, says that Hengist and his son Aesc began to reign in 455, and that Aesc reigned alone from 488 to 512. Nothing further is known of Kentish history until the reign of Aethelberht (*q.v.*), who came to the throne in 560 and was defeated and driven back into Kent by the West Saxons at a place called Wibbandun (Wimbledon) in 568. By 595, however, he had become overlord of all the English kingdoms south of the Humber. He married Berhta, daughter of Charibert, king of Paris, and she brought with her a Christian bishop, Liudhard. It may have been on this account that Kent was chosen as the landing place of Augustine's mission in 597. After Aethelberht's conversion to Christianity, he gave a dwelling place in Canterbury to the missionaries, and hence this became the archiepiscopal see of the English church. A second see was created at Rochester in 604, a fact which suggests that Kent was already divided into East and West Kent, which is clear in later records. Under ecclesiastical influence, Aethelberht issued the first written code of Anglo-Saxon laws.

On his death in 616, Aethelberht was succeeded by his son Eadbald, who was a heathen and who married his stepmother, but was shortly afterward converted by Laurentius, Augustine's successor. Eadbald married his sister Aethelberg to Edwin of Northumbria, who had obtained the supremacy over the lands south of the Humber, except for Kent. No kings of Kent ever recovered the overlordship held by Aethelberht. Eadbald's son Ercenberht, who succeeded in 640, was the first king to enforce the acceptance of Christianity in his kingdom. His son Egbert, who reigned from 664 to 673, was king in Surrey as well as Kent, and founded the monastery of Chertsey. He was succeeded by his brother Hlothhere, in whose reign Kent was raided by Aethelred of Mercia in 676, and ten years later Aethelred still had some power in Kent. Hlothhere issued a code of laws, together with his nephew Eadric, but in 685 the latter brought an army from Sussex against his uncle and early in 685 Hlothhere died of wounds received in battle. On Eadric's death in 686 Kent was divided among a number of kings, one of whom was Sigehere of Essex and another Ceadwalla of Wessex, who founded a monastery at Hoo, Kent. Ceadwalla's brother Mul was burned by the men of Kent in 687, and the Kentish royal line was re-established about 690 by Eadric's brother Wihtred, though at first a member of the East Saxon royal house reigned with him. He seems to have soon gained the whole kingdom, and reigned until 725, recognizing no overlord. He too issued a code of laws (695).

Wihtred was succeeded by three sons, Aethelberht II, Eadberht and Alric. In the middle of the century the first two and Eadberht's son Eardwulf were reigning jointly. Aethelberht died in 762 and there is no later mention of the others. Later kings, Sigered in 762, Eanmund a little later, Heahberht in 764 and 765, and Egbert from 765 to 779, are not known to belong to the royal line. Meanwhile Offa of Mercia was establishing his power in Kent. He appears as overlord of Heahberht and Egbert, and deals alone with Kentish lands in 774. The men of Kent fought the Mercians at Otford in 776, probably with success, for there is no sign of Offa's influence in Kent for the next ten years and a king Ealhmund (father of Egbert of Wessex) appears to have been independent of Offa in 784. But from 785 until his death (796) Offa was supreme in Kent. In 787 he persuaded the pope to divide the province of Canterbury by making Lichfield into an archiepiscopal see. On Offa's death Kent revolted, setting up a king called Eadberht Praen, who was captured by Coenwulf of Mercia in 798. The latter's brother, Cuthred, was king of Kent until 807; Coenwulf then ruled Kent directly, and no king of Kent is heard of until Baldred, who was reigning in 825 when Kent was conquered by Egbert of Wessex. Coenwulf abolished the archbishopric of Lichfield in 802.

Henceforward, Kent was a province of Wessex, but for some time it was ruled as a subkingdom along with Surrey, Sussex and

Essex, first by Egbert's son Aethelwulf, and then, in 839, by the latter's son Aethelstan, last heard of in 851. Aethelwulf relinquished Wessex to his son Aethelbald and resumed the rule of Kent in 856, and on his death this passed to his third son Aethelberht, who united it with Wessex when he succeeded to that kingdom in 860. In the later 9th century Kent was controlled by two ealdormen, but in the later Saxon period by a single ealdorman.

The social organization of Kent has many features peculiar to it, which support Bede's statement (*Historia ecclesiastica,* i, 15) that its inhabitants were a different tribe from the Angles and Saxons, namely the Jutes (*q.v.*). Whether these were, as Bede believed, from Jutland, or, as archaeological evidence may suggest, from a district near to Frankish territory, is disputed. Instead of the two noble classes (gesithcund) of Wessex and Mercia, Kent had only one (eorlcund), and the Kentish ceorl had a wergild twice as high as that of the same class elsewhere. There were also classes of persons called laets, probably freedmen, who are not mentioned in other kingdoms. Moreover Kentish customs in later times, especially with regard to the tenure of land, show many peculiarities. For administrative purposes, Kent was divided into lathes, apparently attached to royal vills and under the control of reeves.

See F. M. Stenton, *Anglo-Saxon England,* 2nd ed. (1947); J. E. A. Jolliffe, *Pre-Feudal England: the Jutes* (1933). (D. Wk.)

KENTIGERN (Mungo), **SAINT** (d. *c.* A.D. 612?), traditionally the first bishop of Glasgow and the evangelist of southwestern Scotland. Little further is known of his life, though there are various dubious stories about him in lives written down centuries later. His feast day is Jan. 13.

According to legend he was of royal descent and his mother had a miraculous escape from death while with child. He is reputed to have been a noted preacher, energetic in combating the Pelagian heresy. He is said to have been taken up by the king of Strathclyde and to have established a see for that kingdom at Glasgow. The next king of Strathclyde, Rydderch, was soon overthrown by a pagan reaction led by Morken, who exiled Kentigern. In the legend he then went to Wales, met St. David, and was given land at Llanelwy to found a monastery, the ancestor of the modern cathedral of St. Asaph. Rydderch, however, with the aid of King Aidan, is supposed to have overthrown the pagan party in Strathclyde, and recalled Kentigern *c.* 573. Kentigern is supposed to have collaborated with St. Columba and to have appointed St. Asaph to succeed him at Llanelwy.

See K. Jackson, "The Sources for the Life of St. Kentigern," in N. K. Chadwick (ed.), *Studies in the Early British Church* (1958); J. MacQueen, "Yvain, Ewen, and Owein ap Urien," in *Transactions of the Dumfriesshire and Galloway Natural History and Antiquarian Society,* vol. xxxiii, 107–131 (1956). (Er. J.)

KENT'S CAVERN, a large limestone cave near Torquay, Eng. which yielded some of the earliest evidence of man's coexistence with extinct animals. The Rev. J. McEnery, who investigated the upper deposits (1825–29), was perhaps the first man to proclaim this fact. In 1840 Robert A. C. Godwin-Austen confirmed McEnery's view; and excavations (1865–80) carried on by William Pengelly, on behalf of the British association, completed the proof. Excavations were resumed in 1926. Collections are in the British museum and the Natural History museum, London, and in the museum of the Natural History society, Torquay.

The deposit has been divided into six layers from top to bottom, as follows: layer (1), Roman, Iron and Bronze Age shards; layer (2), stalagmite with Neolithic pottery; layer (3), black band of burned bones and ash; layer (4), red cave earth; layer (5), stalagmite floor; and layer (6), bone and pebble breccia. The implements have been classified typologically into five stages: Acheulean, Mousterian, Middle Aurignacian, proto-Solutrean and Magdalenian (*see* Archaeology: *Prehistory: Culture History of the Pleistocene* for a description). There appears to be little doubt that the hand axes and several of the flakes belong to a Levalloisian phase of the Mousterian, widespread over northern France and eastern and southeastern England. The Middle Aurignacian stage depends on a group of not very typical implements, whose resemblance to the Middle Aurignacian of western France is somewhat superficial. At Solutré, near Mâcon, there is an "evolved Solutrean" overlying a typical Middle Solutrean, and it is to this material that the Kent's cavern should be referred rather than to the classic regions of western France. The last group, the Magdalenian, occurs mainly, but not solely, in the black band; one harpoon comes from the black band, and two from the upper part of the red cave earth (layer 4). These implements and a small bone needle are typical of a late stage of the Magdalenian. The flint implements from the black band and immediately below it consist mainly of small blades with blunted backs or oblique blunted ends. This blade assemblage occurs in several other British caves, such as Aveline's hole in the Mendips and at Creswell crags (*q.v.*) in Derbyshire, and is typical of the late Magdalenian of the regions of northern Germany, the Netherlands and Belgium.

The animals, apart from the bones of cave bear found in layer 6, appear to have come mainly from the red cave earth and are Upper (Late) Pleistocene. Among the species represented are the mammoth, wooly rhinoceros, bison, reindeer and giant deer (*Megaceros*). Several human fragments have been found but in the 1960s they had not yet been equated with the archaeological phases.

See D. A. E. Garrod, *The Upper Palaeolithic Age in Britain* (1926), with a full bibliography; K. P. Oakley, *Man the Toolmaker* (1957), for examples of Kent's cavern artifacts. (Jo. W.)

KENTUCKY, a south central state of the United States, is popularly known as the "Bluegrass state" because of the abundance of bluegrass found in the central part, but officially known as the Commonwealth of Kentucky. Situated immediately west of the Allegheny Mountains, it is bounded northwest and northeast by the low-water mark on the far side of the Ohio which separates it from Ohio and Illinois, and from Indiana except for a thin sliver of land beyond the low-water mark east of Evansville, Ind.; east by Virginia and by the Big Sandy River and its east fork, the Tug, which separates Kentucky from West Virginia; southeast and south by Virginia and Tennessee; and west by the Mississippi River, which separates it from Missouri. Area, 40,395 sq.mi.; of this, 532 sq.mi. are water surface. Kentucky ranks 37th among the states in size and 22nd in population.

On June 1, 1792, Kentucky became the 15th state of the Union, the second after Vermont to be joined with the original 13; Frankfort has been the capital city since December 1792. The official state bird is the cardinal; the state flower is the goldenrod; and the state tree is the tulip tree (yellow poplar). The state flag displays the state seal with the motto, "United We Stand, Divided We Fall," on a field of blue. The name, of Indian origin, is from the Kentucky River, which flows about 250 mi. into the Ohio in the north central part of the state. The state song is Stephen Collins Foster's "My Old Kentucky Home."

PHYSICAL GEOGRAPHY

Physical Features.—From mountain heights on the east the surface is largely a much furrowed plain, sloping gently to the west and declining toward the Ohio River. The state lies within the Mississippi basin and within the special division of the Ohio Valley between the extremes of approximately 36°30′ and 39°9′ N and 82° and 89°34′ W. A small part in the southeast contains the Cumberland and Pine mountains. The highest point in the state is Big Black Mountain (4,145 ft.) in Harlan County; the lowest point is on the Mississippi River (257 ft.) in Fulton County. The average elevation is about 750 ft. The entire eastern quarter of the state, conterminous with the eastern coal field, is the region of the mountains, but properly speaking almost all except the Cumberland and Pine mountains of the disturbed region of the Alleghenies belongs to the Allegheny plateau province, a rugged region with narrow valleys and sharp ridges seldom more than 1,500 ft. above sea level. The remainder of the area east of the Tennessee River is comprised of the eroded bluegrass region and, to the south, the Highland Rim plateau, which covers one-half of the state. It slopes from an elevation of 1,000 to 1,200 ft. or more on the east to about 500 ft. on the northwest and is less rugged than the Allegheny plateau. One feature of the southern portion is the numerous "sink holes" and caves, the best known being Mammoth Cave and the Flint Ridge Cave system, including Colos-

RAY SCOTT AND THE NATIONAL PARK CONCESSIONS, INC.

FROZEN NIAGARA, AN ONYX FORMATION IN MAMMOTH CAVE

sal Cavern, cut in beds of limestone. The Highland Rim plateau drops 200 ft. or more to the bluegrass region, in which erosion has developed on limestone a gracefully undulating surface resembling a park marked by rounded hills and dales. Especially within a radius of 20 mi. around Lexington, bluegrasses (*Poa compressa* and *Poa pratensis*) add to the unusually luxuriant vegetation. About the middle of June the bluegrass blooms and the hue of its seed vessels gives the landscape a bluish tinge. A small part of the state west of the Tennessee River at the Tennessee boundary forms another lowland area, once a part of the coastal plain, with an elevation below 500 ft. The chief rivers wholly within the state are the Licking, Kentucky, Rockcastle, Salt, Green, and Tradewater. The Cumberland, after flowing through the southeast and south central parts of the state, enters Tennessee at a point near the centre of the southern border of the state. In the extreme southwest the Cumberland, which re-enters Kentucky, and the Tennessee with only a short distance between them cross Kentucky and enter the Ohio River at Smithland and Paducah respectively. The major hydroelectric power sites are Kentucky Dam on the Tennessee River, Barkley Dam on the Cumberland River, Dix River and the Wolfe Creek Dam on the Cumberland. The drainage of the region under which the caverns lie is mostly underground. Some traces of the last glacier period are visible in Boone and Clark counties.

Climate.—The climate is milder and more even than that of some of the neighbouring states. The mean annual temperature, about 50° F (10° C) on the mountains of the southeast and 60° F west of the Tennessee, is about 55° F for the entire state; the thermometer seldom registers as high as 100° F or as low as −10° F. The mean annual precipitation ranges from about 38 in. in the northeast to 50 in. in the south, and is about 46 in. for the entire state with normally even distribution throughout the year and with comparatively little moisture as snow. The prevailing winds blow from the west or southwest, as do most rain-bearing winds, and the cold waves, often destructive of early orchard blooms and the fruit industry, come from the north or northwest.

Soil.—Except for the strips of alluvial land along the rivers, Kentucky soils developed from the decay of underlying rocks; hence, they have more of a local character than soils north of the Ohio, where glaciers brought new material. The best soils are the alluvium along some of the larger rivers and the soils of the blue or Ordovician limestone in the bluegrass region. Within a radius of 20 mi. of Lexington it is especially rich and enduring. Next in fertility is the Lower Carboniferous (Mississippian), or "cavern limestone," found over much of the central and western part of the state. The soils of the Highland Rim plateau and of the lowland west of the Tennessee River vary greatly, but the commonest are a clay containing some carbonate of lime and a sandy loam. On the escarpment around the bluegrass region the soils are largely cherty or stiff with clay and of inferior quality. On the mountains and the Allegheny plateau much of the soil is very light and thin.

(E. T.; W. W. Js.; T. D. C.)

Vegetation.—The eastern mountains present the greatest variety of plant life with rhododendron (including azalea and great laurel, or mountain rosebay), blueberry and huckleberry, magnolia, and many ferns. Dogwood, redbud, and the tulip tree are native to the state; trillium, bloodroot, birdsfoot violet, Jack-in-the-pulpit, and dozens of other wild flowers, reeds and grasses (including bluegrass, mentioned above) range from mountain varieties to those native to the Mississippi River swampland. Lying in the great eastern hardwood forest region, three-fourths of the state once was covered with sycamore, oak, hickory, chestnut, walnut, tulip, ash, cherry, linden, and pine.

Animal Life.—The animal life, like the plant life, ranges from the subboreal in the mountains to the marsh in the river-bottom forests. Bison, once plentiful on Kentucky's central plains, and puma have disappeared. Small mammals—rabbits, squirrels, fox, woodchuck, raccoon, and opossum, for example—exist in considerable numbers. Bear and deer have been restocked. The wild turkey has been reestablished in some places and egrets, great blue herons, and other waterfowl breed in the marshes along the Kentucky-Tennessee border. Migration routes for waterfowl follow the Mississippi, Ohio, and Tennessee rivers while land birds follow a route through central Kentucky and many song birds reside in the state. Fish include the muskellunge (called the jackfish or jack salmon), bass, and channel and blue catfish and there are several species of blind and semiblind cave fish.

Parks and Recreation.—Kentucky maintains more than 50 parks and historic sites. In many instances both recreational and historic interests are served on a single site. Largest of the state parks is that bordering the big Kentucky Lake created by the Tennessee Valley Authority's Kentucky Dam. Cumberland Falls Park at the Great Falls of the Cumberland is a large natural recreational centre where, on moonlight nights, the famous moonbow of the falls is clearly visible above the mist of the cataract.

Among the historic sites are the battlefield of the Blue Licks, the Butler home in Carroll County, the Wilderness Road Park, and the Columbus battlefield on the Mississippi. Boonesboro, newest of the state parks, is the original site of Fortress Boonesboro. Three of the interesting historic sites not in the park system are Big Bone Lick in Boone County, the Buried City near Wickliffe, and Indian Fort Mountain near Berea. The Big Bone Lick was one of the best known early landmarks in the state. The monstrous bones of huge prehistoric animals found about the lick were curiosities for Indian and white alike. The Buried City near Wickliffe is an opened Indian burial mound and the Indian Fort Mountain site is that of a prehistoric encampment and possibly a battleground.

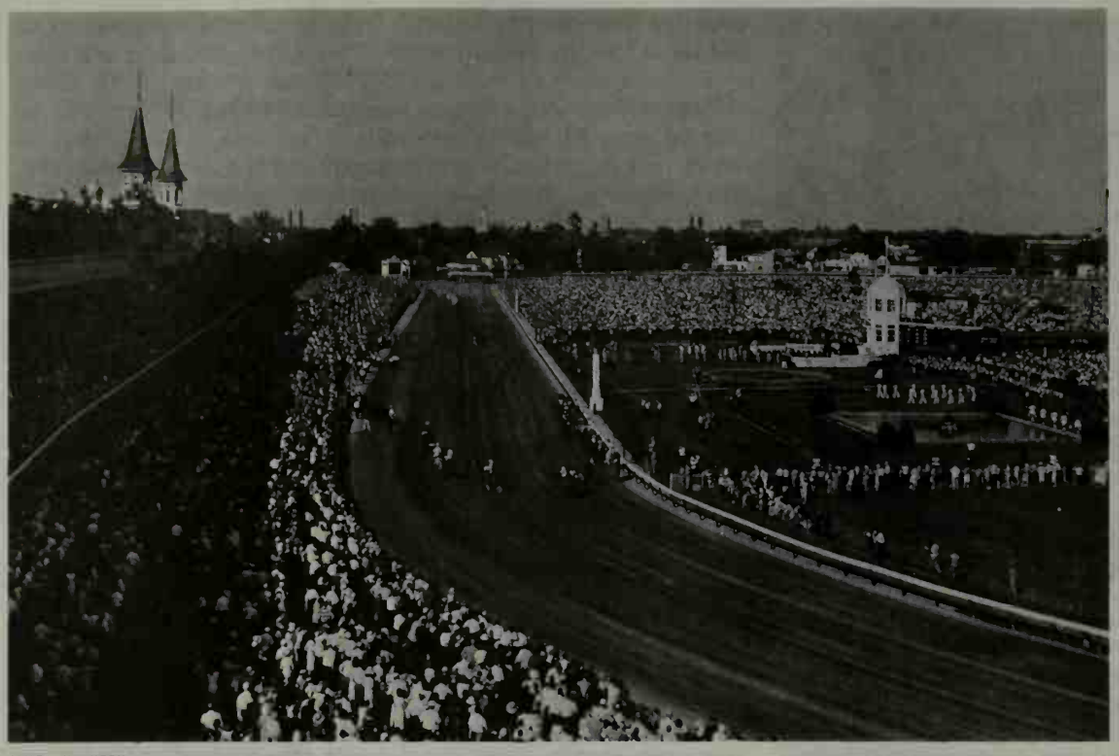
One of the most popular parks is Federal Hill at Bardstown. This home was the family seat of the Rowan family who were related to Stephen Foster. Legend has grown up that Foster composed "My Old Kentucky Home" at this beautiful house and grove. However, there has been no contemporary evidence produced to prove that Foster ever visited Federal Hill. Possibly the most accurate thing that can be said is that the house and grounds are a fitting tribute of the people of Kentucky to the composer.

More than 10,000 ac. of the Cumberland Gap National Historical Park, established in 1955, are in Kentucky. The traditional birthplace cabin of Abraham Lincoln is in the Abraham Lincoln Birthplace National Historic Site at Hodgenville. Mammoth Cave National Park (*q.v.*) in west central Kentucky was established in 1941 (*see* also FLINT RIDGE CAVE SYSTEM).

Annual events held in Louisville are the Kentucky State Fair and the Kentucky Derby run at Churchill Downs in May.

HISTORY

Early History.—Archaeologists and anthropologists have uncovered evidence that there were two, if not three, layers of culture existing before the arrival of the first settlers. An ancient agricultural and hunting civilization left kitchen middens and burial mounds. Indians of a later period hunted in the region,



JAMES N. KEEN

CHURCHILL DOWNS, LOUISVILLE, WHERE THE ANNUAL KENTUCKY DERBY HAS BEEN RUN SINCE 1875

and on the fringes of present Kentucky established small villages and trading posts. The Shawnees and their neighbours from above the Ohio hunted in the region, and the Cherokees came up from the south. The great Warrior's Trace ran diagonally across the state from near Portsmouth, O., to Cumberland Gap. Kentucky was largely a no man's land for the Indians of both regions. They hunted and warred back and forth for its possession.

Exploration.—French and Spanish explorers no doubt saw the region at an early date, but the often repeated statement that René Robert Cavelier, sieur de la Salle, explored the Ohio rim must be discounted as legend. He no doubt saw that part of the state bordering on the Mississippi. In 1671 Thomas Batts and a small party of Virginians crossed over into the Ohio Valley in search of the great western river and John Peter Salling visited the region in 1742. The baron de Longueuil came across country to the Ohio in 1739 when he visited some of the landmarks described by Indians. In 1749 Céloron de Blainville came from Montreal to make formal claim to lands along the Ohio. While Frenchmen were burying leaden plates at the mouths of the Ohio tributaries as evidence of their claims, Virginians and others were preparing to enter Kentucky. No doubt both Virginia and Pennsylvania traders previously had visited the region. In 1749 the Ohio Company (*q.v.*) was organized to lay claim to a large block of Ohio Valley lands; a year later the Loyal Land Company of Virginia was ready to begin its search for lands. Thomas Walker traveled down the Appalachian range in April 1750 to discover the Cumberland Gap. His journey into Kentucky, however, was confused and he left the area without reaching the rich bluegrass plateau. In October 1751 Christopher Gist came by way of the Ohio and Miami rivers scouting for the Ohio Company. Deterred by confusing geography and by Indians, he too left the state without seeing the central plateau.

Further exploration of Kentucky was delayed by the French and Indian War (*q.v.*). John Finley, a Virginian trader, had visited the region before the war began, and in 1755 he described it to Daniel Boone while the two were serving as wagoners on the Braddock expedition. In 1767 Boone set out to explore the Kentucky region alone, but he became lost. Guided by Finley, Boone returned with a small party in 1769. For two years he wandered in the region, much of the time alone. Meanwhile, settlers were moving down the valleys; they had broken through the Appalachian barrier to Tennessee and had established a settlement on the Watauga, a headstream of the Tennessee River. Boone had already left Kentucky in 1771 when the long hunters, so-called because of their extended trips, from the Yadkin Valley of North Carolina were crossing the mountains to raid the territory for skins and furs.

Settlement.—Land hunters were as persistent as those who hunted for game, and by 1774 surveyors were already platting lands in at least three locations in the state. One party was at the falls of the Ohio, later the site of Louisville, another was in the bluegrass area, and James Harrod, a Pennsylvania trader, led a party to the headwaters of the Salt River to begin the first permanent settlement. A brief interruption caused by an Indian outbreak known as Lord Dunmore's war forced Harrod to leave Kentucky, but the following year settlers returned to the station. Richard Henderson had purchased a claim to the land south of the Ohio and between the Kentucky and Tennessee rivers from the Cherokee Indians in the Treaty of Sycamore Shoals, and it was at the signing of this treaty that the disgruntled young Cherokee chief Dragging Canoe assured Henderson that the land would be "a dark and bloody one." The land was named Transylvania and in 1775 Daniel Boone and Henderson led a band of settlers across the mountains to establish Boonesboro on the south bank of the Kentucky River. Soon other forts and stations were established in the region. Already the pressure of the American Revolution was being felt in the west, and British-inspired Indian raids almost destroyed the infant Kentucky settlements. From 1775 to 1782 Kentuckians fought Indians from Detroit to Kaskaskia. George Rogers Clark (*q.v.*) launched his campaign from Harrodsburg and Corn Island in the Ohio River above the falls. While Clark was in the northwest fighting British and Indians, Boone and his fellow settlers repulsed the Shawnee chieftain Black Fish and his British ally, A. D. DeQuindre, from the settlement at Boonesboro. The last of the Indian raids on Kentucky occurred when Estill's Fort and Bryan Station, near Lexington, were raided by a band led by the British officer Caldwell, and the settlers were defeated in a skirmish at the Blue Licks on Aug. 19, 1782.

Toward Statehood.—Internally, another struggle had gone on; Virginia and North Carolina maintained rival claims over Kentucky. The Virginia Assembly, which in 1776 created Kentucky County, practically coterminous with the present state, annulled Henderson's claim in 1778, Henderson and his associates receiving 200,000 ac. of land to be located in present Henderson County as compensation, and all sales to actual settlers were confirmed. In 1780 Kentucky County was divided into Fayette, Jefferson, and Lincoln counties, and in 1783 the name Kentucky was given to the judicial district which was then organized for these counties.

From 1775 to 1784 population increased from 100 to almost 30,000. Following the American Revolution the roads swarmed with immigrants from east of the mountains, largely from Virginia, Maryland, Pennsylvania, and the Carolinas. These were predominantly of English, Scottish, Irish, German, and French backgrounds. There were also some Negro slaves. The pioneers came over the famous "Wilderness road" which led from Cumberland Gap to Boonesboro, Harrodsburg, Danville, Lexington, and the Ohio. Many came down the Ohio by canoe and flatboat to land at Limestone Creek (now Maysville), at the mouths of the Licking and Kentucky rivers and at the falls of the Ohio. This tide of settlement continued to rise until about 1775. Quickly, towns like

Lexington, Harrodsburg, Louisville, Paris, Maysville, Georgetown, and Stanford gained respectable populations.

Historically, Kentuckians have made a special point of the ruggedness of their pioneer background and of their heritage of strong individualism. Pioneering in Kentucky was rugged, but whether more so than elsewhere is open to question. Influences of the frontier were deeply ingrained in the lives of the people, a fact which can still be noted. Hardly had the last Indian warrior fled across the Ohio in 1782 before settlers were expressing varying degrees of dissatisfaction with the management of political affairs. By 1784 this unrest had developed into the beginning of a separation movement. Nine conventions were called in Danville to discuss separation from Virginia, an act which did not occur until 1792. Among those present at the great conventions debates were James Wilkinson, Caleb Wallace, George Nicholas, Isaac Shelby, Benjamin Logan, Samuel McDowell, and David Rice. Wilkinson was in communication with the Spanish governor Esteban Miro in New Orleans and he stood to profit considerably by a friendly decision on the part of Kentucky toward the Spanish authorities. No historian knows fully the truth about the Spanish conspiracy, but it did disturb the proceedings at Danville.

On June 1, 1792, Kentucky was admitted to the Union. Its constitution had been drafted in April and May in a short convention, in contrast to the interminable separation meetings. Possibly one of the most interesting facts about this early frontier document was that it contained a verbatim copy of the bill of rights from the second Pennsylvania constitution of 1790. Isaac Shelby was chosen the first governor, and the state government was organized in the Sheaf of Wheat tavern in Lexington. A special committee chose Frankfort on the Kentucky River to be the permanent site of the capital.

Internal Turmoil.—By the time Kentucky was admitted to the Union its fields were producing large quantities of farm products. Grain, meat, flour, hempen goods, hides, tallow, and distilled spirits were major stocks in trade. Thousands of tons of these products were drifted by flatboats to market in New Orleans each year. There was, however, a constant restlessness over the interference of the Spanish with this trade. Actually there was constant danger that Spanish officials would close the Mississippi River to Kentucky traffic. As a result Kentucky frontiersmen developed a more-than-usual interest in national politics. There arose, because of the proposed Jay-Gardoqui Treaty of 1786, a dislike and suspicion of New Englanders. In the rivalry between Thomas Jefferson and the Federalists, the Kentuckians quickly sided with Jefferson. Possibly their state of mind was more clearly revealed in their resistance to the Alien and Sedition Laws of 1798 (*see* UNITED STATES [OF AMERICA]: *History*). In Lexington, George Nicholas and Henry Clay campaigned successfully against the federalist laws. John Breckinridge brought from Virginia, and largely from the hand of Jefferson, the Kentucky resolutions (adopted by the General Assembly in 1798) which, briefly, proposed the nullification of the distasteful federal laws. Kentuckians were stimulated in this early protest partly by the so-called French conspiracy. In 1793 agents had visited Kentucky in behalf of Edmond Genet, French minister to the United States, in an effort to arouse opinion in favour of the French Republicans in the Ohio Valley.

Hardly had the Alien and Sedition argument developed before Kentuckians were aroused over the issue of reviewing and possibly redrafting their constitution. A political division was to occur over this issue which has largely characterized Kentucky politics ever since. The slaveholders and businessmen were aligned against the farmers and the antislavery forces who favoured rewriting the document. Finally the conservative forces saw they would lose, and assumed leadership of the campaign for a new convention and proscribed the changes which could be made. On June 1, 1800, the state began operation under its second constitution.

The 19th century brought many changes. Rich lands had paid big bounties and society in the more populous areas was rapidly losing its raw frontier character. Concern over the use of the Mississippi was settled by the purchase of Louisiana. Beyond the Ohio, the British in the northwest posts were accused of stimulating Indian troubles. William Henry Harrison (*q.v.*) was helping to open Indian lands to the settlers who were flocking across the river and Chief Tecumseh of the Shawnees, who looked upon this pressure as one of life or death for tribesmen, attempted to organize the Ohio Valley and southern Indians into a confederacy. While he was away in Alabama, Harrison marched against the Shawnees and engaged them in battle at the mouth of Tippecanoe Creek on the Wabash (Nov. 7, 1811). This was for Kentucky the beginning of the War of 1812.

The War of 1812.—Since 1805 Henry Clay had stimulated anti-British sentiment in Kentucky. By 1811 he and his fellow "war-hawk" Richard M. Johnson of Georgetown had stirred public sentiment to a boil in the state. Kentuckians played a major role in the fighting around Detroit and on the Great Lakes. Among the officers who fought with General Harrison in that area were Isaac Shelby, Green Clay, and Richard M. and James Johnson. Almost as many native sons fought with General Jackson at New Orleans under the command of Gen. John Adair as in the northwest.

The War of 1812 was to have an enormous bearing on the history of Kentucky. There was an urgent need for supplies in the war and farmers and manufacturers produced huge quantities of goods. Prices were inflated and a period of speculation endangered the entire economy of the state. People lost all reason and caution. When British goods were dumped on the U.S. market after the war the Kentuckians were brought close to bankruptcy. In 1818 the General Assembly had passed a law permitting the chartering of approximately 50 branches of the Bank of Kentucky, and each branch was permitted to issue its own currency. By 1819 deflation caused such a serious devaluation of state bank paper that almost everybody was ruined financially. To correct its original mistake the legislature passed two moratoriums to permit debtors either to pay their obligations with state bank currency or to delay payment for a period of two years. This came at the time the U.S. Supreme Court was handing down its famous *Dartmouth College* v. *Woodward* decision which involved the right of contract. The Kentucky Court of Appeals upheld a circuit court that found the state laws unconstitutional, and, in a struggle known as the "Old Court-New Court" fight, the legislature repealed the laws establishing the Court of Appeals and established a new court. Partisans were divided between those who opposed relief of delinquent debtors (the "Old Court" supporters) and those who favoured it (the former eventually winning). This division was to mark the difference between the Whig and Democratic parties. Henry Clay became the major Whig leader, with various relief partisans and Jacksonians leading the Democrats.

BY COURTESY OF THE KENTUCKY DEPARTMENT OF INFORMATION

SITE OF FIRST PERMANENT WHITE SETTLEMENT IN KENTUCKY. FT. HARROD AT HARRODSBURG HAS BEEN RECONSTRUCTED AS A HISTORIC SITE BY THE STATE

JERRY COOKE FROM PHOTO RESEARCHERS

HORSE FARM IN THE BLUEGRASS AREA

1820–1860.—Possibly the most disturbing single social and political issue in Kentucky from 1820 to 1860 was that of slavery. Farmers in the fertile bluegrass and in the productive lands of the Pennyroyal in western Kentucky were the major slaveholders, but there were few large slaveholders in the state, and in some counties there were few slaves. From 1820 until slavery was abolished in 1865, the interstate slave trade yielded a fairly large income to both farmers and slave traders. In 1833 the General Assembly enacted a law forbidding slaves to be brought into Kentucky to be resold to the South. This became a highly controversial law that figured in every political campaign until the end of the Civil War. As the state is on the Ohio River, Kentucky slaveowners suffered from the activities of the Underground Railroad (*q.v.*). Too, antislavery critics, including Harriet Beecher Stowe, often saw slavery first in Kentucky and they aimed their criticisms at the state. The Kentucky slaves were finally freed by the adoption of the 13th amendment in 1865.

Since 1820 efforts to call a new constitutional convention had been resisted by conservative proslavery forces, who were afraid that a new convention would destroy their property. The issue of revising the constitution rose again in 1849 and a convention was called. The slavery issue was made the central argument in the election of delegates and only proslavery men were elected. One liberalization of the constitution was made: an educational clause was written into the document for the first time. To counterbalance this a highly restrictive provision forbade the contracting of state debt in excess of $500,000.

In 1820–60 a major economic shift occurred. Capt. Nicholas Roosevelt brought the first steamboat, the "New Orleans," downstream from Pittsburgh in November 1811, and by 1820 there was a thriving traffic between New Orleans and the falls of the Ohio. This trade throttled Lexington's economic life and Louisville became the major city of the state. Too, Kentucky trade was centred on the Ohio. It was not until the coming of the railroad, the first one in the 1830s, and the development of new transportation lines across the state after the Civil War that a trade balance within the state was restored.

A Border State in the Civil War.—Kentucky was a border state. It had about as much intercourse with the states north of the Ohio as with those in the lower south. In 1850–60 Kentucky businessmen faced the distressing dilemma of possible civil war. Definitely war was not to their advantage. It would disrupt their trade and would possibly bring complete ruin. Politically the leadership in Kentucky was shifting. Henry Clay died in 1852 and the place of honour which he had long held was taken by John Jordan Crittenden, James Guthrie, and John C. Breckinridge. The Whig Party disintegrated and in its place came the confusion of the Know-Nothing era. Breckinridge, a Democrat, was elected to the vice-presidency of the United States and Crittenden became a senatorial leader.

In the presidential election of 1860, two of Kentucky's native sons were candidates: Breckinridge, nominated by the proslavery Democrats who seceded from the national party convention, and Abraham Lincoln. The people, however, cast a majority vote for the John Bell–Edward Everett Constitutional Union Party ticket. Lincoln and Hamlin, the Republican nominees, received only 1,366 votes in Kentucky. Prevailing sentiment was for compromise, even if this meant extending slavery into the new western territories. Kentuckians participated in a series of peace conferences hoping to preserve the Union. Ultimately there was a division of sentiment between the North and South. The General Assembly took no positive action in early 1861; it refused to provide for the calling of a sovereignty convention which might well have been stampeded into favouring the South. Reasons why Kentucky adopted a course of neutrality are many. Gov. Beriah Magoffin, though a Democrat, saved the state from seceding. President Lincoln in Washington also approached the problem of Kentucky with great care and understanding. Neutrality did not prevent invasion of Kentucky by both sides, first by the Confederate Gen. Leonidas Polk at Columbus, and then by the Unionists distributing "Lincoln guns." The Confederate Army occupied western Kentucky until February 1862, and Grant's army moved down the Cumberland after skirmishing at Paducah.

In 1862 Braxton Bragg and Edmund Kirby-Smith, generals of the Confederate Army, invaded Kentucky. Kirby-Smith pushed up from the Cumberland Gap, winning the Battle of Richmond en route. Bragg invaded from the Nashville area and pushed toward Frankfort, where he attempted to swear in a Confederate governor. Bragg was pursued by Gen. Don Carlos Buell, and the two commands engaged in a battle near the village of Perryville in Boyle County on Oct. 8, 1862, where the Confederates were defeated. John Hunt Morgan's raiders entered Kentucky on three different occasions and there was skirmishing in many places, but after the Battle of Perryville the major part of the war was fought in other states. By the end of the Civil War, Kentucky had supplied approximately 73,000 men to the Union Army, and about 35,000 men to the Confederacy. Almost immediately upon the end of hostilities the state became pro-Confederate in sentiment.

More Strife.—The process of reconstruction did not leave Kentucky altogether untouched. The free Negro proved to be an issue for three or four years, and there was some Ku Klux Klan activity. The race issue in the Reconstruction period was quickly settled, the Negro was allowed to vote, and the former slaves settled down to a life of tenant farming or working in the towns and industries as wage hands. Too, the patterns of Kentucky economic development changed. Tobacco supplanted hemp as a major field crop and with the introduction of the new burley-type tobacco this industry came to be a mainstay for farmers. Railroads were built across the state from north to south, and the rich eastern coal fields were opened by the extension of rail lines into the rugged mountain valleys of Harlan, Bell, and Pike counties.

Marked social strides made in the postwar years included the

organization of a public-school system with state support, the founding in 1865 of the Agricultural and Mechanical College (which evolved into the University of Kentucky) in Lexington, and the establishment of a fairly effective public health department. The cities of Lexington, Louisville, Covington, Owensboro, and Paducah grew rather rapidly, and some industry was located in the major towns, especially in Louisville. Kentucky wholesale merchants found a prosperous trade in the lower south and drummers from their business houses canvassed the region with great diligence.

Kentucky was not to escape the panics and agrarian turmoil of the latter half of the 19th century. Agrarian forces undertook to dominate the state government with near disastrous results in the 1880s. Nevertheless there continued a bitter fight between the corporations and the farmers. In 1899 the railroads, textbook companies, and bankers joined with the Gold Democrats, who had seceded from the Democratic Party, to support the gold standard (*see* McKINLEY, WILLIAM) and Republicans against the farmer-Greenbackers in a bitter gubernatorial campaign. Republican William S. Taylor seemed to have won but the election was disputed and the legislative committee on contests decided in favour of the Democratic candidate, William Goebel. Goebel, shot by an assassin on Jan. 27, 1900, died after being sworn into office on Feb. 3 and Lieut. Gov. J. C. W. Beckham filled out the term and was reelected in 1903.

Delegates to a fourth constitutional convention had drafted the present constitution in 1891, but Kentucky was not to see peace within its borders for a long time to come. Mountain feuds raged in the east, some of them caused by friction of a state divided in the Civil War. At the same time farmers in western Kentucky were frustrated by the repeated failures of tobacco prices to pay cost of production and from 1903 to 1910 they carried on the so-called night-riders war against the big companies and farmers who refused to cooperate in controlling the production and marketing of tobacco. Farmers' barns were burned or their crops destroyed and armed bands invaded market towns to burn warehouses of the "tobacco trust."

In a more constructive manner an able cluster of writers and newspapermen were able to bring distinction to their state. Henry Watterson, editor of the *Louisville Courier-Journal* from 1868 to 1918, made that paper nationally famous. James Lane Allen, John Fox, Jr., Annie Fellows Johnston, Alice Hegan Rice, Madison Cawein, Irvin Cobb, and Eleanor Mercein Kelly produced books and poetry of more than local importance. Alben Barkley (1877–1956) of Paducah served as vice-president of the United States, and as majority leader of the U.S. Senate.

World War I ushered in an era of change. Although the eastern coal fields were opened much earlier, this period saw marked expansion of the industry. Between 1918 and 1945 this industry grew rapidly. Its history, however, was marred by strikes called by the United Mine Workers. The eastern fields were again torn by labour strife in the years 1957–59. Mechanization gradually reduced the human factor in coal production. In both the western and eastern coal fields from 1940 the practice of strip mining was accelerated and stirred bitter public criticism. In 1966 the General Assembly passed a strict strip-mine law to ensure restoration of the natural contour of the land and its reforestation.

The depression of the 1930s followed by the impact of World War II went far to bring major changes in Kentucky's social and economic conditions. The construction of better roads, the generation of cheap electrical current, and the improvement of educational facilities revolutionized Kentucky life. After 1920 major changes occurred in the population base, with more than half of the state's 120 counties losing people to the industrial northwest and the rising urban centres. (T. D. C.)

GOVERNMENT

The fourth constitution was adopted in 1891. It provides for a large number of elective officials and denies eligibility for immediate reelection. A convention to revise the constitution or to draft a new one meets on the call of two successive legislatures, ratified by a majority of the popular vote if that majority is at least one-fourth of the votes cast at the preceding general election. Ordinary amendments require a three-fifths majority in each house and popular approval. This was the method used in 1955 when Kentucky lowered the voting age to 18 years, the second state (after Georgia) to do so. The legislature in 1960 established a constitution revision committee as an agency of the legislative research commission to carry on a program of "study, review, examination and exposition" of the state constitution and report annually to the commission. In 1965 Gov. Edward Breathitt appointed delegates to a constitutional convention to meet in Frankfort to draft a new constitution. The Franklin Circuit Court and the Court of Appeals upheld the constitutionality of the convention despite the fact its delegates had not been elected by the people. The people, however, had ample opportunity to study the new constitution before they voted to accept or reject it. In the general election, 1966, they rejected the new document by an overwhelming majority. Clearly they revealed an emotional and partisan rather than a rational reaction.

BY COURTESY OF THE KENTUCKY DEPARTMENT OF INFORMATION

KENTUCKY CAPITOL COMPLEX, FRANKFORT. DOMED BUILDING IS THE CAPITOL, OFFICE ANNEX IS BEHIND IT, AND THE GOVERNOR'S MANSION IS AT LOWER LEFT

They actually accomplished what they said they opposed by continuing to centre the major governmental powers in the hands of the governor and the state commissions. After 1920 the general assembly constantly lost ground in making major political decisions. The chief executive officers are: governor, lieutenant governor, secretary of state, attorney general, treasurer, auditor of public accounts, commissioner of agriculture, labour and statistics, and superintendent of public instruction. The legislature can repass over the governor's veto any measure by a simple majority of the total membership in each house.

Senators serve four years, one-half retiring every two years; representatives serve two years. There are 38 senators and 100 representatives. The Senate sits as a court for the trial of impeachment cases. A majority of either house constitutes a quorum, but ordinary bills, on the third reading, must receive a majority of the quorum which must be at least two-fifths of the total membership of the house. A majority of the total membership of each house is necessary for appropriation bills and bills creating debts. All revenue measures must originate in the House of Representatives, but the Senate may introduce amendments. There are detailed restrictions on local and special legislation.

The judiciary consists of a court of appeals, circuit courts, county courts, justice of the peace courts, and police courts. The Court of Appeals, composed of seven judges, one from each appellate district, serves for eight years. The senior judge presides as chief justice. Judicial circuits consist of groups of counties with those containing more than 150,000 people constituting separate districts. Each district has a judge and a commonwealth's attorney. The elective county officials—judge, clerk, attorney, sheriff, jailer, coroner, surveyor, and assessor—serve four years.

The municipalities are divided into six classes according to population, a classification which permits much special local legislation despite constitutional inhibition. The division lines are 100,000 or more for class one; 20,000; 8,000; 3,000; 1,000; and under 1,000 respectively.

*Kentucky: Places of 5,000 or More Population (1960 Census)**

Place	Population				
	1960	1950	1940	1920	1900
Total state	3,038,156	2,944,806	2,845,627	2,416,630	2,147,174
Ashland	31,283	31,131	29,537	14,729	6,800
Bellevue	9,336	9,040	8,741	7,379	6,332
Bowling Green	28,338	18,347	14,585	9,638	8,226
Campbellsville	6,966	3,477	2,488	1,535	1,341
Corbin	7,119	7,744	7,893	3,406	1,544
Covington	60,376	64,452	62,018	57,121	42,938
Cynthiana	5,641	4,847	4,840	3,857	3,257
Danville	9,010	8,686	6,734	5,099	4,285
Dayton	9,050	8,977	8,379	7,646	6,104
Elizabethtown	9,641	5,807	3,667	2,530	1,861
Erlanger	7,072	3,694	2,416	711	453
Florence	5,837	1,325	776	268	258
Fort Thomas	14,896	10,870	11,034	5,028	—
Frankfort	18,365	11,916	11,492	9,805	9,487
Franklin	5,319	4,343	3,940	3,154	2,166
Georgetown	6,986	5,516	4,420	3,903	3,823
Glasgow	10,069	7,025	5,815	2,559	2,019
Harrodsburg	6,061	5,262	4,673	3,765	2,876
Hazard	5,958	6,985	7,397	4,348	—
Henderson	16,892	16,837	13,160	12,169	10,272
Hopkinsville	19,465	12,526	11,724	9,696	7,280
Lexington	62,810	55,534	49,304	41,534	26,369
Louisville	390,639	369,129	319,077	234,891	204,731
Ludlow	6,233	6,374	6,185	4,582	3,334
Madisonville	13,110	11,132	8,209	5,030	3,628
Mayfield	10,762	8,990	8,619	6,583	4,081
Maysville	8,484	8,632	6,572	6,107	6,423
Middlesborough	12,607	14,482	11,777	8,041	4,162
Mount Sterling	5,370	5,294	4,782	3,995	3,561
Murray	9,303	6,035	3,773	2,415	1,822
Newport	30,070	31,044	30,631	29,317	28,301
Owensboro	42,471	33,651	30,245	17,424	13,189
Paducah	34,479	32,828	33,765	24,735	19,446
Paris	7,791	6,912	6,697	6,310	4,603
Pleasure Ridge Park	10,612	—	—	—	—
Princeton	5,618	5,388	5,389	3,689	2,556
Richmond	12,168	10,268	7,335	5,622	4,653
Russellville	5,861	4,529	3,983	3,124	2,591
St. Matthews	8,738	—	—	—	—
Shively	15,155	2,401	1,273	—	—
Somerset	7,112	7,097	6,154	4,672	3,384
Valley Station	10,553	—	—	—	—
Winchester	10,187	9,226	8,594	8,333	5,964

*Populations are reported as constituted at date of each census.
Note: Dash indicates place did not exist during reported census, or data not available.

Finance.—The Reorganization Act of 1936 brought about a considerable realignment of Kentucky's administrative system. One of the major units created at that time was the Department of Finance, which is divided into five major divisions—budget, accounts, personnel, purchase, and services. The division of the budget is under the direction of the commissioner of finance and the governor. The commissioner of finance has wide powers, even to seeing that the local branches of government conform to an established budgetary practice. Kentucky draws its tax income from selected sales excises, licence fees, taxes on individual incomes, on property, and on corporations, death and estate taxes, severance levies, and documentary and transfer fees. The largest sources are sales, motor fuels, and individual income taxes. Motor fuel and motor licence fees are appropriated to highway maintenance.

POPULATION

The population of Kentucky in 1790 was 73,677; in 1820 it was 564,317; in 1860, 1,155,684; in 1900, 2,147,174; in 1950, 2,944,806; and in 1960, 3,038,156. This last figure represented an increase of 3.2% over the population in 1950. The population per sq.mi. in 1960 was 75.2, as compared with 72.9 in 1950, and with 49.6 for the United States in 1960.

Of the population, 1,353,215 or 44.5% were classed as urban as compared with 36.8% in 1950. The state has two standard metropolitan statistical areas, Louisville and Lexington. These areas had a total population of 857,045 or 28.2% of the total population of the state in 1960.

The number of households in 1960 was 851,867, as compared with 779,608 in 1950. The average population per household had declined from 3.8 in 1950 to 3.5 in 1960.

The population of the state was distributed by colour and nativity as follows: 92.3% native white; 0.5% foreign-born white; and 7.2% nonwhite, almost all Negro. There were 98.9 males per 100 females in the native white population, and 95.6 in the Negro population; 9.6% of the population were 65 years old or over; and 48.5% of the population 14 years old and over were in the labour force. Of the total number of employed males, 18.9% were engaged in agriculture, 7.5% in construction, 13.1% in manufacturing, and 19.8% in transportation and trade.

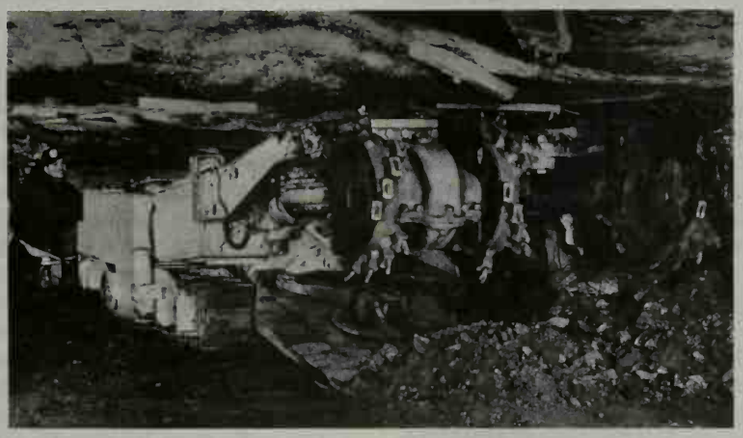
EDUCATION

Public Schools.—The third constitution (1849) provided for the creation and support of a public-school system. This program was interrupted by the Civil War, and from 1865 to the first decade of the 20th century the General Assembly gave the schools most meagre financial aid. The great "whirlwind campaign" of 1908, conducted by school people and interested citizens to call attention to the public schools and to bring about their improvement, brought about the reorganization and revitalization of the public-school movement. The state assumed a larger share of public-school support and required local districts to levy a school tax and to make a maximum effort to finance schools. State funds were used to aid public schools in their operation throughout the state. The Reorganization Act of 1908 established two teachers colleges, provided for a department of education in the Kentucky State College (University of Kentucky), and provided for a series of teacher qualifications. Kentucky led the Southern states in the passage of a compulsory school law (1898), and from 1900 on it encouraged consolidation of small schools into larger and more efficient units.

A series of legislative acts and constitutional amendments have brought about revision of the administration of the public schools. The state has had limited tax resources from which to draw funds and people in many areas have made only minimum efforts to support their schools. In 1941 a constitutional amendment was adopted to permit the distribution of funds in excess of the per capita appropriation, but not more than 10% of the general state school funds to equalize educational opportunities in the poorer districts. This plan was revised in 1953 by a second constitutional amendment to permit the adoption of a minimum foundation plan. In this latter provision emphasis is placed upon a minimum standard of educational effort rather than making a dole appropriation to schools. In addition, appropriation of state funds is

BY COURTESY OF THE KENTUCKY DEPARTMENT OF INFORMATION

(ABOVE) EAST DIAMOND MINE OF THE WEST KENTUCKY COAL COMPANY, MUHLENBERG COUNTY. (BELOW) A MECHANICAL COAL DIGGER OPERATING IN AN EASTERN KENTUCKY MINE



made to local districts on the basis of children enrolled in schools instead of children counted in the school census. Increased state appropriations provide that under the minimum foundation program law, no school district receives less than $80 in state aid per child maintaining an average daily attendance. In the 1960s Kentucky spent $300 per capita on students actually enrolled in school. About three times as many children are enrolled in the first grade as there are in the 12th. The scale breaks sharply after the fifth and eighth grades.

Desegregation.—A federal district court decision, *Johnson* v. *University of Kentucky* (1948), opened the doors of the graduate and specialized schools of the University of Kentucky to Negroes. In essence this decision nullified the Day Law of 1904 which had prohibited coracial education in Kentucky. The subsequent Supreme Court decision in *Brown* v. *Board of Education* in 1954 removed the last of the racial barriers in the public-school system. Gov. Lawrence Wetherby stated immediately that Kentucky would respect the decision of the Supreme Court and many local school boards began making plans to desegregate their schools. By 1960, of the 215 school districts in the state, about 170 had Negro students, and there were approximately 220,000 white students and 30,000 Negro students enrolled in desegregated schools. In these districts approximately 5,500 white and 170 Negro teachers instructed about 133,000 white and 12,000 Negro students in mixed classes. By September 1966 sharp revisions had been made in racial practices, and the Kentucky schools were completely desegregated for both pupils and teachers. This did not come, however, until the U.S. Department of Health, Education and Welfare rejected the plans of several counties and cities. Total enrollment exceeded 700,000 pupils, of whom about 60,000 were Negro.

Higher Education.—In the field of higher education, Kentucky maintains eight four-year colleges including a university. At the head of the educational system is the University of Kentucky, located in Lexington. This school was chartered in 1865, but did not open its doors in its present location until 1881. It was first the Kentucky Agricultural and Mechanical College, and after a series of name changes it became the University of Kentucky in 1918. The university is a land-grant institution maintaining a rather strong liberal-arts tradition. There are 13 colleges, including the professional schools of law, medicine, pharmacy, architecture, dentistry, and nursing. In addition, there are the experiment station and the agricultural extension service.

In 1966 the Kentucky General Assembly revised the state's system of colleges and universities. Western Kentucky State College (1906) at Bowling Green; Eastern Kentucky State College (1906) at Richmond; Murray State College (1922) at Murray; and Morehead State College (1923) at Morehead were elevated to university status, becoming Western Kentucky University, Eastern Kentucky University, Murray State University, and Morehead State University. Kentucky State College, formerly Kentucky State Normal School for Colored Persons (1886) at Frankfort was left unchanged. Besides these schools Kentucky maintains two junior colleges and vocational schools in Paintsville (Mayo State) and Covington (Northern Kentucky State). Degree-granting colleges supported either by municipal or private funds include the University of Louisville, established as Jefferson Seminary in 1798, at Louisville; Asbury (1890), nonsectarian, at Wilmore; Berea (1855), nonsectarian, at Berea; Centre College of Kentucky (1819), Presbyterian and United Presbyterian, at Danville; Georgetown (1787), Southern Baptist, at Georgetown; Cumberland (1889), Southern Baptist, at Williamsburg; Campbellsville (1906), Southern Baptist, at Campbellsville; Transylvania (1780), Disciples of Christ, at Lexington; Pikeville (1889), United Presbyterian, at Pikeville; Union (1879), Methodist, at Barbourville; and Kentucky Wesleyan (1858), Methodist, at Owensboro. Roman Catholic colleges include Nazareth (1920), for women, Ursuline (1938), for women, and Bellarmine (1950), for men, all at Louisville; and Villa Madonna (1921), coeducational, at Covington. Besides these, there are the Southern Baptist Theological Seminary at Louisville, the Lexington Theological Seminary (formerly the College of the Bible) at Lexington, the Louisville Presbyterian Theological Seminary, and the Asbury Theological Seminary at Wilmore. Among the junior or community colleges are the nine University of Kentucky centres at Ashland, Covington, Cumberland, Elizabethtown, Fort Knox, Prestonburg, Henderson, Hopkinsville, and Somerset, and Paducah Junior College at Paducah. Private junior colleges are Lees at Jackson, Lindsey-Wilson at Columbia, and Sue Bennett at London. Alice Lloyd College (formerly Caney Junior College) at Pippa Passes was elevated to the status of a four-year college in 1964.

HEALTH, WELFARE, AND CORRECTIONS

The benevolent, charitable, corrective, and penal institutions of the state are under the supervision of the Department of Welfare created in 1936. The institutions include: Eastern State Hospital, Lexington; Central State Hospital, Lakeland; Western State Hospital, Hopkinsville; Kentucky Training Home, Frankfort; Kentucky Children's Home, Lyndon; Kentucky State Hospital, Danville; Kentucky Houses of Reform, Greendale; Kentucky State Reformatory, La Grange; Kentucky State Penitentiary, Eddyville; and Women's Prison, Pewee Valley. The Department of Welfare is administered through four major divisions, each headed by a director—corrections, probation and parole, hospitals

and mental hygiene; public assistance; child welfare; and division of engineering. The 1948 General Assembly transferred to a new department of economic security the division of public assistance (administering aid to the aged, blind and disabled, and aid to dependent children), formerly parts of the welfare department. At the same time it transferred the division of engineering to the Kentucky building commission.

THE ECONOMY

Agriculture.—No phase of Kentucky economic life has changed more rapidly than its agriculture. Trends—decreasing number of farms and acres in cultivation, increasing size and value per farm and per acre, the shifting of ownership and the drop in tenancy—reflect the changes brought about by increasing mechanization of farms. Each year there has been a shrinkage in the farm population. In 1930 there were 246,000 farms; within 30 years the number had dropped to fewer than 150,000. At the same time the number of acres had dropped from more than 19,225,000 to about 17,000,000 while land values increased from about $870,000,000 to more than $1,700,000,000. During and after World War II the average size per farm increased from 80.2 to 113 ac. and value per farm rose from $3,070 to over $15,000, with an increase in acre value from about $38 to over $135. The number of tenants decreased from about 49,000 to less than 25,000, or about 16% of the farm population.

In spite of these changes Kentucky is still characteristically rural. In 1950 out of a population of 2,944,806 persons, 1,084,070 were urban, 886,566 rural nonfarm, and 974,170 rural. In 1960 out of a population of 3,038,156 persons, 1,353,215 were urban, 1,137,118 rural nonfarm, and 547,823 rural. Both urban and nonfarm represent a strong mixture of rural inhabitants. Reasons for shifting of the farm base in Kentucky are many. Restrictions on tobacco acreage have pushed tenants off farms and mechanization of both cultivating and harvesting operations has reduced substantially the need for farm labour. The growth of industry in many parts of the state and in other states in the middle west has robbed the submarginal farms of their labour, as has an expanding urbanization about Louisville, Owensboro, Paducah, Lexington, Covington, and Ashland.

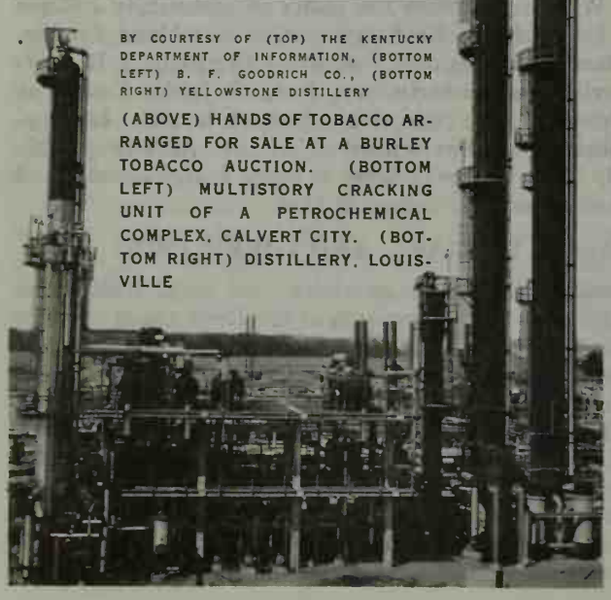
Farm crops have become more highly diversified than at any time in the state's history. The total annual farm crop income in the second half of the 20th century was about $440,000,000; of this amount tobacco yielded more than $275,000,000; corn returned more than $85,000,000, and hay almost $60,000,000. These three crops represented about 90% of the total income from sale of farm produce. Kentucky farmers were cultivating about 3,125,000 ac. with 1,100,000 ac. being planted in corn, 1,600,000 in hay, 300,000 in soybeans, and 200,000 in tobacco. Kentucky tobacco farmers faced grim facts in the 1960s. There was demand for their product, but rising expenses associated with shrinking tobacco acreage and the resultant pressure to increase production per acre by heavy fertilization, the high risk of loss due to the vagaries of weather and other factors, and the high cost of farm labour were driving many farmers out of tobacco growing. In areas where small farmers grew an acre or so of tobacco, the land was being returned to forest or pasture. In the bluegrass country farmers were turning more to nonrow crops more easily managed with machines. Other crops were wheat, potatoes, fruits, vegetables, and small grains. Livestock farming increased after 1950, the value of all livestock on Kentucky farms reaching more than $300,000,000 in the 1960s. Again Kentucky assumed the lead in livestock production in the southeast. Cattle constituted the major gains, totaling more than three-fifths that returned by hogs and lambs. Indicative of the remarkable change that came over Kentucky agriculture in the 1950s and 1960s, the number of horses and mules dwindled from 313,000 to 145,000, although large thoroughbred breeding and training farms still flourished in the bluegrass region. The American Thoroughbred Breeders Association, which operates a research program to obtain knowledge of probability in horse-breeding, has its headquarters in Lexington.

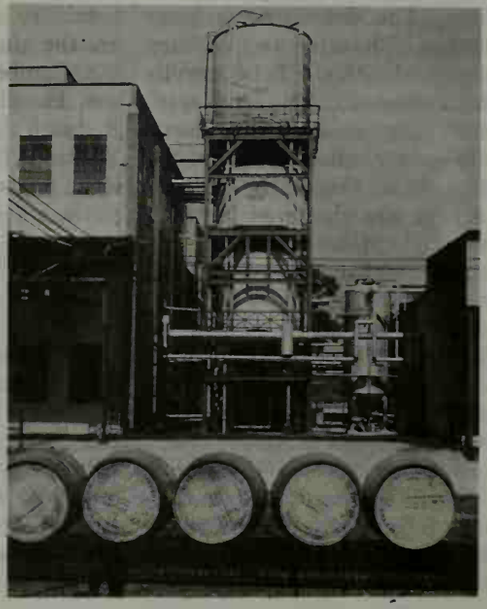
The mule is on its way to extinction in a state which once received a big income from the breeding industry. The Kentucky experiment station made no provision for horses and mules on its new Eden Shale Belt farm, and were it not for sentimental reasons it is doubtful that the Kentucky State Fair would any longer exhibit jacks, jennets, and mules. A more shocking fact in Kentucky agricultural history is that farm proprietary income has dropped below 10% of the entire state income since 1950.

Manufacturing.—Although much of its population is still rural (56.5% in 1960), and its basic economic tradition is agrarian in origin, nevertheless Kentucky tends annually toward developing a rich manufacturing industry.

By the 1960s there were approximately 3,000 manufacturing plants employing more than 180,000 individuals. Payrolls totaled more than $950,000,000 and capital expenditures over $225,000,000. Value added by manufacture, in the neighbourhood of $1,500,000,000 in the 1950s, exceeded $2,460,000,000 in the 1960s. Not only is industry yielding a bigger income in the state, it is becoming more highly diversified. Production of 25% of U.S.-manufactured cigarettes, the long established tobacco industry, centred largely in Louisville (ranked as the second largest cigarette manufacturing centre in the nation) and Lexington, is expanding its manufacturing facilities.

Among newer industries are the chemical plants located along the Ohio River, the aluminum industry in Louisville, the smaller metal factories about the state, and the electrical typewriter industry in Lexington. While manufacturing is still located





BY COURTESY OF (TOP) THE KENTUCKY DEPARTMENT OF INFORMATION, (BOTTOM LEFT) B. F. GOODRICH CO., (BOTTOM RIGHT) YELLOWSTONE DISTILLERY

(ABOVE) HANDS OF TOBACCO ARRANGED FOR SALE AT A BURLEY TOBACCO AUCTION. (BOTTOM LEFT) MULTISTORY CRACKING UNIT OF A PETROCHEMICAL COMPLEX, CALVERT CITY. (BOTTOM RIGHT) DISTILLERY, LOUISVILLE

along the Ohio shoulder, industries are moving into other areas of the state. The larger industrial centres are Ashland, Bowling Green, Covington, Frankfort, Lexington, Louisville, Newport, Owensboro, Russellville, Calvert City, and Paducah. The leading industries are foods, tobacco, metals, electrical equipment, chemicals, farm equipment, electric typewriters, and printing and publishing. Other manufactures include lumber, textiles, wood products, garments and beverages of all types, largely distilled liquors.

Minerals.—Leading mineral products are bituminous coal, petroleum, natural gas, stone, fluorspar, and clays. In the second half of the 20th century Kentucky ranked second among the states in the production of ball clay (about 25% of the U.S. total), third in bituminous coal production, and fourth in fluorspar production. Once settlers obtained their own salt from salt licks and processed saltpetre deposits in Mammoth Cave and elsewhere for gunpowder. Some lead and iron was mined as late as the 1870s. Coal mining began early in the 19th century, continuing in the second half of the 20th century in the western, Big Sandy, Kentucky River, and Cumberland River regions.

Trade.—A good share of Kentucky's income is derived from the retail and distributive business. In the second half of the 20th century there were about 30,000 mercantile establishments with annual sales of $3,000,000,000. About 3,600 wholesale establishments had annual sales of more than $3,000,000,000. Services such as automobile repairs, recreation, business services, and hotels and motels increasingly yielded additional income.

Transportation.—In 1775 Daniel Boone marked a trail through the Cumberland Gap that became the Wilderness Road which, with the Ohio River, served the early settlers. Streams and turnpikes afforded fair service until the railroad era. The first short railway was started in 1830. Growth of steam railways was slow until 1880, when mileage was only 1,530. In the second half of the 20th century the mileage in operation was about 3,500, all diesel. Most of the lines run south or southwest from Cincinnati and Louisville.

Highway construction and maintenance has always been a difficult undertaking for Kentucky, largely because of the state's rugged terrain and numerous stream crossings. The state, however, sits across the main north-south and east-west lines of travel. In the second half of the 20th century Kentucky had a total mileage of roads of almost 70,000 mi. including about 5,500 mi. of primary roads. There are approximately 50,000 mi. of surfaced roads in the state. Support for highways and for maintenance of farm-to-market roads comes from a gasoline tax and from funds appropriated by the federal aid program. Three major interstate routes cross Kentucky. Again the Ohio, Tennessee, and Cumberland rivers have come into their own as major channels of transportation. After August 1966 the Cumberland River was made a more adequate transportation channel by the Barkley Dam. The Markland Dam on the Ohio increased the transportation efficiency of that stream. Many extra-long articles, such as the equipment for astronautical flight, are transported to and from the Redstone Arsenal by way of the rivers. Pipelines crisscross the state bearing natural gas and crude oil to market. Truck and tank car lines also transport large quantities of gas and oils.

See also references under "Kentucky" in the Index.

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(E. T.; W. W. Js.; T. D. C.)

KENYA, an independent state in east Africa and member of the Commonwealth of Nations, is bounded east by the Indian ocean and the Somali Republic, north by Ethiopia and the Republic of the Sudan, west by Uganda and south by Tanganyika. Situated astride the equator, Kenya has a total area of 224,960 sq.mi., including 5,171 sq.mi. of water. The coastlands from the Tanganyika frontier to Kipini to a depth of ten nautical miles inland, with Mombasa, Lamu and other small islands, were leased from the sultan of Zanzibar and formed the Kenya protectorate as distinct from the colony, but when the country became independent in Dec. 1963 the protectorate was integrated with the rest of Kenya. The country takes its name from Mt. Kenya, from the Kikuyu *Kere-Nyaga* ("mountain of whiteness"). The capital is Nairobi (*q.v.*).

This article contains the following sections and subsections:

I. Physical Geography
  1. Geology
  2. Relief and Drainage
  3. Climate
  4. Vegetation and Animal Life
II. The People
  1. Ethnic and Tribal Groups
  2. Religion and Languages
  3. Population
III. History
  1. The Power of the Masai
  2. The Imperial British East Africa Company
  3. The East Africa Protectorate
  4. The Uganda Railway and European Settlement
  5. World War I and Its Aftermath
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IV. Administration and Social Conditions
  1. Central and Local Government
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V. The Economy
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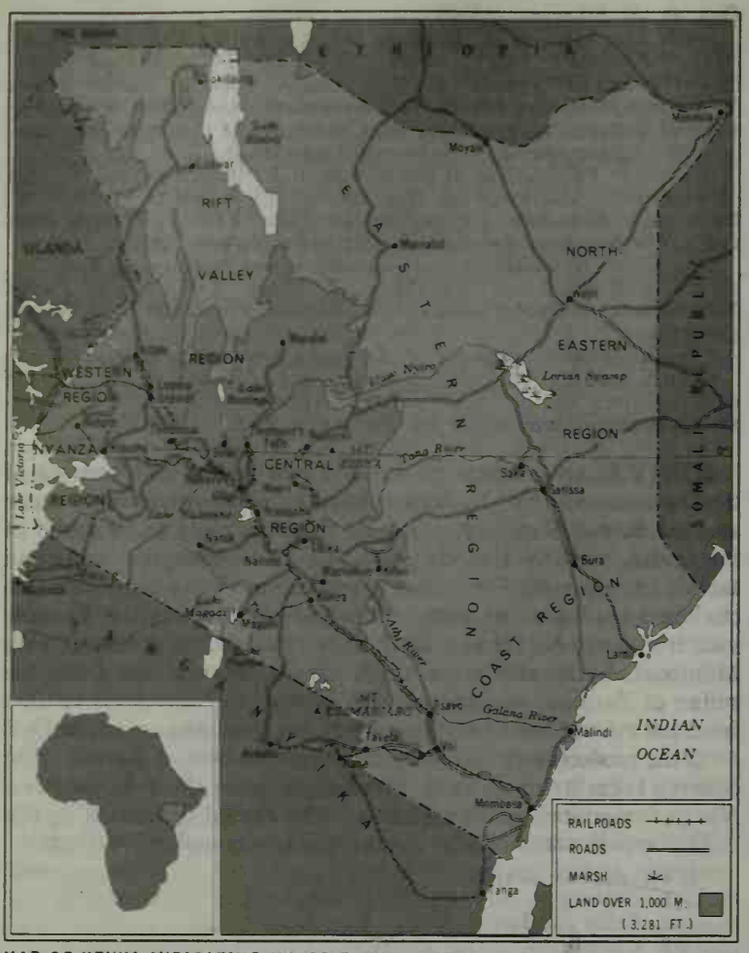
  2. Trade and Finance
  3. Communications

I. PHYSICAL GEOGRAPHY

1. Geology.—The gneisses and schists of the Basement system provide the geological foundation of Kenya and contain kyanite, graphite, asbestos and mica among their minerals. Over the greater part of the country the Basement rocks are overlain by younger material. In western Kenya the Pre-Cambrian Nyanzian and Kavirondian systems form the covering and are in turn blanketed by the Kisii series of Bukoban age. The Nyanzian and Kavirondian systems were intensively folded and extensively invaded by granites; gold and copper are the most important of their economic minerals. A succeeding phase of geological stability and prolonged denudation culminated in the formation of the Cretaceous peneplain. In what are now the eastern lowlands of Kenya deposition occurred, and the Duruma sandstones, of Carbo-Permian and Triassic age, were followed after an unconformity by the marine Jurassic sediments of the coast; and Mesozoic sediments cover a large area in the extreme northeast.



MAP OF KENYA INDICATING MAJOR TOWNS, COMMUNICATIONS, REGIONS AND GEOGRAPHICAL FEATURES

General uplift of early Cretaceous times was succeeded by the phase of denudation which led to the formation of the sub-Miocene peneplain. The tectonic activity which gave rise to the Eastern Rift valley and its flanking highlands, which lie mainly in Kenya, seems to have occurred mainly in the Pliocene and Pleistocene periods; it is the recency of these earth movements that accounts for the freshness and vigour of the relief associated with them. Volcanism accompanied the geological instability, and although the older plateau basalts belong to the Miocene period most of the lavas of the Kenya highlands were erupted in the Pliocene and Pleistocene periods. The Tertiary-Recent lavas extend over most of the Kenya highlands, the whole of the Rift valley and wide areas on either side of Lake Rudolf; to these landscapes they yield soils that are generally porous but fertile.

Tertiary and Quaternary sediments were formed in the main Rift valley and in the Kavirondo rift. In the Miocene beds of Rusinga Island, at the entrance to the Kavirondo gulf in Lake Victoria, the jaw of the fossil ape *Proconsul africanus* (*see* PROCONSUL) was found. Pleistocene lacustrine beds, products of the larger lakes of pluvial periods, yield diatomite at Kariandus, near Gilgil. In the coastal area the principal Pliocene sediments are sands, sandstones and clays; and there are raised coral reefs, coral breccias, sandstones and sands of Pleistocene age. The phase of emergence which brought these deposits well above sea level was succeeded by one of submergence in which the coastal creeks were formed. Modern coral reefs have grown up offshore.

2. Relief and Drainage.—The coast line extends from the mouth of the Umba river in the south to Dick's head in the north. It is broken by bays in the south and farther north by branching creeks of which Mombasa and Kilindini harbours and their inland continuations are the most important. Mombasa, Lamu, Manda and Patta islands are cut off from the mainland by such creeks. Beyond the coastal plain, which varies from 2 mi. to 10 mi. in width, the country rises westward through the coastal hills to the thorn scrub country of the Nyika and increases in altitude to 5,000 ft. on the eastern edge of the highlands. The sedimentary rocks of the eastern Nyika give place to those of the Basement farther west, where steep-sided inselberge occur in the Teita hills and in western Machakos. In the narrow Yatta plateau, in the Chyulu range and on the northern flanks of Kilimanjaro young volcanics rest upon the ancient rocks of the Basement. Low plateau, for the most part below 2,000 ft. above sea level, extends over the vast areas of eastern and northern Kenya. In the area east of Lake Rudolf the volcanic piles of Kulal (7,520 ft.) and Marsabit (5,593 ft.) rise out of an extensive waterless waste.

In the East Kenya highlands the steep eastern wall of the Rift valley is flanked eastward by high country, especially in its central portion where the Aberdare range has an average height of 11,000 ft. and culminates in Sattimma (13,104 ft.) and Mt. Kinangop (12,816 ft.). To the north lies the Laikipia escarpment, mostly over 6,000 ft. and south of Nairobi are the lower-lying Athi and Kapiti plains. The Aberdares slope gradually eastward and southeastward, providing a fine example of an immature, consequent drainage pattern, before the ground rises again to the mighty cone of Mt. Kenya, 17,058 ft., with its well-developed radial drainage. Northeast of Meru the Nyambeni range marks an extension of the volcanic extrusion.

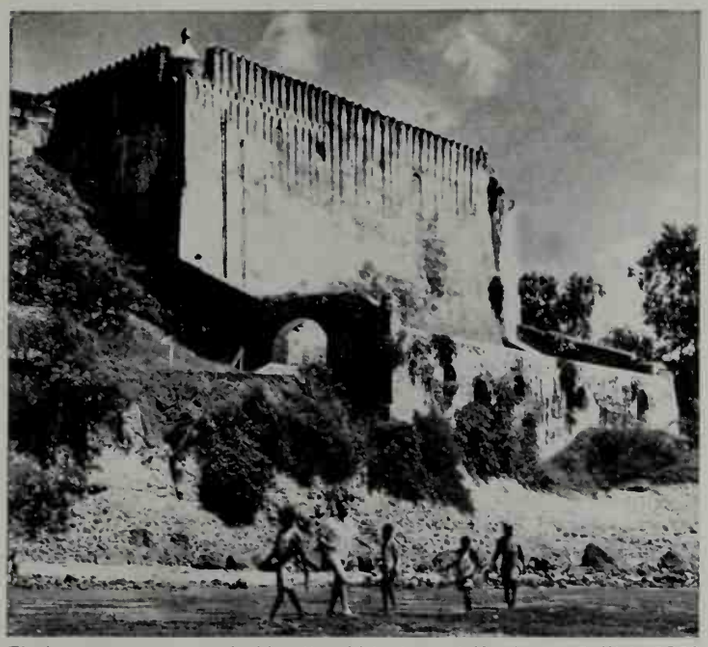
The Rift valley varies in width from 30 to 40 mi. and its floor is 2,000–3,000 ft. lower than the country on either side. In the highest, central portion, between Nakuru and Naivasha, the floor is over 6,000 ft. above sea level, but it falls away northward and southward to less than 2,000 ft. The Rift valley is diversified by the north-south line of the Kamasia hills to the north of the equator, and to the south by craters of which Menengai (7,475 ft.), Longonot (9,111 ft.) and Suswa (7,732 ft.) are the best known. Within the complex relief of the Rift valley a series of basins contains shallow lakes mostly without outlet. The soda lake of Magadi (1,900 ft.) is situated in the south. A central group comprises the fresh-water Lake Naivasha (6,184 ft.) and Elmenteita (5,850 ft.) and Nakuru (5,765 ft.), both of which are saline. Farther north are brackish Lake Hannington at 3,160 ft. and the fresh-water Lake Baringo at 3,200 ft. The Rift valley widens and becomes less defined northward where Lake Rudolf lies at a height of 1,230 ft.

Although the western wall of the rift is less steep than its eastern counterpart it is nonetheless well marked in the Mau and Elgeyo escarpments, the average height of the former exceeding 9,000 ft. West of the escarpment zone the important plateau areas of Trans-Nzoia and Uasin Gishu and, farther south, the Nandi and the Kericho highlands, all lie between 6,000 and 7,500 ft. As a western bastion of the highlands Mt. Elgon rises to 14,178 ft. on the Uganda border.

The West Kenya highlands give place to the western plateaus, which extend roughly from the 5,000 ft. contour down to the level of Lake Victoria at 3,720 ft. The tectonic depression occupied by the Kavirondo gulf and the Kano plains divides the plateaus into two parts. To the south the Kisii highlands and the isolated volcanic hills of Gwasi and Homa are notable features; in the northern area tumbled masses of granite are much in evidence.

To the west of the interior drainage area of the Kenya Rift valley the rivers are tributary to Lake Victoria, the Nzoia being the largest stream; while to the east drainage is toward the Indian ocean. The Tana is the longest river in Kenya. The 340 mi. Athi-Sabaki-Galana rises north of Nairobi and enters the Indian ocean north of Malindi. The Uaso Nyiro has its headwater zone in the Laikipia plateau and flows eastward into the Lorian swamp.

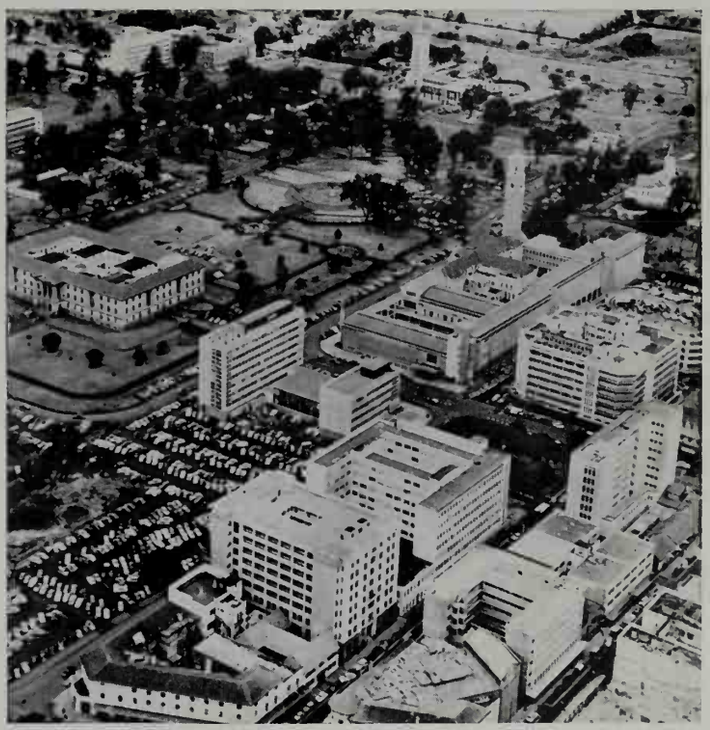
3. Climate.—Vast areas in Kenya have a mean annual rainfall of less than 30 in., while a wide belt over northern Kenya has a mean of less than 10 in.; high temperatures and a high rate of evaporation enhance the aridity. Rainfall unreliability causes drought conditions to extend in some years into areas with a mean of 30 in. or more. Of the better watered landscapes the first is the coastal strip where a marked maximum of rainfall occurs in April and May and appreciable totals are received in all other months except January and February. Even so, with high rates of evaporation there are deficiencies in soil moisture for the greater part of the year. The mean annual temperature is ap-



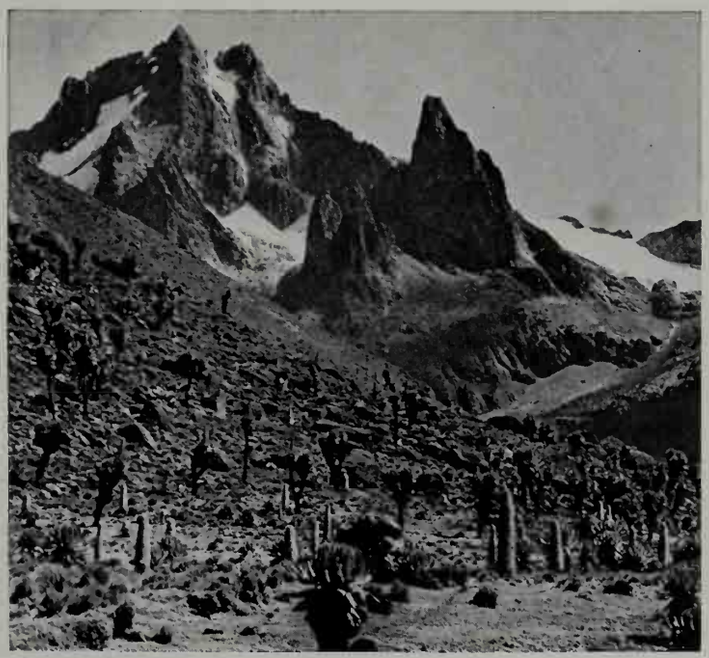
Ft. Jesus, a museum overlooking the old harbour at Mombasa. Built in 1592 by the Portuguese, it later served as a prison

Fishermen setting sail along the shore of the Kavirondo gulf of Lake Victoria, which borders Nyanza province, Kenya

Muslim women of Mombasa peering through slits in their veils. The Persian-Arabic settlement at Mombasa dates from about the 11th century



Northern section of the city square in Nairobi. The building with the tower to the right is the city hall



Peaks of Mt. Kenya, the highest mountain in Kenya. Although near the equator, it has a permanent covering of ice and snow

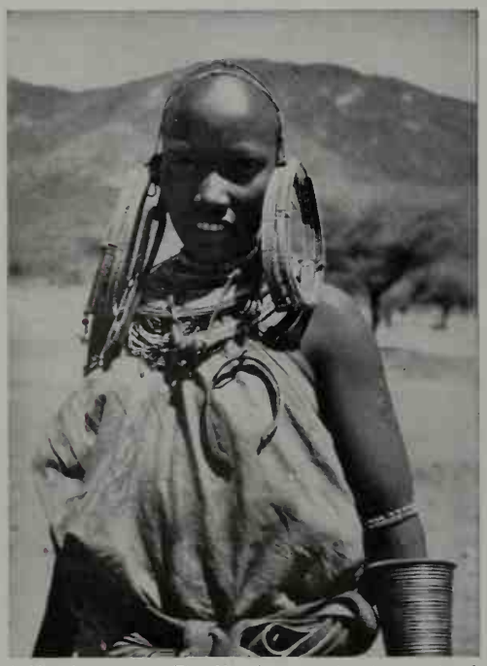
Baling dried sisal fibre at a processing plant near Hoey's Bridge. Sisal is one of Kenya's principal crops

VIEWS OF KENYA AND ITS PEOPLE

BY COURTESY OF (CENTRE RIGHT) CONSULATE OF GREAT BRITAIN, CHICAGO, (BOTTOM RIGHT) CATERPILLAR TRACTOR CO.; PHOTOGRAPHS, (TOP LEFT AND RIGHT, BOTTOM LEFT) AUTHENTICATED NEWS, (CENTRE LEFT) WIDE WORLD

KENYA

Part of the Kenya branch of the Great Rift valley seen from the uplands. Suitable only for cattle farming, it is flanked on either side by fertile farmland



A Masai woman. The Masai are pastoral nomads of Kenya

Parliament building in Nairobi, the capital of Kenya and most important urban centre in East Africa

SCENES OF KENYA

PHOTOGRAPHS, (TOP, BOTTOM RIGHT) AUTHENTICATED NEWS, (BOTTOM LEFT) E. AUBERT DE LA RÜE

proximately 26.1° C. (79° F.), the mean annual range about 3.3° C. (6° F.) and diurnal range 6.7° C. (12° F.). January–March are the hottest months and June–July the coolest. Despite the high relative humidity, there is abundant sunshine and good visibility; and there are fresh breezes from the ocean.

Over much of the highlands the rainfall is only moderate. In the East Kenya highlands the main rains occur from March to May and the lesser rains from October to December; whereas in the West Kenya highlands there is a continuous rainy season from March to September, with maxima in May and August. Temperatures vary according to altitude, Nairobi (5,495 ft.) having a mean annual temperature of 19° C. (66° F.) as compared with 13.3° C. (56° F.) at Equator (9,062 ft.). The mean annual range is small, but the diurnal range averages 10.1° C. (20° F.). Frosts occur occasionally above 7,000 ft. and frequently above 8,000 ft.; while the glaciers of Mt. Kenya descend as low as 15,200 ft. There is a fair amount of cloud and mist in the highlands and, especially in the cool season (June–August), the air can be distinctly chilly. In western Kenya the plateaus have an abundant rainfall well distributed throughout the year, but the totals are lower on the Kisumu flats and on the shores of Lake Victoria; there are also temperature contrasts between the plateaus and the adjacent lowlands.

4. Vegetation and Animal Life.—In the highlands between 6,500 and 9,000 ft. the characteristic landscape consists of patches of evergreen forest separated by wide expanses of short grass. Man has encroached seriously upon the forests, but the forest reserves of Kenya, totaling 6,719 sq.mi., are almost exclusively in the highlands. Above the forest a zone of bamboo extends to about 10,000 ft., beyond which the mountain moorland includes among its species tree heaths, tree groundsel and giant lobelia. In the western plateaus the highland vegetation gives way to a formation in which low trees are scattered through grass 5–8 ft. high; the same vegetation occurs between 3,000 and 6,000 ft. east and south of Mt. Kenya and around the headwaters of the Tana and Athi rivers. On the northern and southern margins of the highlands between 3,000 and 6,000 ft., flat-topped trees are scattered through an even cover of grass 3 or 4 ft. high, as in the Laikipia, the Rift valley south of Nakuru and the area south of Nairobi. Semidesert conditions below 3,000 ft. give rise to thornbush, interspersed with acacias, euphorbias and baobabs, as typified in the Nyika. In the still drier areas of northern Kenya desert scrub exposes the bare ground as a conspicuous element in the landscape. In the coastal belt dense high bush alternates with limited areas of forest and extensive open glades. Coconut palms are characteristic trees at high-tide line and stands of mangrove occur in tidal estuaries and lagoons.

Kenya is noted for its big game which ranges especially over the dry, thornbush country in numbers varying greatly in any one locality in accordance with migrational movements. The large carnivores include lion, leopard, cheetah and wild dog; but the commonest animals are herbivorous. Elephant, buffalo and rhinoceros are found in open country as well as in the mountain forests, and huge herds of zebra, antelope and gazelle range over the open plains. Wildebeest, hartebeest, palla (impala), Thomson's gazelle, Grant's gazelle, oryx, eland and giraffe are some of the numerous herbivores. Hippopotamus and crocodile are common in most of the large rivers, swamps and lakes. Hyena and jackal play the useful role of scavenger. Baboons frequent open country, while Sykes' and colobus monkeys live in the forests. The many species of snakes include mamba, cobra, puff adder and python. Birds include ostriches, storks, several kinds of eagle and vulture, guinea fowl, weavers and hornbills. By the lake shores are flamingoes, pelicans, heron, ibis and ducks. Many species of migrant birds from Europe reach Kenya. The main mountain streams are well stocked with trout; ngege (*Tilapia esculenta*) is the principal fish in Lake Victoria; and there are sea fisheries, including big game fishing.

National Parks.—These provide the main bastion of the wildlife preservation policy and are controlled by a board of trustees. The parks are supplemented by various district council game reserves and by controlled hunting areas. The interest of the small Nairobi park (44 sq.mi.) is primarily faunal and the Tsavo park (8,034 sq.mi.) of southern Kenya contains a rich variety of game. The Lake Nakuru park is primarily a sanctuary for aquatic birds. The Mount Kenya (227 sq.mi.) and Aberdare (228 sq.mi.) parks provide a more scenic and floral interest. Olorgesailie park, 42 mi. S.W. of Nairobi, and other prehistoric sites are situated in the Rift valley; and at the coast the Gedi park, the Fort Jesus park and the Coast historical sites have been created to protect ancient monuments. The chief game reserves are Amboseli (1,259 sq.mi.), Mara (700 sq.mi.) and Meru (600 sq.mi.). (S. J. K. B.)

II. THE PEOPLE

1. Ethnic and Tribal Groups.—Kenya's three fertile and densely populated areas are traditionally occupied by Bantu-speaking and Nilotic-speaking farming tribes, separated by relatively arid belts supporting Nilo-Hamitic-speaking pastoralists. The last named, despite their small numbers, have greatly influenced the sedentary tribes.

The Kikuyu (*q.v.*) are the largest single group, numbering approximately 1,600,000. They form about 20% of the population and live mainly in the highlands south of Mt. Kenya. The smaller tribes to their northeast, the Meru (about 440,000) and Embu (about 96,000), and the Kamba (*q.v.;* about 930,000) to their east, have similar cultures. In Western region a cluster of small agricultural tribes known as the Luhya or Luhia (Baluhya or Bantu Kavirondo; *see* KAVIRONDO) number about 1,100,000. South of them are the Nilotic Luo (*q.v.;* about 1,140,000), the Bantu Gusii or Kisii (540,000) and smaller Bantu tribes. In the east are the Bantu Teita (84,000) in the northern foothills of Mt. Kilimanjaro and many smaller Bantu coastal tribes (320,000), of which the largest are the Giriama, or Giryama, and Pokomo. A partly Arab population, the Swahili, is also centred on the coastal towns.

The arid areas of central Kenya, especially the Rift valley lowlands, are occupied by Nilo-Hamitic pastoralists of whom the Masai (*q.v.;* 154,000) are the best known. Formerly they were notorious for their raids over the whole region (see *History,* below) but their lands were diminished by European farming and their power is small; they may slowly be dying out. The related Nandi (*q.v.;* 170,000) and Kipsigis (34,000) have taken to agriculture. In the semidesert northern areas other pastoralists include the Nilo-Hamitic Suk (45,000), Turkana (181,000) and Samburu (49,000) and the Hamitic Somali (60,000) and Galla (*q.v.;* 30,000). About 225,000 other pastoralists are mostly small tribes, while about 5,000 Dorobo or Okiek are remnants of the autochthonous inhabitants of Kenya who were subjected and largely absorbed by the Kikuyu, Nandi and others.

The traditional society of Kenya was one of many largely self-sufficient tribes. There was no intertribal organization beyond occasional alliances against the Masai and other marauders, nor any kingship except in the small state of Hanga among the Luhya tribes. Agricultural and pastoral tribes exchanged grain and livestock, and raiding and warfare between tribes were endemic. Arab slaving spread inland only as far as the Kamba territory, because the Masai beyond were able to keep out slavers.

The advent of towns, the railway and European farms altered this picture radically. Much land was taken for European farms, most of it from the Masai. Farm labour came from the crowded Kikuyu, no longer able to expand their territory once intertribal boundaries were fixed. They, and to a less extent the Luo and Luhya, spread into the towns and settled as "squatters" on European farms. Christian missions concentrated on these tribes and educated them in preference to others. Therefore these tribes have tended to monopolize political and trade-union activities disproportionately to their numbers. By the 1960s they provided a small middle class and most of the support for the Kenya African National Union (K.A.N.U.), whereas the Kenya African Democratic Union (K.A.D.U.) was drawn mainly from smaller tribes who feared Kikuyu-Luo domination.

Beginnings of a multitribal consciousness can be noted in the terms Kalenjin, applied to some of the Nilo-Hamitic-speaking tribes of central Kenya, and Mijikenda, which denotes certain of

the small tribes of the coast which have united for political purposes under this name. Mijikenda (in Swahili, "nine towns") originally referred to early tribal groupings in the middle ages. The nine tribes are also known generally as Nyika (*q.v.*).

2. Religion and Languages.—The traditional religions of the Africans of Kenya include cults of a High God and ancestral cults. Beliefs in magic, witches and sorcerers are widespread. Many of the tribes of the coast and the northern deserts have been Muslims for a long period, and Islam is spreading there and in the towns. Christian missions of many denominations operate in Kenya. In 1949 it was estimated that missions' adherents numbered about 247,000 Roman Catholics, 80,000 Anglicans and 63,000 other Protestants, a total of 390,000 or a little more than 7% of the total African population. There are also many adherents of various African separatist churches which have broken away from the parent missions, especially among the Kikuyu, Luhya and Luo.

Many nativistic cults have emerged, of which the Mau Mau movement among the Kikuyu was the most important. These are primarily political movements, expressed in the observance of rites which, if not indigenous, have close links with traditional cults. The Mau Mau movement, for example, made much use of prophetic leaders in its early days, and later of oaths based upon traditional Kikuyu oaths. Their main purpose was to remove a person from his usual kin and neighbourhood loyalties under threat of curses and pollution and so to make him a member of a cult whose members should be loyal only to one another and the cult's aims.

The vernaculars include Bantu (especially Kikuyu, Kamba, Luhya and the coastal languages), Nilotic (Luo), Nilo-Hamitic (Masai, Nandi, etc.) and Hamitic (Somali, Galla) languages. A form of Swahili, a Bantu language with a large Arabic vocabulary, is widespread as a lingua franca. The use of English is spreading rapidly. (*See* also BANTU LANGUAGES; SWAHILI LANGUAGE.)

(J. F. M. M.)

3. Population.—The 1948 census showed that Kenya had a total population of 5,405,966, including 154,846 non-Africans. The census of August 1962 listed a total of 8,676,000. This figure yields an over-all density of 39 per square mile of land surface.

The non-African population, although only 3% of the total, has an economic significance out of all proportion to its numbers. The European population (56,000 in 1962) doubled during the period 1948–60, largely by immigration; but it declined in the early 1960s. The Europeans are especially occupied in professional, commercial or technical employment, in the public services or in agriculture. The chief European farming areas are in the highlands, in Nakuru, Uasin Gishu, Trans-Nzoia, Kericho, Laikipia and Thika districts; and the number of non-African farms, almost entirely European, was about 3,600 in 1960. Yet most Europeans are urban dwellers and nearly one-third of them live in Nairobi.

Indians, Pakistanis and Goans form the largest immigrant group, numbering 176,000 in 1962. They increased by about 75% between 1948 and 1960, in part by immigration but mainly from an exceptionally high rate of natural increase. The Indians and Pakistanis comprise the main commercial and artisan classes throughout Kenya; the Goans are mostly in governmental and other clerical services and in the tailoring industry. The Arabs (34,000 in 1962) have a long association with the coast, where most of them dwell, but are still regarded as immigrants. Many are merchants in the towns and others manage coconut plantations in the country.

The rate of natural increase among the African population is probably about 3% annually. Most are self-employed as peasant cultivators, but by the 1960s many were in paid employment, mainly in agriculture, the public services, manufacturing and in transport and communications. Labour migration occurs on a considerable scale.

Population densities present striking contrasts. Extensive areas in the north and east are almost uninhabited, and the distribution is very sparse over the Masai districts of southern Kenya. But densities are very high over the western plateaus, in the East Kenya highlands and in patches at the coast. An average density of about 507 per square mile for Kakamega district compares with respective densities of 577 and 491 for Kiambu and Fort Hall; individual locations present far higher figures. Moderate densities characterize the West Kenya highlands and the adjacent central section of the Rift valley; they reappear on the south-eastern margin of the East Kenya highlands extending into Machakos and Kitui districts.

The principal towns are Nairobi and Mombasa (*qq.v.*). The other municipalities (pop., 1962) are Nakuru (38,181), Kisumu (23,526), Eldoret (19,605) and Kitale (9,342). All these towns have multiracial populations. (S. J. K. B.; R. S. O.)

III. HISTORY

The earliest recorded history of the area now known as Kenya concerns the coastline which for centuries has had trading relations with southern Arabia (*see* AFRICA: *History: East Africa*). About the interior little is known concerning the period up to the 19th century and that little is based mainly upon legends of doubtful authenticity. During the 19th century Arab and Swahili caravans in search of ivory penetrated from Mombasa to Mt. Kilimanjaro and thence to Lake Victoria and beyond toward Mt. Elgon, but this route was not so popular as the caravan trails farther south both because of the difficulty in crossing the desert country of the Taru plain and because of the hostility of the warlike Masai tribe. The first Europeans to penetrate into the interior were the German agents of the Church Missionary society, Johann Ludwig Krapf and Johannes Rebmann, who established a mission station at Rabai, a short distance inland from Mombasa in the territory of the Manyika (Wanyika) tribe. In 1848 Rebmann became the first European to see Mt. Kilimanjaro and in 1849 Krapf ventured still further inland and saw Mt. Kenya. These were isolated journeys, however, and more than 30 years elapsed before any other Europeans attempted to explore the country dominated by the Masai.

1. The Power of the Masai.—The pastoral Masai probably moved into what is now central Kenya from the north in the mid-18th century. Their southward advance was checked about 1830 by the Hehe (Wahehe) tribe of Tanganyika, but their raiding parties continued to range far and wide and even reached the coast south of Mombasa in 1859. Under the spiritual direction of the *laibon* ("medicine man"), the Masai were organized for war. Great power was placed in the hands of the *moran* ("warrior"), so that although the Masai were not particularly numerous they were able to dominate a considerable region and to terrorize their neighbours. Their chief victims were Bantu agriculturalists who could offer little effective resistance to the unexpected raids of the nomadic Masai. The Nandi, who inhabited the escarpment to the west of the Masai, were equally warlike and remained relatively undisturbed by their predatory neighbours. On the eastern slopes of Kilimanjaro the Taveta (Wataveta) were able to take refuge in the forest and, still farther east, the Teita (Wateita) used the natural strongholds provided by their mountainous homeland to resist the Masai raiders.

The Kikuyu, a much larger tribe, near neighbours of the Masai, also looked to the mountains and forests for protection against Masai war parties. The Kikuyu had expanded northward, westward and southward from their territory in the Fort Hall area, cutting down the forests to provide themselves with agricultural land. Toward the end of the 19th century, however, their advance had reached the limits imposed by the presence of the Masai to the north and south and by the upper slopes of the Aberdare mountains to the west. To the south, in the region of Ngong, they were protected by a narrow belt of forest through which the Masai could penetrate only at considerable risk of damage from traps and ambushes. The Kikuyu were organized in clans and by districts and, although war leaders arose to help in the defense of the tribe against the Masai, the lack of a central form of government made them vulnerable to the raids of their neighbours.

In the 1890s famine and smallpox compelled the Kikuyu to withdraw northward, vacating much of the most recently occupied

land in what is now Kiambu district. The Masai, too, were passing through a difficult period. An outbreak of disease, probably pleuropneumonia, had attacked their cattle in 1883 and in 1889–90 epidemics of rinderpest and smallpox further undermined their wealth and power. Simultaneously, the tribe was split on the death of its great *laibon*, M'Batian, and it was some time before his younger son, Lenana, was able to restore order. The legend of the Masai menace lingered on but their power never revived, for their decline coincided with the arrival of European traders and administrators who took control of the country which the Masai had formerly ravaged but never ruled.

2. The Imperial British East Africa Company.—In 1883 Joseph Thomson, the explorer, became the first British traveler to pass through the Masai country, but it was the British East Africa company (*q.v.*) which undertook the opening up of the land to the west of Mombasa. German interest in east Africa had resulted in Nov. 1886 in the delimitation of the grandiose but inadequately authenticated territorial claims of the sultan of Zanzibar. After recognizing the sultan's authority over a ten-mile-wide coastal strip between the Ruvuma and Tana rivers, Germany, Britain and France had agreed to divide the hinterland into British and German spheres of influence. The British took the area north of a line running from the mouth of the Umba river, opposite Pemba Island, and skirting north of Mt. Kilimanjaro to a point where latitude 1° S. cuts the eastern shore of Lake Victoria. The German sphere was to the south of that line. In 1887 Sir William Mackinnon and the British East Africa association (later the company) accepted a concession of the sultan's territory on the mainland for a 50-year period, subsequently amended to a grant in perpetuity. The British government, reluctant to become involved in the administration of east Africa, readily agreed in 1888 to a petition from the association asking for a charter of incorporation authorizing the acceptance of existing and future grants and concessions for the administration and development of the British sphere.

The financial resources of the new Imperial British East Africa company were scarcely adequate for any large-scale development of east Africa. Becoming involved in civil war in Uganda (*q.v.*), the company soon found itself unable to maintain its high level of expenditure and was forced to limit its activities to the region nearer the coast. In 1894 the British government declared a protectorate over Buganda and in the following year, in order that it might itself guard the line of communication between the coast and Buganda, called upon the company to surrender its charter and concession in return for £250,000 compensation. The East Africa protectorate was then proclaimed and Sir Arthur Hardinge became the first commissioner. The lack of importance attached to the new protectorate by the British government was indicated by the fact that Hardinge continued to maintain his headquarters in Zanzibar, where he already fulfilled the duties of consul general.

3. The East Africa Protectorate.—The early years of the new administration were largely taken up in asserting its authority over tribes which did not understand the change that had taken place. This could scarcely be said of the chiefs of the Mazrui family along the coast who actively resisted the usurpation of their authority by the British administrators. However, the Kikuyu and the Kamba (Wakamba) simply opposed what appeared to them to be an unwarranted invasion of their territory, and in 1896 and 1897 small military expeditions had to be sent against them by the new administration. Farther west the Nandi did not accept their new overlords until 1905 after a series of military columns had ranged through their territory with varying success. The Masai alone among the more important tribes offered no resistance to British authority.

The lack of communications and the limited financial resources available locally or granted by an apathetic British government meant that orderly administration was only slowly extended into the more remote areas of the protectorate. The absence of any strong indigenous forms of political organization which might have been employed as agents of the new protectorate also delayed progress. The introduction of direct rule through the agency of European administrative officers was not, therefore, so much a question of policy as a matter of necessity.

4. The Uganda Railway and European Settlement.—At the beginning of the 20th century the importance of the East Africa protectorate was thought to lie in its value as a corridor to the fertile country round Lake Victoria. This view was further strengthened by the fact that the Kedong river marked the western boundary of the protectorate, so that the fine highland pastures to the west of the Rift valley still formed part of the Uganda protectorate. Consequently, although regulations were issued in 1897 authorizing the lease to Europeans of land which was not cultivated or regularly occupied by Africans, there were few requests for concessions.

Two factors changed this negative attitude toward the protectorate. The first was the construction of a railway from the coast to Lake Victoria and the second was the transfer of the western highlands from Uganda to the East Africa protectorate in 1902. The need for a railway to promote the development of east Africa's economic resources had been emphasized by the Imperial British East Africa company and the British prime minister, Lord Salisbury, had favoured the idea, mainly on strategic grounds. However, there had been strong opposition from anti-imperialists in Britain and in 1891–92 a preliminary survey only had been carried out by Capt. J. R. L. Macdonald. But the declaration of the Uganda protectorate strengthened Lord Salisbury's case and work began on the construction of the railway at Mombasa in Dec. 1895. The first locomotive reached Kisumu on Lake Victoria in Dec. 1901 and the line was completed in 1903. By this time it had cost the British treasury £5,317,000 and because of the alteration of the boundary between the two protectorates it no longer extended to Uganda. To the burden of financing the administration of the East Africa protectorate was now added the additional responsibility of making the railway pay. The proceeds of traffic to and from Uganda would still be available to the protectorate administration but this did not remove the need to develop the resources of the territory to the utmost and as speedily as possible. In these circumstances the decision to encourage extensive European settlement was not surprising. The African peoples were not organized in such a way as to suggest that African agriculture, even under European guidance, would produce the swift returns which the economy of the protectorate demanded. Moreover, the transfer of the highlands from Uganda had placed at the disposal of the administration large tracts of land apparently suited to large-scale farming, virtually uninhabited and situated in a region climatically attractive to Europeans. Even around Nairobi itself, which because of its central position was promoted early in the century from its former status as an important railway stores depot to be the administrative capital of the protectorate, there was apparently a considerable area of fertile, uninhabited land. For many reasons, therefore, the decision of Sir Charles Eliot, who had become commissioner for the protectorate in 1901, to invite European settlers to east Africa appeared sound. Eliot was both a scholar and a humanitarian, so that his policy was not adopted without a full consideration of its likely effects upon the indigenous African population.

To make up for the lack of interest of Englishmen in east Africa Eliot invited South Africans to settle in the protectorate. Since the response was both quicker and greater than had been expected, a hurried survey, based upon inadequate information had to be carried out. As a result small areas of land in Kiambu district, which had formerly been occupied by Africans and which the Kikuyu regarded as forming part of their legitimate area of expansion, were allocated to white settlers. The area involved was not large but it served as a justification for all future African criticisms of European settlement.

As the settled area was extended during the first decade of the 20th century into the Rift valley and on to the highlands beyond, the problem of labour supplies also arose. Much of this land was either uninhabited or supported only a very lightly scattered population. Having been invited to east Africa by the government, the settlers expected that an adequate labour supply would be made available. Because few Africans appeared to be completely occupied all the year round in work on their own farms,

to the white settlers there seemed no reason why they should not be invited and, if necessary, compelled to offer their services to European farmers. The Africans, however, accustomed to subsistence farming and requiring only a low standard of material comfort, could see no reason why they should work away from home. Successive commissioners and governors responded in varying degrees to the settlers' demands for the introduction of some form of compulsion to ensure an adequate labour supply, but it was not until immediately after World War I, and largely as a result of a public outcry in Britain, that compulsory labour on either public or private projects was strictly forbidden.

Another cause of African discontent was the decision taken soon after Eliot's departure in 1904 to confine the native population to reserves. Although this plan was intended to protect the Africans from excessive competition as well as to leave as much land as possible available for scientific development by European farmers, the fact that the reserves were not gazetted for many years aroused a profound sense of unease among the Africans, for whom land was the only form of social security.

Owing to the Africans' reluctance to work on the construction of the railway thousands of Indian coolies were brought into the protectorate, but most of these returned to India after their contracts were completed. The opening of the railway had, however, encouraged Indian traders who had formerly lived nearer the coast to penetrate far into the interior, even ahead of the administration, and these men made a valuable contribution to the country's economic development. Other Indians hoped to obtain land, but European settlers strongly resisted any idea of their encroachment into the highland areas. Conscious of the great efforts they had put into the development of a virgin land and anxious to establish a truly British colony in east Africa, the Europeans consistently opposed the Indians' claim to equality in both political and economic fields. Before the outbreak of war in 1914 unofficial participation in political affairs was mainly limited to the creation of pressure groups, the most prominent being the Convention of Associations, which had developed in 1911 from earlier European settler organizations. In 1905 an executive council had been appointed and in 1907 the first legislative council was convened. Although the latter body consisted at first of only two nominated unofficial members in addition to the six official members, the unofficial members were not slow to uphold the white settlers' cause. The transfer of the control of the protectorate from the foreign office to the colonial office on April 1, 1905, did not give the settlers the increased responsibility for which they had hoped and in 1913 they launched a campaign to elect their own representatives to the legislative council. The outbreak of World War I put a check upon their hopes, but the prominent part played by elected representatives in the activities of the war council appointed in Sept. 1915 offered a fair prospect of the early satisfaction of the settlers' claims to elected representation in the country's legislature.

5. World War I and Its Aftermath.—The threat to the protectorate, and in particular to the vital Uganda railway, from German East Africa never materialized, and early in 1916 the British advance into German territory finally removed the possibility of further military action on British soil in east Africa. Nevertheless, the war had serious effects upon the protectorate's economy. Most of the white settlers hastened to join the armed forces, leaving their farms to be looked after by their wives or else to revert to wilderness. Thus, at a crucial stage in the agricultural development of the territory momentum was lost. Immediately after the war an attempt was made to stage a quick revival by the introduction of a "soldier settler" scheme, but the hopes of prosperity encouraged by the postwar demand for primary produce received a severe setback in the early 1920s when the world depression brought bankruptcy to many of those who had started out with inadequate capital or who had relied upon credit from the banks. The achievement of stability was further delayed by the replacement of the rupee currency, first by a florin currency and shortly afterward, before the florin had been fully accepted, by east African shillings.

The courage if not the confidence of the settlers remained unshaken and by the mid-1920s the country's economy had wholly revived. Although the depression of the early 1930s brought further difficulties to east Africa, the foundations of prosperity had been still further strengthened by a great improvement in rail communications. Already in 1913 railway extensions had been opened to Thika and to the soda deposits at Lake Magadi, and during the war a link was made between the main line and the German railway system to the south.

The most important postwar project was the building of a new extension of the main line across the Uasin Gishu plateau to tap the agricultural wealth of the highlands, and thence to Uganda in order to provide a ready means of egress for the cotton crops of that protectorate. The line was eventually completed from Nakuru to Jinja in Jan. 1928 and was carried on to Kampala in Uganda, which it reached in Jan. 1931.

Political considerations then began to usurp the place of prominence formerly occupied by economic problems. In 1920 the status of the East Africa protectorate was changed to that of colony, named after the highest mountain in the country, and the coastal strip leased from the sultan of Zanzibar became the Kenya protectorate. In the previous year the white settlers had been permitted for the first time to elect members to the legislative council and the Indians began to call for equal treatment. In 1920 they rejected an offer of two elected members on the ground that this would mean that they were not so well represented as the Europeans, and a fierce political struggle broke out between the white settlers and their Indian rivals. However, in 1923 the colonial secretary, the duke of Devonshire, after hearing representations from both Europeans and Asians, issued a white paper in which he declared that African interests must be paramount although minorities would not lose their rights. This pronouncement marked the tentative beginning of an era of "trusteeship" for the backward peoples of Kenya. In 1927 the dispute between Europeans and Indians virtually ceased when the Indians accepted five seats in the legislative council. The Europeans were to have 11 elected representatives.

"Trusteeship" did not immediately result in any great improvement in the social conditions of the African population. Little provision for education was made by the government and nearly all the schools for Africans were supplied by missionaries. Africans, too, found no place in the country's legislature, their interests being represented by the official members of the council and by a European unofficial member, usually a missionary. With the example of the Convention of Associations before them, however, the Africans developed their own pressure groups. Among the Kikuyu, who supplied a considerable proportion of the labour force on the European farms and whose proximity to Nairobi brought many of them into regular contact with Europeans, organizations to represent the tribe's grievances began to spring up quickly in the 1920s and 1930s. The most prominent was the Young Kikuyu association, founded in 1921, which in 1925 was renamed the Kikuyu Central association. In demanding African representation in the legislature, the association was in advance not only of the government but also of most of the members of the tribe. However, it won support among the Kikuyu when it complained about low wages, the prohibition of coffee-growing by Africans and the condemnation of certain tribal practices by Christian missionaries. The association never represented the tribe as a whole, however, because its members were mainly young men whom the chiefs did not trust. For this reason, too, the European administration tended to look with disfavour upon its activities. Attempts to win the support of other tribes failed owing to their unwillingness to accept Kikuyu leadership.

Another cause of political concern was the proposal, first made toward the end of World War I, to introduce some form of closer union between Uganda, Kenya and the former German possessions in east Africa. A number of commissions visited east Africa between 1924 and 1929 to investigate means of implementing the plan but in the face of local opposition the idea was dropped early in the 1930s. At the outset the white settlers of Kenya opposed closer union with the other territories through fear of African domination. However, in view of the apparent determina-

tion of the British government, they agreed in the later 1920s to a compromise which would protect their political status in Kenya. In the 1930s they went further and actively supported union with Tanganyika as a protection against Germany's claims to its former overseas dependencies.

6. World War II and After.—The outbreak of World War II again checked development and the entry of Italy into the war for a time threatened the security of Kenya's northern border. The Italians in east Africa were soon defeated, however, and troops from Kenya then took part in campaigns in many parts of the world. In Kenya itself the main objective was to achieve the highest possible degree of economic self-sufficiency. Political progress was not neglected and in 1944 Kenya became the first east African territory to include an African in its legislative council. The number was increased to two in 1946, to four in 1948 and to eight in 1951. All were appointed by the governor from a list of names submitted to him by local governments. In 1948 the East Africa high commission was set up to administer certain services of common benefit to Kenya, Uganda and Tanganyika. The high commission, with headquarters in Nairobi, consisted of the governors of the three territories, with the governor of Kenya serving as chairman. (*See* BRITISH EAST AFRICA.)

Both political progress and the large-scale economic development program initiated soon after the war received a severe setback in the 1950s with the outbreak of the Mau Mau rebellion which necessitated the proclamation of a state of emergency in Oct. 1952. The rising was limited to the Kikuyu tribe and was directed against the presence of Europeans in Kenya and their ownership of land. Nonetheless, during the years of violence which followed, it was those Kikuyu who failed to support the Mau Mau secret society who suffered most heavily. Jomo Kenyatta (*q.v.*), charged with directing the Mau Mau movement and sentenced with five associates to seven years' imprisonment in 1953, was released in 1959 and confined to restrictive residence. A considerable military campaign was needed to destroy the rebellion, and years of rehabilitation were required before order was restored. The emergency was brought to an end early in 1960.

Numerous economic and social changes resulted either directly or indirectly from the Mau Mau rising. One of the most important was the centralization of the Kikuyu in large villages, which was accompanied by a land consolidation program. This plan was also extended to Nyanza region near Lake Victoria. Considerable sums of money were set aside to encourage higher standards of African cultivation, and coffee became one of the principal crops. Throughout the years of uncertainty, foreign investment in Kenya continued. Limited industrial development took place with agricultural expansion.

In spite of the upheaval successive colonial secretaries persisted in their attempt to promote political progress among the African population. In March 1957 elections were held on a qualitative franchise for the eight African seats in the legislature. In 1958 there were further proposals for an increase in African membership of the council and a council of state was set up to scrutinize legislation which might involve discriminatory measures against certain sections of the people. The former rivalry between Europeans and Indians was now giving way to a rivalry between Europeans and Africans, and further constitutional advancement pointed the way to majority rule by Africans in Kenya. As a result of a conference held in London in 1960 Africans became the majority in the legislative council and obtained four of the ten unofficial portfolios in the council of ministers.

To meet this challenge two African political parties were formed, the Kenya African National union (KANU), led by Tom Mboya and later by Jomo Kenyatta; and the Kenya African Democratic union (KADU), led by Ronald Ngala. The former drew most of its support from the Kikuyu and Luo tribes and favoured a strong, centralized government; the latter originated among the smaller tribes who sought to avoid Kikuyu domination by advocating a federal form of government. A coalition government of the two parties was formed in 1962 but after elections in May 1963 KANU took office, with Kenyatta as prime minister, under a new constitution which gave Kenya self-government. Following further discussions in London, Kenya became fully independent in Dec. 1963 and a year later became a republic with Kenyatta as its first president and Oginga Odinga as vice-president. During 1965 KADU was gradually absorbed into the ruling party. In 1966 a new opposition party appeared, led by Oginga Odinga, and consisting of some of the more left-wing political leaders.

After independence a number of Europeans left the country, but those who remained cooperated well with the new African government. Meanwhile, in the North-Eastern region there was considerable agitation among Somali tribesmen who wanted to secede from Kenya to join the Somali Republic. Zanzibar (which also achieved independence in Dec. 1963) surrendered its sovereignty over the coastal strip (the Kenya protectorate) to Kenya.

(K. I.)

V. ADMINISTRATION AND SOCIAL CONDITIONS

1. Central and Local Government.—Prior to independence the governor was advised by a council of ministers, and in making laws he acted with the advice and consent of the legislative council. Early in 1960 agreement was reached in London on a revised constitution which provided for a legislative council. At a conference held in London in February–April 1962, the representatives of the two major political parties agreed to the broad framework for a constitution intended to lead to the internal self-government and subsequent independence of Kenya. The new constitution came into force on June 1, 1963.

On Dec. 12, 1963, with the achievement of independence, Kenya became a member of the Commonwealth of Nations, acknowledging Queen Elizabeth II as queen of Kenya and as head of the commonwealth. Under the independence constitution a governor general represents the sovereign and acts on the advice of a cabinet headed by a prime minister who must command the support of a majority of the members in the house of representatives. Of the two chambers in the national assembly, the house of representatives comprises 117 members elected by universal suffrage from single-member constituencies and 12 specially elected members; the senate consists of 41 members elected directly from the 40 districts and the Nairobi area. The constitution provides for an elaborately calculated balance of power between central and regional government. The sections of the constitution on regional boundaries and on the composition of regional assemblies, like those on the rights of the individual, can be changed only by the favourable vote of 75% of the house of representatives and 90% of the senate; but regional powers can be changed with a two-thirds majority in a national referendum. A single public service commission controls the recruitment, promotion and discipline of the civil service, and the police service commission has similar powers.

In the later part of 1962 a regional boundaries commission demarcated six regions, to which a seventh was later added, to replace the former provinces. The regions are: Coast, North-Eastern, Eastern, Central, Rift Valley, Nyanza and Western. The Nairobi area forms a separate unit outside the regional system. Under the Kenya Order in Council, 1963, regional assemblies were constituted, and they were set up in every region except the North-Eastern, where a political boycott by the Somali nationalists prevented action. The regional assemblies have legislative and executive powers in relation to a wide range of local activities. Within the regions there are in accordance with prevailing circumstances two types of local government authority: municipalities, divided into local council areas; and counties, subdivided as necessary into townships, county divisions and local council areas. With the possible exception of the township authorities, local governments are controlled by an appropriate elected council. The Nairobi area is administered by the Nairobi city council.

East African affairs are controlled by the East African Common Services organization, the authority for which is vested in the prime ministers of Kenya and Uganda and the president of Tanganyika. Among the various services administered by the organization are civil aviation, railways and harbours, posts and telecommunications, customs and excise, and income tax. In June 1963 the prime ministers of Kenya and Uganda and the president of

Tanganyika pledged themselves to form a political federation of east Africa. (*See* also BRITISH EAST AFRICA.)

2. Political Parties.—The two major political parties are the Kenya African National Union (K.A.N.U.) and the Kenya African Democratic Union (K.A.D.U.), the latter having especially strong support among the numerically smaller ethnic groups. At the Feb. 1961 election K.A.N.U. gained 16 seats and K.A.D.U. 10, but since K.A.N.U. did not accept the invitation to form a government the task fell to K.A.D.U. The contrasting points of view of the two parties emerged sharply at the London conference of February–March 1962, where K.A.N.U. advocated a unitary system of government while K.A.D.U. sought a large measure of autonomy for regional assemblies. On the all-important question of land K.A.N.U. maintained that the European farming areas should remain as a national asset under a central land authority; but K.A.D.U. applied its regional policy to this as to other matters. In the elections of May 1963 K.A.N.U. won a decisive victory.

3. Trade Unions.—The conditions under which labour is employed in Kenya depend upon laws which in the main follow U.K. labour legislation. The labour department enforces these laws, provides the usual employment services and affords general assistance to employers and workers. Stronger than in either Tanganyika or Uganda, the trade union movement in Kenya owes much to the help of the International Federation of Free Trade Unions. In 1960 there were 17 employers' unions and 46 employees' unions, the latter with a paid-up membership of 46,000. Rural labour displayed its first active interest in trade unionism in 1959, when unions were formed in the tea, coffee and sisal industries. Most of the unions of African labour are affiliated with the Kenya Federation of Labour, and the employers are represented by the Federation of Kenya Employers. In 1959, and especially in 1960, there were numerous disputes resulting in stoppages of work, partly deriving from the local lack of experience in trade union activity; for where the machinery of conciliation and arbitration was used it was mostly successful and resulted in substantial wage increases. Statutory wages councils and joint consultative councils cover a number of industries.

4. Social Conditions.—The general standard of living in Kenya showed continuing improvement in the period following World War II, but unemployment, especially among the lower-paid workers, provided grounds for concern in the early 1960s. The average European in Kenya lives at a higher standard (and at a higher cost) than the average person in the U.K.; and the Asians are more prosperous than their counterparts in the Indian subcontinent. Africans in the executive grades share the high standards of living of the European, but the ordinary African wage earner is decidedly poorer than his U.K. counterpart. Urban wages have risen more than the cost of living, partly through the progressive raising of statutory minimum wages and partly through the development of the trade union movement. The improvement of material standards in the countryside depends upon changing a predominantly subsistence economy into scientific cash-crop farming. Social insurance is less developed than in western Europe, but among the African population the extended family group and the possession of land provide some social security. The government exercises social controls and provides social services through various departments; and the ministry of health and housing is concerned with the major problem of living accommodation for the urban African.

5. Health.—The morbidity statistics include an infant mortality rate of 170 deaths per 1,000 live births, a life expectancy of between 35 and 40 years, as compared with 70 years in the countries of western Europe, and a crude death rate of 24–26 per thousand. There is a heavy incidence of pneumonia and other respiratory diseases, tuberculosis, skin diseases and eye diseases; and only the highlands are malaria-free. The health of the European population is on the whole good. The gross recurrent expenditure of the government medical department in the early 1960s was more than £2,500,000 ($7,000,000). The services provided are preventive as well as curative; and there is a medical training centre associated with King George VI hospital, Nairobi. Mission hospitals are mostly in the rural areas and there are other nongovernment hospitals in the major towns. Health centres, numbering about 150, bring integrated health services to the rural areas.

6. Justice.—The supreme court, which derives its authority from the Kenya constitution, has full jurisdiction, civil and criminal, over all persons and all matters of dispute in the country. It consists of the chief justice and 11 puisne judges; it sits in Nairobi, Mombasa and Kisumu throughout the year; and circuit sessions are held at Eldoret, Nakuru, Nyeri and elsewhere. All legal practitioners are advocates of the supreme court and have equal rights to appear in all courts. Subordinate courts, which are regulated by the courts ordinance, may be presided over by a magistrate or by an administrative officer possessing magisterial powers. African courts exercise restricted criminal jurisdiction over Africans and administer customary law in civil cases. These courts are supervised by administrative officers who have powers to revise the decisions and where necessary to transfer cases to other courts. At the Coast, Muslim courts have limited jurisdiction over Muslims.

7. Education.—The school system caters separately for Africans, Asians, Arabs and Europeans, but in 1961–62 the first Asians were enrolled in schools hitherto reserved for European pupils. In education for the African the primary, intermediate and secondary stages are each of four years, with an examination and rigorous selection at the end of each stage. English is the medium of instruction throughout the secondary school and in the upper part of the intermediate school. The secondary course leads to the Cambridge School certificate examination, but in 1962 five African schools provided an additional two-year course for the Higher School certificate. At secondary level Asian pupils pursue either a four-year grammar-school course or a three-year modern course; several schools prepare their pupils for the Higher School certificate examination. It is planned to use English as the medium of instruction from the beginning of the primary school as soon as sufficient qualified teachers can be found. Most European pupils complete a four-year course leading to the Cambridge School certificate examination and some go on to the Higher School certificate course; but shorter modern courses are provided for non-academic pupils. More than 80% of Kenya schools are managed by the Roman Catholic and Protestant churches and most are state-aided. In the early 1960s they contained a total of about 880,000 pupils, including 820,000 Africans, more than 50,000 Asians, 3,300 Arabs and 11,000 Europeans. In addition there were pupils in a number of technical and trade courses, and about 6,000 students, more than 4,000 of them Africans, in more than 40 teacher-training centres. Higher education for Kenya students of all races is provided at Makerere University college, Uganda, at the Royal college and the Kenya Polytechnic and Technical institute in Nairobi, and in oversea universities. Numerous Kenya students were receiving higher education elsewhere in east Africa and overseas. The Royal college is scheduled to develop into a university college.

Among the cultural institutions of Kenya are the Coryndon Memorial museum, especially famous for its material on East African prehistory and paleontology, the Kenya National theatre and the East Africa Conservatoire of Music, all of them in Nairobi.

8. Defense.—The three Kenya battalions of the King's African Rifles with their brigade headquarters at Nanyuki are intended for local defense and for internal security. They contain an appreciable number of African officers and the other ranks have been completely africanized. The Kenya regiment, a territorial unit which formerly provided compulsory military training for Europeans, had by the 1960s become a volunteer, multiracial citizen force. From 1960–61 the British government assumed direct responsibility for the current cost of these and other East African land forces; and there are various forms of co-operation with the British troops of East Africa command stationed in Kenya. For example, the British army, the Royal Air Force and the Royal Navy were all involved in efforts to counteract the famine and floods of 1961. Joint police and military operations are necessitated by the sporadic raids, stock thefts and tribal clashes which occur among the pastoralists of the northwestern border area and the related groups in the Karamoja district of Uganda. The police force, which is over 12,000 strong, comes under the ministry

of defense; but each African district has in addition its own tribal police, the control of which lies with the provincial administration.

V. THE ECONOMY

1. Production.—Following World War II there was a considerable increase in industrial activity in Kenya. The contribution of manufacturing to the net domestic product was just under 10% in 1960. The basis of the economy of Kenya is nevertheless agricultural and likely to remain so.

Agriculture.—The areas most suitable for agriculture comprise the Kenya Highlands, the Nyanza plateaus and parts of the coastal belt. The highlands became renowned as a European farming area, and in the early 1960s they contained more than 90% of the 7,600,000 ac. under non-African agriculture. But it was government policy to open up the highlands for farming by all races and large-scale plans for settling Africans on land purchased from European farmers are already in operation. Asian agriculture is mainly associated with the growing and processing of sugar cane in central Nyanza district and at the coast. In the early 1960s non-African and particularly European agriculture was by far the most important contributor to the export market. The main plantation crops of Kenya are coffee, tea, sisal, wattle and sugar; while wheat, maize (corn), barley, oats and pyrethrum are grown on the highland farms. Dairying and the raising of beef cattle are important; but most of the land on the non-African farms was under natural grazing. The average holding in 1960 was about 2,100 ac. but individual farms ranged from 20 to 50,000 ac. European and Asian agriculture is partly mechanized, but manual labour is indispensable and its supply is of particular concern to the plantations.

In addition to their food crops the Africans grow cotton, coffee, tea, pyrethrum and sisal as cash crops. Subsistence agriculture usually yields a surplus of maize for export, especially from the area near Lake Victoria. By the early 1960s African agriculture, especially coffee, had made notable strides toward a crop economy. Consolidation of holdings, which constitutes a prerequisite of improved agriculture, made outstanding progress in the Kikuyu country. The African land units carry more than 6,000,000 cattle and 14,000,000 sheep and goats, supplying meat and milk and providing the basis of a hides and skins industry.

Forestry.—The gazetted forest estate of Kenya was in 1960 only 6,939 sq.mi., or about 3% of the total land area. It is essential in relation to conservation and it also yields useful timbers, of which podo, cypress and cedar are the best known. Local demands are met and there is some export. New plantings are mainly of quick-growing exotics.

Fisheries.—Sea fisheries, with Malindi as the chief centre, yield almost 5,000 tons annually, but the Kenya waters of Lake Victoria yield about 25,000 tons, with ngege (a Cichlid food fish) as commercially the most important species. There is fishing in other lakes and in the rivers and the highland streams are well stocked with trout.

Mining.—Mineral production plays only a modest part in the economy, although it is a long-standing form of economic activity. Sodium carbonate from Lake Magadi, with an annual production of about 130,000 tons, is by far the most important mineral. Common salt is obtained from the same source and also from sea water at the coast. The Macalder-Nyanza mine yields about 2,000 tons of copper annually. Gold mining has declined in importance and production value is about £100,000 annually. Other exploited minerals include limestone, gypsum, diatomite, kyanite (processed to become mullite) and silver.

Power.—Kenya is without coal and the main sources of fuel are imported mineral oils. Electricity is generated at thermal and hydroelectric stations, the former having as a group about twice the capacity of the latter. These sources supply about 220,000,000 kw.hr. annually and are supplemented by imports of about 190,000,000 kw.hr. from Uganda (Owen falls) and about 21,000,000 kw.hr. from Tanganyika (Pangani falls). Production and distribution is administered by two companies; one responsible for the bulk supply from Uganda and from the hydroelectric stations and the other for thermal stations and distribution to consumers.

Manufacturing.—The chief aim in the expansion of manufacturing industry has been to reduce the overdependence on other parts of the world. Factories for consumer goods have been established in the principal towns and especially in Nairobi and Mombasa; and canned foods, beer, soft drinks, cigarettes, woolen blankets, footwear, hollow ware and glassware are made. A cement factory at Bamburi, near Mombasa, and another at Athi River, near Nairobi, have a combined potential output of about 400,000 tons, leaving a surplus for export. An oil refinery was built at Mombasa to use crude oil imported from the Persian gulf.

2. Trade and Finance.—By 1960 the domestic exports of Kenya were valued at £35,000,000 ($98,000,000) compared with £10,000,000 ($28,000,000) in 1948. The principal commodities were coffee (30% of total domestic exports), sisal (12%), tea (11%), pyrethrum (9%), meat and meat preparations (7%), hides and skins (5%) and sodium carbonate (5%). One quarter of exports by value went to the U.K., 17% to the Federal Republic of Germany and 14% to the U.S. Total net imports were valued at £70,000,000 ($196,000,000), leaving, after taking into account re-exports, an unfavourable visible trade balance of £30,000,000 ($84,000,000) as a characteristic feature of the external trade of the country. Manufactured goods, machinery and petroleum were the chief imports; and the U.K., Japan, Federal Republic of Germany and Iran were the main countries of origin. In the interterritorial trade with Uganda and Tanganyika, Kenya had a favourable balance, the distinctive agricultural production of the highlands and the miscellaneous urban industries contributing to the strength of Kenya in these transfers of produce and manufactures.

The standard coin is the East African shilling which is convertible into sterling at E.A.Sh. 20 to the pound. There is a subsidiary coinage of cents (E.A.Sh. 1 = 100 cents) and notes are issued in denominations of E.A.Sh. 5 upward. The currency is controlled by the East African Currency board, the headquarters of which were removed from London to Nairobi in 1960. A unified customs service operates in Kenya, Uganda and Tanganyika, as a department of the East African Common Services organization. Under a nondiscriminatory tariff basic dues are at 22% ad valorem on finished articles and 11% on partly processed goods. Higher specific duties are levied on wines, spirits, beer, cigarettes and perfumery. Capital equipment for agricultural and industrial development is usually admitted free. In the early 1960s income tax and graduated personal tax came second to customs and excise duties as sources of government revenue. Development projects, largely financed by U.K. government grants and loans, accounted for a considerable proportion of the expenditure. The long-standing feature of a deficit in the annual revenue and expenditure account gave continued cause for concern.

3. Communications.—The external trade of Kenya and Uganda and much of that of northern Tanganyika passes through Mombasa (*q.v.*), which is the largest port of East Africa. The Uganda railway, which was begun in 1896 and completed in 1901, linked Mombasa with Kisumu, on Lake Victoria, from where connection with Uganda was made by steamer. A new main line from Nakuru across the Uasin Gishu plateau reached Kampala, Uganda, in 1931; the extension to Kasese in western Uganda was made in 1956, thus giving Mombasa a rail hinterland of 1,036 mi. The line reaches 7,500 ft. in mounting the Kikuyu escarpment and after a drop to 6,000 ft. in the Rift valley it climbs to 9,000 ft. at Timboroa. The 131-mi. section from Nakuru to Kisumu retains considerable importance, as Kisumu is pre-eminent among the ports of Lake Victoria. A branch line from Voi to Kahe, Tanganyika (94 mi.), provides connection with the Tanga line; and a 91-mi. branch from Konza serves for the export of the Lake Magadi soda products. Other lines serve agricultural areas in the highlands, namely Nairobi-Nanyuki (145 mi.), Gilgil-Thomsons Falls, Rongai-Solai, and Leseru-Kitale; and the Kisumu-Butere line runs through a populous area in Nyanza and Western regions. In 1948 the Kenya-Uganda railway was combined with the Tanganyika railways to form the East African Railways and Harbours administration as a self-contained service under the East Africa High commission; and in 1951 a unified tariff was introduced for the whole system.

Road communications are relatively underdeveloped. Out of nearly 26,000 mi. of public roads in 1960 trunk roads accounted for 3,700 mi. and of these only 634 were bitumenized. Embakasi airport, 9 mi. S.E. of Nairobi, was opened in 1958 as a first-class international airport. Several airlines operate scheduled trunk route services and East African Airways provide international, regional and internal services. The Directorate of Civil Aviation is responsible to the East African Common Services organization as is the East African Posts and Telecommunications administration.

The Kenya Broadcasting service came into operation in 1959 and took over the European and Asian programs formerly provided by Cable and Wireless Ltd., and also the programs in Arabic, Swahili and other African languages which were sponsored by the department of information. Radio facilities now include a fully integrated operation from Nairobi comprising English National, Asian National and African National services. There are regional stations at the Coast, Kisumu and Nyeri.

See also references under "Kenya" in the Index.

(S. J. K. B.; R. S. O.)

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KENYA, MOUNT, after which the country of Kenya is named, lies immediately south of the equator. At the 8,000 ft. contour the girth of this vast dome is about 95 mi.; and in the restricted summit area of steep, pyramidal peaks the principal heights are those of Batian (17,058 ft.), Nelion (17,022 ft.) and Lenana (16,355 ft.). This long-extinct volcano of pre-Pliocene Age has been much denuded, and the highest peaks consist of the crystalline nepheline-syenite which plugged the former vent. Around this core there are gently dipping lavas (phonolites, kenyites and basalts), together with agglomerates and tuffs. Ridges radiating from the central peaks are separated by seven principal valleys and some smaller ones: the Höhnel, Teleki, Hausburg and Mackinder valleys lie to the west, the Hinde, Gorges and Hobley valleys to the east. Twelve small glaciers, of which the Lewis and Tyndall glaciers are the largest, have been in process of retreat during the 20th century. Glaciological observations made during the International Geophysical year (1957–58) showed that the lowest tongue of glacier rested at 14,700 ft., but arêtes, cirques, rock tarns, U-shaped valleys and moraines indicate a former extent of ice occupation which at its maximum reached down at least to 11,500 ft. A markedly radial drainage characterizes the mountains, but all the numerous streams eventually drain either southward into the Tana river or northward into the Uaso Nyiro.

From the acacia-themeda grassland of the basal plateau to the west and north and from the low tree-high grass formation of the south and east, a ring of dense forest, broken only by a narrow gap on the north, covers the slopes of Mt. Kenya up to about 10,500 ft. Cedar (*Juniperus procera*) and yellowwood (*Podocarpus*) are the most important timber trees and are prominent on the drier western and northern flanks. On the upper margins of the forest, *i.e.*, from about 8,000 ft., bamboo (*Arundinaria alpina*) is the dominant species. The zone of alpine vegetation, which comprises a tufty grass interspersed with heaths, lobelias and groundsels, including the characteristic giant forms, gives way at about 15,000 ft. to bare rock and snow. Elephant, buffalo and leopard inhabit the forests and the leopards, in particular, may travel into the moorland zone where they feed on the small rodents. The Mount Kenya national park (175 sq.mi.) occupies the moorland and crag landscape above 10,500 ft., and forest reserve extends over much of the slopes, but the fertile lower slopes are cultivated by the Kikuyu and the related Embu and Meru groups.

The name Kenya comes from the Kikuyu *Kere-Nyaga*, meaning "mountain of whiteness." In 1849 Johann Ludwig Krapf was the first European to see the mountain. Partial ascents were made by Count S. Teleki in 1887 and by J. W. Gregory in 1893, but it was not until 1899 that Halford J. Mackinder conquered the summit, a feat of mountaineering which was first repeated 30 years later by P. Wyn Harris and E. Shipton.

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KENYAH, with the Kayan and the Iban (*qq.v.*) one of the three dominant tribes of Sarawak, are also numerous in parts of Indonesian Borneo. In the 1960 Sarawak census, 8,093 Kenyah were reported. Their original home seems to have been in the north central highlands; in the 1960s they were living near river headwaters, in close association with the Kayan, with whose culture they have much in common though the languages differ. Traditional Kenyah economy was based on the cultivation of dry rice in jungle clearings. The forest was cut and burned and the rice was planted among the ashes. After 10 to 15 years the suitable ground within reach of a village was exhausted and the group moved to a new site. Fowls, pigs, goats and dogs were kept. The village often consisted of only one communal house up to 400 yd. long, built on piles, with a row of family rooms at the back and a wide covered veranda that served as a general working space and village street. Kenyah are skilled craftsmen, making fine swords (*parang ilang*), originally from native ore but later from imported steel. The blades have a distinctive concavo-convex section and the hilts are of finely carved antler or wood. Kenyah make excellent baskets, and carve and paint elaborate house ornaments with curvilinear patterns often based on animal forms. Their war canoes hold up to 100 men.

Chieftainship was elective, though there was a strong bias in favour of a capable son of the old chief. An outstanding chief may influence a number of neighbouring villages. They were headhunters traditionally; their methods of warfare and their religious beliefs closely resemble those of the Kayan. *See* also BORNEO: *The People*.

See L. W. Jones, *Sarawak: Report on the Census of Population* (1962). (B. A. L. C.; X.)

KENYATTA, JOMO (1893?–), president of Kenya and a leading figure in African politics, was born in the Kikuyu tribal area near Nairobi. Educated at the Church of Scotland mission school, he was for several years employed as a clerk by the Nairobi municipality. His interest in the recovery of Kikuyu lands led him to join the Kikuyu Central Association (K.C.A.),

of which he became general secretary in 1928. Having visited England to represent the K.C.A. in 1929, he left Kenya again in 1932 to travel extensively in Europe, including the U.S.S.R. He also studied at the London School of Economics and in 1938 published an anthropological work, *Facing Mount Kenya: the Tribal Life of the Gikuyu.* Returning to Kenya in 1946, he was elected president of the Kenya African Union in 1947. On Oct. 21, 1952, after the outbreak of the Mau Mau disorders, he was arrested, and on April 8, 1953, he was sentenced to seven years' imprisonment for "managing Mau Mau" and for "being a member of a proscribed cult." He was finally freed in August 1961 and in October accepted the presidency of the opposition party, the Kenya African National Union (KANU). After KANU's victory in the elections of May 1963 he became first prime minister of a self-governing Kenya in June. In December 1963 he was prime minister when Kenya achieved independence and exactly a year later he became president of the Republic of Kenya. Both inside and outside Kenya his policies won a reputation for moderation, which was exemplified by his cautious diplomacy in the Rhodesia crisis in 1966.

BLACK STAR

KENYATTA

See also KENYA: *History.* (K. I.)

KEOKUK, a city of Lee county, in the southeastern corner of Iowa, U.S., on the Mississippi river at the mouth of the Des Moines. The first house on the site of the city was built in 1820 by S. C. Muir, but there was no further settlement until 1836. The town was laid out in 1837 and was chartered as a city in 1848.

At the foot of the Des Moines rapids in the Mississippi river, beyond which steamboats could not pass, the settlement, in its early days served as a transshipment point. A canal (opened 1877) was constructed around the rapids by the federal government. In 1910–13 the Mississippi River Power company dammed the river for a hydroelectric power plant, generating a total of 200,000 h.p. The dam proper is nearly one mile long; set in a channel cut several feet into the hard limestone bed of the river, it created Lake Keokuk, at the bottom of which lie the rocks that caused the rapids.

Keokuk has a large wholesale trade and numerous and varied manufacturing industries. There is a national cemetery there. The city was named after Keokuck, a chief of the Sauk Indians (1788–1848) who remained peaceful during the Black Hawk War. The word meant "the watchful" or "he who moves alertly." For comparative population figures *see* table in IOWA: *Population.*

KEONJHAR, a district in Orissa, India. Formerly a princely state, it merged with Orissa on Jan. 1, 1948. Area 3,206 sq.mi.; pop. (1961) 743,315, most of whom depend on agriculture. The total area under cultivation is less than one-third of the whole, but almost as much again is cultivable. There are two natural divisions in the districts: lower Keonjhar, which is a fertile plain, and upper Keonjhar, hilly and undulating. The chief river, Vaitarani, is held in veneration in the epics and the puranas, and there are other good irrigation facilities. The district is rich in such minerals as iron ore, limestone, manganese, hematite, chromite, steatite, dolomite and quartzite; there is some china clay. Champua, the northernmost subdivision, was developed and prospered because of its mining and timber and the construction of the Amda-Jamda section of the railway line.

Keonjhargarh, the headquarters, is the only town in the district. Pop. (1961) 12,624. It contains the palace of the raja and the Keonjhar science college affiliated to the Utkal university. At Sita Vinjhi in Anandpur subdivision are beautiful 5th-century rock paintings of the Ajanta school. (MA. M.; N. K. S.)

KEOS (Lat. CEOS or CEA, ZEA, modern Gr. KEA), a Greek island in the Aegean sea, lies 22.5 km. (14 mi.) off the coast of Attica and 64 km. (40 mi.) from Piraeus, in the group of the Cyclades and the eparchy of Syros. Pop. (1961) 2,361. Its length is about 21 km. (13 mi.) and its breadth about 13 km. (8 mi.). Mt. Elias (Profitas Ilias) in the centre is 1,841 ft. high. Its products include lemons, citrons, olives, wine, honey and valonia. There were formerly four towns in the island: Iulis, about 3 mi. from the northwest shore, represented by the town of Kea; Coressia, the harbour of Iulis; Carthaea, in the southeast, at Stais Polais village; and Poieessa, in the southwest. Iulis was the birthplace of the lyric poets Simonides and Bacchylides, the philosophers Prodicus and Ariston and the physician Erasistratus. It was famous for its excellent code, whence the proverbial Kean laws, one of which forbade a citizen to protract his life beyond 60 years. Keos fought on the Greek side at Artemisium and Salamis; joined the Delian league (*q.v.*), and also the Athenian alliance in 377 B.C.; revolted in 363–362, but was reduced again. Athens then assumed monopoly of the ruddle, or red earth, the most valuable product of the island. Keos was divided in A.D. 1207 among four Italian adventurers; was included in the duchy of Naxos in 1537; passed under Turkish rule in 1566 and thence into the Greek kingdom. Silver coins of Carthaea and Coressia on the island date from the 6th century B.C.

See Pridik, *De Cei Insulae rebus* (1892); Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft.* (J. Bo.)

KEPLER, JOHANNES (1571–1630), German astronomer, whose studies of the motions of the planets helped materially in laying the foundations of modern dynamical astronomy. He was born on Dec. 27, 1571, at Weil in Württemberg. His father was a petty officer in the duke of Württemberg's army and his mother, Catherine (née Guldenmann), came of a family of once noble standing. Johannes was a two months' premature infant and a very delicate child. With his younger brother Heinrich, he lived with his grandparents while his father was engaged in the Dutch wars and his mother accompanied her husband to the Netherlands. When about four years of age he contracted smallpox and nearly went blind with the result that his eyesight was permanently impaired.

BY COURTESY OF THE TRUSTEES OF THE BRITISH MUSEUM

JOHANNES KEPLER

He first attended school in Weil, then in Leonberg on the return of his parents, and finally in the Convent schools of Adelberg (1584) and Maulbronn (1586). In Sept. 1588 he obtained his bachelor's degree and entered the University of Tübingen the following year. There, in Aug. 1591, he obtained his master's degree. He had hoped to enter the ministry but instead was persuaded to accept the post of professor of mathematics at Graz in 1594.

At Tübingen Kepler came under the influence of Michael Maestlin who became a lifelong friend. Maestlin was a protagonist of the views of Copernicus which he had to teach privately to his young pupil as the Ptolemaic system was still the picture of the universe which was held in official circles. Kepler absorbed the heliocentric concept of Copernicus and later developed it with a pertinacity and brilliance for which he will ever be remembered.

As professor at Graz, Kepler lectured on mathematics and also, at the request of the university, on Virgil and rhetoric. He was also expected to prepare annual almanacs giving astronomical and astrological predictions and so he applied himself with great diligence to the study of astrology. No disparagement should be attached to Kepler for this astrological work because at the close of the 16th century not only was the conception widely held that the stars and planets exerted a definite influence on day to day

events, but there were no clear ideas of the forces which caused planetary motion; moreover, the concept of the differences between the behaviour of heavenly bodies and terrestrial phenomena was still unquestioned and thus even as independent and penetrating a mind as Kepler's could accept the basic doctrine of astrological influence. Soon after taking up his appointment, therefore, he published (1595) his *Calendarium und Prognosticum* computed for the years 1591–99.

Kepler was, however, primarily interested in the problems of the planetary system. Because of his firm faith in God and in the order of creation, he believed with almost fanatical fervour that there must be some regularity in the relationship between the orbits of the planets and he spent his major efforts in seeking this relationship. The first fruits of his labours were published in 1596 under the title *Prodromus Dissertationum Mathematicarum continens Mysterium Cosmographicum.* Although a youthful work, it showed Kepler's freedom of mind and his ability to speculate in a scientific manner on problems of great significance and complexity. The hypothesis presented in the *Mysterium Cosmographicum* was ingenious: Kepler found that between the "spheres" of the six planets there could be fitted the five "regular" solids and believed that he had thus discovered a basic order underlying the distances of the planets from the sun. The publication of this work brought him fame and he began corresponding on very friendly terms with Tycho Brahe and Galileo, two of the most eminent astronomers of the day.

In April of the following year, Kepler married the wealthy Barbara von Mühleck, whom he had met in Graz, but by September all Protestant theologians were expelled from the city, although his wife's influence enabled him to return after but one month away. However, the situation remained unfavourable and in 1599 he asked Maestlin to help him obtain a chair at Tübingen. He met with no success and, finally, in 1600, Kepler and his wife had to leave Graz. The Roman Catholic Hensart von Hohenberg, who was an old pupil of Maestlin's and with whom Kepler had been in correspondence, suggested that Tycho Brahe (*q.v.*) might help. Tycho himself had been forced to leave the island of Hveen but when appointed court mathematician to Emperor Rudolf II in Prague invited Kepler to join him there and, two months after leaving Graz, Kepler and his wife made their home in Prague.

Tycho died a year after Kepler's arrival in Prague and he was thereupon appointed by the emperor to succeed his late patron as court mathematician (although at a reduced salary). All the observations which Tycho had made were at Kepler's disposal and, as later events proved, these were a veritable storehouse of information to which astronomy will ever be in debt. The emperor had, however, astrological leanings and in 1602 in *De fundamentis astrologiae certioribus,* his first publication from Prague, Kepler declared his aim of distilling and preserving the grain of truth which he believed astrology to possess. He also drew up horoscopes for the emperor and other dignitaries.

Although he had no liking for this kind of well-paid activity, Kepler believed that a means of subsistence was provided for all humans and classed astrology as the means of assisting astronomers in their work. In 1603 he dedicated to the emperor the *Judicium de trigono igneo,* a small treatise on an important conjunction. On Sept. 30, 1604, a nova appeared and remained visible for 17 months; this stimulated in 1606 another small publication *De Stella nova in pede Serpentarii.* But much more important was the publication in 1604 of the *Astronomiae pars optica.* This book contained Kepler's fundamental ideas on the nature of vision and a definition of a ray of light which later became generally adopted in geometrical optics. There was also offered an explanation of the reflection of light and a notable approximation to the law of refraction.

From the time he came to Tycho, Kepler paid particular attention to the observations of Mars, the movements of which, because of its comparatively large eccentricity, had always been difficult to account for by means of the customary circular motion. It was in his efforts to reconcile the observations with the Copernican system that Kepler was led to take the bold step which had so profound an effect on future astronomy and made a complete break with traditions of more than 2,000 years. He proposed first that the planets revolved round the sun in elliptical paths with the sun at one focus. Next, with his belief in the order and regularity of the heavens, he sought some kind of regular motion which would describe the behaviour of the planets in paths of elliptical form. Such work entailed much labour but finally he discovered that the radius vector of each planet described equal areas of the ellipse in equal times. Thus he accounted precisely for the irregular velocity of a planet in its orbit and obviated the need for epicycles. This new and fundamentally important work was published in Prague in 1609 in Kepler's 36th year. Besides making public the two laws of planetary motion, the book contained a discussion of celestial forces and extended ideas first enunciated 13 years earlier in his *Mysterium cosmographicum.* He supposed that some kind of force emanated from the sun and that its effect lay in a plane close to the planes of the planetary orbits, its magnitude being proportional to the length of the radius vector. The orbital motion of the planets Kepler presumed to be due to the rotation of the sun on its axis and the whole concept was, in fact, a theory of vortexes. This explanation was the first attempt to formulate a physical mechanism to account for the motion of the planets; that it was not satisfactory is no discredit to Kepler for it was based on the 16th-century belief that a force must be constantly applied to a body in order to keep it in motion. In the same year Kepler published also the *Mercurius in Sole* on a transit of Mercury and in 1610, after observing with a Galilean telescope, he published the *Narratio de Observatis a se quatuor Jovis Satellibus erronibus.* The year 1610 also saw the *Tertius Interveniens* on astrology and a publication on Galileo's *Nuncio Sidereo.*

The use of the newly invented telescope stimulated Kepler to further optical studies and in 1611 his *Dioptrice* appeared. In this the design of the inverting astronomical telescope which, with modifications, came later into wide use, was first suggested.

Political disturbances were occurring in Prague. Matthias, brother of the emperor Rudolf, assumed the throne in 1611 and the next year Rudolf died. Fortunately Kepler's loyalty to Rudolf did not prevent his being favoured by Matthias and in 1612 he was appointed mathematician to the states of upper Austria. In 1613, with the new emperor, he advocated the introduction of the Gregorian calendar but was frustrated by antipapal prejudice. During this year he married Susanna Reutlinger, his first wife having died two years earlier.

In 1613 an abundant vintage drew Kepler's attention to the methods used for determining the cubical contents of vessels. His thoughts on this appeared in 1615, in the *Nova Stereometria Doliorum,* which could be said to have prepared the way for the development of the "infinitesimal" calculus. Some theological writings appeared in 1614 and 1615, and in 1618 observations of three comets gave rise to *De Cometis* (1619) wherein Kepler suggested that comets were condensations in the ether and moved in straight lines due to impulses received from the sun.

Kepler extended his planetary laws to the satellites of Jupiter in the *Epitome astronomiae Copernicanae* published in parts between 1618 and 1620–21 and which is notable for its emphasis on physical explanations. The third planetary law connecting the periods and mean distances of the planets had seen the light of day in 1619 in his *De Harmonice Mundi* with which his great contribution to dynamical astronomy was completed. It was in this work that Kepler proposed the mathematical concept of "harmony" in the solar system, believing he had thus further extended his search for unification by marrying together intervals in the musical scale with the angular velocities of the planets.

He was the first to apply his three laws to the computation of ephemerides and, to assist his work, used logarithms. He wrote on the subject and published (1624) *Chilias Logarithmorum.*

In 1627 there appeared the *Tabulae Rudolphinae.* These tables held their place for over a century, being universally used in calculating planetary positions. This work contained also tables of refraction and of logarithms and an extended catalogue of 1,005 stars based on Tycho's observations of 777 star positions.

In 1628 Kepler and his family moved to Silesia where he still

concerned himself with ephemerides and in 1629 drew attention to approaching transits in *Admonitio ad astronomos*. On Nov. 15, 1630, in Ratisbon (Regensburg), Kepler died, leaving behind him achievements which helped to change the face of astronomy and ensured his permanent and deserved fame. *See* also references under "Kepler, Johannes" in the Index.

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KEPPEL, AUGUSTUS KEPPEL, VISCOUNT (1725–1786), British admiral whose political views caused conflict with his naval career, was the second son of the 2nd earl of Albemarle. Born on April 25, 1725, he entered the navy and at the age of 15 went around the world with Commodore George Anson in the "Centurion." During the Seven Years' War he saw constant service. In 1757 he was a member of the court-martial that condemned Adm. John Byng, and actively endeavoured to secure his pardon. In 1762 he went with Sir George Pocock on the expedition that took Havana, and received £25,000 prize money. He became rear admiral in Oct. 1762 and vice-admiral in Oct. 1770. The most debated period of his life belongs to the opening years of the American Revolution. He was member of parliament for Windsor (1761–80) and a strong supporter of the Whigs. Consequently when he fought against France (1778) in command of the western squadron, he believed that Lord Sandwich, then first lord of the admiralty, would be glad to see his defeat. Unfortunately Sir Hugh Palliser, a member of the admiralty board, went to sea with him in a subordinate command. Keppel believed that his failure in the battle with the French (July 27, 1778), which was actually due partly to his own incapacity and partly to Palliser's disregard of his orders, was the result of a deliberate betrayal. He praised Sir Hugh in public but attacked him in private, and a campaign of calumny was begun in the press that resulted in the trial and acquittal, first of Keppel and then of Palliser, for neglect of duty. Keppel was ordered to strike his flag in March 1779. When Lord North's ministry fell in 1782 he became first lord (March 1782–Jan. 1783 and April–Dec. 1783) and was created Viscount Keppel, but his career in office was not distinguished. He died at Elveden Hall, Suffolk, on Oct. 2, 1786.

KER, WILLIAM PATON (1855–1923), Scottish scholar, was born in Glasgow on Aug. 30, 1855. Although primarily a medievalist, Ker had a breadth of reading and of sympathy which gave him a remarkable and fruitful power of analogy. A tireless and inspiring teacher, his belief that the critic's function is "to *praise* in the right way" is a main current in his books. These include *Epic and Romance* (1897; 2nd ed. 1908), which revolutionized criticism of the epic; *The Dark Ages* (1904); *Essays on Medieval Literature* (1905); and *Collected Essays,* ed. by C. Whibley, two volumes (1925). He studied at Glasgow and Balliol college, Oxford, and held professorial chairs at Cardiff (1883–89) and University college, London (1889–1922). He was elected professor of poetry at Oxford in 1920 and was a fellow of All Souls, Oxford, from 1879 until his death. He died at Macugnaga, Italy, while on a climbing holiday, July 17, 1923.

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KERALA, a state of the Republic of India, lies mainly along the extreme southwestern coast of the Indian peninsula. It stretches for about 340 mi. between latitude 13° 40′ and 8° 20′ N., thus excluding the peninsular tip around Cape Comorin, which is in Madras state. Its maximum inland width is 75 mi. Comprising broadly the territory of the medieval kingdoms of the same name, Kerala was revived as a political entity under the States Reorganization act, 1956, when the states of peninsular India were realigned mainly on a linguistic basis. Thus Kerala comprehends the peoples speaking Malayalam (*q.v.*), and is bounded east by Tamil-speaking Madras and north by Kannada or Kanarese-speaking Mysore. It absorbed the former princely states of Travancore and Cochin (united since 1949 as Travancore-Cochin), with the exception of some Tamil-speaking subdivisions in the south, together with the former Malabar district and other land in the north hitherto in Madras.

Physical Features.—Being on the west coast and receiving the full force of the southwest monsoon the state has a heavy rainfall—for the most part more than 80 in. a year—and being in the extreme south there is little difference in temperature between one season and another. Cochin, for example, has a range from 78° F. in July to 84° F. in April. The contrast is even less at Trivandrum, the state capital in the south, which has considerable rainfall in October and November as well as in the normal Indian rainy season in May, June and July.

Along most of the coast are lines of sand hills and dunes thrown up by the waves of the Arabian sea and densely covered with coconut palms. Behind lies a succession of sheltered lagoons which are linked by artificial cuts so that it is possible to travel by boat almost the length of the state. Here and there the lagoons connect with the sea and at Cochin the entrance of a great lagoon called the Vembanad "lake" was dredged to afford a good modern harbour. Bordering the lagoons are extensive alluvial lands devoted to rice cultivation. These rice plains stretch inland to the foothills and spurs of the mountains which make up the eastern part of the state.

The hill lands are densely wooded with equatorial-type forests. The land rises eastward to the crests of the Western Ghats which form the state's boundary in the north and to those of the Cardamom hills which divide it from Madras in the south. Between the Vellangiris, the Ghats' southern bastion, and the Anaimalai hills, the northern extension of the Cardamoms, is the Palghat gap, affording a line for the railway to Madras. (L. D. S.)

History.—Kerala always offered easy access from the western world by sea, and it remained almost isolated by land from the rest of India until the British period. This explains much of its history. Pepper, rice and other commodities brought Greek, Roman, Ethiopian and Arab traders by the 2nd century B.C. The Arabs stayed and founded colonies along the Malabar coast; their descendants are known as Malabar Muslims or Moplahs. The Portuguese, arriving under Vasco da Gama in 1498, emulated the Arabs, whom they drove out where they could. The Malabar coastal strip was rarely invaded from the eastern side of the Western Ghats, and this security enabled petty rajahs to rule sections of it generally without acknowledging an emperor.

The early history of Kerala is obscure. The land is mentioned in inscriptions of the Buddhist emperor Asoka (*q.v.*). Western classical texts, including Pliny and the *Periplus of the Erythraean Sea,* refer to its ports, but it is not until the end of the Perumal dynasty (*c.* A.D. 900–950) that any historical details can be dated. The *Kerala Mahatmyam* is a late and unreliable document. Inscriptions on copper plates and occasionally on stone can be dated only paleographically; few are dated in the Malabar era, which began in A.D. 824–825, the date apparently marking the foundation of the city of Kollam or Quilon (*q.v.*). Thereafter (and also earlier) references are made throughout south India to the Kerala ruler as "the Chera king."

By the 10th century, Jews and Christians were already established alongside the Muslims, Nayar (*q.v.*), Thiyya and other Hindu peoples characteristic of Malabar.

Medieval Kerala was often allied to the Pandyas, who intermittently sought to monopolize south Indian and Ceylonese trade. For short periods the Cholas (*q.v.*) managed to gain supremacy. In return Tiruvadi Ravivarma Kulasekhara, king of Quilon, conquered the greater part of the Pandya (*q.v.*) and Chola countries after their defeats in 1310–11 at the hands of Malik Kafur, general and favourite of Sultan Ala-ud-Din Khalji of Delhi.

Interference from the north via the west coast began in the reign of Mohammed Tughluq at Delhi (1325–51); but on the whole Malabar was left in peace, and in the 14th–16th centuries the Hindu empire of Vijayanagar buffered the Malayali peoples

from the Muslim Bahmani sultanate and the subsequent Muslim sultanate of Bijapur.

The Portuguese exploited rivalries between Cochin, by then the power in central Kerala, and Calicut in the north, which assisted them to take Goa in 1510. The Dutch followed about 1640 and benefited from Portuguese decline, until Travancore (south Kerala) defeated them in turn in 1741 and Haidar Ali of Mysore did the same in 1778. While the rajah of Cochin suffered under Hyder's son Tipu Sahib, Travancore was relatively safe from the Mysorean, becoming an ally of the British. Cochin became a subsidiary of the East India company in 1791, and prospered after the disappearance of the Dutch. Travancore entered the same relationship in 1795. Rebellions of 1804 and 1809 were put down with ease, and except for Moplah rebellions of 1849–55 and 1921 Kerala has been at peace since.

Enlightened princes ruled with legislative councils and able chief ministers until in 1949, following the accession of the two states to independent India, the union of Travancore-Cochin was formed as one of its component states. In 1956, with revised boundaries, the Malayalam-speaking areas were united in one state and the ancient name of Kerala restored. Anxieties were aroused by the return of a Communist ministry in the general elections in 1957. Following disturbances and a period during which state constitution was suspended by the central government, midterm elections in 1960 restored an anticommunist front led by the Congress party to power.

Extreme orthodoxy and the preservation of Sanskritic learning continue side by side with radicalism among the people of Kerala; ancient customs, including the disappearing matriliny and polyandry, endure side by side with cosmopolitanism. Innovations, such as the opening of temples to all Hindus (1936), gave a lead to other parts of India. Malayalis had a thirst for education and a versatility beyond the average before missionaries came to develop both. (J. D. M. D.)

Population.—The population of Kerala according to the census of 1961 was 16,903,715. The area was 15,002 sq.mi. Thus, with an average density of 1,126 persons per square mile, rising to more than 4,000 in some localities, it is thickly populated compared with the all-India mean of 373.

About 25% of the population are Christian, accounting for about one-third of the Christians of India. Kerala's ancient "Mar Thoma" Christian community claims continuity from the reputed Indian apostolate of St. Thomas (*q.v.*). It is now divided between the uniate church of the Malabar or Malankara rite, in communion with Rome; the Monophysite Syrian Orthodox (Jacobite) Church of Malabar, which acknowledges the spiritual authority of the patriarch of Homs, Syria; and a number of small independent Nestorian or Monophysite communities. There are also many congregations of Roman Catholics (Latin rite). (*See* also ROMAN CATHOLIC CHURCH.)

Other ancient communities are Jews, Nayars and Muslims (Moplahs) of Arab origin. In the hills are tribespeople such as the Kadirs (Kadars), probably of Negrito stock.

Administration.—There is a state governor, appointed by the president of India, but practical administration is exercised by a chief minister and cabinet of departmental ministers drawn from the majority party in the legislative assembly. This assembly is elected on a constituency basis under universal adult suffrage, normally every five years. The local government of the state was reorganized in 1958–59 to provide eight districts, Alleppey, Cannanore, Palghat, Quilon, Trivandrum, Kottayam, Kozhikode, and Trichur (*qq.v.*), in place of the previous five; in the process the historic name of Malabar disappeared from the political map.

There is a state high court of justice and public service commission in Trivandrum. (X.)

Education and Social Welfare.—Kerala leads India in literacy, with more than 50% of the male and 30% of the female population literate according to the 1951 census. By the 1960s primary education was provided for virtually all children, and in most towns and many villages, had been made free and compulsory. In addition to secondary and vocational schools, there is the University of Kerala, founded in 1937 as the University of Travancore. Its headquarters and central teaching faculty are at Trivandrum, and it has affiliated colleges there and in other towns.

Under the contributory employers' state insurance scheme medical aid and cash benefits for sickness, maternity and employment injury are provided for factory workers. Free medical treatment is available in many hospitals and dispensaries.

The state government's program for the social amelioration of tribal and backward communities includes the provision of schools, mobile medical units and welfare centres, as well as cottage industries and free grants for buying agricultural implements. (S. B. L. N.)

The Economy.—Along the coasts and in the lagoons, fishing flourishes. Besides being a country with a large rice and coconut production, Kerala includes the famous old Malabar coast (*q.v.*) where pepper, cardamoms and other spices are still produced; also rubber, tea (from the hills), cashew and areca nuts, tapioca and oilseeds. The forests afford teak, ebony and a variety of other woods. Kerala has a wide range of minerals: beach sands yield monazite, ilmenite, zircon and other minerals of economic importance; there are deposits of white clay, and products from the old rocks include mica, graphite and limestone.

The preparation of coir from the husks of coconuts is a leading cottage industry or occupation and other home industries are organized on a co-operative basis. Most modern industrial concerns are state-owned or state-sponsored: there is a wide range of manufactures—from textiles, ceramics and chemicals to electrical goods, glass and paper—though for the most part on a small scale.

For centuries small ports shipped timber and spices, but until the improvement of Cochin the area's external trade on a modern scale relied mainly on the long rail haul across the peninsula to Madras. Landward access to the state, both road and rail, is largely through the Palghat gap from Madras and the more difficult Shencottah gap across the Cardamoms in the south. The wet country is difficult for road construction and maintenance. The main road route serves the southern coast from Trivandrum northward to Cochin; then from Ernakulam to Madras.

Broad-gauge railway lines with termini at Mangalore (just within the Mysore boundary in the extreme north) and Cochin harbour (Ernakulam) join in the middle of the state to pass through the Palghat gap to Madras. The Mangalore line hugs the coast for all but 30 mi. of its 190-mi. length and serves administrative centres and small roadstead ports such as Kozhikode (Calicut), Mahé, Tellicherry, Cannanore and Kasaragod. On the Cochin spurline are the industrial towns of Trichur (cotton manufactures, tiles) and Ernakulam (soap, rice-milling). A metre-gauge line follows the more difficult Shencottah route to Quilon and Trivandrum and the two systems are linked by a further metre-gauge route from Quilon northward to Ernakulam. Cochin and Trivandrum have domestic airports. (L. D. S.)

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KERCH, a town and seaport in the Crimean *oblast* of the Ukrainian Soviet Socialist Republic, U.S.S.R., stands on the western shore of the Strait of Kerch (Kerchenski Proliv), at the head of a small bay 120 mi. E.N.E. of Simferopol. Pop. (1959) 99,000. It is one of the oldest towns in the Soviet Union, having been founded as the colony of Panticapaeum by Greeks from Miletus in the 6th century B.C. In the 5th century it became the capital of the kingdom of Bosporus Cimmerius (*see* BOSPORUS, KINGDOM OF THE), which extended its power round the shores of the Sea of Azov. The trade of Panticapaeum flourished, especially its export of wheat to Greece. At the close of the 2nd century B.C. the kingdom fell to Mithradates (*q.v.*) VI of Pontus. With the final defeat of Mithradates by the Romans and his death (at Panticapaeum), the kingdom became tributary to Rome, under his son, Pharnaces. Later the Cimmerian Bosporus became part of the eastern Roman

empire and suffered greatly during the series of barbarian invasions. The Goths were established there for a lengthy period, and in A.D. 375 the Huns devastated the area. It was held in turn by Sarmatae (*see* SARMATIANS) and Khazars (*q.v.*) and for a time was included in the Russian princedom of Tmutarakan on the Taman peninsula (Tamanski Poluostrov) across the strait. At that time it was known as Korchev, from which the present name derives. Kerch was conquered by the Tatars in the 13th century, but in 1318 they ceded it to the Genoese, who had established themselves on the south Crimean coast, with their centre at Kaffa (Feodosiya). Kerch, known to the Genoese as Cerco or Cerchio, was a relatively minor consulate of Kaffa. In the 15th century the town, with the rest of the Crimea, passed to Turkey and its trading importance almost entirely vanished. In 1771 the Russians captured Kerch, which was formally ceded to them by the treaty of Kuchuk Kainardji in 1774. The town remained of small importance, for the main fortifications guarding the strait were at Yenikale, 6 mi. to the northeast, but in 1821 the tsar Alexander raised it to the status of a town and seaport of the Russian empire. Even then its significance was chiefly as a transshipment point to shallow draft vessels for the passage to Taganrog and Rostov. Kerch suffered damage during the Crimean War and again even more severely, in World War II, when it was held by the Germans (1942–44) and was the scene of bitter fighting.

Ancient catacombs in the town and the vast number of *kurgans*, or burial mounds, in and around Kerch have been a rich source for archaeological research since the beginning of the 19th century, in particular the so-called King's Mound (Tsarski Kurgan) on the northern outskirts. The many finds of Greek objects testify to the wealth of Panticapaeum, which imported from Greece not only articles of luxury and art, but also white marble for its buildings.

The present importance of Kerch dates from the discovery in 1783 of iron ore in the vicinity of the town, although this only began to be exploited at the end of the 19th century, when improved techniques made it possible to deal with its high phosphorus content. In 1897 an iron works was set up in Kerch. In all there are seven ore deposits on the Kerch peninsula and it is claimed that reserves are the third largest in the world. By Soviet standards the iron content is not very high, for the most part between 33% and 42%, with an extreme range of 20%–51%. In addition to the high phosphorus percentage the ores contain sulfur and arsenic, as well as a little manganese and vanadium. However, the proximity of the deposits to the Donets Basin (*q.v.*) has led to large-scale exploitation. The main deposit is at Kamysh-Burun, with 34.3% iron. The large integrated iron and steel plant at Kerch, completely destroyed in World War II, has been rebuilt, as has the associated coke-chemical plant. The phosphorus-rich slag is used for fertilizer. Limestone is obtained from large quarries near the town. The port is used mainly for the export of ore to Mariupol and Taganrog and as the base of a large fishing fleet. In spring and particularly in autumn there are large runs of fish through the Strait of Kerch. There are ship-repair yards and a fish cannery. A train-ferry links Kerch to Sennaya across the strait and thus to Krasnodar. Kerch itself is the terminus of a line from Kherson. It is the location of the Azov-Black Sea Institute of Fisheries and Oceanography and has a metallurgical technical school and a number of secondary schools. *See* also CRIMEA. (R. A. F.)

KERENSKI, ALEKSANDR FEDOROVICH (1881–), Russian political leader, head of the provisional government in the revolutionary period from July to Nov. 1917, was born at Simbirsk (the modern Ulyanovsk), the son of a schoolmaster. At St. Petersburg university, where he studied law, he embraced the radical ideology of the Narodniki or Populists fashionable at the time. Unlike most Russian socialists, Kerenski stood above narrow party loyalties. He practised successfully as a barrister, specializing in the defense of revolutionaries accused of political offenses; and in 1912 he was elected to the 4th *duma* as a Labour (*Trudovik*) deputy for Volsk (Saratov province). During World War I he kept his party outside the Progressive bloc, calling for the immediate introduction of democratic reforms to give the army an incentive to fight. His fiery temperament made him an excellent orator. In March 1917 he emerged as one of the few leaders capable of directing the passions of the crowds into organized channels. He saw the Revolution as "an epic sweep toward the eternal and universal ideal" of human liberty. Yet his impetuosity led him to make errors of judgment, and he veered unpredictably from one extreme to another.

Defying the dogmatically antibourgeois Petrograd soviet of workers' deputies, Kerenski accepted office on March 15 (new style) as minister of justice in the provisional government under Prince G. E. Lvov. As he remained vice-president of the soviet, he could to some extent bridge the gap between it and the government. In the cabinet Kerenski was instrumental in bringing about the resignation of P. N. Milyukov (*q.v.*) and the subsequent coalition with Socialist Revolutionary and Menshevik members of the soviet. In this government he became minister of war (May 18, N.S.). He toured the front, appealing to the troops to defend the freedoms won by the Revolution, but army discipline, already weak, was further undermined by his organizational reforms and finally shattered by the abortive Galician offensive of July 1 (N.S.).

On July 21, after a government crisis, Kerenski became prime minister. His premiership was characterized by the growing isolation of the government from both the right and left wings of Russian opinion. Kerenski, nervous at the threat of counterrevolution, on Sept. 9 summarily dismissed the commander in chief, Gen. L. G. Kornilov (*q.v.*), whom he suspected of attempting to overthrow the government. Moderates who saw in Kornilov a bulwark against anarchy considered Kerenski ill advised—and also guilty of bad faith, since he had not been entirely unaware of Kornilov's plans. The knowledge that Kerenski himself had contemplated assuming dictatorial powers undermined his reputation with the left, where his government was already unpopular because it would not sanction the radical measures demanded by the Bolsheviks. Moreover, Kerenski was hampered by conflicts within his cabinet, democratic scruples and the determination to fight on to victory. Trusting in the democratic sentiments of the masses, he hoped that the threat of a Bolshevik coup could be averted without repressive measures; but when he appealed to the "preparliament" for support (Nov. 6), he met only with angry recriminations. That same night the Bolsheviks struck. Kerenski escaped from the Winter palace by a ruse and called on nearby army units for aid; but here too he was greeted with indifference or outright hostility. He emigrated to England, then to France and later to the United States, remaining politically active and loyal to his democratic credo. His publications include *Prelude to Bolshevism: the Kornilov Revolt* (1919), *The Catastrophe* (1927) and *The Crucifixion of Liberty* (1934). (J. L. H. K.)

KERGUELEN'S LAND CABBAGE (*Pringlea antiscorbutica*), a plant resembling in habit and belonging to the same family (Cruciferae) as the common cabbage. The cabbagelike heads of leaves abound in a pale-yellow highly pungent essential oil, which gives the plant a peculiar flavour but renders it extremely wholesome. It was discovered by Capt. James Cook during his first voyage, but the first account of it was published by (Sir) Joseph Dalton Hooker upon his return from the Antarctic voyage of the "Erebus" and "Terror" in 1839–43. During the stay of the latter expedition on the island, daily use was made of this vegetable either cooked by itself or boiled with the ship's beef, pork or pea soup. Hooker observes of it, "This is perhaps the most interesting plant procured during the whole of the voyage performed in the Antarctic Sea, growing as it does upon an island the remotest of any from a continent, and yielding, besides this esculent, only seventeen other flowering plants." Though belonging to a family of insect-pol-

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KERGUELEN'S LAND CABBAGE (PRINGLEA ANTISCORBUTICA)

linated plants, it has become modified for wind pollination, having projecting stamens and long threadlike projections on the stigma. This peculiarity is apparently an adaptation to the absence of winged insects on the island.

KERKRADE, a town in the province of Limburg, the Netherlands, is located on the German frontier, 32 km. (20 mi.) E. of Maastricht. Pop. (1963) 50,263 (mun.). Kerkrade's importance as a coal-mining centre dates from 1113, making it one of the oldest coal-mining towns in Europe. Among buildings of historical interest are the former abbey of Rolduc, founded in 1104, now used by a Roman Catholic school for boys, and the 17th-century Oud Ehrenstein castle, adjoining a natural history and mining museum. In the Europaplein park international music festivals for amateur brass bands and symphony orchestras are held from time to time. Kerkrade is connected by train and bus to centres in the Netherlands and abroad; air services operate from the Zuid Limburg airport at Beek. (J. M. N. B.)

KERMADEC ISLANDS, a group of volcanic islands in the Pacific, lie 600 mi. N.E. of New Zealand. The four islands (from north to south: Raoul, Macauley and Curtis islands and L'Espérance rock) have a total area of about 13 sq.mi. The largest is Raoul, or Sunday (11.3 sq.mi.), rising to 1,723 ft., with a combined meteorological and communications radio station. In 1963 the station had a staff of nine men who were the sole inhabitants of the group. The other islands are completely uninhabited. Stone artifacts left by Polynesian peoples have been found. Curtis and Macauley were discovered by the British ship "Lady Penrhyn" in 1788; the others by the French navigator A. R. J. de Bruni d'Entrecasteaux in 1793. Between 1827 and 1914 there were unsuccessful attempts at settlement by Europeans. The islands were annexed by New Zealand in 1887 and New Zealand laws apply there. *See* PACIFIC ISLANDS. (R. M. FR.)

KERMAN, a city and *ostan* (province) of Iran. The city of Kerman, the administrative centre of the *ostan,* is situated on a sandy plain at the junction of three valleys, 5,680 ft. above sea level. Pop. (1956) 62,157, an increase of 10,000 from 1949–50. There are minorities of Shaikhis, Babis, Zoroastrians and Jews. The city lies tucked away under barren, rocky hills; modern development outside the old wall, now demolished, is not extensive. The bazaar is large and well built and there are some old mosques, including Masjid-e-Malik (11th-century, now restored). Outside the town is the ruined Gombad-e Jebeliyeh. At the western end of the bazaar is the "ark" or former Kajar citadel, and next to it the *qaleh,* allegedly constructed as a citadel by the Afghans after their conquest of Kerman (1722).

Kerman owes its industrial reputation to its shawls, but this industry has long been surpassed by carpetmaking. Mahani suburb is noted for its carpetmakers. Kerman is the largest carpet-exporting centre of Iran. All other crafts have lost their prominence, but other exports include pistachios, tragacanth, wool and *kurk* (soft underhair of goats). There is very little cultivation in the immediate vicinity, and the city's water is brought by *qanats* (underground water channels) from considerable distances.

Kerman appears to have been a town from early Sassanid times, probably founded by Ardashir who allegedly also built the now completely ruined castle on a hill outside the modern town. It was made the capital of the province in the 10th century by a governor of the Buyids, replacing Sirjan and maintaining its position through the vicissitudes of history.

KERMAN OSTAN is bounded north by Khurasan and Isfahan *ostans,* west by Fars *ostan,* east by the Baluchistan-Seistan *ostan,* south by the general governorship of Bandar Abbas, along the Gulf of Oman and the Strait of Hormuz. It includes the southern part of the central Iranian desert (Lut). Kerman proper falls into five *shahrestans:* Kerman in the north, Rafsanjan and Sirjan in the west and Bam and Jiroft in the east. Chains of mountains stretch (northwest-southeast) across much of the province with the highest to the south and east of the elevated Kerman basin. Kuh-e Laleh Zar (14,350 ft.) and Kuh-e Hazaran (14,500 ft.) are extinct volcanoes; other summits exceed 12,000 ft. The main axis continues southeastward in the Kuh-i Bariz which separates Bam from Jiroft. There are other, lower ranges and uplands in the south. Kerman has no important rivers apart from the Khalil Rud which flows across Jiroft district into the Hamun-e Jaz Murian, a periodic sweet-water lake.

The desert of Kerman lies in the north and northeast where it merges into the Lut ("bare," "void of vegetation"). The southern Lut differs from the *kavir* or salt desert of central Iran, being drier, less saline, and containing a great massif of dunes and sand in the east whereas in the west there is an extensive area of wind-carved ridges cut out of silt beds up to 60–80 yd. high, separated by wind-swept corridors. These whale-shaped ridges are called *Kalut.* In other parts there are wind-eroded cuestas, called *Shahr Lut.* The lowest depression, not more than about 1,000 ft. above sea level, is filled by the *kavir*-like *namakzar.* The summer heat and the low humidity are believed to be unsurpassed anywhere. The caravan track from Kerman via Nay Band to Birjand in Khurasan, and the motor road from Kerman via Bam to Zahedan and Seistan, or Pakistan, both avoid this lowest and most inhospitable part of the desert. Most of the upland valleys enjoy a pleasant and healthful climate, with cool nights because of a downflow of air from the hills.

Formerly loose stands of pistachio, almond and maple were more extensive on the hills which are now almost bare. Settlement and cultivation is in isolated patches because of scarcity of water. Irrigation is laboriously practised by *qanats.* The upland regions produce some wheat and barley, beans and peas, millet, cotton, beet—including sugar beet which is processed in Mashiz (Bardesir)—pistachios and fruits. In the *garmsir,* or warm region, below 3,600–4,500 ft., rice and maize are cultivated; henna is produced around Bam and Shahdad, and fruits are found in abundance, mainly dates and oranges, which are exchanged for wheat in Khurasan. The chief animal products are wool and *kurk,* used in the making of Kerman shawls, which in delicacy of texture are second only to those of Kashmir, often surpassing them in colour and design. Mineral wealth (lead, copper and iron ores and coal) appears to be considerable but is difficult of access.

The area of the *ostan* is 86,939 sq.mi. The population, 616,705 in 1956, seems to be mainly of Iranian stock and includes communities of Zoroastrians, while the nomad minority are largely intruders of Turkish, Kurdish, Arab or Balochi origin. Arabs prevail along the coast in the Bandar Abbas general governorship (pop. 248,153). Besides Kerman, other centres are Bam (pop. [1956] 15,747), Sa'idabad (Sirjan; 12,160), Rafsanjan (9,212) and Zarand (4,099). The only good road runs from Isfahan to Zahedan via Yazd, Kerman and Bam; along it most of the Kerman carpets are exported. The natural outlet of Kerman should be Bandar Abbas (*q.v.*) but the roads to this port are bad, though usable by motor transport. The southeastern railway from Qom and Kashan was planned to reach Kerman but was discontinued. (H. Bo.)

KERMANSHAH (or KERMANSHAHAN, the plural form), chief city of the *ostan* (province) of the same name of western Iran. It lies in the fertile valley of the Qareh Su, a tributary of the Karkheh. Pop. (1956) 125,181, largely Kurds, compared with 40,000 at the beginning of the 20th century. The city owes its prosperity to its function as the principal market of a rich hinterland, and to its position on the main transit route connecting Iran with Iraq, the Levant states and the Mediterranean. There is some local industry: a modern beet sugar factory, a textile plant, a flour mill and an oil refinery which receives its crude oil through a pipeline 87 mi. long from Naft-e Shah (near Khosrowvi at the Iraqi frontier).

KERMANSHAH OSTAN lies across the West Iranian or Zagros mountain system and is bounded west by the Iraq frontier, north by the formerly dependent subprovince (now an *ostan*) of Kurdistan (Kordestan), east by the general governorship of Hamadan and south by Luristan. Area 17,529 sq.mi. Climatically it is divided into three altitudinal zones: the warm land (*garmsir*) of the western piedmont and lower valley bottoms, with mild winters, some date cultivation and lush winter pastures; the medium zone of the largely cultivated upland valley bottoms with hot summers and cold, snowy winters; and the upper zone of the higher uplands, with long and very cold winters and mostly used for summer

grazing. Rainfall is between 20 and 35 in., concentrated in winter and early spring and sufficient for unirrigated grain crops in many parts. The drainage, amply nourished by numerous karstic springs, is in four directions: eastward to the Qareh Su of Saveh to be ultimately lost in the salt deserts, northward to the Qezel Owzan, which discharges to the Caspian sea, westward to the Tigris and southward to the Karkheh river which ends in the Hoveyzeh swamps. Some of the ridges still bear their natural cover of mixed oak woods but most of this has long been depleted.

The inhabitants, 744,917 in 1961, are mainly Kurds of many different tribes, most of them settled or seminomadic. Some important and formerly dominant groups in the frontier region still embrace permanent tent life, moving to upland or lowland according to the season. In the south of the province Lurish tribes prevail. Persians, Turks, Jews and Christians form mostly urban minority groups of varying importance.

The province is one of the richest agricultural areas of Iran. Irrigation is largely used in the upland valleys. Wheat and barley, rice, cotton, maize, clover and lucerne, beans and oil plants, fruits and vines, and formerly opium, are the main crops while the hill pastures feed large stocks of cattle, sheep and goats, and horses. There are exports to other parts of Iran. Major centres in the province besides Kermanshah town are Qasr-e Shirin (1956 pop. 23,901), Shahabad (4,346), Karand (Karind; 4,472), Paveh (2,631) and Ilam (8,346).

The history of the province goes back into antiquity as many monuments of Achaemenid or Sassanid origin demonstrate; *e.g.*, the rock carvings of Taq-e Bostan and Bisitun (*q.v.*). There are many prehistoric remains also in the form of mounds and formerly settled caves. Kermanshah's position on a great route has always played a prominent role. (H. Bo.)

KERN, JEROME DAVID (1885–1945), U.S. composer of popular theatrical music whose *Show Boat* became an American classic. Born in New York city on Jan. 27, 1885, he studied piano and theory there and later in Germany. Returning to New York in 1904, he earned his living as a pianist and salesman for various music publishing firms. In 1911 he presented on Broadway a musical comedy, *La Belle Paree;* this was the first of a series of almost annual productions, among them *Red Petticoat* (1912), *The Girl from Utah* (1914), *Very Good, Eddie* (1915), *Oh Boy!* (1917), *Oh Lady, Lady!* (1918), *Sally* (1920), *Stepping Stones* (1923), *Sunny* (1925), *Show Boat* (1927), *Sweet Adeline* (1929), *The Cat and the Fiddle* (1931), *Music in the Air* (1932) and *Roberta* (1933).

After 1933, Kern lived mostly in Hollywood, where he composed film music. He died in New York city on Nov. 11, 1945. A motion picture on his life, *Till the Clouds Roll By,* was made in 1946.

Kern's great significance in U.S. music lies in his ability to compose melodies of a folksonglike quality with a natural flow of rhythm, possessing an indefinable but unmistakable American character. The bass song "Ol' Man River" from *Show Boat,* written in the style of Negro spirituals, became universally popular.

See D. Ewen, *The World of Jerome Kern* (1960). (N. Sy.)

KERNER, JUSTINUS ANDREAS CHRISTIAN (1786–1862), German poet, spiritualist and writer on medicine, a friend of Ludwig Uhland (*q.v.*), with whom he founded the Swabian group of Romantic poets. He was born at Ludwigsburg, Württemberg, on Sept. 18, 1786. After the death of his father (1799), he worked in a cloth factory until he was able to study medicine at Tübingen. Here he met Uhland, who shared his poetic interests. Kerner became a practising physician and in 1818 settled in Weinsberg, where his hospitality was enjoyed by many writers. He had a sound sense of humour which stood in strange contrast to the melancholy and mystic longing for death of his poetry (for example, *Gedichte,* 1826). His best prose works, such as *Reiseschatten* (1811) and *Die Heimatlosen* (1816), suffer from the formlessness of Romanticism. Kerner's interest in somnambulism was strengthened through his observation of the somnambulist and clairvoyante Friederike Hauffe (1801–29) whom he examined from 1826 onward, publishing as a result *Die Seherin von Prevorst* (1829; Eng. trans., 1845). His work on F. A. Mesmer and animal magnetism appeared in 1856. In 1851 his eyesight began to deteriorate, and he died at Weinsberg on Feb. 21, 1862. The influence of his personality on his contemporaries was greater than that of his written work.

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KERNITE (RASORITE), the name given to a mineral which is a hydrated sodium borate, $Na_2B_4O_7.4H_2O$. It occurs as veins, irregular masses and crystals embedded in clay shale beds. Kernite was the chief source of commercial borax (*q.v.*), which was produced by dissolving kernite in water, filtering off the insoluble clay and crystallizing borax by evaporation. Kernite recently has been displaced by the mineral borax as a cheaper source of commercial borax.

Kernite crystals are commonly large, 2 to 3 ft. thick, the largest observed measuring 8 by 3 ft. Kernite crystallizes in the monoclinic system; the commonest forms present are the basal pinacoid, the front pinacoid, the unit prism and the dome. The natural crystals from California are characterized by the notable absence of pyramid faces which have been observed on synthetic crystals. Kernite is colourless and transparent with a vitreous lustre except on fibrous cleavage surfaces where it is satiny. It has two perfect cleavages, parallel to {100} and to {001} and a fair cleavage parallel to {201}. When well developed these perfect cleavages give rise to a fibrous structure. The mineral is soft (H = 2.5) and has a specific gravity of 1.908. Kernite fuses easily before the blowpipe flame and forms white cauliflowerlike masses which on further heating change to clear glass (borax glass). Kernite is slowly soluble in cold water, readily soluble in hot water and in acids. One part of kernite dissolved in water upon evaporation will yield 1.39 parts of borax ($Na_2B_4O_7.10H_2O$). While well drillers were drilling for water, immense deposits of kernite were discovered in 1926 in the Kramer borate district in the Mohave desert in southeastern Kern county, Calif. In 1948 the second occurrence was reported from the borate deposit of Tincalaya of the Salar del Hombre Muerto, in the department of Antofagasta de la Sierra, in the province of Catamarca, Arg. Kernite occurs associated with borax, ulexite, colemanite, tincalconite, probertite (kramerite), calcite, realgar and stibnite.

See W. T. Schaller, "Borate Minerals from the Kramer District, Mohave Desert, California," U.S. Geol. Survey *Prof. Paper 158-I,* pp. 137–173 (1930); Frederico Ahlfeld and Victorio Angelelli, *Las Especies Minerales de la República Argentina* (1948). (G. T. Fr.)

KEROSENE, a term applied to that portion of petroleum or other mineral oils boiling between the approximate limits of 180° C. and 320° C. (356° F. and 608° F.). It is used as jet engine fuel, in domestic heating, as an illuminant, as a cleaning solvent and in insecticides. The material is sometimes called paraffin oil or coal oil. It occurs naturally in petroleum, the major source, and in the other mineral oils in amounts varying between approximately 10% and 25% of the total volume and is separated physically from the other portions by fractional distillation. It can also be produced chemically by decomposing, or cracking, the less volatile portions of mineral oils at atmospheric pressure and elevated temperatures. A maximum yield of 70% from a given volume of petroleum could be obtained by combining the natural or "virgin" material and the cracked material.

In distillation (*q.v.*), the first step in the kerosene refining sequence, the major fractions of petroleum—those destined to become fuel gas, gasoline (petrol), kerosene, distillate oils, lubricants and heavy fuels—are separated. The crude petroleum is pumped through the tubes of a furnace or still, where it is heated sufficiently to vaporize all but the heaviest portions. The vapour is discharged into the bottom of a tall fractionating column equipped with a series of perforated decks; on these decks, the ascending vapours and descending condensed liquid come into intimate contact. A temperature gradient is established throughout the tower; gasoline is withdrawn near the top, kerosene above the middle, distillate oils below the middle and the heaviest oils at the bottom. Distillation plants of this type operate continuously.

The crude kerosene distillate thus obtained usually requires chemical treatment to remove the sulfur compounds that produce colour, unpleasant odour and poor burning qualities. There are a variety of treating methods; the conventional one utilizes sulfuric acid.

Kerosene was first manufactured in the 1850s from coal tar and shale oils, although petroleum became the major source after 1859, when E. L. Drake drilled the first petroleum well. Until the advent of electricity and the internal combustion engine, kerosene was the major refinery product because of its use in lamps.

Refined kerosene is a pale-yellow or white oily liquid with a characteristic odour that is not unpleasant. Although the chemical composition of kerosene depends on its source, it usually consists of a mixture of about 10 hydrocarbons containing 10 to 16 carbon atoms per molecule; the constituents include *n*-dodecane, alkyl derivatives of benzene, naphthalene and derivatives of naphthalene.

See also PETROLEUM: *Refining*.

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KERR, SIR JOHN GRAHAM (1869–1957), British zoologist known for his research on the embryology of the lower vertebrates and as a pioneer in naval camouflage, was born at Arkley, Hertfordshire, on Sept. 18, 1869, and began by studying medicine at the University of Edinburgh. In 1889 he joined an Argentine expedition to the Pilcomayo river in Paraguay. His account of this expedition, *A Naturalist in the Gran Chaco*, was published for the first time in 1950. On his return in 1891 he joined Christ's college, Cambridge, and except for a second expedition to Paraguay to study the lungfish *Lepidosiren* during 1896–97, he remained at Cambridge until appointed regius professor of natural history at Glasgow in 1902, this title being changed to that of professor of zoology in 1903. He held this post until 1935, when he resigned the chair on being elected member of parliament for the Scottish universities. He was made a fellow of the Royal society in 1909 and knighted in 1939.

Kerr's outlook was morphological and phylogenetic and he greatly advanced knowledge of the evolution of vertebrates. He is best known for his studies of the embryology of lungfishes, especially of *Lepidosiren*, but he published papers on *Spirula* and many other zoological subjects. He was the first to advocate a system of camouflage for ships based on "dazzle" principles, and in Sept. 1914 urged their adoption upon the British admiralty. His books include *A Textbook of Embryology* (1914–19); *Zoology for Medical Students* (1921); and *Evolution* (1926). He died at Barley, Hertfordshire, on April 21, 1957. (ED. HE.)

KERRY (CHIARRAIGHE), a county of the Republic of Ireland in the province of Munster, includes some of the country's finest scenery, notably in the Killarney district. Area 1,815 sq.mi. In 1961 the population was 116,458, 4.6% less than in 1956.

The principal highlands of Kerry, including the highest mountains in Ireland, are of Old Red Sandstone. Kerry contains three of the six Atlantic peninsulas of southwest Ireland and part of a fourth. In general character these peninsulas consist of mountainous ridges, in places intersected by deep valleys and generally surrounded by lowlands, but each peninsula has its distinctive physical characteristics. The most northerly is the Kerry Head peninsula, with rugged hills of Old Red Sandstone 700 ft. high, surrounded by a lowland formed of Carboniferous Limestone. This peninsula, only 7 mi. long, is a delicate miniature of the far grander ones to the south. The Dingle peninsula extends for nearly 40 mi. from the lowland around Tralee to its last insular fragments in the Blasket Islands; and the Iveragh peninsula, 30 mi. long and 15 mi. wide, continues the line of hills from west Cork to Valentia Island. There, and around various western bays, the ridges perish in magnificent cliffs like those of the Blasket Islands on the north side of Dingle bay. South of the Iveragh peninsula, on the other side of the Kenmare river, lies the Caha peninsula, most of which is in County Cork though the county boundary runs along the main ridge for several miles.

Although the peninsulas all consist of mountains and lowlands, only Kerry Head is a single ridge. The Dingle peninsula begins near Tralee as the Slieve Mish, with several hills over 2,000 ft. and a summit of 2,796 ft. in Bautregaum, but in the west it becomes an intricate mixture of hills and lowlands, with a north-trending line of mountains near the small town of Dingle. This ridge includes Brandon mountain, 3,127 ft., and ends in some magnificent cliffs on the northwest. The extreme west of this peninsula consists mainly of lowlands. The mountains are formed partly of Old Red Sandstone, partly of other rocks of unknown geologic age; they are deeply seared by valleys of glacial origin.

The Iveragh peninsula includes Macgillycuddy's Reeks, with the highest summit in Carrantuohill, 3,414 ft., the numerous mountains south of Killarney (*q.v.*), including Mangerton, 2,756 ft., and several other ridges which run west veering into southwest through the peninsula. During the glacial epoch ice accumulated over the Kenmare river and swept northward through the mountains, finally making some fine crescents of moraines on the lowlands from Killarney westward. The wild craggy slopes known to those traveling by the famous tourist road from Killarney to Kenmare are ice-molded. In the last stages, ice nestled in mountain valleys and eroded such features as the Devil's Punch Bowl on Mangerton. North Kerry consists of carboniferous lowlands with plateaulike uplands rising to 1,400 ft. These have long even sky lines, very different from the jagged crests of the greater mountains in the peninsulas.

Climatically, Kerry shows the effects of its maritime situation. The winters are so mild, with January to March mean temperatures as high as 6.7° C. (44° F.), that the growth of vegetation continues almost throughout the year. Animals may be pastured in the fields in the middle of winter, evergreen shrubs flourish and in the natural woods of the Killarney area there are arbutus (strawberry) trees of Mediterranean origin. Mosses, ferns and woodland plants grow luxuriantly, even on tree trunks. Everywhere the rainfall is high—generally more than 40 in. and well over 50 in. in large areas of the peninsula. The summer warmth is tempered by frequent cloud and rain. In Kerry, as elsewhere in the west of Ireland, peat bog has accumulated thickly; some bogs have remnants of forests dating from drier climatic phases.

Kerry lay on the Atlantic route of prehistoric movement and there are numerous remains of the Megalithic period, such as those on the Skellig rock. Some of the church sites are of great antiquity, including Ardfert and Aghadoe cathedrals and the medieval monastic church at Muckross near Killarney.

The name Kerry is derived from Ciar, son of Fergus, king of Ulster about the beginning of the Christian era. His descendants, called Ciarriaghe, occupied this part of Munster. Kerry was divided in 1127 between the O'Brien kingdom of Thomond or North Munster and the MacCarthy kingdom of Desmond or South Munster; but with the coming of Anglo-Norman invaders this area and a large part of Cork fell to the Fitzgeralds. Kerry often is referred to as the kingdom of Kerry, a usage which arose because letters patent were issued in 1329 creating Maurice FitzJohn Fitzgerald earl of Desmond, with a royal jurisdiction or palatinate over the county. Maurice used his power as count palatine to create his three sons hereditary knights, founding the titles of the White Knight, the Knight of Glin and the Knight of Kerry. When the Fitzgeralds were goaded into revolt in the reign of Elizabeth I, a small Spanish force landed at Dingle in 1579 and established a fort, destroyed the following year. With the ruin of the Fitzgeralds of Desmond, Kerry fell within the scope of the plantation of Munster, begun in 1586. Seigniories of 12,000 ac. in Kerry were granted at a quitrent to the crown of only £100. One prominent planter was Sir Nicholas Browne, ancestor of the earls of Kenmare. The Cromwellian and Williamite land settlements further transformed the land ownership of Kerry, which was to be modified again by the land acts of the 19th and 20th centuries.

Kerry had, in 1946, more than 27,000 Gaelic speakers, particularly on the Blasket Islands and the mainland opposite them. It is still much visited by students desiring to acquire a knowledge of Gaelic, but the speaking of Gaelic is in decline. Approximately one-third of the people live in towns and villages. The largest are

Tralee (10,723) and Killarney (6,825).

There is a county council and county manager with offices in Tralee which serves as the county town. Tralee, Killarney and Listowel (2,858) are urban districts. The county is divided into two constituencies for electoral purposes—North Kerry which returns four members to *dáil éireann,* and South Kerry which returns three.

Within the peninsulas, settlement is restricted to the lowlands and to some interior valleys, such as those of the Iveragh and Caha peninsulas. Many of these valleys are covered with peat bogs, some of which are exploited commercially; in most years, Kerry farmers draw at least 250,000 tons of peat from bogs for sale. Three-quarters of the farms are of less than 50 ac.; Kerry never had the minute fragmentation of land characteristic of other parts of the west, notably Mayo and Donegal. Oats and potatoes are the main crops, with young cattle and sheep as the main cash resources. Some money is derived from milk sales to creameries or to traveling separating vans.

The plateaus in north Kerry have some strata of Coal Measure age but though the coal field covers a large area it is not of commercial value. The northern lowlands are varied: in some places they are marshy and poorly drained, with large areas of peat bogs, but in others there are farms, two-fifths of them covering less than 30 ac.

At Tralee there is bacon curing, a boot factory, an enamelware works and other trade. Killarney has a boot factory but relies mainly on market and tourist returns; an engineering industry has been established and cranes are made by a German firm which brought some Germans to the district. The other towns are small trading centres. Fishing is of little commercial significance.

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KESHUB CHUNDER SEN (1838–1884), a leader of the religious reform movement in Bengal in the 19th century, was born of a high-caste family at Calcutta. He joined the Brahmo Samaj (*q.v.*) in 1857 and became the head of a group of young radicals. When the older members refused to alienate the *samaj* completely from Hindu traditions, Keshub and his followers seceded and formed a separate organization, called the Brahmo Samaj of India, in 1866. Having now a free hand, Keshub made his new *samaj* more cosmopolitan than Hindu in character. He inclined so much toward Christianity that many expected he would become a Christian, and although he did not take this step, later he called upon all his countrymen to accept Christ. In 1870 he visited England and was warmly welcomed by many Christian organizations. After his return to India he established a number of institutions that did useful social service. The crash came in 1878 when Keshub consented to the celebration of his minor daughter's marriage with the young Hindu prince of Cooch-Behar according to Hindu rites, thus violating all the principles he had advocated as a reformer. His followers thereupon left him and formed themselves into a separate *samaj.* To regain his lost prestige Keshub called his church Nava Vidhan ("New Dispensation") and declared himself to be the prophet of a new universal religion that was to be the synthesis of all religions. After his death, in Jan. 1884, his church broke into fragments and his influence faded away.

Keshub was the author of *The Brahmo Samaj Vindicated* (1863) and *The New Samhita* (1883).

See P. Mozoomdar, *Life and Teachings of Keshub Chunder Sen* (1888); M. C. Parekh, *Rajarshi Keshub Chunder Sen* (1926). (D. S. SA.)

KESKI-SUOMI (Swed. MELLERSTA FINLAND), a *lääni* (county) of south central Finland focused on the Päijänne lake system, supporting a mixed farming and forest economy. Area 18,330 sq.km. (7,077 sq.mi.). Pop. (1960) 245,122. Jyväskylä (*q.v.*), the administrative centre, is also one of Finland's educational centres with pedagogical institutions celebrated for their architecture as well as their learning. Its diversified industries include softwood processing, plywood manufactures, milling, metallurgy, foodstuffs and pharmaceutical products. To the southwest is Jämsänkoski, with softwood mills; to the north are the industrial settlements of Suolahti (pop. 5,101) and Äänekoski (pop. 7,170) at the approaches to the Keitele lake system. There are modest hydroelectric resources. (W. R. ME.)

KESSELRING, ALBERT (1885–1960), German army officer, prominent field commander in World War II, was born at Marktstedt, Bavaria, Nov. 30, 1885, and commissioned in artillery in 1906. After serving mostly in staff duties throughout World War I and the 1920s, he was transferred to the illicit air force in Oct. 1933. He commanded air fleets in the Polish and western campaigns, 1939–40, ordered the bombing of Warsaw and Rotterdam and conducted the air attack on the Dunkerque evacuation and later on Britain. He was promoted to field marshal in July 1940. As commander in chief, south, Kesselring shared in directing Erwin Rommel's campaign in Africa, the withdrawal from Tunisia and the defensive battles in Italy. Retaining Hitler's confidence to the end, he relieved Gerd von Runstedt as commander in chief, west, in March 1945 and surrendered the southern half of German forces on May 7. He was sentenced to death by a British military court in Venice in May 1947 for ordering the shooting of Italian hostages, but the sentence was commuted to life imprisonment in Oct. 1947, and he was freed in Oct. 1952. Subsequently he was active in German veterans' organizations. He died at Bad Nauheim, Ger., on July 16, 1960. Kesselring wrote *Soldat bis zum letzten Tag* (1953), published in English as *Memoirs of Field Marshal Kesselring* (1953) and as *Kesselring: a Soldier's Record* (1954); also *Gedanken zum Zweiten Weltkrieg* ("Thoughts on World War II"; 1955). (P. N. T.)

KESTREL, the common name applied generally to about a dozen old world species of small falcons (*q.v.*) of the genus *Falco,* locally in England called windhover because of their habit of hovering in mid-air against the wind or on quivering wings while watching the ground below for beetles, grasshoppers and other large insects that comprise their food. Kestrels also prey on small rodents and occasional small birds. They are distributed over much of the eastern hemisphere, but none is found in the Americas, where their counterpart, the sparrow hawk (*F. sparverius*), sometimes called the American kestrel, is found. Most are 10 to 14 in. long, reddish-brown above and whitish or rusty below. The cry is a rapid "kee, kee, kee, kee," usually uttered on the wing and customarily only during the breeding season. Some species nest in natural crevices in trees, cliffs or buildings, and some commonly utilize the abandoned nests of crows and magpies. The three to five eggs are rounded oval, whitish or buffy and heavily mottled with brown and lavender.

JOHN MARKHAM

OLD WORLD KESTREL (FALCO TINNUNCJLUS)

The common kestrel (*F. tinnunculus*) ranges over Europe, Asia and Africa, eastward to Japan, and westward to Madeira, the Canaries and Cape Verde Islands. The lesser kestrel (*F. naumanni*) ranges from the Mediterranean to Manchuria; the fox-colored kestrel (*F. rupicoloides*), east and south Africa. The Madagascar kestrel (*F. newtoni*) is found on Madagascar and Aldabra, while nearby Mauritius and the Seychelles each possess a species (*F. punctatus* and *F. araea,* respectively); the nankeen kestrel (*F. cenchroides*) occurs in Australia, Tasmania and New Guinea; and the Moluccan kestrel (*F. moluccensis*) in the Moluccas to Java. Three species of gray kestrels occur extensively in Africa and Madagascar, the commonest being *F. ardosiaceus* of tropical Africa south to Angola and Lake Victoria. (E. R. BE.)

KESTUTIS (*c.* 1300–1382), grand duke of Lithuania, a defender of the western borders against the Teutonic Order, was a son of Gediminas (*q.v.*). Before his father's death (1341) he

ruled western and southern Lithuania; *i.e.*, Samogitia and the areas of Trakai (Troki), Grodno and Brest (Brzesc). In 1345 he removed his incompetent brother Jaunutis from possession of Vilnius and put his elder brother Algirdas (*q.v.*) in his stead. The two then ruled Lithuania harmoniously, Algirdas the Russian territories, Kestutis the west and the south, till Algirdas died in 1377.

The Teutonic knights intended to conquer Lithuania and make it the centre of their eastern Baltic empire. In 1345, they tried to occupy Samogitia; but later they changed their tactics to continual incursions. To oppose them, Kestutis led expeditions into Prussia. In 1361 he was captured and sent to Marienburg (Malbork), but escaped. The knights besieged Kaunas for six weeks in 1362, while Kestutis and Algirdas were fighting the Tatars. In 1370 the brothers attacked the Order's lands, and the battle at Rudava ended with great losses to the knights.

Kestutis was moreover involved in a prolonged dispute with Poland over Galicia and Volhynia. The Polish king Casimir the Great, who in 1340 had been named heir presumptive by the childless prince of Galicia, tried to enforce his claim in 1349; but a brother of Kestutis, Liubartas, who was married to a Galician princess, claimed the heritage also and was supported by Kestutis. By a treaty of 1352 Galicia, with Lvov, was retained by Casimir, while Volhynia was recognized as Lithuania's. In 1363, Casimir resumed his encroachment on Volhynia, and in 1366 a new treaty, leaving western Volhynia to Poland, was signed. After Casimir's death in 1370 Kestutis regained all Volhynia and Galicia.

Kestutis was hampered in his latter years by family intrigues. Jogaila (Jagiello), son and successor of Algirdas, had a brother Andrew who sought an alliance with the Livonian knights and with Muscovy, inciting them against Kestutis; and another brother, Skirgaila, was sent by Jogaila to the Teutonic Order, also to plot against Kestutis. Forced by these circumstances, Kestutis signed a ten-year peace treaty with the Teutonic Order in 1379; but a year later Jogaila concluded a secret treaty with the Order against Kestutis. The knights however divulged this to Kestutis, who therefore had Jogaila arrested. Thus in 1381 Kestutis became the supreme ruler of all Lithuania. In 1382 he again attacked the Teutonic Order, but soon had to go to fight beyond the Dnieper against the rebelling prince of Novgorod Seversk. Jogaila then seized Vilnius and Trakai. When Kestutis arrived at Trakai he was lured into reconciliation and then arrested with his son Vytautas. Brought to Kriavas, he died there—presumably killed.

See K. Stadnicki, *Olgierd i Kiejstut* (1870); A. Kučinskas, *Kęstutis* (1938). (MA. G.)

KESWICK, a market town and urban district of Cumberland, Eng., 33 mi. S.S.W. of Carlisle by road. Pop. (1961) 4,752. In the northern part of the Lake District (*q.v.*) National park, it stands in the picturesque valley of the Greta, with Skiddaw on the north and Derwentwater on the south. The Moot hall (1813), painted white and black, stands in the wide market place. Fitz park, in which is a museum and art gallery, was opened in 1887 and there is a school of industrial arts near Greta bridge. Greta hall, where Robert Southey and Samuel Taylor Coleridge lived, is at Crosthwaite (northwest); Southey is buried there in the yard of the 16th-century parish church, on the site of one built by St. Kentigern in 553. The tourist trade, the manufacture of lead pencils, bobbin making and slate and granite quarrying are the main industries.

KET (KETT), **ROBERT** (d. 1549), leader of the Norfolk rising of 1549, is usually referred to as a tanner, but was more probably a small landowner. The rising seems to have originated in a quarrel between the people of Wymondham, Norfolk, and a certain Flowerdew, and was at first intended only as a demonstration against enclosures of common land (perhaps encouraged by the antienclosure policy of the protector Somerset). A feast held at Wymondham in July 1549 developed into a riot and gave the signal for the outbreak. Leading his followers to Norwich, Ket formed a camp on Mousehold heath, where he is said to have commanded 16,000 men, introduced a regular system of discipline and justice, and blockaded the city. He refused the royal offer of an amnesty on the ground that innocent and just men had no need of pardon, and on Aug. 1, 1549, attacked and took possession of Norwich. But the rebels were soon driven out by forces under the earl of Warwick who attacked their main body at Dussindale on Aug. 27. Ket's men were easily routed by the trained soldiery, and Robert Ket and his brother William were seized and taken to London, where they were condemned to death for treason. Both were executed early in Dec. 1549; Robert at Norwich on Dec. 7, William at Wymondham.

See S. T. Bindoff, *Ket's Rebellion, 1549* (1949).

KET are an indigenous people of central Siberia who live in the Yenisei river basin; in the 1960s they numbered about 1,000. Their language is the last survivor of a group of related tongues (Arin, Asan, Kot, Yarin and Baykot) spoken in the area in the 17th century. This small language family has no firmly established relation with any other. It has been erroneously classified with Paleo-Asiatic (Chukchian-Eskimoan); less improbable but strongly contested is a proposed genetic relation with Sino-Tibetan. Certain traits of the Ket support the idea of a southerly origin. All but the Ket have been absorbed by neighbouring Russian peoples who have been in the area since the 17th century, and indigenous Uralic and Altaic groups.

Their taiga economy is based on hunting squirrel, sable, fox, deer, elk, bear and hare; it was the quest for such furs that first attracted Russians to Ket territory. Traditionally, reindeer breeding and fishing have been of great importance. Ket transport depends heavily on domesticated reindeer hauling sledges; they also use skis and boats as the weather dictates. They dwell in conical summer tents and semisubterranean winter houses.

The Ket are divided into patrilineal exogamous clans and they are shamanists (*see* SHAMANISM). In both religion and social organization they thus conform to a pattern common to native Siberian peoples. They have come under strong influences from Russians and neighbouring indigenous peoples, the degree of acculturation being reflected by the fact that nearly all Ket speak Russian; some also speak Sel'kup (*see* SAMOYED). During the Soviet period they were collectivized and their hunting and fishing were carried forward; reindeer breeding increased in importance.

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KETCH, JOHN (d. 1686), English executioner, who as "Jack Ketch" gave the nickname for nearly two centuries to his successors, is believed to have been appointed public hangman in 1663. The first recorded mention of him is in *The Plotters Ballad, Being Jack Ketch's Incomparable Receipt for the Cure of Traytorous Recusants and Wholesome Physick for a Popish Contagion,* a broadside published in Dec. 1678. Ketch was notorious for the barbarous and inhuman manner in which he performed his duties. He executed Lord William Russell (1683) in a "butcherly fashion" (John Evelyn) and took at least eight strokes to dispatch the duke of Monmouth in 1685. Ketch died in Nov. 1686.

KETCH: *see* BOAT.

KETCHIKAN, city near the southern tip of the southeast Alaska Panhandle, located on Revillagigedo Island, about 600 mi. N.W. from Seattle by way of the Inside passage (*q.v.*). Ketchikan is the principal port of entry for steamers. The public-school system includes a two-year community college.

When Alaska became a state in 1959, Ketchikan had a registered fleet of approximately 2,500 boats, about half of which were engaged in halibut and salmon fishing. Five salmon canneries were located within the city limits, producing a pack with an annual retail value of between $10,000,000 and $15,000,000. A wood-pulp mill with a daily capacity of 450 tons was in operation. The annual value of its product in the late 1950s was approximately $26,000,000. A lumber mill specialized in high-grade Sitka spruce. For comparative population figures, *see* ALASKA: *Population.* (J. E. CL.)

KETENES, in chemistry, a class of organic compounds containing the carbonyl group, CO, combined with either methylene, CH_2, or its analogues, RCH and R_2C, where R may be either an alkyl or an aryl radical (for other carbonyl compounds *see* ALDEHYDES AND KETONES).

Ketene, $CH_2{:}CO$, the prototype of the series, is a colourless

gas at ordinary temperature, having a penetrating odour. It has been condensed to a liquid and even solidified (melting point −134.6° C.; boiling point −56° C.). It was discovered in 1907 by N. T. M. Wilsmore among the gaseous products formed when a platinum wire is heated electrically under the surface of acetic anhydride, and was subsequently obtained by H. Staudinger (1908) by the action of zinc on bromoacetyl bromide. The latter chemist and O. Kupfer also obtained ketene by passing carbon monoxide and diazomethane, $CH_2{:}N_2$, through a quartz tube at 400°–500° C. It is prepared most conveniently by the thermal decomposition of acetone, acetic acid, or diketene (*see* below).

Ketene is a remarkably active chemical substance. It reacts with hydrogen chloride, acetic acid, ammonia and aniline, yielding respectively acetyl chloride, acetic anhydride, acetamide and acetanilide. It acetylates hydroxylated compounds by direct addition, the primary alcohols being most readily attacked, the tertiary alcohols and phenols least readily. It reacts with aldehydes and ketones to produce β-lactones. When kept for some time, ketene polymerizes to a liquid dimeride $(CH_2{:}CO)_2$, known as diketene, boiling at 126°–127° C., which combines with water to form acetoacetic acid and with aniline to yield acetoacetanilide. Diketene is available commercially. At 600° C., ketene decomposes into carbon monoxide and ethylene.

The more complex ketenes are divisible into two classes: (a) aldoketenes, (b) ketoketenes. The aldo group includes ketene itself and its monoalkyl and monoaryl derivatives RHC:CO. They are colourless, do not undergo autoxidation and are polymerized by pyridine. The keto group consists of the dialkyl and diaryl ketenes, $R_2C{:}CO$. These derivatives are coloured, undergo autoxidation and form additive compounds with certain unsaturated nitrogen compounds, *e.g.*, Schiff's bases, pyridine, quinoline and acridine. In addition to the foregoing aldoketenes and ketoketenes, carbon suboxide O:C:C:C:O is a ketene of unique type.

(G. T. M.; X.)

KETONES: *see* ALDEHYDES AND KETONES.

KETTELER, WILHELM EMMANUEL, FREIHERR VON (1811–1877), German Roman Catholic churchman and social reformer, considered by some the outstanding German bishop of the 19th century, was born at Münster on Dec. 25, 1811. He abandoned an incipient career in the Prussian government service for the church when, in 1837, the archbishop of Cologne, K. A. von Droste zu Vischering, was arrested on a trumped-up treason charge. Ordained a priest in 1844 and appointed bishop of Mainz in 1850, Ketteler attracted national attention by his sermons and his writings. As a churchman, Ketteler, while generally favourable to papal authority, regarded the proclamation of papal infallibility as inopportune; his basic views on the subject caused him to be the first member of the Vatican council's minority to rally to the decision of the majority. Always interested in political and social as well as religious problems, he was a member of the Frankfurt national assembly in 1848 and of the German *Reichstag* in 1871–72. He had favoured Austria in the war of 1866 but accepted Bismarck's empire in the hope that the Prussian tendencies toward centralism and toward state absolutism in religious matters could be checked.

In the field of social reform Ketteler's views were most comprehensively expressed in his book *The Labour Question and Christianity* (1864). While the treatise—it followed the criticism of the existing order as presented by the Socialist writer Ferdinand Lassalle—was not original, it was forceful and popular and greatly stimulated the interest of German Roman Catholics in social problems, as did his other writing and his sermons. In his advocacy of a position between laissez-faire liberalism and Socialist collectivism, Ketteler stressed the need for a Christian foundation. He died in Burghausen, Bavaria, on July 13, 1877. Ketteler's most important works were edited by Johannes Mumbauer, *Wilhelm Emmanuel von Kettelers Schriften*, 3 vol. (1911; 2nd ed., 1924).

The leading biography is Fritz Vigener, *Ketteler: Ein Deutsches Bischofsleben des 19. Jahrhunderts* (1924). (F. A. Hs.)

KETTERING, CHARLES FRANKLIN (1876–1958), U.S. engineer, inventor and an outstanding figure in the automotive industry, was born near Loudonville, O., on Aug. 29, 1876. Despite difficulty with poor eyesight, which interrupted his schooling, he graduated from Ohio State university in 1904 with a degree in electrical engineering. He worked for a manufacturing company for five years and then joined with a partner to found the Dayton Engineering Laboratories company (Delco). In 1916 Delco became a subsidiary of the United Motors corporation, which in turn was absorbed two years later by General Motors. Kettering was a vice-president and also director of research of the General Motors corporation from 1920 until his retirement in 1947. He died on Nov. 25, 1958, in Dayton, O.

Of Kettering's numerous achievements, four may be selected as the most significant. (1) He designed the motor for the first practical electric starter for gasoline automobiles, installed on the Cadillac car in 1912. (2) Having decided that the cause of knock in automobile engines lay in the fuel, he discovered, in co-operation with Thomas Midgley, Jr., that tetraethyl lead provided a remedy and introduced ethyl gasoline in 1922. (3) In co-operation with du Pont chemists, he developed quick-drying lacquer finishes for automobile bodies (1923). (4) In the 1930s he made the diesel engine a much more efficient mechanism by improving its fuel injection, refining piston and cylinder design and using two- instead of four-cycle operation. His interests extended beyond automotive engineering to research in medicine, particularly in seeking a cure for cancer, in photosynthesis and the possible utilization of solar energy, and in magnetism.

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KETTERING, a municipal borough of Northamptonshire, Eng., 14 mi. N.N.E. of Northampton by road. Pop. (1961) 38,659. Although Kettering became a considerable trading town following the grant in 1227 of the Friday market and yearly fair there to the abbot of Peterborough, lord of the manor from 972 until 1540, its later prosperity began with the woolen manufacture, introduced in the 17th century. A substantial trade in silk and plush weaving and bell founding also grew up, but this, along with the woolen industry, gradually gave way to the manufacture of boots and shoes, especially for men and boys. In addition, iron ore is quarried and smelted, cardboard and brushes are made and there is engineering. The County School of Boot and Shoe Manufacture and the headquarters of the Boot and Shoe Research association are in the town. The Baptist Missionary society was founded there in 1792. Kettering, an urban district in 1894, was incorporated in 1938.

KETTERING, a city of Montgomery county, Ohio, U.S., on the southern periphery of Dayton (*q.v.*), is located in the rolling moraine country of the middle Miami valley. It was incorporated as a village in 1952 and as a city of 38,000 in 1955 and has operated under a charter form of government since 1956. It is a planned city of wide streets and generous lots, with a professional planning director and a five-member lay planning commission. There was in 1960 only a railroad spur and one factory; 1,200 ac. had been zoned for future industrialization. The city has a board of construction review and operates a 200-unit housing project, with income going to the city; government is by the council-manager plan, in effect since 1954. The Kettering Memorial Medical centre commemorates the inventor and industrialist Charles F. Kettering, for whom the city was named. Pop. (1960) 54,462. (A. J. WT.)

KETTLEDRUM: *see* TIMPANI.

KEUPER: *see* TRIASSIC SYSTEM.

KEVIN (CAEMGEN, COEMGENUS), **SAINT** (d. 618 or 622), founder of the famous Irish monastery of Glendalough, County Wicklow. According to his genealogy he belonged to the royal race of Leinster. His earliest *Life* (10th or 11th century?) contains the following biographical details: Kevin chose the religious life in his early youth; he lived for some time as a hermit and ascetic beside the upper lake of Glendalough; later he founded a monastery near the lower lake, where he died in his old age as abbot of a large community (*see* GLENDALOUGH, VALE OF). The *Life* also records a visit by Brandub, king of Leinster, before the battle of Mag Ochtair (590), and is consistent in associating Kevin with

Leinster saints and chiefs of the 6th and early 7th century. How much of all this is historical remains uncertain. The extant lives of St. Kevin consist largely of hagiographical legends in which he is often represented as a protector of animals. His feast day is June 3.

The story, immortalized by Thomas Moore, that Kevin rid himself of a woman who had come to seduce him by throwing her into the lake is probably the romantic development of an episode in the *Life*, where young Kevin cools a girl's passion for him by flogging her with a bunch of nettles.

See C. Plummer, *Vitae sanctorum Hiberniae*, vol. 1, pp. lv-lvi, 234–257 (1910; edition of the earliest *Life*); J. F. Kenney, *Sources for the Early History of Ireland*, pp. 403–404 (1929). (L. Br.)

KEWEENAWAN: *see* Precambrian Time.

KEW GARDENS, the name popularly applied to the Royal Botanic gardens at Kew in the London borough of Richmond upon Thames, Eng., on the south bank of the river. The name is derived from the grounds of Kew house, a former royal estate. Starting with an original botanical collection begun by Lord Capel in the late 1600s, Princess Augusta established the botanical garden of 9 ac. about 1759 with the scientific help of the earl of Bute. Since that time other grounds have been assimilated till by the end of the 19th century the gardens covered 288 ac. Sir William Chambers designed the orangery, a superb example of Georgian architecture and also the pagoda, a Chinese-style building 163 ft. high, which serves as a landmark. George III continued to develop the gardens with the help of Sir Joseph Banks who was, in effect, director for 47 years. The gardens were handed over to the nation in 1841 when Sir William Hooker became the first official director. They soon developed into an important botanical institution with a herbarium, which by the early 1960s contained more than 6,000,000 sheets exceptionally rich in "type" specimens, and a specialized library of 55,000 volumes. There are three museums largely devoted to economic plant products and a laboratory where, in addition to cytogenetical investigations, the structure of plants is studied, especially in relation to classification.

The living collections comprise more than 40,000 different kinds of plants. Among the greenhouses, which provide for the less hardy plants, the largest are the Temperate house, about an eighth of a mile in length, and the Palm house, built in 1848, both from designs by Decimus Burton and housing magnificent collections of tree ferns and cycads. The collections of tropical orchids, succulents and tropical ferns are exceptionally fine, and the Australian house, erected in 1952 and built of aluminum alloy, contains numerous plants native to Australia.

Kew originated the plantation industry of rubber and still plays an important role in plant introduction and as a quarantine station. Its publications include numerous basic floras of commonwealth areas, the *Kew Bulletin* and the *Index Kewensis*, for which supplements are periodically issued.

See also Botanical Gardens. (E. J. S.; G. T.)

KEY, ELLEN (KAROLINA SOFIA) (1849–1926), Swedish essayist and educationalist whose radical ideas exerted a wide influence. She was born on Dec. 11, 1849, at Sundsholm, the daughter of the landowner and politician Emil Key (1822–92). Family misfortune obliged her to take up teaching in Stockholm in the late 1870s and for the next 20 years she also lectured at the workers' institute there. *Barnets århundrade* (1900; Eng. trans., *The Century of the Child*, 1909) made her world-famous. Both this and *Lifslinjer* (1903–06; Eng. trans., *Lines of Life*) were translated into many languages. In 1903 she started lecture tours abroad, particularly in Germany. She also propagated her ideas through an enormous correspondence and many young authors were influenced by her. Her liberal and radical opinions in most fields of cultural life, and especially on love and marriage, led to controversy. She died at Strand, on Lake Vattern, April 25, 1926.

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KEY, FRANCIS SCOTT (1779–1843), U.S. lawyer and author of the national anthem, "The Star-Spangled Banner," was born in Frederick county (now Carroll county), Md., Aug. 1, 1779. He attended St. John's college, Annapolis, Md., 1789–96. Upon graduation, he studied law in Annapolis, and began to practice in 1801 in Frederick, Md. In 1805 Key moved to Georgetown, D.C., where he became a partner of his uncle Philip Barton Key.

In Sept. 1814, after the burning of the city of Washington by the British during the War of 1812, Key was sent to the British fleet in Chesapeake bay to secure the release of his friend, William Beanes, who had been captured after the defeat of the U.S. forces at Bladensburg, Md. Key was detained on his ship during the shelling of Ft. McHenry, one of the forts that successfully defended Baltimore. During the night of the bombardment, Sept. 13–14, Key's anxiety was at high pitch, and in the morning when he discerned the American flag still flying over the fortress, he wrote "The Star-Spangled Banner." Released that day, he rewrote the poem in a Baltimore hotel. It was immediately printed anonymously under the title "Defence of Fort M'Henry," and on Sept. 20 was published by the *Baltimore Patriot*. Set to the tune of the English drinking song, "To Anacreon in Heaven," it soon became popular throughout the nation. It was later adopted by the army and navy as the national anthem, but it was not until 1931 that congress officially adopted it.

Key died in Baltimore on Jan. 11, 1843, and was buried in Mt. Olivet cemetery in Frederick. (Ja. B. R.)

KEY: *see* Keys and Keyways; Lock; *see* also Harmony.

KEYES, ROGER JOHN BROWNLOW KEYES, 1st Baron (1872–1945), British admiral who planned and directed the raid on the German base at Zeebrugge, Belg. (April 23, 1918), and thus helped to close the Straits of Dover to German submarines. Born at Tundiani Fort, Punjab, India, on Oct. 4, 1872, he entered the navy in 1885 and was promoted commander for bold action during the Boxer uprising of 1900. From 1912 to 1915 he was commodore in charge of submarines, being responsible for the scheme which led to the battle of Heligoland Bight (*q.v.*). In 1915 he became chief of staff to the commander of the Dardanelles expedition. Appointed director of plans at the admiralty in 1917, he began work on a plan for a raid on Zeebrugge and Ostend, and in 1918, as vice-admiral in charge of the Dover command, led the successful attack on Zeebrugge. He was created knight commander of the Order of the Bath and after the Armistice was made a baronet, and received a grant of £10,000. He became deputy chief of staff at the admiralty, 1921, commander in chief in the Mediterranean, 1925, and at Portsmouth, 1929–31, with the rank of admiral of the fleet from 1930. He was elected to parliament in 1934, retaining his seat until elevated to the peerage in 1943. He retired from active service in 1935 but was recalled in 1940 and acted as liaison officer to King Leopold of the Belgians, subsequently exerting himself to defend him from criticism of his surrender of the army in 1940. He then became director of combined operations with special charge of commandos. After retirement in 1941 he remained a keen critic of the conduct of the war. He died on Dec. 26, 1945, at Buckingham.

KEYNES, JOHN MAYNARD KEYNES, 1st Baron (1883–1946), British economist who revolutionized economic theories, critic and architect of national economic policies, political essayist, successful financier, bibliophile and patron of the arts, was born at Cambridge, Eng., on June 5, 1883. He was educated at King's college, Cambridge, as a mathematician but his scholarly interests, then and throughout his life, were wide. He first studied economics under Alfred Marshall (*q.v.*), founder of the Cambridge school, in preparation for the civil service, in which he was posted in 1906 to the India office. He returned to Cambridge, however, as a lecturer in economics in 1908 and remained an active fellow of King's for the rest of his life, exercising great influence over successive generations of students. In 1915 he became a temporary wartime civil servant in the British treasury and in 1919, as one of its most senior officials, served as its chief representative during the peace negotiations at Versailles. He found himself in increasing disagreement, however, with the severity of the obligations to be imposed, which he believed to exceed Germany's capacity to make payment and to threaten disruption of the world economy. He finally resigned and wrote *The Economic Consequences of the*

Peace (1919). The furore created by this book, with its pungent attacks on Lloyd George and Woodrow Wilson, first made Keynes a public figure. During the subsequent years he was continually active in economic controversy, seeking solutions of the major practical issues of the day: currencies and exchange rates, the gold standard and economic reconstruction were among the issues to which he devoted his prolific energies.

Until the 1930s he was to be regarded as an orthodox economist of unusual brilliance and penetration. In the subsequent ten years he attained fame as the protagonist of a school of economic unorthodoxy and a savage critic of earlier orthodoxies. Seeking to analyze the causes of the recession of the 1930s, he showed how demand in total was determined by expenditures and how an equilibrium short of full employment might emerge without automatically setting in operation forces of recovery. Full employment, according to his theory, could be achieved only if governments and central banks deliberately encouraged investment in new capital goods and maintained a cheap money policy and public investment during a recession. Keynes's most important work, *The General Theory of Employment, Interest and Money* (1936), advancing these ideas, for a time divided economists throughout the world into two opposing camps. Determined to provoke argument, Keynes had made uncompromising attacks on his predecessors and colleagues and, as he subsequently wrote, had deliberately heightened controversy. The academic impact of the book was permanent and a majority of economists the world over came to use much of Keynes's technique of thought, even if in detail they departed significantly from his first conclusions.

At the level of practice the book had profound effects, first upon the American scene and later upon war finance. In the U.S., Keynes had earlier outlined his ideas to Franklin D. Roosevelt and they were known to some of his advisers; they formed one intellectual ingredient in framing the Roosevelt policies for economic recovery. In Great Britain, though vigorously pressed by their author, his ideas made little impact on policy before the outbreak of World War II, though they greatly affected it subsequently. They were, paradoxically, more influential in shaping war finance; Keynes applied the same techniques to the problems of controlling inflation in *How to Pay for the War* (1940) and a few months later he was invited by the chancellor of the exchequer to join the treasury as an adviser. From that time he played a central part in British war finance and in the discussions of postwar problems. He was chief British representative at Bretton Woods in 1944, where plans for the International Monetary fund and the International bank to stabilize exchanges and assist reconstruction were worked out, and he was the chief negotiator of the large U.S. loan to Britain in 1945. Raised to the peerage in 1942, he died on April 21, 1946, at his home at Firle, Sussex, of a heart disease of which he had been continuously a victim for the last nine years of his life.

See also references under "Keynes, John Maynard Keynes" in the Index.

His other major works include *Indian Currency and Finance* (1913), *A Treatise on Probability* (1921), *A Tract on Monetary Reform* (1923) and *A Treatise on Money*, 2 vol. (1930).

See R. F. Harrod, *The Life of John Maynard Keynes* (1951) and E. A. G. Robinson, "John Maynard Keynes," *Economic Journal*, vol. LVII, no. 225 (March 1947), for biographical information.

(E. A. G. R.)

KEYS AND KEYWAYS. A key, in mechanical engineering, is a machine element used to connect another machine element to a shaft; for example, a gear, a pulley, sheave, coupling, clutch or flywheel may be keyed to a shaft (fig. 1). The grooves in which the key fits are called keyways. Connections between such machine elements may also be made by splines, described below, and by means of force fits, shrink fits or, if appropriate, by welding. However, a keyed connection can be disassembled without damaging any parts.

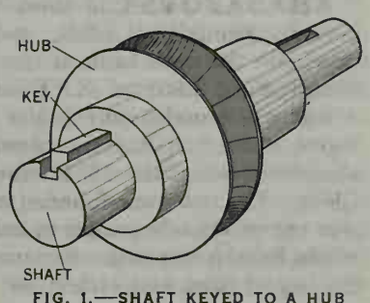

FIG. 1.—SHAFT KEYED TO A HUB

A key with a rectangular cross section is called a flat key and is placed so that its smaller dimension is in the radial direction; a square key has a square cross section. Keys with a circular cross section are called pin keys, and they may be assembled (fig. 2) either along the shaft or through it.

For convenience, keys are made in standard sizes, defined in the U.S. by the American Standards association. In its assembled position, the key lies with about half of its radial dimension in the hub and about half in the shaft (fig. 1). A keyway cut into a shaft weakens the shaft significantly and introduces an undesired concentration of stress at the inside corners of the keyway, a phenomenon which the designing engineer must consider.

Flat and square keys are available tapered, the taper making it possible to draw the hub tight against the opposite side of the shaft and facilitating disassembly because the key is more easily driven out. The matching keyway taper is in the hub, not the shaft. There are a number of other types of keys, some of which are shown in fig. 3. The gib-head key is useful for disassembly purposes, but it is dangerous where workmen's clothing might be caught. Kennedy keys are square keys in a special arrangement to provide greater holding capacity. The Woodruff key, widely used in machine tools, is easy to remove by tapping it on an end until it rocks in its seat. The patented Rollpin is inserted in a radial hole as in fig. 2(B).

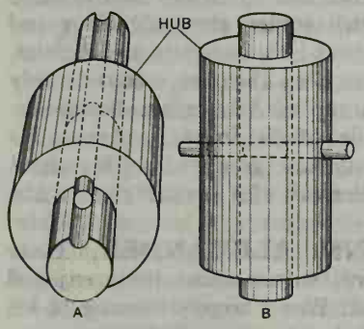

FIG. 2.—PIN KEYS ASSEMBLED (A) ALONG THE SHAFT AND (B) THROUGH IT

Ordinary keyed connections prove inadequate in many situations where heavy duty and repeated applications of the loads are involved. If a stronger junction is needed, a splined connection is used. In this case, the shaft has integral splines which fit into corresponding grooves in the hub. The splines may be rectangular in shape or they may have an involute profile. Splined connections are used for permanent fits, the hub being pressed on the shaft, and for sliding fits where it is desired to move the hub axially, as to disengage a clutch or meshing gears.

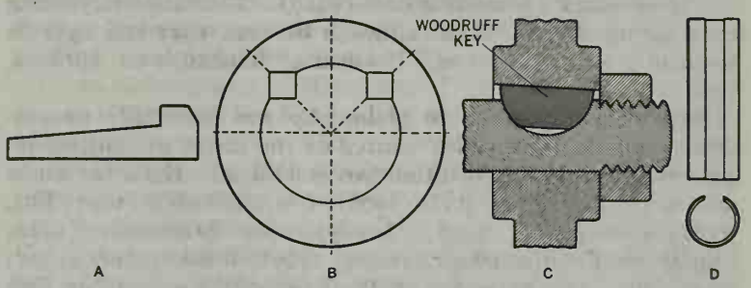

FIG. 3.—(A) GIB-HEAD KEY; (B) KENNEDY KEYS; (C) WOODRUFF KEY; (D) ROLLPIN

(V. M. F.)

KEYSER, HENDRIK DE (1565–1621), Dutch architect and sculptor, the most important Dutch sculptor of his day, was born in Utrecht on May 15, 1565. In 1594 he was appointed municipal stonemason and sculptor of Amsterdam, and from 1612 onward was mentioned as a municipal architect. His architectural works formed a link between the ornamental style of the Netherlandish Renaissance and the classicism which marked Dutch architecture around 1630. Most of his work was done in Amsterdam; *e.g.*, the South church (1603–14), which was the first Protestant church erected in the Netherlands; the East India house (1606); a number of fine towers; and his greatest building, the West church (1620).

The tomb for William the Silent in the New church, Delft (1614–21), is his principal work in sculpture. A few of his terracotta busts suggest some of the immediacy and directness which Frans Hals brought to 17th-century Dutch portrait painting. His best-known pupil was the English sculptor Nicholas Stone (*q.v.*), who became his son-in-law. De Keyser died in Amsterdam on

May 15, 1621. His sons Pieter (1595–1676), Willem (1603–after 1674) and Hendrick (1613–65) became sculptors, and Thomas (1596/97–1667) was an outstanding portrait painter.

See *Architectura Moderna ofte Bouwinge van onsen tyt* (a book of engravings published in Amsterdam, 1631); Elisabeth Neurdenburg, *Hendrik de Keyser* (1931). (S. Se.)

KEYSER, THOMAS DE (1596/1597–1667), Dutch painter, best known for his masterly portraiture, was born at Amsterdam, the son of the architect and sculptor Hendrik de Keyser. Aert Pietersz, Cornelis van der Voort, Werner van Valckert and Nicolas Elias are accredited by different authorities with having developed his talent. De Keyser chiefly excelled as a portrait painter, though he also executed some historical and mythological pictures, such as the "Theseus" and "Ariadne" in the Amsterdam town hall. His portraiture is full of character and often, as in the "Old Woman," is distinguished by a rich golden glow of colour and Rembrandtesque chiaroscuro. Some of his portraits are life size, but the artist generally preferred to keep them on a considerably smaller scale, like the famous "Group of Amsterdam Burgomasters" assembled to receive Marie de' Medici in 1638. Among his other works are a characteristic portrait group of a "Merchant With His Clerk"; a magnificent "Portrait of a Savant"; and a fine portrait of "Claes Fabricius."

KEYSERLING, HERMANN ALEXANDER, Graf (1880–1946), German philosophical writer whose ideas enjoyed considerable popularity after World War I largely because of his forceful personality and the troubled atmosphere of the times, was born at Könno in Livonia on July 20, 1880. He studied at several universities in Europe before beginning, in 1911, a world tour which provided the material for his best-known work, *Das Reisetagebuch eines Philosophen* (1919; Eng. trans. *The Travel Diary of a Philosopher,* 1925). Dispossessed of his family property by the Russian Revolution, he moved to Berlin, where he married one of Bismarck's granddaughters (1919). Thereafter Keyserling lived mainly at Darmstadt, although between 1927 and 1932 he frequently lectured abroad. He died at Innsbruck on April 26, 1946.

Keyserling's approach to philosophy was essentially nonacademic, and his ideas, which centred on the theme of spiritual regeneration, were often platitudinous or obscure. His other works include *Das Gefüge der Welt* (1906); *Unsterblichkeit* (1907; Eng. trans., *Immortality,* 1938); *Schöpferische Erkenntnis* (1922; Eng. trans., *Creative Understanding,* 1929); *Wiedergeburt* (1927; Eng. trans., *The Recovery of Truth,* 1929); *America Set Free* (1929); and *Südamerikanische Meditationen* (1932; Eng. trans., *South American Meditations,* 1932).

KEYSTONE, in architecture, the central stone of an arch; although of no more structural importance than any of the other voussoirs, or wedge-shaped stones of which the arch is built, its position at the centre makes it a unit that can be advantageously accented. Thus, in Etruscan, Roman and Renaissance work it is frequently projected beyond the face of the rest of the arch and decorated with S-scrolls, masques or figures. In Gothic architecture the pointed arch is usually built with a joint at the centre, so that no keystone exists. In vault ribs, however, keystones decorated with bosses often occur where two ribs intersect.

See also Arch and Vault.

ALINARI

KEYSTONE FROM THE ARCH OF TITUS IN THE ROMAN FORUM

KEY WEST, a city of Florida, U.S., is the southernmost settlement within the continental limits of the United States. It is located 100 mi. from the mainland of the state at the end of a long string of keys on an island 3½ mi. long and 1 mi. wide, 157 mi. S.W. of Miami and 90 mi. N. of Havana, Cuba. It is the seat of Monroe county and has served as a port of entry from 1822, when a naval depot was established there.

A modern highway, which terminates there, connects the keys with long bridges over vast expanses of water. The weather is tropical, varying from an average of 70° F. (21.1° C.) in January to an average of 84° (28.9°) in August. The lowest temperature ever recorded was 41° (5°) and the highest was 97° (36.7°). The tropical plant life includes bougainvillea, royal poinciana or flamboyant tree, sea grape, breadfruit, Spanish lime, coconut palm and many tropical flowers.

There is a unique blend of Cuban, West Indian, Bahamian and American atmosphere in the city. It was incorporated in 1828. Its history is told in old buildings and residences, pre-Civil War forts, churches and monuments set amid trees and shrubbery native to a coral isle. Tourists who visit the island contribute a major source of income; among the attractions are the aquarium, museum, garden centre, library and public beaches.

Sports fishing and commercial fishing are other sources of income; over 20,000,000 lb. of food fish, crabs, lobsters, shrimp and sea turtles are marketed annually. Throughout its history the city has been the seat of naval activity and the largest single payroll comes from the several U.S. naval installations which employ large numbers of navy personnel and civilian workers. The name Key West derives from its position as the westernmost of the Florida keys and the Spanish *cayo,* "small island"; Spanish explorers named it *Cayo Hueso* ("key of bones") because of the human bones found there. The city has a council-manager form of government, in effect from 1945. For comparative population figures *see* table in Florida: *Population.* (J. E. D.)

KHA, the generic name for the hill tribes of Laos, corresponding to Moi in Vietnam and Pnong in Cambodia. There are numerous distinct tribes (*e.g.,* Djarai, Radè and Lamet), speaking several different languages, some of which are akin to Indonesian and some to Khmer. The villages lie on the crests or the slopes of hill ranges, and cultivation of rice, grown on frequently shifted hill fields, is the basis of the economy; in addition plow cultivation of irrigated fields is practised by some tribes. Buffalo, pig and fowl are the main domestic animals; they are widely used for sacrifices. Hunting was still an important source of food in the 1960s. The houses, usually standing on piles, are built of wood and bamboo. Many tribes have community houses, which serve as ritual centres and dormitories for the unmarried men. The village is the main political unit; the offices of village headmen and priests are often hereditary. Polygamy is frequent, and the possession of several wives adds to a rich man's prestige. Divorce can be obtained easily at the initiative of either husband or wife. The dead are buried with elaborate and very expensive funerary rites, and the worship of ancestors is of great importance. Dancing and music are highly developed arts; bronze gongs are combined to form instruments of up to 12 elements. *See* also Kaw; Laos.

Bibliography.—L. de Reinach, *Le Laos* (1911); K. G. Izikowitz, *Lamet, Hill Peasants in French Indochina* (1951); F. LeBar and Adrienne Suddard (eds.), *Laos* (1960). (C. v. F.-H.)

KHABAROVSK, a town of the Russian Soviet Federated Socialist Republic, U.S.S.R., and administrative centre of a *krai,* stands on the right bank of the Amur, at its confluence with the Ussuri, about 3,800 mi. E.S.E. of Moscow. Pop. (1959) 322,744. A fort was founded on this site in 1652 by the explorer Y. Khabarov, as the first Russians penetrated the Amur basin, but it was abandoned when the 1689 treaty of Nerchinsk left the area to China. The town was founded in 1858 as Khabarovka, when Russian colonization began anew, and it soon became the focus of the whole Russian far east. Renamed Khabarovsk in 1883, it is now the largest town east of Irkutsk. Its importance derives from its

position at the crossroads of main transportation routes where the navigable Amur, flowing southeast, sweeps round northeastward to the sea, and where the Trans-Siberian railway crosses the river and turns south to Vladivostok. At one time, up to 1938, the town administered the entire Soviet Far Eastern territory, as far as the Bering strait.

Modern industries include a wide range of large-scale engineering and machine building, ship repairing, oil refining (based on oil from Sakhalin, brought by river tanker), timber working and furniture making and many light industries producing clothing and foodstuffs. There are agricultural, medical, pedagogic and railway engineering institutes and several scientific research establishments. (R. A. F.)

KHABAROVSK KRAI of the Russian Soviet Federated Socialist Republic, U.S.S.R., lies in the Soviet far east, covering the vast area of 318,378 sq.mi. Formed in 1938 out of the Far Eastern territory it was originally far more extensive, reaching to the Bering strait, but in 1953 Magadan *oblast* and the Chukot (or Chukchi) national *okrug* were detached, followed in 1956 by the Kamchatka *oblast* and the Koryak national *okrug*. With the abolition of the Lower Amur *oblast*, formerly subordinate to the *krai*, there now remains only one subordinate administrative area, the Jewish autonomous *oblast* (*q.v.*). The focus of the *krai* is the basin of the lower Amur, a broad, swampy lowland, with numerous lakes. South of this the *krai* includes the northern end of the Sikhote-Alin mountains, fronting the Tatar strait, while to the north is the complex of mountains dominated by the Bureinski range and the series of long, narrow, parallel ranges which lie along the northwest coast of the Sea of Okhotsk, known collectively as the Dzhugdzhur mountains. Almost the entire area is in dense Siberian taiga, dominated by larch, spruce and fir, with very poor podzol soils. In the extreme south there is mixed forest, with many eastern deciduous species.

The population (1959 census) was 1,142,535, overwhelmingly of Russian settler origin. Apart from the Jews (a minority in their own autonomous *oblast*), there are small numbers of indigenous peoples, such as the Nanaytsy (numbering 8,000 in 1959), Nivkhi (3,700), Ulchi (2,100) and some Evenki and Eveny in the north. The bulk of the population is concentrated in the Amur lowland, where the largest towns are located. A high proportion (74%) is urban—848,300, of whom about 60% live in the two biggest towns, Khabarovsk (322,744), and Komsomolsk-on-Amur (177,278). Other urban centres are Sovetskaya Gavan and Nikolayevsk-on-Amur (*qq.v.*). The *krai* is an area of rapidly developing economy and labour demand is constantly exceeding supply. It is rich in minerals including coal, iron ore, manganese, molybdenum, wolfram, tin and gold, but apart from coal at Sredni Urgal their exploitation is only beginning. The main industries are timber working especially in the Amur basin, and seal hunting and fishing are of great importance along the coasts and rivers. Heavy industry is concentrated in the two great towns, Komsomolsk being the iron and steel centre for the far east. Both refine oil from Sakhalin. Agriculture is relatively unimportant and is found only in the Amur basin. Wheat, potatoes, oats, soya beans, vegetables and maize (corn) for fodder are the main crops. Livestock are not numerous, but the indigenous peoples keep about 35,000 head of reindeer. (R. A. F.)

KHAFRE (KHAFRA; Gr. CHEPHREN according to Herodotus, SOUPHIS according to Manetho) (3rd millennium B.C.), the fourth Pharaoh of the 4th dynasty of Egypt and builder of the second of the pyramids of Giza, reigned probably from *c.* 2540 to *c.* 2514 B.C., though Herodotus allots 56 years to his reign and Manetho 66. He was the son of Khufu (Cheops), who built the Great pyramid, and his consort Hetepheres, and succeeded the short-lived Dedefra, probably his elder brother; he married his full sister Khamerernebti, Meresankh III and perhaps two other queens. Though many of his relatives were hastily buried in cheap tombs, his own pyramid is almost as vast as his father's. The valley temple, linked to it by a causeway, was of great monolithic blocks of granite and contained remarkable diorite statues of the king (now in the Cairo museum) from a remote quarry in the Nubian desert where his father's name has been found inscribed. Near the causeway is the Great sphinx, which many consider to bear Khafre's features. *See* PYRAMID. (M. S. DR.)

KHAIRPUR, a municipality, district and division of West Pakistan in the Sind region. The town, also called Khairpur Mirs, was the capital of the former princely state from the time of its foundation in 1783. It lies on the Mir Wah canal, 11 mi. S. of the Indus, on the main line of the Pakistan Western railway (Peshawar-Karachi), 14 mi. S.W. of Rohri, and on the Karachi-Sukkur road. Pop. (1961) 34,144. The main bazaar is known as Shahi Bazar and the streets are hard surfaced. Buildings include Faiz Mahal, Lal Bungalow, the civil hospital and Lady Willington hospital. Institutions include the Mumtaz degree college, a primary teachers' training college, a technical school, high schools and an industrial home for women. There are also three parks, among them the Baghicha-i-Atfal (children's park), a public library, the Khairpur trust (a welfare organization) and a stadium. An industrial exhibition is held there annually. After independence the town grew into an important industrial centre with textile and silk weaving mills and other factories.

KHAIRPUR DISTRICT, formerly a princely state (area 6,018 sq.mi.; pop. [1961] 472,137), consists of a rich and fertile alluvial plain bordering the Indus and a desert of sand dunes, called Nara, which is covered with stunted brushwood in the east and where cultivation is impossible. A small ridge of the Kirthar (Mid-Eocene) limestone hills, a barren and forbidding continuation of the Ghar ridge, passes through the northern part of the district. The climate is arid and hot, the temperature rising to 45° C. (113° F.) in summer, and dust storms are frequent. Rainfall is low and occurs mainly in late summer. The district is watered by the canals drawn off from the Indus at the Lloyd or Sukkur barrage. Wheat, millets, cotton, oilseeds and tobacco are the chief products. Sodium carbonate is a valuable product of the desert area, and is not found elsewhere in the surrounding country. In the 1950s the district developed industrially and several mills were established. Cottage industries include hand-loom cotton, silk and blanket weaving. An annual fair is held at Ranipur.

On an outlying spur of hills, 15 mi. S. of Khairpur on the highway to Hyderabad, lies Kot Diji, an important site, excavation of which was begun in Nov. 1955. It reveals not only early phases of the Harappa and Mohenjo-Daro civilization but also another cultural element in the lower levels. Before the arrival (*c.* 3000 B.C.) of the Harappa-Mohenjo-Daro people, there flourished at Kot Diji for a considerable length of time a well-settled community of highly efficient people, whose ruling classes lived in houses of sun-dried bricks in a fortified citadel. They manufactured tools and implements of stone and were skilled in pottery making. There is no knowledge of their racial and linguistic affinities.

The chief, or mir, of Khairpur belongs to a Baluch family known as the Talpur, which rose on the fall of the Kalhora dynasty of Sind in 1783, when Mir Fateh Ali Khan obtained a sunnud from Kandahar which made him the titular ruler of Sind. Previously the history of Khairpur was part of that of Sind. Mir Sohrab Khan, the nephew of Mir Fateh Ali Khan, separated from him and founded Khairpur state, at first confined to the town of Khairpur and a small adjacent tract of country but later enlarged. About 1813, during the troubles in Kabul incidental to the establishment of the Barakzai dynasty, the mirs were able to withhold the tribute which up to that time had been somewhat irregularly paid to the rulers of Afghanistan. On the partition of the Indian subcontinent in 1947 this state acceded to Pakistan, in which it occupied a status similar to a governor's province. In Oct. 1955 it merged in the integrated province of West Pakistan and became one of the districts of the newly formed division to which it gave its name.

KHAIRPUR DIVISION (area 20,293 sq.mi.; pop. [1961] 3,133,712) comprises, besides Khairpur, the districts of Jacobabad, Sukkur, Larkana and Nawabshah. Rice, wheat, gram, jowar, rape and mustard are the chief crops. Almost all the cultivated area is irrigated, mainly by canals. (K. S. AD.)

KHAJURAHO, a village in Chhatarpur district, Madhya Pradesh, India, 27 mi. S. of Mahoba on the Jhansi-Manikpur line. Pop. (1951) 2,347. Of its 85 famous temples, 20 survive (disused), dedicated by the Chandel Rajput kings of Bundelkhand to

Shiva, Vishnu and Jain patriarchs. The most notable is the Kandarya Mahadeo temple (*c.* 1000), a 116-ft. agglomeration of porches and turrets culminating in the spire. Both internally and externally the temples of Khajuraho are richly adorned with sculptures of enchanting grace, including a great variety of erotic sculpture the significance of which has not been firmly established. The Archaeological Survey of India has been engaged in a complete study of the temples of Khajuraho.

See Krishna Deva, "The Temples of Khajuraho in Central India," *Ancient India,* vol. 15 (1959); E. Zannas, *Khajuraho* (1962). (F. R. A.)

KHAKASS AUTONOMOUS OBLAST (KHAKASSKAYA AVTONOMNAYA OBLAST') forms part of Krasnoyarsk *krai* (*q.v.*) of the Russian Soviet Federated Socialist Republic, U.S.S.R. Formed on Oct. 20, 1930, it covers an area of 23,900 sq.mi. and occupies the western half of the broad, tectonic Minusinsk basin on the upper Yenisei, which serves for a considerable distance as its eastern boundary. The southwest-northeast valley of the Abakan, a tributary of the Yenisei, is the *oblast's* axis. South of this valley rise the Western (Zapadny) Sayan mountains, reaching 9,613 ft. in Mt. Karagosh. North of the Abakan, along the western boundary, are the Abakanski and Kuznetski Alatau ranges, with their highest point, Mt. Verkhni Zub, 7,146 ft. Apart from the headwaters of the Tom, rising near this peak, and the headwaters of the Chulym in the north, the whole *oblast* drains to the Yenisei. The enclosed basin has a dry, severely continental climate, with about 12 in. of rain a year, rising, however, on the mountains to 30–40 in. The dry conditions lead to steppe and forest-steppe vegetation in the lowlands, on chernozem soils, although much of the grassland was plowed up, especially during the Virgin Lands campaign after 1954. The mountains are in forest, mostly of conifers—pine, fir, stone pine and spruce.

The population of the *oblast* by the 1959 census was 411,047, of whom 221,866 (56%) were urban dwellers, living in 2 towns and 19 urban districts. The towns are the administrative centre of Abakan (56,416) and the mining town of Chernogorsk (51,064). The great majority of inhabitants are Russian and Ukrainian settlers and the 1959 census recorded only 56,584 Khakass in the entire U.S.S.R. The Khakass peoples are a Siberian Turkic ethnic group who were originally nomadic herdsmen. Stock rearing, particularly of sheep and goats, remains their most important agricultural activity, the steppe and mountain areas alike providing abundant pasture and hayland. The dry climate of the lowland parts has limited arable farming, but the construction of the Uiskaya and Uibat irrigation projects has greatly increased both the area and yield of crops, notably wheat and maize (for fodder).

Mining has been important since copper first attracted Russian settlers in the 18th century. There are several molybdenum and molybdenum-copper-wolfram deposits, of which the most important is at Sonski. Coal is mined at Chernogorsk, gold along the headwaters of the Chulym round Zolotogorski and Priiskovy, and barites around Askiz in the Abakan valley. Iron mining is developing rapidly in the Sayans, in the head valleys of the Abakan round Abaza and Anzas. The forests of the *oblast* are exploited for timber, the main sawmilling centres being Abakan and Sonski. The latter stands on the left bank of the river Abakan, two miles above its confluence with the Yenisei, and was built in the years 1929–31. It is now linked by railways to Achinsk on the Trans-Siberian railway and to Novokuznetsk in the Kuzbass. Branch lines serve the iron mines of Abaza and the coal mines of Chernogorsk. From Abakan a motor road crosses the Yenisei to Minusinsk and on into the Tuva Autonomous Soviet Socialist Republic. (R. A. F.)

KHAKI, from the Hindustani *khaki,* "dust" or "dust-coloured," a term applied to drab fabrics used primarily for military uniforms. It is made in cotton, wool, worsted and combinations of these fibres as well as with blends of man-made fibres. Khaki uniforms were worn by British colonial troops in India and were found to be especially effective for field service and battle. It was widely used by the time of the Sepoy mutiny (1857–58) and thereafter served as the official colour for uniforms of British armies, native and colonial, in India; later it was adopted in other parts of the empire and by other nations. During the South African War (1899–1902) cotton khaki proved to be unsatisfactory because of climatic conditions and woolen and worsted serge was introduced. The use of olive tints, which reduce visibility against both bare ground and foliage, began during World War I. The term is also used for some brown-toned fabrics used for uniforms.

Khaki has limited use in civilian dress; some work clothing and riding breeches are made in this shade. (G. E. L.)

KHALIFA, THE ('ABDULLAHI IBN MOHAMMED) (1846–1899), head of the mahdist state in the Sudan from 1885 to 1898. 'Abdullahi's ancestors originated in the central Sudan between Wadai and Bornu; his great-grandfather went east and settled among the Ta'aisha Baqqara tribe in southern Darfur where 'Abdullahi was born. He followed the family vocation for religion and, about 1880, hearing of the fame of Mohammed Ahmed (*q.v.*), joined the future mahdi as a disciple. In June 1881 Mohammed Ahmed announced his divine mission and shortly afterward appointed 'Abdullahi a caliph (Arabic, *khalifa*). As the mahdi's staff officer he helped to organize a series of sweeping victories over the Egyptian forces which led to the capture of Khartoum in Jan. 1885.

On the mahdi's death in June 1885 'Abdullahi assumed the leadership of the mahdist movement. He crushed opposition by the mahdi's kinsmen in 1886 and again in 1891. To overawe the Nile valley he compelled the Ta'aisha warriors from the west to move to Omdurman. Two revolts, in the Nuba mountains in 1885–86 and in Darfur in 1888–89, were suppressed. In 1887 the mahdists invaded Ethiopia and sacked Gondar; in 1889 they killed King John IV in battle at Metemma. 'Abdullahi's troops were, however, no match against well-supplied, disciplined armies. In a forlorn march on Egypt led by the amir 'Abd al-Rahman al-Nujumi, a mahdist expedition was destroyed at Tushki in 1889 by an Egyptian army commanded by Sir F. W. (afterward Field Marshal Lord) Grenfell, while on the Red sea coast another Egyptian force seized Tokar. In 1894 the Italians occupied Kassala and on the upper Nile the mahdist outposts, after successes against the garrisons of Mehmed Emin Pasha (*q.v.*), were expelled from Rejaf by the Belgians in 1897. The reconquest of the Sudan by an Anglo-Egyptian army under the command of Sir Horatio Herbert (afterward Field Marshal Earl) Kitchener brought the mahdist rule to an end. Dongola fell in 1896, Abu Hamad was stormed and Berber occupied in 1897; finally in 1898 the mahdist empire collapsed in the battles of the Atbara and Omdurman. 'Abdullahi with a remnant of his followers fled to Kordofan where he was killed at Umm Diwaikarat (Om Debreikat) by an Egyptian force led by Sir F. R. Wingate on Nov. 24, 1899.

For 13 years, by means of a highly centralized military dictatorship based on Omdurman, 'Abdullahi imposed a superficial unity upon the Sudanese. He maintained an arsenal, a river fleet, a lithographic press and a local telegraph. He struck coins but his debased currency suffered progressive depreciation. Though he was himself loyal to the mahdist theocratic ideal, he was forced by sheer administrative necessity to reintroduce Egyptian political institutions and re-employ Egyptian government personnel. Nevertheless all his efforts to establish a permanent mahdist state were defeated by the decline of religious solidarity and disunion among the tribes, by the incompetence of his agents and his own ignorance and finally by the overwhelming technical superiority of the Anglo-Egyptian power.

BIBLIOGRAPHY.—F. R. Wingate, *Mahdiism and the Egyptian Soudan* (1891); A. B. Theobald, *The Mahdiya* (1951); P. M. Holt, *The Mahdist State in the Sudan* (1958). (R. L. HL.)

KHALIL (AL-KHALIL IBN AHMAD IBN 'AMR IBN TAMIM AL-FARAHIDI AL-AZDI) (d. 786 or 791), Arab philologist, leader of the Basran philological school and compiler of the first Arabic dictionary. He also discovered and codified the rules of Arabic prosody and, although his book on the subject is lost, his system still stands. He was born at Oman, but his date of birth is unknown. It is known, however, that when he died (at Basra, in 786 or 791) he was 75 years of age. He compiled the dictionary, which he called *Kitab al-'Ain* ("Book of the Eye"), with the help of his pupil, Laith, a Khorasani. In it he used an anagrammatical arrange-

ment, and also listed roots separately in accordance with the number of letters they contained: two, three, four or five. He also invented a special alphabetical order based on phonetic principles, beginning with the gutturals and ending with the labials. This suggests Sanskrit influence, but no direct contacts are known.

BIBLIOGRAPHY.—There are manuscripts of the *Kitab al-'Ain* in Tübingen and Baghdad. *See* G. Flügel, *Die grammatischen Schulen der Araber* (1862); C. Brockelmann, *Geschichte der arabischen Litteratur,* vol. i, p. 100 (1898); suppl. vol. i, p. 159 (1937). (J. A. HD.)

KHAMMAM, a town and district of Andhra Pradesh, India. The town, headquarters of the district, lies 65 mi. S.S.E. of Warangal on the Central railway which runs through the district from north to south. Pop. (1961) 35,888. There is a fort said to be 900 years old. The town is an important centre of trade and commerce.

KHAMMAM DISTRICT (area 6,147 sq.mi.; pop. [1961] 1,057,542) was formed on Oct. 1, 1953. The Godavari river flows along its eastern boundary. The soil is mostly sandy. The climate is hot and slightly humid; Khammam is the hottest district of Telangana and receives 35 in. of rainfall a year. The eastern part is covered with thick forests. The chief agricultural products are rice, jowar, bajra, maize and pulses, rice being largely grown on land irrigated from tanks and wells. The minerals include coal, garnet, iron ore, limestone, barite, talc and corundum. The coal mines of Singareni and Kothagudem are in the neighbourhood of Yellandu town in the north. Kothagudem has a barium factory and a thermal power station. A branch line runs from Dornakal junction on the Central railway to Singareni and Kothagudem collieries. (S. AH.)

KHAMSIN: *see* WIND: *Local Winds.*

KHAN, a title of respect in Muslim countries. It is a contracted form of *kaghan* (Persian and Arabic *khaqan*), a Mongolian word equivalent to "sovereign," used among the Mongol and Turkic nomad hordes. At the time of Genghis, a distinction was still made between the title *qaan,* which he assumed as supreme ruler of the Mongols, and the inferior title *khan,* but the latter gradually ousted the former and his successors became known as the great khans (in European works sometimes as the chams, etc.) of Tartary or Cathay. The title of khan was often applied to semi-independent rulers in various parts of the Muslim world. The meaning of the term also extended downward until it became an affix to the name of any Muslim owner of property, particularly in Afghanistan, Pakistan and India. (G. E. WR.)

KHANAQIN, a town of Iraq, of considerable antiquity, in the Diyala *liwa'* (province) 90 mi. N.E. of Baghdad. Pop. (1957) 19,312. It is 5 mi. from the Iranian frontier on the Baghdad-Kermanshah road, the main route between Iran and Iraq, much used by Iranian pilgrims visiting the holy cities of Arabia and Iraq. The town is in a fertile and intensively cultivated stretch of the Alwand river, and also in the Zagros oil field region; there are naphtha springs nearby. Following oil exploitation at Naft Khaneh, the crude oil was piped to Alwand, 3 mi. S.E. of Khanaqin, for refining, and Khanaqin became a residential and transport centre for the oil field. (W. B. FR.)

KHANDWA, a municipality and the headquarters of the Nimar district in Madhya Pradesh, India, lies 353 mi. N.E. of Bombay on the Bombay-Delhi section of the Central railway. Pop. (1961) 63,505. The town is conveniently situated in the Narmada (Narbada) rift, and has several ginning and oil mills. It has a considerable trade in cotton, timber and grains. The people speak Nimari, a local dialect of Hindi. Khandwa is mentioned by J. D. Cunningham as Ptolemy's Kognabanda. It is also mentioned in the epic of *Mahabharata* as the Khandava-Vana area. Several temples near Rameshwar tank to the north of the town have beautifully carved massive pillars. The town has two colleges affiliated to Sagar university. (D. G. NA.)

KHANSA, AL- (TUMADIR BINT 'AMR) (d. *c.* 645), Arabian poet of the tribe Sulaim, a branch of Qais, is famous for her elegies. Before the time of Islam she lost her brothers Sakhr and Moawiya in battle. Her elegies written on these brothers and on her father made her the most celebrated poet of her time. With her tribe she accepted Islam somewhat late, but persisted in wearing the heathen sign of mourning, against the precepts of Islam. When her four sons were slain in the battle of Kadisiya, Omar wrote her a letter congratulating her on their heroic end and assigned her a pension. Her daughter 'Amra also wrote poetry.

See also ARABIC LITERATURE: *Pre-Islamic Poetry.*

BIBLIOGRAPHY.—Her collected poems have been edited by L. Cheikho (1895) and translated into French by Father De Coppier (1889). *See* also G. Gabrieli, *I tempi, la vita, et il canzoniere della poetessa araba al-Hansa,* 2nd ed. (1944).

KHANTY-MANSI NATIONAL OKRUG in Tyumen *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., covers 201,969 sq.mi. and lies in the west Siberian lowland, round the confluence of the great rivers Ob and Irtysh. The area is mostly low lying, a huge, extremely swampy plain, rising slightly in the north to the rolling, morainic country of the Siberian swell. Only in the far northwest does the *okrug* rise to the crest of the Urals, culminating in Mt. Narodnaya, 6,214 ft., the highest peak of the range. A very high proportion of the surface is covered by peat bog and grass marsh and almost all the rest is dense taiga forest of spruce, pine, fir, larch, stone pine and birch. Broad meadows, inundated in spring, follow the rivers. The climate is severely continental, with long, very cold winters (December average temperature about −21° C. [−6° F.]). Average wind speeds are high and blizzards are frequent. Rainfall is about 18 in. a year.

Throughout this great area, comparable in size to France, there lived only 123,926 people (1959 census), or 0.6 persons per square mile. Most lived along the Ob and Irtysh; 30% (37,298) were urban, living in the administrative centre of Khanty-Mansiysk (20,677) and three urban districts. Although it is a national *okrug* (established 1930 and called Ostyak-Vogul National Okrug until 1940), Russian settlers form four-fifths of the population. In the whole U.S.S.R. there are only 19,400 Khanty and 6,400 Mansi, the two tribes for whom the *okrug* was formed. The Mansi predominate in the west and southwest. A few Komi live in the Urals, and Nentsy (Samoyeds) in the far north. The Khanty and Mansi are Finno-Ugrian tribes, who get their living from fishing, hunting and trapping. Fish-canning factories have been established in Khanty-Mansiysk, Surgut and Berezova. Timber working is being slowly developed, hindered by the great distance from markets. Agriculture is confined to one or two small patches along the rivers. The rivers are the only communications other than winter trails and aircraft. (R. A. F.)

KHAQANI (IBRAHIM IBN 'ALI NAJJAR [AFZAL AL-DIN]) (*c.* 1106–*c.* 1185), Persian poet, whose eminence rests mainly upon his numerous court poems, satires and epigrams, was born at Shirvan on the Caspian sea. His father was a carpenter and a Muslim, his mother a Nestorian Christian. Brought up in poverty, he aimed at a court career by composing panegyrics, and for several years enjoyed the favour of Akhsitan, the shirvanshah of Baku. Shortly after 1150 Khaqani sought permission of his royal patron to make the pilgrimage to Mecca, and this long journey inspired him to write his most famous poem, the *Tuhfat al-'Iraqain* ("Gift to the Two Iraqs"), a description of his travels interspersed with panegyrics and some autobiography. Returning to court in 1157, he quickly fell into disgrace when he boasted of the consideration shown him during his absence by other rulers, and he was committed to the prison fortress of Shabiran. His sufferings there moved him to write a *habsiya* (jail ballad) which is considered one of the finest specimens of its kind. He was eventually released, and after his wife's death, which he mourned in a tender elegy, he retired to Tabriz where he died. His style is learnedly obscure, and his writings generally require detailed commentary for their elucidation.

See N. de Khanikov, *Mémoire sur Khacani* (1865); Yahya Qarib (ed.), *Masnavi i Tuhfat al-'Iraqain* (1955). (A. J. AY.)

KHARAGPUR, the largest town in Midnapur district of West Bengal, India, lies 72 mi. W. of Calcutta by rail. Pop. (1961) 147,253. Its railway station is an important junction of the South-Eastern railway, and the colony round the railroad workshops has a population (1951) of 50,384. The principal object of interest in the town proper is the shrine of a Muslim saint. Of the educational institutions in Kharagpur the Institute of Technology

deserves special mention. It was founded in 1951 by the central government and enjoys the status of a university. There are laterite quarries near the town. (S. P. C.)

KHARAN, a district in the Kalat division, West Pakistan, from 1955, was formerly a princely state of the Baluchistan region and from 1952 to 1955 was part of the Baluchistan States union. Area 18,553 sq.mi. Pop. (1961) 42,483. Bounded north by the Ras Koh, south by the Siahan range and east by the Garr hills, it is mostly desert country with immense stretches of sand, receiving torrents from the surrounding mountains. Severe dust storms are experienced throughout the year. Sheep, goat and camel rearing are the main occupations of the people. Some cultivation is found near the hills and along the Mashkel and Baddo rivers. Wheat is the staple though there are rich date groves.

KHARAN TOWN (Shahr-i-Karez or Kharan-Kalat; pop. [1961] 2,692), formerly the capital of the state and now the headquarters of the district, lies near the Baddo river, 77 mi. S.W. of Kalat city. There is an old fort constructed by Sardar Amir Azad Khan. The former ruling family belonged to the Nausherwani tribe, claimed to be descended from the Kiani dynasty of Iran (Persia). Formerly under the control of Kalat, Kharan came under British political control in 1884 and in 1940 was recognized as separate from Kalat and only nominally under its suzerainty. It acceded to Pakistan on March 17, 1948. (K. S. AD.)

KHARIJAH, AL WAHAT AL (KHARGA), "the outer oasis," the largest of the Egyptian oases, frequently called the Great oasis, lies in the Muhafaza as Sahra' al Janubiyah (Southern Desert governorate) of the Libyan desert between 24° and 26° N. and 30° and 31° E. The area covers 1,426 sq.mi., measuring 100 mi. north to south and from 12 to 50 mi. east to west. Permanent pop. (1947) 11,121, a mixture of Berber and Bedouin stock. The chief town, Al Kharijah (pop. about 7,000), is due west of Isna and 471 mi. S. of Cairo by rail; it is reached by narrow-gauge line (opened 1908) from Al Wahat junction on the Nile valley line near Farshut.

The oasis consists of a depression, at its lowest 70 ft. above sea level. The climate is virtually rainless and, because of a steady lowering of the underground water table, there is no longer a single natural-flowing spring. Water is obtained from numerous borings of the porous Nubian sandstone which underlies the greater part of the Libyan desert. Rice, barley and wheat are the chief crops, with berseem for fodder. Baskets and mats are woven from palm leaves and fibre. In ancient times the cultivated area was greater, but new boring and land reclamation are slowly proceeding. Al Kharijah town lies among palm groves. Its houses are of sun-dried brick, and the streets are narrow and winding, sometimes cut through solid rock and mostly roofed over, the roofs carrying upper stories. (A. B. M.)

The higher water table during the Paleolithic period made the place a centre for Paleolithic hunters, and remains dating from the Acheulean to the Levalloisian have been found. Mesolithic and Neolithic settlers were also present.

Al Kharijah was called Kenem by the ancient Egyptians but does not appear to have come under their control until the 18th dynasty, when the Temehu tribesmen were subdued. In the 26th dynasty a temple to Amon, of sandstone, was built, and during the 27th dynasty this was enlarged. The water supply was improved and wells and pools were built. This led to a large increase in the sedentary population which reached its peak under the Ptolemaic and Roman rulers.

Remains include a Roman fort on the eastern escarpment and an early Christian necropolis on a hillside 3 mi. N. of Al Kharijah. This was provided with mummy chambers, a practice continued by the Christian Egyptians for some time.

Al Kharijah is usually identified with "the Oasis" and was called the Island of the Blessed by Herodotus. It was regarded as the home of spirits. The oasis was visited by the army of Cambyses on its way to the oasis of Amon Siwah, before it perished in the desert sandstorms. Because of its remote position Al Kharijah was also used as a place of exile. (M. V. S.-W.)

KHARIJITES (KHAWARIJ), members of the earliest sect to arise in Islam, trace their beginning to a religio-political controversy concerning the caliphate (*q.v.*). After the murder of the third caliph, Othman, and the accession of 'Ali (Mohammed's son-in-law) as the fourth caliph, Mu'awiya, governor of Syria, sought to avenge the murder of Othman. During the battle of Siffin (July 657) 'Ali was forced to agree to arbitration by umpires. This concession aroused the anger of a large group of 'Ali's followers who regarded arbitration as a repudiation of the Koran ("If one party rebels against the other, fight against that which rebels"; Koran xlix, 9) and as treason against God, the sole arbitrator. Taking the name Kharijites ("Seceders"), these pietists formed a new sect, opposed equally to Mu'awiya (who subsequently became caliph) and to 'Ali. Repudiating not only the caliphs but all Muslims who did not accept their views, they engaged in campaigns of harassment and terror.

The Kharijites held that the judgment of God could be expressed only through the free choice of the entire Muslim community. They insisted that anyone, even a Negro slave, could be elected caliph (that is, head of the Muslim community) if he possessed the necessary qualifications, chiefly religious piety and moral purity. A caliph may be deposed upon the commission of any major sin. The Kharijites thus set themselves against the special claims of the family of Mohammed and the Muslim aristocrats. As proponents of the democratic principle, they drew to themselves many who were dissatisfied with the existing authorities. Thus, for example, their ideology was readily accepted by the Berbers of north Africa, who resisted the dominance and taxation of the Arab caliphs. Although the Omayyad caliphs dealt them severe blows, the Kharijites continued to exist in scattered groups, especially in north Africa.

Besides their democratic theory of the caliphate, the Kharijites were known for their puritanism and fanaticism. Any Muslim who committed a major sin was considered an apostate, subject to ostracism and even death unless he made a public confession and did penance. Luxury, tobacco, music, games and concubinage without the consent of wives were forbidden. Intermarriage and relations with other Muslims were strongly discouraged. The doctrine of justification by faith without works was rejected and literal interpretation of the Koran was insisted upon. They developed their own legal system and collections of *hadith* ("traditions").

Kharijites survive today largely under the name of Ibadis (north Africa, Oman and Zanzibar), numbering perhaps 500,000. More important, however, has been the influence of their ideas on the Wahhabis who rule much of the Arabian peninsula through the Sa'udi dynasty (*see* WAHHABI; ARABIA: *History: The Wahhabi Movement*).

See Elie Adib Salem, *Political Theory and Institutions of the Khawārij* (1957). (H. B. PA.)

KHARJ, AL, a small district of Najd in Saudi Arabia, lies south of Riyadh with which it is associated administratively. It enjoys the peculiarity of a series of deep-water pools, and has therefore probably been inhabited from the earliest times. There are numerous ancient tombs but by the mid-1960s no serious archaeological work had been undertaken. With the development of oil in Saudi Arabia, U.S. experts, under an assistance program, installed mechanical pumps and agricultural development was started, including a model farm and training college. The principal crops are wheat, barley, alfalfa, melons and dates. Al Kharj is linked by rail with Riyadh and the Persian gulf. It has an airfield for local and military use, an army headquarters and a French-built ammunition factory.

KHARKOV, an *oblast* in the Ukrainian Soviet Socialist Republic of the U.S.S.R., was formed in 1932 and covers an area of 12,162 sq.mi. in the eastern Ukraine. Most of the *oblast* lies in the basin of the Northern (Severny) Donets, the valley of which is its main axis. The southwest is drained by small tributaries of the Dnieper, such as the Orel. In the north the terrain rises to the southern end of the Central Russian upland. The greater part of the *oblast* lies in the steppe zone and is almost entirely under the plow, although much land has been and is being lost by gullying of the friable loess subsoil. The northwest is within the forest-steppe zone and there are groves of oak and

other deciduous trees; but many of the original forest areas have been cleared for agriculture and again intensive gullying has developed, especially on the Central Russian upland. Save for meadow soils along the rivers, the land everywhere comprises thick, fertile chernozems. The climate is dry, with about 16 in. of rain a year. January temperatures at Krasnograd average −7.2° C. (19° F.) and July temperatures 18.3° C. (65° F.).

The rich soils and intensiveness of agricultural use combined with industrialization have made the *oblast* one of the most densely settled parts of the U.S.S.R. There is a relatively high rural population density of 77 persons per square mile. A high proportion (64%) of the total population of 2,520,129 (1959 census) is urban, however, and live chiefly within the conurbation of the administrative centre of Kharkov. All the remaining towns are small with fewer than 50,000 people, and are largely concerned with processing agricultural products and small-scale engineering. The biggest is Izyum (pop. [1956 est.] 34,000). Agriculture is dominated by grain production, taking up 65% of the cropped area. Winter wheat and maize (corn) are the leading grains. Industrial crops are important, notably sugar beet, sunflowers, hemp and *makhorka* tobacco. Market gardening is intensive in a wide area around the Kharkov metropolitan district to supply the local demand; cattle, pigs and poultry are also kept in considerable numbers and dairying is well developed. The *oblast* is excellently served for communications by the Moscow-Crimea and Kiev-Kharkov-Donbass highways which cross it and the eight trunk railways focusing on Kharkov. (R. A. F.)

KHARKOV (Ukrainian KHARKIV), a town and *oblast* centre in the Ukrainian Soviet Socialist Republic of the U.S.S.R., stands on the left bank of the Udy, a tributary of the Northern Donets, at its confluence with the Lopan and Kharkov streams 400 mi. S.S.W. of Moscow. Kharkov was founded (1656) like many other Ukrainian towns as a military stronghold to protect Russia's southern marchlands, but during the 18th century it developed rapidly as a trading and industrial centre and seat of a *guberniya* (province) from 1732. Its industrial growth was very rapid during the later 19th century, with the opening up of the adjacent Donets basin (Donbass), and by the time of the Revolution, Kharkov was the fifth largest city of Russia, with 352,000 inhabitants. With the establishment of the Ukrainian S.S.R. in 1917 Kharkov became its capital, but this was transferred to Kiev in 1934. After the Revolution the town's industrial importance continued to develop, despite very heavy destruction in World War II when it changed hands several times. It is now an important urban centre ringed by about 20 satellite towns with a population approaching 1,000,000 (934,136 according to the 1959 census). The leading industry is engineering, especially the production of tractors, threshing machines and other agricultural equipment. A wide range of electrical equipment is made, including generators and turbines, as well as diesel locomotives, machine tools and mining machinery. Other products include paints and lacquers, textiles and clothing, boots and shoes, furs, flour, biscuits, jam and other foodstuffs. After Moscow and Leningrad, Kharkov is the largest rail centre of the U.S.S.R., with eight lines focusing on it and three main-line stations. It is a junction of main highways and has regular air connections with Moscow, Kiev, Odessa and Baku. It is also a major cultural and educational centre with the A. M. Gorky state university, founded in 1805, and many higher educational and research institutions, a philharmonic hall, six theatres and several museums. Kharkov is supplied with natural gas from Shebelinka, 64 km. (40 mi.) to the southeast. (R. A. F.)

KHARTOUM (AL KHURTUM), the capital city of the Republic of the Sudan and of Khartoum province, lies at the confluence of the Blue and White Nile rivers, 1,750 mi. upstream from Cairo, Egypt. Pop. (1956 census) 93,103. With its sister towns Khartoum North and Omdurman, it forms the largest conurbation in the republic and is rapidly growing. The city stands on the north end of the Gezira (*q.v.*); the name Khartoum means "elephant's trunk" in Arabic and was first given to the Egyptian army camp pitched in 1821 on the narrow spit of land at the confluence. Khartoum North lies across the Blue Nile on the right bank and Omdurman on the west bank north of the confluence. Traders built around the army camp, which became a garrisoned market town. Maj. Gen. Charles George Gordon (*q.v.*), then governor general of the Sudan, was killed there by Mahdist forces in 1885. Subsequently abandoned, Khartoum was rebuilt by Maj. Gen. Sir H. H. (later earl) Kitchener (*q.v.*) after its reconquest in 1898 and was the seat of the Anglo-Egyptian government of the Sudan until 1954, when it became capital of the independent republic.

Khartoum grew around Kitchener's governmental and market districts, with tree-lined streets and squares. The official area, adjoining the Blue Nile bank, has stone and brick buildings occupied by ministries, museums and the offices of national and civic administration. These include the palace, the parliament buildings and the university (formerly the Gordon Memorial college). A shady avenue runs along the Blue Nile from the waterworks upstream from the 611-yd. road and railway bridge (1910) to the Nile port with quays and sidings at the Mogren (confluence) and to the White Nile road bridge (1928) leading to Omdurman. This bridge has an opening swing span to allow vessels to pass. In the green area are the Roman Catholic, Anglican and Coptic cathedrals, and the Greek and Maronite churches, with their own schools, as well as the zoological and botanical gardens. Behind lies the sook (market), a central district congested with automobiles, trucks, buses and donkeys. Beyond the sook are two mosques, several high schools, the civic hospital and the university school of medicine and laboratories.

Two main lines run from the railway station south of the town. One, leading south-southwest and skirting the Gezira, brings cotton and supplements the Nile steamers bringing gum, hides, oilseeds and other produce to Khartoum for processing. The northern line goes to Port Sudan (492 mi. N.E.) with these exports and to Egypt, and brings gasoline, kerosene, machinery, textiles and other imports. The southwest quarter by the railway is industrial, with cotton and gum processing, tanning, milling and mechanical works. Other industries include printing and the manufacture of glass, tiles, knitwear, soft drinks and sweetmeats. The workers' dwellings are partly in the sook and industrial areas and partly in a suburban district, the Deims. Modern garden suburbs, in which are some embassies, lie to the southeast near the international airport which is the headquarters of Sudan Airways, the national airline. By reason of immigration from the provinces and from western Africa, Khartoum, with about 83% of its population speaking Arabic, is the least Arab of the Three Towns of the conurbation. Its foreign residents also include Egyptians, Cypriots, Greeks, Asians and about 1,000 western Europeans.

KHARTOUM PROVINCE, the small central province in which Khartoum city is situated, lies between latitude 15° and 17° N. and is roughly triangular, with the Three Towns (Khartoum, Khartoum North and Omdurman) toward the southern apex at the Jabal Aulia dam. The dam, completed in 1937, forms a reservoir of about 3,500,000 cu.m. capacity. The northern boundary of the province crosses the Nile at the 6th cataract (Sabaluka). Pop. (1956 census) 504,923; area 8,097 sq.mi. The provincial boundaries are drawn to include permanent villages and their distant grazing grounds but exclude the main tribal territories of the nomads, while giving these access to wells. The Gezira plain, except for a strip along the White Nile containing the fish hatcheries and the local headquarters of the Egyptian irrigation department, lies outside the province. Nearly half the inhabitants of the province live in the Three Towns.

Khartoum province lies at about 1,200 ft. altitude on a peneplain of Archean gneiss. Flat-topped residual hills of Nubian sandstone and conglomerate, small basalt flows and grotesque granitic inselberge sparsely interrupt the almost flat horizon. The gneiss is exposed near Sabaluka, where ancient volcanic rocks formed a barrier between the upper and lower Nile systems until a gorge was worn through it. Elsewhere the plain is covered with basal Nubian or with gravel and sand eroded from the rocky *jabals* (hills). Low riverbanks, flats and islands are covered with Nile silt. The *jabals* are a source of stone for building and roads; the silt yields material for bricks and earthenware jars. Omdur-

man has small pits of Aswan pottery clay. Ancient settlement sites abound, from Acheulean to Meroitic and Christian, some not investigated. The main focuses in the province are the Nile confluence and Sabaluka gorge. The Omdurman battlefield (1898) is at Kerreri, 7 mi. N. of the town.

The dry season (September to June) has extreme temperatures, with a mean maximum of 41.7° C. (107° F.) in May and June and a mean minimum of 15.6° C. (60° F.) in January, but with records of 47.8° and 6.7° C. (118° and 44° F.). Rain falls intermittently from July to early September but rarely exceeds 7 in. annually. Some water lies for months in gravels and sands around hills and in wadies, encouraging grasses, herbs and thornbushes that feed sheep, goats and camels; later in the season, however, stock must be kept within reach of deep wells or the Nile. The grazing grounds supply the towns with mutton, goats' milk and cheese, and with asses, camels, hay, firewood and skins for the large export trade. Overgrazing and overcutting have denuded the town peripheries of vegetation. Bare silt and sand are the main sources of haboobs (dust storms) and soil conservation is difficult, but sunt (*Acacia arabica*) is planted for firewood.

The Nile flood from mid-July to December (when 80% of the annual flow passes) covers and resilts the low ground and islands, which are sown with beans, melons, durra, sugar and vegetables as the flood retreats. Other stretches of old silt are watered by landowners or co-operatives with motor pumps and canals and by peasants with the *saggia* ("water wheel") or shadoof (counterbalanced dipper). Large pump-irrigated estates grow fruit, vegetables, and fodder for cows that supply Khartoum with milk and butter. The White Nile and the left bank of the main river with its rugged hinterland have fewer villages than the Blue Nile and right bank. Apart from the municipalities of the Three Towns, the province is divided into two districts with headquarters at Khartoum North and Omdurman and controlled locally by village councils. Khartoum North (pop. 39,082) is the main industrial centre, having the dockyard, railway shops, sawmills and works for engineering, tanning and brewing, with brickyards upstream at Gereif. Light industries manufacture shoes, sweetmeats and treacle. Downstream at Shambat are the cotton research centre and the university farm. Khartoum North is 95% Arabic speaking. (M. T. P.)

KHASI AND JAINTIA HILLS constitute the United Khasi and Jaintia Hills District in Assam, India. Area 5,546 sq.mi. The district comprises two adjacent highland systems which form a single massif between the Brahmaputra and Surma valleys. The massif consists of a series of steep east-west ridges with elevated tablelands between. On the southern side, the mountains rise precipitously from the Surma valley and form a plateau 4,000–6,000 ft. above sea level. Shillong (*q.v.*), the administrative centre of the district, lies on this plateau at 4,900 ft., behind which lies the Shillong range. Cherrapunji (*q.v.*) is a village noted for its heavy rainfall. On the north are two similar but lower plateaus. The general appearance of the tablelands is of grassy downs. The flora is exceptionally rich in the variety and number of plants, orchids being especially prolific. At 3,000 ft. the indigenous pine, *Pinus khasya,* predominates while the highest ridges bear oaks and chestnuts. Iron ore and sulfurous Tertiary coals are found in the district. (X.)

At the 1961 census the population was 462,152, an increase of nearly 100,000 since the census of 1951 and about 140,000 since that of 1931. The increase has been largely in Shillong. The density of population is 66 per square mile and the majority (about 330,000) is rural. Of these about 270,000 depend directly upon agriculture, the remainder being occupied in small manufactures, servicing, trading, transport, etc. Wet rice provides the main subsistence: it is cultivated in the valley bottoms and in terraced gardens built on the hillsides. It is estimated that 60,000 of the farmers still cultivate only by the *jhum* method, in which secondary jungle is burnt over and a crop raised for one or two years in the ash. This method is wasteful of natural resources and in this district, as in other hill districts in India, inducements are offered to shifting cultivators to settle and cultivate farms by conventional methods. Some market gardens serve the urban centres, in particular the growing town of Shillong. Formerly the district was famous for its orange groves, but these have run into difficulties since the principal markets for the fruit lay in Sylhet district, now in Pakistan, and the border has been closed to this trade.

The main population categories, apart from the residents of Shillong and the refugees from Pakistan, are the Khasis (about 230,000), Syntengs (about 30,000), and Pnar (about 15,000). The language of the Khasi-Syntengs belongs to the Mon-Khmer branch of the Austroasiatic family of languages. The people have a distinctive culture. Inheritance to property and succession to tribal office both run through the female line, passing from the mother to the youngest daughter. Office and the management of property is, of course, in the hands of men identified by these women, and not in the hands of women themselves. This system of inheritance and succession is being modified by conversions to Christianity and the consequent conflict of ritual obligations under the tribal religion and the demands of the new religion, and by the right of the people to make wills in respect of self-acquired property. Another distinctive feature of the Khasi-Synteng culture was the commemoration of ancestors by the erection of menhirs and stone tables.

The area has long been a centre of activity by the Christian missions, who have established schools and hospitals, and have published much literature in the tribal languages. No figures are given in the 1951 census for Christians by district, but it is probable that Christians are in a majority in the Khasi hills.

The traditional system of government was considerably modified after Indian independence in 1947. The population is divided into matrilineal exogamous clans. Some of these clans were of royal status and provided the chiefs and *siems* of 25 so-called princely states. During the British period these states had some measure of internal autonomy. In 1950 all these states (covering an area of 3,788 sq.mi.) were merged with the rest of the district and the whole area came under a uniform system of administration. The United Khasi and Jaintia Hills district is one of the six so-called autonomous districts of Assam. This status is given in recognition of the distinctive culture of the inhabitants and their differences, as tribesmen, from the people of the Assam plains. Elected councils enjoy a measure of legislative, executive, financial and judicial autonomy under the guidance of a deputy commissioner. In addition, seats are reserved for the state assembly and for the Indian parliament, and these seats may be contested only by members of designated tribes belonging to those areas. In short, an attempt is being made to bring about a guided transition in matters of government from a controlling bureaucracy (with some feudal enclaves) to democratic local self-government, based on free elections.

See P. T. R. Gurdon, *The Khasis* (1914). (F. G. B.)

KHASKOVO (Haskovo), a town and headquarters of an *okrug* of the same name in southern Bulgaria, is situated in the foothills of the northeastern Rhodope mountains, 79 km. (49 mi.) S.E. of Plovdiv. Pop. (1956) 38,812. It is a station on a branch line of the Belgrade-Sofia-Istanbul railway and is on the Sofia-Istanbul road. It has tobacco processing, dairy, flour and silk and cotton industries. Khaskovo has been much rebuilt since World War II. A mineral spa, with curative warm mineral springs and balneosanatoria, is situated 20 km. (12½ mi.) W. of the town.

Khaskovo Okrug (first-order administrative division) and economic region is a rich farming area, producing tobacco, cotton, sesame and aniseed. Vine growing and silkworm breeding are also well developed. (L. Di.)

KHAZARS, a people, probably Turkic-speaking, who played a role of some importance in the second half of the 1st millennium A.D. Although it is impossible to establish with exactitude the by no means unvarying limits of their empire, they can be placed approximately, in the second half of the 6th century, in the territory between the Sea of Azov, the Caspian sea and the Volga and Don rivers. The Caucasus constituted the southern limit of their expansion.

The Khazar empire was for many centuries an important turntable on the crossroads between Byzantium and the world of

Islam, between the forest peoples of the north and the nomadic empires of central Eurasia. It also exerted some influence on the destinies of the smaller peoples of the Caucasus region. In spite of the fact that the southern and western neighbours of the Khazars belonged to civilizations with a solid tradition of historical writing, knowledge of Khazar history is rather poor and, although some details emerge with sufficient clarity, the main trends remain relatively obscure.

The name Khazar first appears in the 6th century A.D., but there can be little doubt that the same people had previously existed under a different name. Some scholars would like to see in the Huns called Akatzir their direct ancestors. This theory, if warranted, would add another century to the span of Khazar history, for the Akatzirs are known from the middle of the 5th century. Unfortunately, however, knowledge of the Akatzirs themselves is very scanty, so that their identification with the Khazars, instead of shedding new light on the origin of this people, would simply push the problem back a century. The main argument for the identification of the two peoples is the similarity of their names, and geographical location is of little further help. The anonymous geographer of the *Ravenna Cosmography,* quoting Jordanes, suggests that the Akatzirs mentioned by him are in fact the Khazars. The Byzantine historians Theophanes and Nicephorus Patriarcha have the Khazars coming from Berzilia, which almost certainly means Dagestan; but according to the 10th-century Arab historian al-Masudi, Khazar was the Persian name for a people called by the Turks Sabir. This implies that the Khazars were in fact the direct descendants of the Sabirs. Of this people again, all that is really known is that from the middle of the 5th century they were living in central Russia in the neighbourhood of the Bulgars. The only way of reconciling the statements of the Ravenna geographer and al-Masudi is to consider the Akatzirs and the Sabirs as one and the same people; but this cannot be harmonized with the testimony of the 5th-century Byzantine historian Priscus, who quite clearly holds them to be distinct.

The first certain reference to the Khazars seems to be that found in the Syriac chronicle of Zachariah of Mytilene, which dates from the middle of the 6th century A.D. Although Persian sources of this date do not mention the Khazars by name, the Persians certainly had contact with them as early as the reign of Khosrau I (A.D. 531–579). It is very likely that at this epoch they formed part of the western Turkic empire. The Khazars really enter the orbit of western politics during the reign of the Byzantine emperor Heraclius (610–641). In this campaign against the Persians Heraclius secured the help of Khazar auxiliary troops, whose contribution proved to be decisive. The Khazar kaghan obtained as reward the hand of one of the emperor's daughters.

Toward the middle of the 7th century the Arab conquest reached the Transcaucasian territory and in 661 Arab armies penetrated to the north of the Caucasus, compelling the Khazars to abandon Derbent. This major defeat, which marked the beginning of a lengthy warfare between the expanding Arab forces and the Khazar empire, coincides with a westward expansion of the latter. It is difficult to know whether this was a deliberate move on the part of the Khazars to transfer the centre of gravity of their empire to safer regions; it is, however, certain that the Khazar power was not much affected by this first Arab offensive. Some years later, about 681, the Khazars were strong enough to take the initiative into their hands. Around 685 they carried their attacks south of the Caucasus: first Georgia, Armenia and the Caspian Albania, later, in 717, Azerbaijan were invaded. This campaign was followed in 721–722 by a Khazar attack against the Alani. These conquests brought the Khazars into the neighbourhood of the Arabs, and in 722 the two forces clashed on Armenian territory. The Khazars were victorious, but soon afterward the Arabs launched a counterattack. Having taken Balanjar, the first great Khazar city north of the Darial pass, they were even threatening the capital, Atil (on the mouth of the Volga), in 729; but in 730 the Khazars attacked again and their victorious army penetrated southward as far as Mosul. Though later Arab counterattacks compelled them to withdraw north of the Caucasus, the historical effects of their initial victories were of considerable importance. Thereafter the Caucasus remained the northern border of Arab expansion.

During all this time the Khazars remained in close touch with the Byzantine emperors. During his exile Justinian II stayed for several years with the Khazars, and in 704 he married the sister of the kaghan. Their apparent friendship soon deteriorated, however, and the Khazars, by supporting the revolt of the inhabitants of Kherson, played a considerable part in the fall of Justinian (711). In 732 Leo III the Isaurian married his son, the future Constantine V, to a Khazar princess called Tzitzakion (Turkish *chichek,* "flower"), who was then baptized Irene. At this time Khazar influence was considerable in the Byzantine court, and Constantine's son Leo IV bore the surname of "the Khazar."

In general it can be said that it was in the second half of the 8th century that the Khazar empire reached the acme of its glory. Its zone of direct influence extended from the northern shores of the Black sea and the Caspian to the Urals and the Volga beyond Kazan. The Alani and other peoples living to the north of the Caucasus between the mountain range and the Kuban river, the Hungarians who occupied probably the territory between the Don and Dnieper rivers, the Goths, and the Greek colonies of the Crimean peninsula all recognized the Khazars as their overlords, as did the Bulgars farther to the north, in the region of the middle Volga. The kaghan of the Khazars was also the suzerain of a number of Slavonic tribes centred chiefly around Kiev.

The second half of the 8th century saw the renewal of Khazar-Arab wars. In 786 or 787 the Goths of the Crimea were also attacked by the Khazars; and sometime during the same period there was a Khazar attack on Georgia.

During the 9th century the Khazars had to face a new and extremely powerful enemy: the Russians. In 965 the campaign led by Svyatoslav spelled the virtual end of Khazar might. In 1016 the Byzantine emperor Basil II joined with the Russians in an attack against the Khazars and occupied the Crimean colonies of this people and also the Taman peninsula. Around 1030 the Khazars ceased to play a political role on the northern shores of the Black sea, and their territories became subjected to Byzantium. Khazars are, however, still mentioned as late as the 12th century.

Khazar civilization shows a fairly complex texture, and their religious life raises more than one problem. Christianity, Islam, Judaism and some sort of "pagan" worship are all attested by sources. About 740 the Khazar ruler—and probably the greater part of the ruling classes—were converted to Judaism. The circumstances of the conversion remain obscure, the depth of the Jewish layer difficult to assess; the fact itself is, however, undisputed and unparalleled in the history of central Eurasia.

The story of this conversion of the Khazars had a considerable and lasting impact on the western world. The first to record it was Druthmar of Aquitaine (9th century), but the circumstances of the conversion are related in greater detail in various Hebrew documents such as the so-called "Khazar Correspondence." This consists in a letter (*c.* 955) from the Spanish Jew Hasdai ibn Shaprut to the Khazar king and in a reply (of contested authenticity) sent by Joseph, king of the Khazars. A short fragment from the Cairo Genizah, the so-called Cambridge Document, dating probably from the 12th century, gives an alternative account of the conversion. A Hebrew translation of an Arabic work on the Khazars, written *c.* 1140 by Judah Halevi, was published by J. Buxtorf in 1660, together with the "Khazar Correspondence." This book was instrumental in keeping alive interest in the Judaism of the Khazars, confirmed also by various Arab authors such as al-Istakhri, Ibn Rustah and al-Masudi.

Despite the relatively high level of Khazar civilization, and the wealth of material preserved in Byzantine and Arabic sources, not a single line of the Khazar language has come down. No inscriptions have so far been found. Single words, mostly proper names, embedded in Greek texts suggest that the Khazars spoke a Turkic language. It is very likely that several Turkic dialects, and possibly some other languages belonging to wholly different

(perhaps Finno-Ugrian?) stock were also in use within the Khazar empire.

Although probably basically Turkic, the Khazar state shows little resemblance to the other Turkic empires of central Eurasia. The organization of the state—with, at its head, a secluded supreme ruler of semireligious character, who wielded practically no power—is very different from the usual pattern. The military organization seems to lack the forcefulness of those of the greater Turkic-Mongol nomad empires. The Khazars also seem to have been more inclined to a sedentary way of life, tilling the soil and planting gardens and vineyards. Trade was among the main sources of income, and it is not too bold to surmise that the fall of the Khazar state was chiefly due to the Russians' seizing the chief trade routes of central Russia.

Extensive excavations brought to light the remains of the Khazar fortress Sarkel, on the lower Don, built in the 9th century with the help of Greek architects. This site, which clearly revealed the mixed character of Khazar civilization, unfortunately had to be inundated during the construction of the Volga-Don canal.

See M. I. Artamonov, *Istorija Khazar* (1962) and "Trudy Volgo-Donskoi arkheologicheskoi ekspeditsii," in *Materialy i issledovanya po arkheologii S.S.S.R.*, 65 and 75 (1958–59); D. M. Dunlop, *The History of the Jewish Khazars* (1954), with full bibliography. (Ds. Sr.)

KHEDIVE, a Persian word meaning "lord" or "prince." It was granted as a title by the sultan of Turkey to the hereditary pasha of Egypt, Ismail, in 1867, and was used by his successors, Tewfik and Abbas II Hilmi, until 1914. The khedivial dynasty was Albanian in origin but was considered Turkish by Egyptians; their rule was a period of Europeanization. (A. D. A.)

KHERI, a town area and district in the Lucknow division of Uttar Pradesh, India. The town lies 73 mi. N. of Lucknow on the North-Eastern railway. Pop. (1961) 10,210. The main industry is the manufacture of sugar.

Kheri District (area 2,972 sq.mi.; pop. [1961] 1,258,433) is one of the largest districts of Uttar Pradesh. It is situated along the border line which separates India from Nepal, with the Mohan river on its north. It consists of a series of fairly high plateaus dissected by rivers flowing from the northwest, each bordered by alluvial soil. There are several large lakes, some formed by the ancient channels of the northern rivers, fringed in places with magnificent groves. In the north are extensive forests mainly of sal trees. The vegetation is dense toward the eastern border where stagnant water makes the climate unhealthy. The main crops are rice, wheat and gram. The Tharu tribal population in the border villages are known for their folk songs and dances. The municipalities of Gola Gokarannath (15,231) and Lakhimpur (32,285) are the other towns in the district. The latter, 3 mi. N. of Kheri and virtually contiguous with it, has a degree-granting college affiliated to Agra university. (B. Si.)

KHERSON, an *oblast* in the Ukrainian Soviet Socialist Republic of the U.S.S.R., was formed in 1944 and covers an area of 10,463 sq.mi. It lies across the lower Dnieper and along the shores of the Black sea, Sivash and Sea of Azov. It comprises a level plain of Tertiary rocks with almost no surface water apart from the Dnieper and with extensive sands, often forming bare dunes. In the north is the large Kakhovka reservoir on the Dnieper, completed in 1956. The Askania-Nova Nature reserve, used for scientific research, is located in southern Kherson. The climate is dry, with only 12–14 in. of rain a year, and although much of the *oblast* is under the plow to wheat, maize (corn) and sunflowers, agriculture suffers severely from drought. An irrigation canal system from Kakhovka to the Crimea was under construction in the 1960s. The population, the least dense in the Ukraine, numbered 824,167 (1959 census), of whom 333,119 (40%) were urban and 491,048 rural. (R. A. F.)

KHERSON, a town and seaport and the administrative centre of Kherson *oblast* of the Ukrainian Soviet Socialist Republic of the U.S.S.R., stands on the right bank of the lower Dnieper, 15½ mi. from its mouth. Pop. (1959) 157,995. It was founded by G. A. Potemkin in 1778 as a fortress to protect the newly acquired Black sea frontage of Russia. Its name was derived from the supposition that it was on the site of the ancient Greek colony of Tauric, or Heracleotic, Chersonese (more probably Sevastopol). In 1803 it became the seat of a government (province). Its importance as a port dates only from 1901 when the Rvach, a distributary of the Dnieper, was dredged, but the cascade of barrages on the Dnieper built in Soviet times has greatly increased its trade, especially in petroleum from the Caucasus area. The navigation season lasts from early March to late December. There are shipyards building fishing craft, river vessels and dredgers, and making reinforced concrete docks. Kherson is noted for its jam industry, with which is associated a glass jar factory. A cotton textile mill there is the largest in the Ukraine. Engineering is important, manufacturing agricultural machinery, wind generators and diesel engines. Power is obtained from the Kakhovka barrage, 67 km. (42 mi.) upstream. Kherson lies on the Nikolayev-Crimea railway, while another line runs to Dnepropetrovsk and Kharkov. In Kherson are agricultural and pedagogic institutes and a scientific research institute of irrigation agriculture. (R. A. F.)

KHEVENHÜLLER, LUDWIG ANDREAS (1683–1744), Austrian field marshal and writer of military manuals, was the scion of an Austrian noble family which from the 16th to the 20th century provided the Habsburg monarchy with a number of efficient administrators, generals and statesmen. He first saw active service under Prince Eugene in the War of the Spanish Succession (1701–13) and had risen by 1716 to command Eugene's own regiment of dragoons. He was conspicuous at the battles of Peterwardein and Belgrade, became a major general of cavalry in 1723 and a lieutenant field marshal in 1733. In the War of the Polish Succession (1734–35) he was present at a number of engagements and for a time commanded the army in Italy. In 1737 he became a field marshal and, in September, distinguished himself in the Turkish war at Radujevac. Early in the War of the Austrian Succession he commanded the army of the Danube and operated with great success against the French and Bavarians, overrunning Bavaria and capturing Munich (1742). Khevenhüller was the author of a number of military textbooks, in fact a pioneer of the type of technical handbook for regimental officers and soldiers later used in most armies. He died suddenly in Vienna on Jan. 26, 1744. (C. N. B.)

KHEVSUR, an ethnic group of Transcaucasia; they numbered 6,500 in 1897, but there were no more recent population data concerning them in the 1960s. They speak one of the eastern dialects of the Georgian family and live in the northeastern mountainous region of the Georgian Soviet Socialist Republic along the Aragvi and Argun rivers. Isolated by their mountain habitat, they have tended to remain distinct in language and culture from the main body of Georgians; but they are closely related to the neighbouring Pshav and Tush peoples with whom they form a separate class in the Georgian culture area. As is common in the Caucasus, Khevsur social organization is patrilineal, and they are divided into patriclans. Public affairs are conducted by village elders, family affairs by the patriarch. Nevertheless, women have relative freedom and enjoy similar private rights as the men.

Khevsur religion combined Christian and pre-Christian elements in the 1960s. Both the Khevsur and Pshav had *kadagi* (fortune-tellers and clairvoyants) who foretold the future in a state of trance. Christian priests, the formal religious leaders of the villages, often worked together with the diviners. Each clan and village had a *khati* (temple) where group sacrifices were led by the priest. For lying-in, women were isolated near the settlements in small stone hovels by both the Khevsur and Pshav. Distinctive richly embroidered Khevsur costumes feature shirts of dark, heavy wool for both sexes; elsewhere in the Caucasus male costumes are not embroidered. In addition to maintaining small mountain farms, the Khevsur breed cattle.

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KHIDR, AL- (contraction of al-Khadir, "the green one"), a legendary figure in Islam who developed, in folk religion, into

a favourite saint, especially with sailors and Sufis (mystics). The origin of the cycle of myths and stories that have gathered around this figure and endowed him with immortal life is a vague narrative in the Koran (xviii, 60–82), which takes Moses and his servant on a long and arduous journey to the "meeting of the two seas," in the course of which they lose a fish which had accompanied them and then meet a "man of God" who performs outrageous deeds but gives them satisfactory explanation. Modern scholars detect in the koranic original a strand from the Babylonian epic of Gilgamesh (*q.v.*), who goes in search of an ancestor endowed with eternal life; another, from the *Romance of Alexander,* whose cook discovers for him the fountain of life; and a third, from the Jewish legend of Elijah, one of the few who never tasted death. Arab commentators elaborated and embellished the koranic story and named the "man of God" Khidr, claiming that as he dived into the spring of life he turned green. The Khidr story soon enjoyed widespread popularity—despite orthodox Islamic opposition —among Arabs, Turks, Persians and other Muslim communities. What gave the cult easy vogue was the consideration of the saint as a still-living being, with ability to assume local characteristics. In Syria he became partially identified with St. George, whom a local tradition makes of Syrian nativity; in Bengal, with a water deity specializing in the protection of mariners and river travelers; and in Sufi circles, with their founders, who were often endowed with holiness and sainthood. (P. K. H.)

KHINGAN MOUNTAINS (Ta-hsing-an-ling Shan-mo), a mountain system of northeast China, extending about 700 mi. from the great bend of the Amur river south to the upper reaches of the Liao river. The width of this mountain system, known also as the Greater Khingan range, varies from 80 mi. in the south to 200 mi. in the north. The highest elevation is an unnamed summit at 44° 30′ N., 118° 40′ E., reaching 6,673 ft. The Greater Khingan is a tilted fault block, trending north-northeast by south-southwest and forming the easternmost bastion of the Mongolian plateaus, which lie at an altitude of 3,000 ft. at the base of the gradual western slope of the mountain system. To the east the ranges fall more rapidly to the plains of central Manchuria, whose undulations are partly caused by projecting spurs from the Greater Khingan. The mountain system forms an important orographic divide in Asia, for it intercepts the moisture-laden southeasterly winds and is thus a factor in the contrast between fertile Manchuria, on one hand, and arid Mongolia, on the other.

The Greater Khingan is crossed by two railroad lines, and settlement has proceeded mainly along their rights of way. The main line, in the north, is the historic Chinese Eastern railroad, which crosses the mountains between Tsitsihar and Hailar. Lumber railroads penetrate into the rich timber stands of the Greater Khingan, especially in the newly developed Tuliho area. The southern railroad is a branch of the Manchurian rail net and goes through the regional centre of Ulan Hoto to the hot springs resort of Arshan.

The Greater Khingan has not been thoroughly explored, and vast sections, particularly in the northernmost portion, are virtually unknown. The mountains have a sparse population, consisting mainly of Mongols. Under the Chinese Communist regime the Greater Khingan has, therefore, become a part of China's Inner Mongolian Autonomous Region. Other population groups include the Chinese, who are employed in the lumber industry along the Chinese Eastern railroad; the Evenki and Orochon, two Tungus hunting peoples; and the Daurs, who are related to the Mongols and the Tungus.

The Little or Lesser Khingan range (Hsiao-hsing-an-ling) is connected with the Greater Khingan by the Ilkhuri range (I-li-hu-li Shan) and extends for about 375 mi. along the Chinese right bank of the Amur river. Except for an active lumber industry at Ichun, the Lesser Khingan is little developed. The name Little Khingan (Malyy Khingan) is also applied to mountains in the Bureya-Amur watershed of the Soviet Union, especially in the Jewish Autonomous Oblast (Birobidzhan). (T. Sd.)

KHITAN (Ch'i-tan, K'itan, Kitai), an Ural-Altaic people, probably Tungus in origin, formed the Chinese Liao dynasty (907–1125), which ruled over north China, Outer and Inner Mongolia and the country of their origin, Manchuria. In China the Khitan ruled through a Chinese bureaucracy; on the steppes they continued tribal life and controlled other tribes through fortified garrisons. Their dynasty was defeated by rival nomads, the Jurchen (Juchen). The so-called Kara-Khitai or western Liao ruled in Turkistan until defeated by Genghis Khan (*q.v.*) in 1218. *See* also Chinese Architecture: *The Pagoda: The Barbarian Empires;* as well as historical sections in Peking; Manchuria; Kashgar.

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KHIVA, a town in the Khorezm *oblast* of the Uzbek Soviet Socialist Republic, U.S.S.R. It is also the name given by the Russians and some western historians to the khanate or feudal kingdom that occupied the Khorezm oasis from the 16th century onward. For the history of this kingdom *see* Khorezm.

The town of Khiva is situated to the west of the Amu-Darya (Oxus) on an oasis near the Kara-Kum desert 32 km. (20 mi.) S.W. of the railway station of Urgench on the Chardzhou-Kungrad railway. The old city is of great antiquity, being mentioned as a town by the 10th-century Arab geographers al-Istakhri and al-Maqdisi. It was the capital of the khanate until 1920. The architectural remains are of great interest. The ancient city, Kuni Arq (old citadel), was rectangular walled, with four gates. In the middle of the 19th century the adjoining suburbs were embraced by the building of outer walls with ten gates. The old city was then called the Ishan Qal'eh (inner part) and the newly added portion Dishan Qal'eh (outer part). The Ishan Qal'eh is now preserved as an ancient monument.

In Khiva there are a school of mechanized agriculture, a railway institute, an agricultural college and institutes for pedagogy (one for men and one for women), land reclamation and medicine. There is also a historicorevolutionary museum, formerly the palace of the khans. The chief industries are cotton spinning and brickmaking, and old crafts, such as carpetmaking, embroidery and woodworking, survive. (G. E. Wr.)

KHMELNITSKI, an *oblast* and town of the Ukrainian Soviet Socialist Republic, U.S.S.R. The town and *oblast* centre was until 1954 known as Proskurov and the *oblast* as Kamenets-Podolskaya.

The *oblast,* formed in 1937, covers an area of 7,992 sq.mi. It stretches from the Dniester in the south across the Volyno-Podolsk upland. The upland is greatly cut up by small streams, including the headwaters of the Southern Bug, and by innumerable erosion gullies. The soil is fertile chernozem, overlying friable loess and loesslike deposits, highly susceptible to erosion when the vegetation cover is removed. The vegetation is of the forest-steppe type, an alternation of open grass steppe and groves of oak and hornbeam, with a little beech. Almost all the original steppe and much of the original forest is now under the plow. The population of the *oblast* in the 1959 census numbered 1,608,407 and was overwhelmingly rural in character, 1,281,130 or 80% as against 327,277 urban dwellers. The largest of the nine towns, apart from Khmelnitski, is Kamenets-Podolski (pop. [1956 est.] 33,000). The *oblast* is a rich agricultural area in the heart of the major sugar-beet growing region of the U.S.S.R., and there are many sugar refineries. Winter wheat and maize (corn) are the chief grains, while sunflowers, vegetables and tobacco are also important. The area is noted for its dairy cattle and pigs and for its orchards. The Dniester flood plain is especially important for dairy farming.

The town of Khmelnitski dates from the 15th century. It stands on the right bank of the upper Southern Bug 170 mi. W.S.W. of Kiev at the junction of the Odessa-Lvov and Chernovtsy-Korosten railways. Pop. (1959) 62,473. In 1940 the administration of the *oblast* was transferred there from Kamenets-Podolski, and the town was occupied by the Germans (1941–43) during World War II. Its main industries are concerned with processing agricultural products and with meeting local demand for such consumer goods as clothing. There is a machine-tool factory. (R. A. F.)

KHMER, an ethnic term for Cambodian, still in use among the inhabitants of the country and apparently of native origin.

The more familiar term Cambodian, which, in various forms, has been used in European languages since the 16th century A.D., derives from a form *kambuja-desa*, "land of the lineage of Kambu," the eponymous legendary founder of the Cambodian royal line. The great sage Kambu fathered this line, according to Khmer tradition, upon the celestial nymph Mera, a name which may have been fabricated to provide an etymology for the word Khmer. This tradition may derive from a Pallava source in India. In southeast Asia the terms *kambuja* and *kambuja-desa* were first employed by Sanskrit-using kings or by their scribes. There is reason to think that the term *srok kok thlok*, "land of the *thlok* tree," may have preceded *srok khmer*, "land of the Khmer," as a designation for the country known in the west as Cambodia. Cham evidence, confirming the usage *kambuja-desa*, also points to a form *kvir* as well as *khmer*. Arab travelers of the 9th and 10th centuries A.D. used *k.m.r* with various medial vowels to designate this country, while Chinese sources may sometimes have referred to it under the term *k'un-lun*, which is also of much wider usage. If this is so, a further variant *k.r.m* must be postulated, unless this form is to be explained as a metathesis, or transposition. *See* also CAMBODIA; INDIAN ARCHITECTURE.

(A. H. CE.)

KHOI (KHUI), a city and district in the *ostan* (province) of West Azerbaijan, in northwestern Iran, between Lake Rezaiyeh and the Aras river, 91 mi. N.W. of Tabriz on the great trade route into Anatolia and Trabzon (Trebizond). Pop. (1964 est.) 49,146. It is one of the best-laid-out cities of Iran, with cool streams and lines of willows along broad and regular streets. There are several mosques, an extensive brick-built bazaar, a fine caravansary and gardens. Khoi is a lively centre of local and transit trade. Because of its position between Russia and Turkey, it has been of considerable strategic importance, and in the early 19th century it was surrounded by strong fortifications, under the direction of French engineers. The fortress was attacked by the Russians in 1827 but was successfully defended. Following the treaty of Turkmanchai, 1828 (which defined the Russian-Persian frontier), it was held by a Russian garrison as a guarantee for the payment of the war indemnity. During the Crimean War and the Russo-Turkish War (1877–78), Persian troops were stationed there at the request of Russia. In 1911 it was occupied by Turkish troops and later by the Russians, who withdrew in 1917. It was occupied by Soviet troops during World War II and until 1946. The fortifications have been demolished.

KHOI DISTRICT consists of a plain 25 mi. long and 8–15 mi. broad, well drained and highly cultivated under irrigation. It contains many flourishing villages and produces rich crops of wheat, barley, rice, cotton, tobacco and many kinds of fruit. The surrounding hills are treeless, and planted poplars are used for timber.

(H. BO.)

KHOISAN, a synthetic name originally devised to designate the racial grouping to which the Bushmen and Hottentots (*see* BUSHMAN; HOTTENTOT) of southwestern Africa belong, but also used with reference to their language and culture. "Khoi-san" is a compound of the initial syllable of the name *Khoi-khoin* ("men of men"), by which the Hottentots call themselves, and the first syllable of *San-qua* ("San people"), the name by which the Hottentots call the Bushmen, who have no collective name for themselves. Properly, Khoisan refers to these two groups, who are culturally, linguistically and physically related, while differing markedly from their Bantu neighbours in all three respects.

They have yellowish wrinkled skins, enlarged *labia minora* ("Hottentot apron") and steatopygia in females, and are short but not pygmy in stature. Bushmen average 62 in. and Hottentots 64 in. in height. The somewhat greater height, prognathism and narrower heads of the Hottentots, sometimes attributed to interbreeding with other African groups at an early date, are their chief points of difference in physical type.

Khoisan languages, whose unity has long been recognized, are characterized by sex gender, semantic tone, prepositional genitives and monosyllabic roots. Their most striking features are the implosive consonants or clicks (*q.v.*), of which Bushman and Hottentot each has four: lateral, dental, alveolar and palatoalveolar. Similar click consonants are also present among the Bantu-speaking Nguni and Sotho of southeastern Africa but as the result of contact rather than common origin. J. H. Greenberg's click language family includes Khoisan and two related languages in Tanganyika: Hatsa (Hadzapi) and Sandawe. (*See* AFRICAN LANGUAGES: *The Click Family;* BUSHMAN LANGUAGES.) The Sandawe (*q.v.*), who practise farming, are similar to the Khoisan peoples in physical type, as well as language, but differ in culture.

Culturally the Hottentots are distinguished by a sense of ethnic unity, a more complex social and political organization and by their herds of cattle from the Bushmen, who were nomadic hunters with the dog as their only domesticated animal. Neither group practised agriculture, on which the economies of most African societies are founded, or weaving. Ironworking has disappeared among the Hottentots, who practised it at the time of first European contact, and it was unknown among the Bushmen. Pottery making, which has also been abandoned, was confined to the Hottentots and a few southern Bushmen groups. Despite some differences, the Khoisan people were discussed by I. Schapera as a single cultural unit, and the Khoisan area is included in the culture areas of Africa outlined by M. J. Herskovits. The Bergdama (*q.v.*) who have been assimilated to the Nama Hottentots have adopted Khoisan language and culture, but differ in racial type.

The origin of the Khoisan peoples is uncertain. An estimated 15,000 Hottentots lived in South-West Africa in 1926, but few have survived in the Republic of South Africa except as mixed breeds in the Cape Coloureds population. The Bushmen have also declined in numbers; the evidence suggests that they were once spread over most of eastern, central and southern Africa. In the 1960s their number in South-West Africa, Bechuanaland and Angola was estimated at 50,000.

See also AFRICA: *Ethnography (Anthropology): Southern Africa.*

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(WI. B.)

KHOMYAKOV, ALEKSEI STEPANOVICH (1804–1860), Russian philosopher and lay theologian, the most original, powerful and many-sided of the Russian Slavophil writers, was born on May 13 (new style; May 1, old style), 1804, in Moscow, of an aristocratic and wealthy family. He received a good education, first at home, then at the University of Moscow, where he concentrated on mathematics and natural sciences. Promoted an officer in the imperial guard, he lived for six years in St. Petersburg, taking an active part in the intellectual and social life of the capital, writing poetry and discussing German philosophy. During this period he spent 18 months in Paris (1825) and a year in the Balkans with the Russian army fighting the Turks. In 1830 Khomyakov left the military service, and after that his life was divided between his estates of Bogucharovo and Lipitzy and the intellectual *salons* of Moscow.

It was a time of intellectual awakening in Russia, of intense philosophical and religious discussion, and Khomyakov became one of the most prominent protagonists. In 1836 he married Katerina Jazykova, who gave him three children and a perfectly happy family life. He took great care of his estates, always trying to improve the social conditions of life for his peasants, and studying medicine and agriculture in order to assist them. He freed the majority of his own serfs and advocated the abolition of serfdom in Russia. While in Moscow he was the recognized leader of the Slavophils (*q.v.*), a movement which, in opposition to the westernizers, defended the originality of Russian culture and religion against the rationalism of western European civilization.

Khomyakov, although a layman, was well read in Orthodox theology and the Fathers of the Church and was deeply attached to the traditional forms of Eastern Orthodoxy. In articles and essays he supported the Orthodox concept of the church, as a spiritual organism of love and truth, against Roman Catholicism and Protestantism. He also fought the influence of Hegel in Russian philosophy and the beginnings of philosophical materialism. His original theological ideas, however, were looked at with suspicion by representatives of the official church, and it was not

until after his sudden death, on Oct. 5 (N.S., Sept. 23, O.S.), 1860, that he won recognition as a great teacher of Orthodoxy.

A fighter by nature and temperament, Khomyakov was indifferent to the publication of his works. His theological essays, of which the most important is *The Church Is One,* were first published in French in Paris and Lausanne. His collected poems appeared in 1861, and his other writings between 1861 and 1872. Finally a complete and critical edition of all his writings was published by his son, in eight volumes (1900).

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KHOND (KOND, KANDH, KONDH), a tribe in the hills and jungles of Orissa state, India, mainly in the districts of Phulbani, Koraput and Kalahandi. Their numbers in 1960 were estimated at 700,000, making them the largest tribe in Orissa. Their language, Kui, and its southern dialect Kuwi, are Dravidian (*see* DRAVIDIAN). Most Khonds are now rice cultivators, but there are still groups, for instance the Kuttia Khonds of Phulbani, who practise slash-and-burn agriculture in the forest, raising a crop in the ashes.

The country was pacified between 1836 and 1850, when annual punitive expeditions, known as the Meriah wars, were made from the Orissa coast to suppress the Khond rite of human sacrifice. From about 1850 the country was administered as an agency and attempts were made to limit exploitation by traders and adventurers from the plains. In the Republic of India, Khonds, as a scheduled tribe, qualify for privileges in education and employment.

The Khonds have been in contact for many centuries with Oriya-speaking neighbours to the west, north and east, and Telugu-speakers to the south. By degrees they have taken on the language and customs of their more advanced neighbours. In such places as the Baudh plains there are Khonds who speak only Oriya: farther into the hills the Khonds are bilingual: in the remoter jungles Kui alone is spoken. There is an analogous gradation in the practice of Hindu customs concerning caste and untouchability, and in the knowledge of the Hindu pantheon. The advance of Oriya culture has been accelerated by the many traders who settled in the hills after 1850, and the process of acculturation was progressing rapidly in the 1960s as a result of the welfare and development activities of the government of Orissa (*see* ORISSA).

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KHOREZM (KHWARIZM), formerly the name of a great kingdom dating from the 6th century B.C., is now an *oblast* (Khorezmskaya *oblast,* established 1938) in the Uzbek Soviet Socialist Republic of the U.S.S.R.

The *oblast* lies in the Khorezm (or Khiva) oasis on the left bank of the Amu-Dar'ya and covers an area of 1,737 sq.mi. Its population in 1959 was 380,583 (83% rural and 90% Uzbek). Urgench (*q.v.;* pop. [1959] 43,756), the capital, is about 208 km. (129 mi.) from the Aral sea, and the other important town is Khiva (*q.v.*). The climate is sharply continental and dry; there is very little atmospheric precipitation and much evaporation. In the west and southwest, where it borders on the Kara-Kum desert, the *oblast* is covered by sands. The only big river is the lower Amu-Dar'ya (*q.v.*), whose banks there are very low and are walled to prevent flooding. The soil consists chiefly of alluvial deposit from the Amu-Dar'ya and often contains salt. Much of the vegetation is cultivated, the original flora being preserved in the water meadows along the river and in the sand-covered areas. Poplar and willow are among the chief trees, and the saxaul is used for the stabilization of the desert soils. Among the animals there are species of wildcat and jerboa. Many of the fish in the Amu-Dar'ya have commercial value.

The *oblast* is one of the principal cotton-growing regions in Uzbekistan; there is also cultivation of silkworms and stock breeding (karakul sheep, cattle, camels). The construction of the Chardzhou-Kungrad railway through Khorezm in the 1950s has improved the region's economic prospects by linking it to the Trans-Caspian Railway system.

The Khorezm kingdom extended across the Khorezm oasis, which is now divided between Khorezm *oblast,* the Kara-Kalpak Autonomous Soviet Socialist Republic and the Tashauz *oblast* of the Turkmen Soviet Socialist Republic. The earliest references to Khorezm are in the Bisitun (*q.v.*) inscriptions (*c.* 600 B.C., when as Chorasmia it was part of the Achaemenid empire) and in the Avesta (sacred texts and interpretations of Zoroaster). The name is derived from the Persian *Khur,* "the sun," and the kingdom has provided one of the most ancient relics of highly developed cultivation. Archaeological finds have enabled much of the artificial irrigation system and the ancient civilization of the Khorezm oasis to be reconstructed. Apart from this little is known of its history until its seizure by the Arabs in A.D. 680. When the power of the caliphs declined, the governor of the province probably became independent; but the first known ruler is Mamun ibn Mohammed in 995. Khorezm fell under the power of Mahmud of Ghazni in 1017, and subsequently under that of the Seljuk Turks. In 1097 the governor Qutb ud-Din Aibak assumed the title of king, and one of his descendants, Ala ud-Din Muhammad, conquered Persia and was the greatest prince in central Asia until Genghis Khan appeared in 1219, after which Khorezm was included in the Golden Horde. Khiva was conquered again by Timur in 1379 and by the Uzbeks in 1512.

Russia established relations with Khorezm in the 17th century. The Cossacks of the Yaik (the ancient name of the Ural river) during their raids across the Caspian learned of the existence of this rich territory and made more than one plundering expedition to the chief town, Urgench. In 1717 Peter I the Great, having heard of the presence of gold-bearing sand in the bed of the Amu-Dar'ya (Oxus), desiring also to "open mercantile relations with India through Turan" and to release from slavery some Russian subjects, sent a military force to Khorezm, or Khiva as it was thereafter called by the Russians. When within 100 mi. of the capital, they encountered the troops of the khan. The battle lasted three days and ended in a Russian victory. The Khivans, however, induced the victors to break up their army into small detachments and treacherously annihilated them in detail. It was not until the third decade of the 19th century that the attention of the Muscovite government was again directed to the khanate. In 1839 a force under Gen. V. A. Perovski moved from Orenburg across the Ust-Urt plateau to the Khivan frontier to occupy the khanate, liberate the captives and open the way for trade. This expedition likewise terminated in disaster. In 1847 the Russians founded a fort at the mouth of the Syr-Dar'ya. This advance deprived the Khivans not only of territory but of a large number of tax-paying subjects, and also gave the Russians a base for further operations. For the next few years, however, the attention of the Russians was taken up with Kokand, their operations on that side culminating in the capture of Tashkent in 1865. Free in this quarter, they directed their attention once more against Khiva. In 1869 Krasnovodsk (*q.v.*) on the eastern shore of the Caspian was founded, and in 1871–72 the country leading to Khiva from different parts of Russian Turkistan was thoroughly explored and surveyed. In 1873 an expedition to Khiva was carefully organized on a large scale. The army of 10,000 men placed at the disposal of Gen. K. P. Kaufmann started from three different bases of operation—Krasnovodsk, Orenburg and Tashkent. Khiva was occupied almost without opposition. All the territory (35,700 sq.mi. and 110,000 people) on the right bank of the Amu-Dar'ya was annexed to Russia, while a heavy war indemnity was imposed upon the khanate. In the summer of 1919 the Soviet government firmly established itself in this area, and the native dynasty was expelled. By autumn the khan of Khiva was deposed and a people's soviet republic was substituted for the khanate. The remaining sections of Russian Turkistan with Khiva and Bukhara and the Transcaspian province now constitute the

Uzbek and Turkmen Soviet Socialist Republics. In Oct. 1924 these two republics were admitted to membership of the U.S.S.R. (G. E. Wr.)

KHOROG, the capital of the Gorno-Badakhshan autonomous *oblast* in the Tadzhik Soviet Socialist Republic of the U.S.S.R. Pop. (1959) 8,000. Located in the southwestern Pamirs at an altitude of 2,200 m. (7,218 ft.), Khorog lies on the Gunt river 216 km. (134 mi.) from the railway at Dushanbe (formerly Stalinabad). It is connected by metaled road and by air with Dushanbe and Osh. There is a hydroelectric station on the Gunt. Khorog has various small factories, a theatre, a library and a teachers training college, and the Pamir botanical garden and research station is nearby. (G. E. Wr.)

KHORRAMABAD (Khurramabad), a city in western Iran, chief town of the general governorship of Luristan (Lorestan), is situated 90 mi. S. of Hamadan. It commands a river gap in the Luristan mountains which is used by the main road from Khuzistan to the highland plateau via Dezful and Borujerd. Pop. (1956) 38,806, compared with 8,500 at the beginning of the 20th century. A thriving town and the main summer market of the still nomadic Lur tribes (Dezful being their principal winter market), it has lively bazaars and a strong garrison. On a ridge between town and river stand the ruins of Dez-i-Siyah ("black castle"), the former seat of the governors, which was built in the 10th century by a Kurdish chieftain. (H. Bo.)

KHORRAMSHAHR (formerly Mohammerah), a city and port in southwestern Iran, in the Khuzistan (Khuzestan) *ostan* (province), is situated on the right bank of the Karun river (*q.v.*), where it enters the Shatt al Arab, 65 mi. from the Persian gulf. Pop. (1956) 43,840, compared with about 5,000 in the early 20th century. It is an important commercial port. The port's facilities were much improved during World War II, when it was connected with the Trans-Iranian railway by a branch line to Ahvaz (76 mi.). It is also connected by road to Ahvaz, and to the oil centre on Abadan (*q.v.*) Island with the help of a ferry. It handles about 200,000 tons of imports and 100,000 tons of exports annually, and its capacity was extended under the second seven-year plan (1955–62). The climate is hot and often oppressively humid. The town has substantial buildings, and there is extensive date-palm cultivation.

Although in the middle ages a town named Bayan seems to have existed in the vicinity, the modern town came into prominence in 1837, when it was attacked and demolished by the Turks because it was diverting trade from Basra. The British and Russians intervened, and by the treaty of Erzurum (1847), Mohammerah, its anchorage and Abadan Island were allocated to Persia. This agreement was complicated by the fact that the Karun had changed its course to westward to join the Shatt al Arab at Mohammerah, thus depriving Persia of direct access to the gulf. Although nominally under Persian administration, Mohammerah was in practice ruled by the sheikh of the Muhaisin tribe of Shi'ah Arabs until 1924, when Reza Khan brought it under the control of the central government and its name was changed to Khorramshahr. (H. Bo.)

KHOSRAU (Arabic Kisra; Gr. Chosroes), "the famous"; an often used Persian name, notably of two Sasanian kings of Iran:

Khosrau I Anushirvan ("of the Immortal Spirit"), son of Kavadh I, reigned A.D. 531–579. Restorer with his father of the power of the Sasanian monarchy, his justice and magnificence became proverbial in the east. Having acceded he executed his rebellious brothers Kaus and Zham and completed the extermination of the heretical Mazdakites. Confusion due to Mazdakite doctrines he remedied by social legislation (*see* Mazdakism). The celebrated tax reforms of Anushirvan (represented by al-Tabari as a substitution of fixed assessment for crop sharing as the basis of land revenue) were with few dissentients acclaimed profitable to subjects and exchequer alike. The "indefinite peace" concluded with Justinian in A.D. 532 was abrogated in 540 when Khosrau—alarmed at Byzantine triumphs in Italy—invaded Syria and captured Antioch, taking captives and booty. Later his forces campaigned against the Byzantines in Lazica (ancient Colchis) and Mesopotamia. Meanwhile the Turks made their first appearance in history, attacking the Hephthalites in Khurasan. By timely alliance with the Turkish king Silzibul (Sinjibu) Khosrau crushed the Hephthalite survivors (557), freeing his eastern frontier from long-standing danger and annexing Bactria. The Yemenite Arabs he supported against the Ethiopians, whose expulsion by his governor Wahriz gave him overlordship of the Yemen. In new fighting against Byzantium the Persians in 573 captured Dar'a, a stronghold facing Nisibin (Nusaybin), and raided Syria and Cappadocia. Wartime captives were settled near Ctesiphon, where Anushirvan's palace became famous as the *Taq-i Kisra.* Peace negotiations were still pending when, in the early spring of 579, Khosrau died. In the Bibliothèque Nationale in Paris a jeweled dish with crystal representation of a king enthroned is believed to portray Anushirvan.

Khosrau II Parvez ("the Victorious"), son of Ormizd IV and grandson of Khosrau I, reigned from 590 to 628, being raised to the throne during the rebellion of Bahram Chobin (*q.v.*) against Ormizd, whose murder followed his deposition. Khosrau, powerless against Bahram, fled to Syria and gained support from the emperor Maurice. With Byzantine escort he recrossed the frontier early in 591 and drove out Bahram. The chronicler Evagrius describes thank offerings of Khosrau to the church of St. Sergius of Resafa, sent at the instance of his Christian consort Shirin, a figure celebrated in legend. There was peace between Byzantium and Iran until Maurice was murdered by Phocas in 602. Khosrau then invaded Anatolia and Syria to avenge his death. In 608 his armies, threatening Constantinople, reached Chalcedon on the Bosporus. In 614, under the general Shahrvaraz, having taken Damascus they stormed Jerusalem and seized the True Cross. Alexandria too was captured (616), papyrus fragments attesting a ten-year Persian administration of Egypt. Not till 622 could the new emperor Heraclius (*q.v.*) assume the offensive in a brilliant series of expeditions carrying him into the heart of Media. In 626, however, Shahrvaraz again reached Chalcedon, but he failed to cross the straits and take Constantinople. Finally, in 627, Heraclius defeated the Persians at Nineveh, and in 628 captured the royal residence of Dastagerd. Thence Khosrau fled to Ctesiphon. He was deposed in favour of his son Kavadh II, and four days later was murdered in prison (628). During his reign Khosrau had amassed fabulous treasures but his ferocity and avarice alienated his supporters. Two life-sized sculptures of him exist at Taq-i Bustan near Kermanshah, one showing him enthroned, the other in battle armour mounted on his charger Shabdiz. (A. D. H. B.)

KHOTAN (Ho-t'ien), town in the Sinkiang Uigur Autonomous Region, China, on the southern margin of the Tarim basin, 270 mi. S.E. of Kashgar (Su-fu). Khotan is the centre of an oasis, which also comprises the nearby towns of Yurung Kash, Bazar to the east and Kara Kash (Mo-yü) to the northwest. The oasis is watered by the Yurung Kash and Kara Kash rivers, which descend from the Kunlun mountains and unite to form the Khotan river. This river disappears in the sands of the Takla Makan desert, except during the high-water season of July–September, when it may reach the Tarim river.

Khotan was a relatively weak state in the time of the early Han dynasty, but, in the latter part of the 1st century A.D., when China was energetically establishing control over the Tarim basin, its geographical position as the largest oasis and best supply base on the more southerly of the two chief routes to the west, and as a connecting link between central Asia and India, gave it great importance. Conquered by the famous general Pan Chao in A.D. 70, it was held by China during the later Han dynasty and again under the T'angs in the 7th century, when it was one of the four garrison centres from which the Tarim basin was then administered. In the following century it was conquered by the Arabs from Western Turkistan, and in the 10th it was annexed by Kashgar. Genghis Khan captured it in the 13th century, and later it was included in the Mongol Central Asian khanate (Jagatai). During this period Marco Polo passed through it (1274) and noted its agricultural wealth, especially cotton, its commercial importance and the unwarlike character of its inhabitants. Later it became one of the chief centres of Islamic activity in Chinese cen-

tral Asia and played a prominent part in the Muslim revolt against Chinese authority (1864–75) and that of Yakub Beg of Kashgar a year or two later.

The surrender of Kashgar and Khotan to the famous "agricultural army" in 1878 marked the final stage in the reassertion of Chinese authority, and Khotan was included in the province of Sinkiang, of which it became one of the chief centres.

The oasis is of outstanding agricultural importance. The staple cereals are wheat, rice, oats, millet and, above all, Indian corn. The early harvest of the spring-sown crops and the abundant water supply in summer permit of its being grown everywhere as a second crop. The cotton crop is also of great value, and good fodder crops of lucerne are grown. So, too, are great quantities of olives and fruits. The cultivation of the mulberry is carried on everywhere as the basis of the important silk industry. Carpets and felts are manufactured. Its metalwork is famous, and there is extensive mining, including that of gold, which is still washed from the alluvium in the rivers.

For centuries Khotan was famous for jade or nephrite, a semi-precious stone greatly esteemed by the Chinese for making small fancy boxes, bottles and cups and mouthpieces for pipes, also bracelets, etc. Pop. (1958 est.) 50,000. (T. Sd.)

KHRUSHCHEV, NIKITA SERGEEVICH (1894–), Soviet statesman, emerged from the power struggle after the death of Stalin as secretary of the Communist Party from 1953 to 1964 and as head of the government of the U.S.S.R. from 1958 to 1964.

A Russian miner's son, Khrushchev was born on April 17, 1894, at Kalinovka, Kursk Province, in the Russo-Ukrainian borderland. He was a shepherd boy and later worked in factories and mines of the Donets Basin. When the Revolution began he enlisted with the Red Guards at Yuzovka (now Donetsk) and in 1918 joined the Communist Party. In 1921, at the end of the Civil War (in which his activity was political rather than military), he returned to industrial work at Yuzovka. At the close of 1922 he seized an opportunity to take a three-year technical course at the "Workers' Faculty" of the Donets Industrial Institute. During this period he served as secretary of the school's Communist cell, after which he turned to full-time political work for the Ukrainian Communist Party.

WERNER WOLF FROM BLACK STAR

KHRUSHCHEV, PHOTOGRAPHED IN 1960

Selected to study engineering at the Industrial Academy in Moscow (1929–31), Khrushchev again served as secretary to a party cell. He worked his way up through a series of local Moscow party organizations until he became a member of the Central Committee of the All-Union Communist Party (1934) and of the Supreme Soviet (1937). Chosen by Stalin in 1938 to boss the Ukraine, Khrushchev was named first secretary of the Ukrainian Communist Party and a candidate member of the Politburo of the All-Union Central Committee. Full membership in the Politburo from March 1939 made him one of the most powerful men in the U.S.S.R.

At the start of World War II, Khrushchev supervised the annexation of Polish territory. When the Germans attacked the U.S.S.R., he took charge of the evacuation of Ukrainian industry to the east. Serving on military councils of the Soviet western and southwestern fronts, he directed partisan warfare behind the German lines and figured in the defense of Stalingrad. In 1943 he was given the military rank of lieutenant general. After the expulsion of the Germans from Kiev in November 1943, he resumed control of the Ukraine as first secretary of the Ukrainian Communist Party. For the Soviet general public, Khrushchev's reputation was originally built up from his work in the Ukraine—his efficient restoration of the economy and his suppression of all opposition to Soviet rule in one of the most politically disaffected territories of European Russia.

In December 1949 Khrushchev was recalled to Moscow; and in October 1952, at the 19th party congress, he was appointed to the Presidium (which had replaced the Politburo) of the Central Committee and to the committee's secretariat.

On Stalin's death (1953), Khrushchev kept a place in power as "collective leadership" came into being. He did not appear at first to be a principal contender for Stalin's succession. While G. M. Malenkov became prime minister (or head of government), Khrushchev was put in charge of the Communist Party apparatus, becoming first secretary of the party in September 1953. The sweeping reforms in domestic and foreign policy that he initiated brought him into conflict with other leaders. By February 1955, when N. A. Bulganin succeeded Malenkov as chairman of the Council of Ministers, Khrushchev was emerging as a contender for supreme power. He accompanied Bulganin to Yugoslavia in May 1955, to the Geneva meeting with Western statesmen in July, and on a tour of India, Burma, and Afghanistan in November–December. They also visited Great Britain in April 1956.

At the closed session of the 20th congress of the Soviet Communist Party on Feb. 5, 1956, Khrushchev made a great speech, denouncing Stalin's purges after 1934 and his establishment of a "personality cult." Ensuing conflicts among Soviet leaders led to an attempt in June 1957, at a meeting of the Central Committee, to oust Khrushchev from his post. Instead, Khrushchev secured the expulsion from the Central Committee of V. M. Molotov, Malenkov, L. M. Kaganovich, and D. T. Shepilov. In the following autumn Marshal G. K. Zhukov, who had helped to save Khrushchev in June, was dismissed from the ministry of defense and from the committee; and in March 1958 Khrushchev himself took Bulganin's place as prime minister, while remaining first secretary of the party.

Apparently without rival in the U.S.S.R., Khrushchev became increasingly active in foreign affairs. He stood ostensibly for peaceful coexistence with capitalist powers. In addition to frequent visits to Communist Eastern Europe, he went to Peking (July 1958 and September 1959), where Chinese opposition to his anti-Stalinism and to his efforts to avoid armed conflict with the West was, as yet, only incipient. In September 1959 also, he paid an official visit to the U.S., forcefully addressing the U.N. General Assembly on world disarmament. The summit meeting in Paris (May 1960), called to discuss such problems as Berlin and the division of Germany, broke up when Khrushchev announced the capture of the pilot of a U.S. reconnaissance aircraft brought down near Sverdlovsk. His meeting with U.S. President Kennedy in Vienna (June 1961) likewise produced no agreement on Germany, and the erection of the Berlin Wall followed. Ending a confrontation with Kennedy over Cuba (October 1962), Khrushchev agreed to remove those weapons that the U.S. viewed as a threat to its security.

It seems that this retreat, coupled with growing Soviet industrial and agricultural difficulties and the widened rift between China and the U.S.S.R., renewed opposition to Khrushchev within the party. Moreover, he antagonized on the one hand the armed forces by belittling conventional weapons and on the other his political colleagues by making sudden decisions without consulting them. On Oct. 15, 1964, it was announced that he had been removed from the Soviet government and from his first secretaryship. In April 1966 the congress of the Soviet Communist Party did not reelect him to the Central Committee, and in the following June he did not stand for reelection to the Supreme Soviet.

By his first wife, who died during the famines of the early 1920s, Khrushchev had a son, who was killed serving as a pilot in World War II, and a daughter, who married a theatre director. With his second wife, Nina Petrovna, whom he married in 1924, he had a son, Sergei, who became an engineer; and a daughter, Rada, the wife of Aleksei Adzhubei, editor of *Izvestia* (1959–64), who lost his position after Khrushchev's fall.

As the first Soviet head of government to travel widely abroad, Khrushchev attracted much attention with his public display of down-to-earth camaraderie often juxtaposed unpredict-

ably to outspoken irascibility. *See* further UNION OF SOVIET SOCIALIST REPUBLICS: *History: The Khrushchev Era and After.*

See E. Crankshaw, *Khrushchev* (1966); M. Frankland, *Khrushchev* (1966).

KHUFU (KHUFWEY; Gr. CHEOPS; reigned *c.* 2590–67 B.C.), second Pharaoh of the 4th dynasty of Egypt and builder of the Great pyramid at Giza (Jizah). Herodotus (ii, 124–128) represents his reign and that of his son Chephren (Khafre), the builder of the second pyramid, as 106 years of oppression and misery. His story of Cheops' prostitution of his daughter in order to raise money for his building projects is clearly scandalmongering legend, belied by his later reputation in Egypt as a wise ruler. Contemporary sources are few. It is known that he was the son of Sneferu and his queen Hetepheres. He was probably married four times: to Merityetes, who was buried in one of the three small pyramids beside his own; to a second queen, whose name is unknown; to Henutsen, whose pyramid is the third of the group; and to Nefert-kau, the eldest of Sneferu's daughters. Two of his sons, Rededef and Khafre, succeeded him in turn.

Khufu's known monuments are nearly all at Giza. The Great pyramid itself, the largest single building ever erected, covers 13 ac. and probably contains upward of 2,500,000 blocks of stone, averaging 2½ tons weight apiece, some of the blocks being six times as large. The length of Khufu's reign (63 years), as given by Manetho, must be too long; the 23 years of the Turin "Canon of Kings" is a minimum, for it has been calculated that to build this one monument, 100,000 men would have had to work unceasingly for 20 years.

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KHULNA, a city, district and division of East Pakistan. Formerly in the Rajshahi division, Khulna town was made the headquarters of a new division created in 1960. The town (pop. [1961] 127,970) lies on the Bhairab river, 77 mi. E.N.E. of Calcutta, India, with which it is linked by road and by railway via Jessore. It was connected with the rest of the Pakistan Eastern railway through the Jessore-Darsana section after 1950. Khulna is an important river port and trade centre, connected by steamers with Barisal, Narayanganj and Madaripur and through the port of Chalna with Chittagong. The shipyard (1957), on the Kazi Bacha river (3 mi. S.), and the new Chalna port (18 mi. S.) have developed Khulna's water traffic. With the products of Sundarbans (*q.v.*) forests, Khulna has become a main industrial centre.

KHULNA DISTRICT (area 4,652 sq.mi.; pop. [1961] 2,448,720) was formed out of Jessore (1882). It is an alluvial plain intersected by rivers, which, with the exception of the Madhumati (the eastern boundary), have ceased to be true deltaic streams because of silting. The northwestern part is higher, but the southern part is covered with the swampy forest-clad Sundarbans, and there is no settled population. Rice, oilseeds and jute are the main crops; the chief industries are boatbuilding, fishing and the manufacture of date molasses. It was expected that Khulna would benefit from the multipurpose Ganges-Kobadak irrigation project.

KHULNA DIVISION (area 12,810 sq.mi.; pop. [1961] 10,066,900) comprises the districts of Khulna, Jessore, Kushtia and Barisal. (K. S. AD.)

KHURASAN, an *ostan* (province) in the northeast of Iran, is bounded north by the Turkmen Soviet Socialist Republic of the U.S.S.R. and east by Afghanistan. Adjoining Iranian provinces are Mazanderan, Isfahan, Kerman and Baluchistan (Baluchestan). Khurasan includes the former subprovince of Qainat. Area 120,710 sq.mi. Pop. (1961 est.) 2,261,197. The administrative centre is Meshed (*q.v.*; Persian, Mashhad; pop. [1964 est.] 342,162).

The northern part of the province is occupied by an extensive highland system composed of two parallel ranges, one being the eastern prolongation of the Elburz chain, the other forming the independent ridge of the Koppeh Dagh which disappears toward the Caspian sea. Limestones are dominant, besides igneous and metamorphic rocks. Major heights are Kuh-e Hezar Masjed (10,309 ft.) and Kuh-e Binalud (10,536 ft.). The southern highland (or Kuhestan) also has heights between 7,000 and 9,000 ft., mainly composed of clastic (fragmental) rocks of igneous origin, largely turned into schists. The great salt desert, Dasht-e Kavir, with its quicksandlike marshes, obtrudes into Khurasan from the west and there are other salt depressions, *e.g.*, the Kavir-e Namak of Bijistan, but such features decrease in importance toward the south as aridity increases. There are also extensive sand dune areas. Broadly the *ostan* has the appearance of a great number of oases, large and partly coherent in the north but mostly small and isolated in the south. Except for extensive areas where the spring rains suffice to feed a remarkable crop of wheat and barley, these oases get their water from intermittent streams, by *qanats* (subterranean canals) and wells. The climate is more continental than any other part of Iran.

The rivers of Khurasan are small, the few permanent ones being the Atrek, a tributary of the Caspian sea; the Kal-i Mureh, which drains a vast area toward the Dasht-e Kavir; the Rud-e Shur of Birjand, which loses itself in the desert basin of Namakzar-e Shahdad; and the Kashaf Rud, which passes Meshed and joins the Hari Rud. All are heavily drawn on for irrigation and are more or less salty in their lower courses.

Khurasan, as a result of its troubled history, is peopled by a great variety of races. There are Turkmen of the Yamut and Goklan tribes in the northwest, Kurds around Bojnurd and Quchan. East and south of Meshed are Timuris and Jamshidis or Chahar Aimak, in parts still nomadic; farther southwest are Haidaris, and southeast Baluchis. The Kuhestan is peopled by a settled population of old Iranian stock. Here and there are found Berberis of Mongol origin, Arabs, gypsies and a few Jews in the towns. The largest cluster of settlements and cultivation stretches from around Meshed northwestward, containing the important towns of Quchan, Shirvan and Bojnurd.

Modern developments in Khurasan are largely agricultural. Settlement of remaining nomads, improvement of communications, introduction of sanitation and amenities into the cities have also been pursued. The agricultural products are fruits, grain, rice, cotton, tobacco, oilplants (*konjit* and others), saffron and some silk. Asafetida and various gums are collected. The province usually produces surpluses. Livestock is plentiful and wool, lambskins and goat hair are exported. The mineral products consist of turquoises from the mines at Ma'dan near Nishapur. Salt is found at the surface of the *kavirs* (salt deserts) and in mines. Iron, copper and lead are found as well as coal, which is extracted in small quantities. The small amount of manufacturing industry, mainly food processing, is largely concentrated in Meshed. Chief exports are carpets, hides and skins, cotton stuffs, wool, gums and turquoises.

Meshed, the provincial capital, is a thriving city, connected with Teheran by a branch of the Trans-Iranian railway and the highway leading to Afghanistan. Other important road connections lead to the Trans-Caspian railway in the Turkmen S.S.R. (met at Askhabad) and to Zahedan and Seistan. Meshed contains the mausoleum of Imam Reza, a place of great veneration by pilgrims from all over the Shi'ah world.

History.—In ancient times Khurasan, the "land of the rising sun," signified a vast tract of country comprising lands now lying within the U.S.S.R. and Afghanistan. To Arab geographers, Khurasan had for its boundaries India on the east; west the desert of Ghuzz and Gorgan; north Khwarizm (now Khiva or Khorezm); southwest and southeast the desert of Iran and Seistan. Khurasan was an integral part of the Achaemenid and Sassanid empires and modern Khurasan roughly corresponds to ancient Parthia (*q.v.*). It was conquered by the Arabs in A.D. 651–652 but regained virtual independence under the Tahirid, Saffarid, and Samanid dynasties (821–995). Successively it formed part of the Ghaznavid, Seljuk and Khwarizm kingdoms, but was overrun by the Mongols of Genghis Khan (1220) and again by Timur (1383). The Safawid kings fought over it against Uzbek invasions. After Nadir Shah's death it was occupied by the Afghans and only partly regained by the Qajars. The present frontier was defined in 1881 and in the convention of July 8, 1893. (H. Bo.)

KHUZISTAN (KHUZESTAN; formerly ARABISTAN), an *ostan* (province) of southwestern Iran, at the head of the Persian gulf,

notable for its oil resources. It is bounded west by Iraq, north by Luristan, east by Chaharmahal and Isfahan, southeast by Fars and south by the Persian gulf. Area about 24,167 sq.mi.; pop. (1956) 1,290,175. Khuzistan forms part of the Mesopotamian plain and includes the adjoining Zagros (or Bakhtiari) ranges. These are drained by several rivers, the most important being the Karun (*q.v.*) which, with its right-bank tributary the Dez, flows into the Shatt al Arab and the Karkheh, rising in Luristan, which discharges into the Hoveyzeh marshes. Other rivers are the Jarrahi and Zoreh. The rivers are building up large alluvial fans and partially saline mud flats that merge into a zone of tidal marshes near the gulf. Considerable shore-line recession in historical times was partly compensated by local crustal movements; deep tidal estuaries (*khor*) are characteristic. An isolated ridge (Jabal Hamrin) marks the edge of the piedmont with its large gravel plains. The bare, heavily eroded foothills contain oil-bearing Asmari beds of Oligo-Miocene Age. Behind them are the rugged Zagros ranges, which are forested and dissected by gorges.

The plains have a desert climate in their lower regions; everywhere they are excessively hot and dry in summer and oppressive inland whenever a southern current carries humid air from the gulf. Rainfall is concentrated in the winter, ranging from 12 to 20 in. in the plains and increasing in the mountains. The climate permits the cultivation of date palms, citrus and other fruit trees, sugar cane, indigo, cotton and rice, sorghum, sesame, melons and vegetables by irrigation.

More than half of the population are Arabs who live in the plains; they are mostly Shi'ites with a weakened tribal tradition. The rest are Bakhtiaris and other Lurs, with many Persians in the cities. The Arabs have largely given up nomadism, but large groups of Bakhtiaris and Lurs (probably 100,000) still roam the hill pastures in summer and pitch their tents on the piedmont in winter (*see* also LURISTAN).

Khuzistan, the "land of the Khuz," was the heart of the biblical Elam (*q.v.*) and corresponds largely to ancient Susiana. Once famous for agriculture and trade, the province fell into decline because of tribal quarrels, insecurity and maladministration. Most of the irrigation dams, Sassanid or later, were ruined. Reconstruction, though slow in the beginning, was undertaken with the rise of the Pahlavi dynasty and the development of the oil resources. Ahvaz (*q.v.;* pop. [1956] 120,098), the provincial centre, is a modern city, though on an ancient site. It is the most important road and railway centre in the province, linked with Teheran by the Trans-Iranian railway and by road through Khorramabad, by road and rail with Khorramshahr on the mouth of the navigable Karun, and with Bandar-e Shahpur on the Khor Musa. Ahvaz also has an airport.

Other centres are Dezful (*q.v.;* 52,121), Shushtar (18,527), Ramhormoz (7,258) and Behbehan (29,886), all markets for the adjacent Bakhtiari and Lur country. A motor road to Shiraz was under construction in the early 1960s.

Oil exploitation has developed into the major industry of the province and of the country (*see* IRAN: *Economy*). First struck in 1908, the oil was developed by the Anglo-Persian (later Anglo-Iranian) Oil company, which was nationalized in 1951. Production is from seven fields but mainly from Agha Jari (Agajari). All fields are connected by road and pipeline with the refinery at Abadan (*q.v.*), and with Bandar-e Ma'shur, the main crude-oil-exporting terminal until 1961, when a large tanker-filling station was opened on Khark, an island off Bushire. Khark draws its crude oil from Gach Saran, the southernmost producing field. From nothing Abadan became the fifth largest city of Iran (pop. [1956] 226,083) in less than 50 years. Masjed Soleyman (*q.v.;* 44,655) grew on the first producing field. The oil district with its settlements is one of the most modern and well-developed areas in the country.

A new phase of development began with the U.S.-sponsored Khuzistan Development service, which undertook to rehabilitate the whole province by means of the giant Dez dam (1962), upstream of Dezful. It was designed to irrigate 300,000 ac., to create factories and to improve the cities. (H. Bo.)

KHWARIZMI, AL- (MOHAMMED IBN MUSA AL-KHWARIZMI) (fl. 9th century A.D.), mathematician and astronomer, whose work in the first golden period of Islamic science had far-reaching influence, flourished in Baghdad under the caliphates of al-Ma'mun (813–833) and al-Mutasim (833–842). He was probably born in a suburb of Baghdad but of a family that came from the province of Khwarizm (Khorezm), south of the Aral sea. His work on elementary mathematics, *Kitab al jabr wa'l muqabala,* has in part survived in the term "algebra," as has his name in the term "algorism."

The *Algebra* is a compilation of rules for arithmetical solutions of linear and quadratic equations, for elementary geometry and for inheritance problems; *i.e.,* distribution of money according to proportions. The work was based on a long tradition originating in Babylonian mathematics of the early 2nd millennium B.C. and traceable through Hellenistic, Hebrew and Hindu treatises. Its elementary and practical character undoubtedly contributed to its survival. Another work on Hindu numerals (*i.e.,* the decimal system) is preserved only in a fragmentary Latin translation.

Al-Khwarizmi also compiled a set of astronomical tables, based largely on the *Sindhind,* an Arabic version of the *Brahmasiddhanta* (7th century A.D.) but also showing Greek influence. *See* also MATHEMATICS, HISTORY OF; ALGEBRA, HISTORY OF.

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KHYBER PASS, the most important of the passes which lead from Afghanistan into West Pakistan, lies about 10½ mi. W. of Peshawar. It is threaded by a good metaled road, a caravan track and in greater part by rail. It is a narrow defile winding between cliffs of shale and limestone, 600 to 1,000 ft. high, stretching up to more lofty mountains behind. No other pass in the world has had such strategic importance or so many historic associations. Through it have passed the legions of Persians, Greeks, Tatars, Moguls and Afghans and in more modern times it was a key point in British control of the Afghan border and of the warlike tribes inhabiting the surrounding country.

The name Khyber is also applied to the range of arid, broken hills through which the pass runs and which form the last spurs of the great range of the Safed Koh as it sinks into the valley of the Kabul river, forming the southern wall or water divide of the basin. On either side of the connecting ridge are the sources of two small streams whose beds form the Khyber defile. The pass enters the Khyber hills from the Shadi Bagiar opening, about 3 mi. beyond the fort and cantonment of Jamrud, and continues for about 33 mi. in a northwesterly direction. It finally debouches, just beyond the old Afghan fort of Haft Chah, onto the barren plain of Loi Dakka, which stretches to the banks of the Kabul river opposite the Mohmand village of Lalpura.

Jamrud fort, about 7 mi. from Peshawar, is said to have been built by Hari Singh Nalwa, Ranjit Singh's best-known general; it originally was named Fatehgarh to commemorate the Sikh victory over the disunited tribes. After a steep ascent at its mouth the pass rises gradually to Ft. Ali Masjid (3,174 ft.) where the Khyber stream is first encountered and where it leaves the pass to the south. From Ali Masjid for five miles the pass becomes a defile not more than 200 yd. broad, flanked by imposing and precipitous walls. At the village of Zintara is a large mud fort with high towers. From there on the valley widens to a mile or more, with forts, villages and scattered plots of cultivation. About 10 mi. W. of Ali Masjid lies Landi Kotal fort and cantonment (3,518 ft.), the highest point in the pass and an important market centre with a route past the Shinwari villages and through the Shilmani country back to Peshawar. The summit widens out northward for about two miles, and the summer temperature there may reach 47.8° C. (118° F.). The main pass, however, descends

from Landi Kotal through Shinwari territory to Landi Khana, where it runs through another gorge. At Torkham (2,300 ft.), 6 mi. W. of Landi Kotal, the pass enters Afghan territory and winds down the valley to Dakka.

In and around the Khyber dwell the Khyber Afridis (Aprides). From Jamrud to Ali Masjid are the territories of the Kuki Khel, Sipah, Kamrai and Kambar Khel; from Ali Masjid to the Kandar ravine, near Garhi Lala Beg, is the country of the Malikdin Khel and Zakka Khel. The road has been improved and cars and light trucks go through to Kabul. The railway (1925) from Jamrud through the pass as far as the Afghan frontier at Landi Khana revolutionized the problem presented by the Khyber, providing quick means of movement in the border region. The pass may, however, be turned by a road fork which enters the hills about 9 mi. N. of Jamrud and emerges at Dakka.

In the 5th century B.C. Darius the Great of Persia conquered the country around Kabul, and passed through the Khyber to the Indus. Two hundred years later Alexander the Great advanced through the mountainous country to the north of Swat and the Kabul river, but his generals Hephaestion and Perdiccas probably used the Khyber pass. Buddhism flourished in and around the pass when it was part of Asoka's kingdom, which included Afghanistan. A number of Buddhist remains are found in the pass today, the chief being the Kafir Kot (the citadel of the Kafirs), Shopla stupa (also called the Khyber Top) and the stupa near Ali Masjid. It is said that a number of Greco-Bactrian states flourished in and around Khyber for a century or two. It was used at least once by Mahmud of Ghazni and more than once by Babur. It was also the route used by Nadir Shah and Ahmad Shah Abdali and his grandson Shah Zaman in the invasion of India. Ranjit Singh, the Sikh ruler of Punjab, extended his kingdom as far as Jamrud in the early 19th century. Dost Mohammed Khan, the amir of Kabul, defeated the Sikhs near Jamrud. The tribes that live around the pass always have been difficult to control and constant punitive expeditions had to be undertaken by the Moguls and the British.

The first British advance into the Khyber took place in 1839 when Lieut. Col. Claude Wade conducted Shahzada Timur to Kabul via Peshawar. During the First Afghan War the pass was the scene of many skirmishes with the Afridis. It was at the fortress of Ali Masjid that Sir Neville Chamberlain's friendly mission to the amir Sher Ali was stopped in 1878, thus causing the Second Afghan War. The treaty of Gandamak which ended the war in May 1879 left the Khyber tribes under British control. In 1897 the Afridis seized the pass on the withdrawal of the British officers, and held it for several months. This was the chief cause of the Tirah expedition of 1897. After the defeat of the Afridis the Khyber rifles were reorganized under British officers supported by a movable column at Peshawar, and the British became responsible for the safety of the pass. At the end of the Third Afghan War of 1919 the Khyber rifles were disbanded and their place taken by *khassadars,* tribal levies paid by the British but providing their own arms and ammunition. In 1947 the government of Pakistan became responsible for the control of the Afridi clans. Political control of the area is effected through the Khyber agency (area 995 sq.mi.; pop. [1961] 301,319), formerly subject to the governor of the old North-West Frontier province and now attached to the Peshawar division of West Pakistan. (K. S. Ad.)

KIAMIL PASHA (1832–1913), Turkish army officer and statesman, liberal in outlook but an opponent of the adventurous foreign policy of the Committee of Union and Progress, was born in Cyprus, the son of an artillery captain. He was educated at the school of languages in Nicosia and later in Cairo. When the Cairo school of languages became a cadet school, he graduated as an officer and served in the army, becoming a major. He was fluent in languages and was appointed secretary to the governor (khedive) of Egypt, Abbas Pasha. Later he became director of religious foundations for Cyprus. He was then appointed governor of Aleppo. He resigned because of British protest at his conduct during the Armenian revolt at Zeytun (Suleymanli). Proceeding to Istanbul, he became undersecretary in the ministry of the interior. He was appointed minister of religious foundations (*Evkaf*) in 1881 and later minister of education. In 1884, on the resignation of Küchük Said Pasha, he became grand vizier (prime minister), but resigned in 1887 because of certain Russian objections against him. He was reappointed grand vizier in 1896 but again was dismissed by the sultan Abdul-Hamid II because he proposed a cabinet responsible to a parliament. He was then sent as governor to Izmir, where he remained for 12 years. He was well liked by Greeks and Turks alike as an honest administrator.

On the revolution of 1908 (*see* Turkey: *History*), Kiamil joined the cabinet of Said Pasha, later replacing him as grand vizier for the third time. At first his administration was successful, for he convinced the sultan of the necessity of co-operating with parliament, but in 1909 he failed to appear in parliament to answer questions and resigned when a vote of no confidence was taken against him. After this there was increasing enmity between Kiamil and the Committee of Union and Progress who disliked his anglophile policy. During the Balkan Wars he became grand vizier in 1912 for the fourth time but was forced to resign in 1913 because of a *coup d'état* led by Enver Pasha (*q.v.*) and the unpopularity of the peace terms.

Kiamil retired to Cyprus and died at Nicosia on Nov. 14, 1913. His three-volume political history of Turkey was published in 1915. (M. P. P.)

KIANGSI (Chiang-hsi sheng), a province of central eastern China south of the Yangtze river occupying the P'o-yang (*q.v.*) lake basin. Area 63,629 sq.mi., pop. (1953) 16,772,865, (1957 est.) 18,610,000. Its chief river is the Kan Chiang running from the south into the lake which empties into the Yangtze through a wide neck constricted at Hu-k'ou (*q.v.*). From the west the Hsiu Shui, and from the east the P'o and Hsin Chiang (rivers) enter the lake which acts as a reservoir for the Yangtze flood waters. As a result, it is heavily silted and shallow and expands and contracts greatly with the wet and dry seasons. Kiangsi and the lower Yangtze valley occupy a trough through which the Kan Chiang and the lower Yangtze run in a line with relatively small deviations from the city of Chi-an in the south to Nanking in the north. This corridor, connecting in the south via the Mei-ling Kuan (pass) with the similarly aligned Pei Chiang valley south of the Nan-ling (southern range) and leading in the north directly to the Grand canal, formed a historic route from Canton to Peking.

The climate of the province is temperate. The average January temperature is 3.3° C. (38° F.) at Chiu-chiang on the Yangtze but rises to 5.2° C. (41.5° F.) at Chi-an in the south. This permits two crops of rice on the same land in the south, but only one in the lake plain. Annual rainfall averages from 40 to 47 in., and is heaviest in the southeastern hills. The rainiest place in the province, however, is on the Lü Shan northwest of the lake, with 79 in. Its coolness in summer and easy access from the Yangtze have made this massif a famous summer resort area, notably at Kuling.

Rice, wheat, beans and sweet potatoes are the chief food crops, and the provincial capital and largest city Nan-ch'ang (*q.v.*) as well as the river port of Chiu-chiang (*q.v.*) in the lake plain are famous rice and tea markets. Cotton, ramie, tobacco, tea, soybeans and peanuts are important industrial crops. Nanfeng near the eastern central border is a leading tangerine and orange growing centre. Bamboo and other woods are floated down the Kan Chiang and exported via the Yangtze. Important quantities of camphor, tung oil, pitch and raw varnish are derived from the mountainous forests. Vast numbers of fish for export as well as for local consumption are cultivated in fish ponds, especially in the southeast.

Minerals are abundant in the Ta-yü Ling and the Chiu-lien mountains, in the extreme southwest and south. Some of the world's leading wolfram mines (Sihwashan, Lung-nan) are found here and furnish most of China's tungsten supplies. Coal mines are numerous, one of the largest in south central China being at An-yüan near P'ing-hsiang (site of a projected steel centre) where the railroad crosses into Hunan. East of P'o-yang, China's most famous porcelain centre supplying two-thirds of the nation's fine chinaware is based upon the excellent kaolin (*q.v.*) or china

clay deposits at Kingtechen. Much of the industry is of the handicraft type, but modern factories include a paper plant and a sugar mill at Kanchow, where cotton cloth, matches, cigarettes, electric bulbs and chemicals are also produced. Nan-ch'ang's newer industries include ramie weaving, electric motors, dyes, pitch, and sanitary products, and a jute mill.

Much of the products of the province is transported in native junks along its extensive system of rivers. River steamers can navigate only a few miles above Nan-ch'ang on the Kan Chiang, but small junks can reach Kanchow in the southern hill basin. River communications are supplemented by a highway system, mostly dirt roads. In 1937 the completion of the railway crossing the province from Chekiang to Hunan linked Nan-ch'ang with an earlier line running south from Chiu-chiang on the Yangtze. These lines were torn up during World War II but have been restored. To bolster strategic communication with the coast opposite Formosa, the Chinese Communists built a branch line southeastward into Fukien from Ying-t'an about 100 mi. E. of Nan-ch'ang.

History.—Politically, the provincial territory was part of Chiang-nan province during the early T'ang dynasty. Later this was divided into an eastern and western province when the present provincial territory became Chiang-nan Hsi Tao (Chiang-nan west province). The Mongol or Yüan dynasty simplified this to Chiang-hsi, conventionally Kiangsi. Except for the flat plain around the lake, the province is very hilly and especially rough in the south. Communist leaders found this favourable to their defense during Chiang Kai-shek's extermination campaign against them from 1928 to 1934. Kiangsi achieved historic importance as the revolutionary base of the early Communist movement. It was at Nan-ch'ang on Aug. 1, 1927, that Chu Teh formed the 1st China Workers and Peasants Red army. At Jui-chin near the Fukien border in Nov. 1931 the so-called Chinese Soviet Republic was proclaimed with Mao Tse-tung as chairman. In Oct. 1934 Chiang Kai-shek forced the collapse of the Red army, and Mao Tse-tung and Chu Teh fled on their long march to northwest China. After the successful comeback of the Chinese Communists in 1949, Kiangsi came under the control of the central and south China regional administration. The subsequent abolition of the administrative regions brought the provincial administration back to the direct control of the Communist government at Peking. (H. J. Ws.)

KIANGSU (CHIANG-SU SHENG), one of the smallest but one of the most densely populated provinces of China situated on the east coast bordering the Yellow sea between Shantung province in the north, Chekiang in the south and Anhwei in the west. Area 40,927 sq.mi., pop. (1953) 41,252,192, (1957 est.) 45,230,000. Except in the southwest corner of the province and in the extreme north where low hills occur, the entire area is part of the marshy delta lands of the Yangtze (*q.v.*), Huai Ho and the Yellow rivers and a continuation of the north China plain. Virtually the entire coast is devoid of settlement because of extensive offshore mud and sand flats that hinder navigation. The Yangtze forms the chief artery connecting the two most important cities, Shanghai near the estuary, and Nanking (*q.v.*) on the provincial border in the west, 150 mi. away.

Several old courses of the Yellow river (*q.v.*) cross northern Kiangsu, but after 1946 the route of the river was successfully diverted north of Shantung. The Huai Ho gathers the drainage of Anhwei between the Yellow river and the Yangtze, and pours its waters into Hung-tze Hu (lake) west of which runs the boundary of Kiangsu. In the past, during floods the Yellow river flowed through the Huai Ho and then followed the adjoining Grand canal into the Yangtze. The Grand canal, first built in the 7th century A.D., runs the length of the province. T'ai Hu in the south is the largest lake in the province. Kiangsu is crisscrossed by canals and rivers. Major canals include the Su-pei (North Kiangsu Irrigation Trunk canal) completed by the Communist regime to facilitate the discharge of Huai Ho water from Hung-tze Hu. Other projects planned are a 120-mi. canal from Hung-tze Hu to Lien-yün Chiang (Sinhailien; *q.v.*) harbour, and a new sluice gate and shipping lock on the Yen Ho, both to help divert excess flood waters from the Huai Ho to the sea. In the south a 35-mi. flood control and navigation canal was built to connect T'ai Hu with the Huang-p'u Chiang (Whangpoo river) flowing past Shanghai. In the north, the east-west running Lung-hai railroad crosses Kiangsu where it runs between Sinhailien and Süchow. From Shanghai, a railroad runs northwest to Nanking and another runs southwest across the provincial boundary to Hangchow. Highway communications are less important than canal and river routes in most of Kiangsu, although navigation on waterways other than the Yangtze and the short Huang-p'u Chiang is limited to small shallow-draft boats and launches.

Climatically, Kiangsu from Hung-tze Hu northward shares the climate of the north China plain with its lower precipitation (25–30 in.) and colder winters. The line of the Huai Ho usually is considered the climatic divide between north and south China. The lower Yangtze region ranges in precipitation from 42 in. at Nanking to 45 in. at Shanghai, with average January temperatures between 1.1° and 1.7° C. (34° and 35° F.) respectively. Hot humid summers characterize the entire province. Agriculturally, winter wheat and summer kaoliang (sorghum) predominate in the north, with other summer crops being chiefly millet, cotton, corn (maize), soybeans and sweet potatoes. The lower Yangtze plain is a transition zone between wheat and rice dominance. In winter, wheat and barley are dominant; in summer, rice, cotton, soybeans and mulberry are the chief crops. Cotton is especially important near the Yangtze estuary, and mulberry between Shanghai and Lake T'ai. The grain crop usually includes about 10% of China's rice and wheat. About 20% of China's cotton is grown in Kiangsu. Silkworms, fed on the mulberry leaves, produce large quantities of silk for the reeling mills and looms of Shanghai, Wusih, and Soochow (*q.v.*). The cotton produced provides raw material for Shanghai's cotton textile industry. Along the drier northern sector of coastal Kiangsu, salt evaporation is an important industry. Fishing is significant in the rivers, lakes and canals as well as off the coast in the southern sectors as a means of livelihood. North of the Yangtze, pigs and cattle are raised; the amphibious landscape is the setting for breeding huge numbers of ducks.

Although poor in mineral resources because of its alluvial foundations, Kiangsu through its strategic position has controlled more than half the commerce of China and has been a centre of industrial development. Some of China's largest cities are there: Shanghai, which is politically independent of Kiangsu; Nanking, the provincial capital; Soochow; Wusih; and Changchow (*q.v.*). All five are south of the Yangtze and along the railroad between Shanghai and Nanking. Yangchow and Chen-chiang (*qq.v.*) command the north and south entries of the Grand canal from the Yangtze.

Historically, the provincial territory has had an important status. In ancient times it formed parts of the Wu and then the Chou kingdoms, with Soochow being capital of the former in the 5th century B.C. During the later dynasties it formed parts of larger provinces. It was not given separate provincial status until 1667. Nanking became the seat of national government as early as the Six Dynasties period and became the capital of the Ming empire in A.D. 1368. At other times it has been the provincial capital of Kiangsu. Nanking was the national capital temporarily in 1911, and again during 1928–37 and 1945–49. In 1949 the Communists moved the capital to Peking and the provincial seat from Chen-chiang to Nanking. North of the Yangtze, Mandarin, the national language (kuo-yü), is spoken. South of the Yangtze, Southern Mandarin dialect prevails in the Nanking area. From east of the Mao hills to the coast, people speak the Sung-chiang or Wu dialect which is considerably different. (H. J. Ws.)

KIAOCHOW BAY: *see* TSINGTAO.

KIDD, WILLIAM (*c.* 1645–1701), famous as "Captain Kidd" the pirate, was born at Greenock, Scot., the son of a Calvinist minister. His early career is obscure, but from 1689 he was sailing as a legitimate privateer against the French in the West Indies and off the coast of North America. In 1695 he was in London, where he received a royal commission to apprehend pirates who molested the ships of the East India company in the Red sea and the Indian ocean. Kidd's ship, the "Adventure Galley," was fitted out at the expense of several notable persons, in-

cluding the earl of Bellomont, Sir John (afterward Lord) Somers and the earl of Oxford. Kidd sailed from Deptford on Feb. 27, 1696, called at Plymouth, and on July 4 arrived at New York, where he took on more men. In Dec. 1696 he was rounding the Cape of Good Hope on his way to Madagascar. But he avoided the normal pirate haunts and in Feb. 1697 was at the Comoro Islands. It was apparently here that Kidd, the terms of whose contract provided no pay for captain or crew unless prizes were taken, decided to turn to piracy. In Aug. 1697 he made an unsuccessful attack on the Mocha fleet from the Yemen, but later took some small ships. His refusal, in October, to attack a Dutch ship provoked a near mutiny and in an angry exchange Kidd mortally wounded his gunner, William Moore. He took his most valuable prize, the Armenian "Quedagh Merchant," on Jan. 30, 1698, moved into her and scuttled the unseaworthy "Adventure Galley." After again visiting Madagascar he reached Anguilla in the West Indies in April 1699 and learned that he had been denounced as a pirate. Leaving the "Quedagh Merchant" at Hispaniola (where she was possibly scuttled, and in any case disappeared), he sailed to New England in a newly purchased ship, the "Antonio," and tried to persuade Bellomont, now governor of New York, of his innocence. He was, however, sent to England for trial. On May 8 and 9, 1701, he was tried for the murder of Moore and on five indictments of piracy and was found guilty on all charges. Important evidence concerning two of the piracy cases was suppressed at the trial, but there is no doubt of Kidd's guilt on the other indictments. He was executed at Wapping on May 23, 1701, and his body hung in chains at Tilbury. Some of his treasure was recovered from Gardiner's Island, off Long Island. His effects and the goods taken from the "Antonio" realized £6,472 1*s.* and this sum was given in 1705 by Queen Anne to Greenwich hospital. Kidd was survived by his wife, whom he had married in 1691, and an only son who was killed in battle in 1715.

See G. Brooks (ed.), *The Trial of William Kidd* (1930).

KIDDERMINSTER, a market town and municipal borough of Worcestershire, Eng., 14 mi. N. of Worcester, on the river Stour and the Staffordshire and Worcestershire canal. Pop. (1961) 40,822. In 736 lands upon the Stour called Stour-in-Usmere and identified with the site of Kidderminster were given to *comes* ("count") Cyneberght by King Aethelbald to found a monastery. Cyneberght's son gave these lands to the bishop of Worcester, and in 816 Bishop Deneberht gave them to Coenwulf, king of the Mercians, in return for privileges. Kidderminster remained a royal manor until Henry II granted it to Manasser Biset. The first charter of incorporation (1636) remained valid until 1835. Kidderminster sent two members to the parliament of 1295. The public library (1855) has a large collection on local history. The church of All Saints is Early English and Decorated, with Perpendicular additions. The cloth trade is first mentioned in 1334 but carpet manufacture replaced that of woolen goods in 1735.

KIDDUSH AND HABDALAH, in Judaism are, respectively, the beginning and concluding ceremonies of sabbaths and festivals (*Kiddush,* "sanctification"; *Habdalah,* "separation"). Kiddush includes the blessing or sanctification of the day, of the wine and of the bread, and is recited at the first of the three statutory meals (the last two items, which were the earlier, are pronounced also at other meals). Those scholars who believe that the Last Supper took place on Passover consider Jesus' blessing of the cup to have been the Passover Kiddush.

The term Habdalah is applied (1) to the section of the evening service proclaiming the distinction between light and darkness and marking the boundary between sacred and secular days; (2) to the subsequent synagogal and domestic ceremony which contains the four blessings of Habdalah, wine, light and spices. At the conclusion of festivals and fasts alterations and omissions are introduced. The prohibition against kindling fire on sabbath (Ex. xxxv, 3) is modified on festivals (Ex. xii, 16), hence the festival Habdalah lacks the blessing over the light. The origin of this blessing may, however, be symbolical, as may be that of the spices (or myrtles, which are substituted in the east). The spices may recall the bowl of incense used after banquets in Roman days. *See* also LITURGY, JEWISH.

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KIDERLEN-WÄCHTER, ALFRED VON (1852–1912), German statesman who was often regarded as "the heir of Bismarck" until better historical knowledge destroyed this illusion. He was born in Stuttgart on July 10, 1852, the son of a banker, Robert Kiderlen, and of Baroness Marie von Wächter. After service as a volunteer in the Franco-German War of 1870–71, he studied law and entered the diplomatic service in 1879. Closely connected with Friedrich von Holstein and with Philipp von Eulenburg, he belonged to the inner circle of exponents of the "new course" in German diplomacy and accompanied the emperor William II repeatedly on his travels, as representative of the foreign office. His sharp tongue, however, lost him the emperor's favour in 1898, and he was sent away as minister to Bucharest in 1900, to cool his heels. Even so, he kept up good relations with the German foreign secretary Adolf Marschall von Bieberstein, whose project of a Berlin-Baghdad railway he went to Istanbul to champion.

Appointed deputy foreign secretary in 1908, Kiderlen took a leading part, in close contact with Holstein, in ending the crisis following Austria-Hungary's annexation of Bosnia-Hercegovina: a sharp German note bordering on an ultimatum, sent to St. Petersburg on March 22, 1909, forced Russia to abandon Serbia's cause. Appointed secretary of state in 1910, he advised Bethmann Hollweg in the unsuccessful negotiations with Great Britain over the German naval program: though critical of Tirpitz, Kiderlen agreed with the latter's demand for a loosening of the Anglo-French entente as compensation if the naval program was to be modified.

Kiderlen acquired international notoriety in the Agadir crisis of 1911 (*see* MOROCCO: *History*). Believing that the French occupation of Rabat and Fès meant the end of Morocco's independence, he had tried to solve the question by an agreement with France (1909), but finally decided on a naval demonstration in Morocco: the gunboat "Panther" was sent to Agadir. Kiderlen allowed the German public to understand that he aimed at acquiring Moroccan territory, and the situation worsened when he refused offers by Joseph Caillaux and Jules Cambon. Kiderlen's attempt to exclude Great Britain from the negotiations led the Liberal government to threaten intervention (Lloyd George's speech at the Mansion house). Eventually the Franco-German agreement of Nov. 1911 enlarged the German Cameroons by portions of the French Congo; but this result disappointed the German right-wing parties and led to sharp criticism of Bethmann Hollweg and to a lawsuit between Kiderlen and the leader of the Pan-German league. Kiderlen's brusque policy moreover caused the fall of Caillaux in France and the ascendancy of Raymond Poincaré there. Germany had to agree to the transformation of Morocco into a French protectorate. Kiderlen's resort to forceful gestures, superficially but not substantially Bismarckian, had only aggravated international tension. Exhausted by dissolute living, Kiderlen died in Stuttgart on Dec. 30, 1912.

See E. Jaeckh, *Kiderlen-Wächter . . . ,* 2 vol. (1924); P. Barlow, *The Agadir Crisis* (1940). (HA. H.)

KIDNAPING, a criminal offense consisting of the forcible seizure of a person and his detention or transportation to a place of concealment. The principal motives for kidnaping are to subject the victim to some form of involuntary servitude, to make it easier to commit some further criminal act upon him or to obtain ransom for his safe release. The word itself is a compound of two slang expressions, "kid," meaning a child, and "nap" or "nab," meaning to snatch or seize. The word as originally coined (*c.* 1680) described the then-prevalent practice of stealing children and sending them to servitude on British plantations in America. It later came to mean the taking and sending off of any person to servitude in another country and, as so expanded, was described by Blackstone as a common-law misdemeanour.

Kidnaping for the purpose of subjecting the victim to servitude has taken many forms. In European countries one of the most prevalent was the practice of crimping, that is, the impressment

(*q.v.*) of sailors or soldiers by kidnaping, drugging, decoying or other illegal means. Crimping or shanghaiing, as it is sometimes known, of merchant seamen flourished in port towns throughout the world where the owners of water-front boardinghouses, brothels and taverns did a brisk business by victimizing their own clientele. To prevent such malpractices in Great Britain the Merchant Shipping act, 1894, empowered the board of trade to grant licences for the supplying of seamen upon closely defined terms and contained provisions for the protection of seamen from imposition. State laws regulating the licensing of boardinghouses and limiting the amount of money paid by masters of vessels to the suppliers of ships' crews greatly curbed crimping in the U.S.

The white-slave traffic, whereby young girls are abducted and sold into a life of prostitution, is another aspect of kidnaping for subjection to servitude.

With the growth of organized crime in the U.S. during the prohibition era (1920–33), the maintenance of criminal discipline required that punishment be meted out to those who infringed the underworld code. This usually took the form of the victim-offender's being "taken for a ride," that is, seized and whisked away by automobile (the modern kidnaper's chief resource) to some secluded spot, there to be dispatched at leisure. This pattern persisted throughout the era, although the motive changed from inflicting underworld "justice" to extorting large sums of money on the promise, often broken, of the victim's safe return. Kidnaping then offered all the rewards of bank robbery with few of the risks. In the late 1920s and early 1930s it became commonplace for wealthy persons or their children to be taken off or "snatched," in the argot of the underworld, and held for heavy ransom. In 1931 alone, for example, 279 kidnapings were reported to have taken place in the U.S.

Most of the kidnapings that attracted public attention at that time involved the transportation of victims across state lines. It was widely believed that state and local law enforcement was inadequate to cope with this form of crime and there was consequent agitation for making kidnaping a federal offense, so that the enforcement resources of the federal government might be brought into play. The kidnaping and murder of Charles A. Lindbergh's infant son in March 1932 so aroused public sentiment that the desired legislation was speedily passed. The Lindbergh law made it a federal offense to transport a kidnaped victim across a state line and imposed heavy penalties, including death at the jury's option, if the victim was not released unharmed. Federal agents were empowered to enter a case after seven days, even though no proof existed that a state line had been crossed. State legislatures, similarly aroused, passed laws greatly increasing existing penalties for kidnaping.

Following the passage of these laws kidnaping for ransom in the U.S. declined sharply. Advocates of capital punishment discerned a causal relationship in this sequence of events and maintained that the Lindbergh law and its state counterparts demonstrated the deterrent efficacy of the death penalty. Others questioned this conclusion, maintaining that the decline was more properly attributable to criminals' fear of almost certain capture by the Federal Bureau of Investigation.

Modern U.S. criminal statutes generally divide kidnaping into two offenses: simple kidnaping, typically penalized by terms of up to 25 years' imprisonment, and kidnaping for ransom, typically penalized by life imprisonment or death.

Although counterparts exist in the laws of other countries (in Germany, *Menschenraub;* in France, *arrestation illégale et séquestration de personnes*), kidnaping as a widespread social problem appears to have been confined primarily to the United States.

(H. L. Pr.)

KIDNEY: *see* Urinary System.

KIDSTON, ROBERT (1852–1924), British paleobotanist noted for his researches on fossil plants of the Devonian period, was born on June 29, 1852, at Bishopton house, Renfrewshire. He was educated at Stirling high school and Edinburgh university. His private means enabled him to devote himself entirely to his scientific interests.

During the first period of Kidston's work (1880–1904), he concentrated on systematic, floristic and stratigraphic problems. From 1904 on he was concerned more with structure. He was the first to describe seed-fern specimens with seeds attached (1904). His most noteworthy work was on Devonian plants of the Rhynie chert (1917–21), done with W. H. Lang. Three new genera were described, and a new class of vascular plants (Psilophytales) was based upon them. Psilophytes had been known for about 60 years, but their great significance was unrecognized until the work of Kidston and Lang. Kidston's most ambitious enterprise, *The Fossil Plants of the Carboniferous Rocks of Great Britain* (six parts published, 1923–25), was only partially completed when he died at Gilfach Goch, Wales, on July 13, 1924.

An account of Kidston, his work and his more than 170 publications is found in a British Geological Survey memoir, *The Kidston Collection of Fossil Plants* (1938). (J. W. Tt.)

KIDWELLY (Cydweli), a market town and municipal borough of Carmarthenshire, Wales, lies 8 mi. S. of Carmarthen, at the head of an inlet in the northeastern corner of Carmarthen bay on the south Wales coastal plain, at this point low and swampy. Pop. (1961) 2,879. The Welsh form of its name denotes its position at the junction of two streams, the Gwendraeth Fawr and Gwendraeth Fach. The Normans realized the importance of the site, as it commanded the way along the coast as well as two minor valley ways northward. Consequently Kidwelly has a magnificent castle built in 1084 by William de Londres, a follower of Robert Fitz Hamon who conquered Glamorgan. The castle was destroyed about 1230 by Llewelyn the Great, and rebuilt about 40 years later. It is now in the care of the ministry of works. Kidwelly received its first charter from Henry I, and it has been confirmed several times since. The town has a fine 13th- to 14th-century church, once a chapel of a Benedictine priory. The harbour has silted up and industrial developments in the 20th century have tended to focus on nearby Llanelly. A variety of industries have, at one time or another, been associated with the town, including limestone quarrying, coal mining, brickmaking and the manufacture of tin plates and eyeglass lenses. (E. G. Bow.)

KIEL, a town of Germany, a Baltic port, and capital of the *Land* (state) of Schleswig-Holstein, which after partition of the nation following World War II became part of the Federal Republic of Germany. It lies along both shores of the southern end of the Kieler Förde, an inlet of the western Baltic, 70 mi. (112 km.) N. of Hamburg by rail. Pop. (1961) 273,890. More than one-third of the town was devastated by air raids in World War II. The new town, with building blocks separated by wide green spaces, centres round the town hall (1911) and the Kleiner Kiel, two small lakes once a branch of the fjord. Close to the town hall are the municipal theatre (1907) and the Ostseehalle (1950), designed for exhibitions, congresses and mass entertainment. In the market place stands Kiel's oldest church, St. Nicholas', built about 1240, when the town was founded, and rebuilt after 1949. Close by are the remaining wings of the palace, which dates from the 13th century. The university medical school was founded by Christian Albrecht, duke of Schleswig, in 1665. The new university buildings include a school for agricultural science and the institute of world economics. There are also an art gallery and the botanical gardens near the old university grounds facing the sea.

Kiel has a magnificent harbour with a comparatively uniform depth of water, averaging 40 ft. Its length is 7 mi. and its breadth varies from 656 yd. at the southern end to about 2 mi. at the mouth. A promenade along the western shore adjoins the yachting harbour. Farther north are the locks of the Kiel canal (*q.v.*), opened in 1895. The canal is crossed by a high-level bridge carrying road and rail connections from Hamburg northward to Denmark.

Ferryboats ply between the eastern and western parts of the town and serve the fishing villages and bathing resorts along both shores. Shipbuilding and engineering are the main industries. There are also iron foundries, printing works, breweries, brickworks, a fish curing industry and other factories. Trade is carried on in coal, timber, oils, machinery, cereals and fish. Kiel was an important naval base during World Wars I and II. The main event of the town's year is *Kieler Woche* ("Kiel week"), celebrated

in June as an international regatta and, since 1948, also as a cultural festival.

The name of Kiel appears as early as the 10th century in the form Kyle (probably from the Anglo-Saxon *Kille,* a "safe place for ships"). In 1242 it received the Lübeck rights; in the 14th century it acquired various trading privileges, having in 1284 entered the Hanseatic league. By the treaty of Kiel in 1814 Norway was ceded to Sweden. In 1773 Kiel became part of Denmark, and in 1866 it passed with the rest of Schleswig-Holstein to Prussia. (W. Jn.)

KIEL CANAL (Ger. Nord-Ostsee Kanal), connects the North sea and the Baltic. It was built in the period 1887–95 and enlarged in 1907–14. The sluices at the entrances at Holtenau (the harbour of Kiel) and Brunsbüttelkoog (mouth of the Elbe) are 1,082.6 ft. long, 147 ft. wide and 45.9 ft. high. The canal is 53.3 nautical miles long, 338 ft. wide and 37.07 ft. deep. Vessels are admitted on it which do not exceed the following dimensions: depth 29.7 ft., width 131.2 ft., length 1,033.5 ft., height of masts over the water line 131.2 ft. Steam- and motor-propelled vessels pass up the canal under their own power. The highest speed permitted is 8.1 knots, the lowest 5.4. Other vessels are towed, either by private tugs or the tugs of the canal administration, as desired. Pilots are compulsory.

Prior to World War II the Kiel canal was owned by the German *Reich,* which administered it through the Reichskanalamt in Kiel. Art. 380–386 of the treaty of Versailles (June 28, 1919) laid down certain regulations which in effect internationalized the canal while leaving it under German administration. Canal and pilotage dues were limited to a rate sufficient to cover the cost of administration, maintenance and improvements. All mercantile and war vessels of nations at peace with Germany had permanent free use of the canal, without special permission, and on an equal footing, although as foreign ships of war passed through German territorial waters in approaching or leaving the canal they were expected to obtain permission through diplomatic channels. Subjects, goods and vessels of all nations enjoyed equal treatment as regarded payments and attention. Traffic on the canal was subject only to general police, shipping and sanitary and customs regulations. Goods in transit arriving under seal or accompanied by customs officers were not subject to any further customs formalities. In the event of violations of any of these conditions, or of disputes as to the interpretation of them, any interested power could appeal to the jurisdiction instituted for the purpose by the League of Nations. A local German authority at Kiel was qualified to deal with disputes in the first instance. These provisions were repudiated unilaterally by Adolf Hitler in 1936. Following World War II the canal was in the *Land* of Schleswig-Holstein, Federal Republic of Germany. The provisions of the Versailles treaty guaranteeing freedom of navigation continued in force.

The Kiel canal, being the safest, most convenient, shortest and cheapest route connecting the North sea and the Baltic, is increasingly used by merchant vessels. In 1913, 55,382 ships of 10,350,000 tons net displacement passed through; in 1927, 53,711 ships of 19,912,069 tons; and by 1960, 80,303 ships of 41,527,000 tons. (M. C. M.; R. E. Di.)

KIELCE, a town of Poland, seat of a bishop and capital of the *wojewodztwo* (province) of the same name, is situated in the Gory Swietokrzyskie (Holy Cross mountains), 105 km. (65 mi.) N.N.E. of Cracow on the Warsaw-Cracow railway line. Pop. (1960) 89,000. Kielce's long history is evident in its many old buildings, including the 12th-century cathedral, frequently restored, and the 17th-century bishop's palace. The minerals industry is based on local resources; metal and food industries are also being developed. Kielce originated as a market town on the edge of the Holy Cross forest. In the 12th century it belonged to the bishops of Cracow, and it obtained town rights in 1360. During the 13th century it developed as the centre of a mining region. In the third partition of Poland (1795) the town fell to Austria. A part of the duchy of Warsaw during the Napoleonic period, it was afterward included in the so-called kingdom of Poland, which was actually united to Russia. Kielce was returned to Poland in 1918. During the German occupation in World War II, four extermination camps for Jews functioned in Kielce; about 11,000 persons died in a penal camp nearby.

Kielce Wojewodztwo is located in central Poland between the Vistula and its tributary the Pilica. Area 19,469 sq.km. (7,517 sq.mi.). Pop. (1960) 1,815,667. It includes the eastern part of the Little Polish highlands, with the Gory Swietokrzyskie in the centre. The Sandomierz highlands lie to the east of the mountains and the Nida valley to the south. The northern section is lowland. The Gory Swietokrzyskie are a Paleozoic chain with a surrounding Mesozoic belt rising to 2,005 ft. in the Lysica peak; the Swietokrzyski national park is there. The mountains contain rich mineral deposits, including iron ore, limestone and sandstone, quartz, fire clay, ceramic clays and barites, upon which the prosperity of the Old Polish industrial district depended. The Sandomierz highlands and the Nida basin are agricultural regions with good soils, although underdeveloped and overpopulated. About 65% of the provincial population is engaged in farming. The most advanced industries are iron founding and machinery manufacture, followed by building materials and food processing. Sulfur in the Sandomierz region and gypsum deposits along the Nida form the basis of a developing industry. The fine landscapes and colourful folk customs of the area offer tourist attractions. However, poor communications are obstacles to economic development. Important towns, besides Kielce, are Radom (pop. 130,100), Ostrowiec Swietokrzyski (38,000), Sandomierz (*q.v.;* 13,300), Starachowice (*q.v.;* 36,000), Skarzysko Kamienna (*q.v.;* 35,000), Jedrzejow (12,900) and Pionki (12,600). (T. K. W.)

KIERKEGAARD, SÖREN AABYE (1813–1855), Danish philosopher and theologian whose curious genius entitles him to be regarded both as the founder of modern existentialism and as a revolutionary in Protestant Christianity, was born in Copenhagen on May 5, 1813. His father, Michael Pedersen Kierkegaard, was a West Jutland farmer who later moved to Copenhagen and made a fortune as a wool merchant. Early in his life, however, Michael had cursed God; and Sören's mind was dominated by a sense of involvement in his father's guilt. A student of theology at Copenhagen university from 1830 to 1840, Kierkegaard after his father's death (1838) entered a critical period of his life in connection with a young woman named Regine Olsen (1822–1904): engaged to her in 1840, he broke the engagement in 1841. His relations with her have been variously interpreted.

Kierkegaard's later life was marked by controversies. For instance, a quarrel with Poul Martin Møller, who was a leading contributor to the periodical *Corsaren,* led to a public feud with the periodical's editor, Meïr Aron Goldschmidt, since Kierkegaard detested both its liberalism and its satirical attacks on established worthies. On the other hand he himself bitterly attacked the whole position of the established church in Denmark as being a mockery of Christianity: having constrained himself to spare the personal feelings of the old primate Jacob Peter Mynster (1775–1854), whom he had venerated in his childhood, he made no secret of his hostility toward Mynster's successor, the Hegelian Hans Larsen Martensen (1808–84). Kierkegaard, who never took holy orders, died in Copenhagen on Nov. 11, 1855.

For all the complexity and distortion of his character, which emerges from his private journals, Kierkegaard published voluminously. Many of his writings appeared under curious pseudonyms; *e.g.,* Victor Eremita, Johannes de Silentio, Constantin Constantius, Johannes Climacus, Nicolaus Notabene, Vigilius Haufniensis, Hilarius Bogbinder, H. H., Anti-Climacus. The title of his best-known work, *Either/Or* (1843), indicates the central feature of his thought; viz., his insistence on the choice which each individual has to make between Christ and the world. According to Kierkegaard there are no logically compelling reasons why a man should opt for one rather than for the other. Someone may choose a life of pleasure or of cultivated humanism, but he will inevitably be haunted by a conscious or an unconscious despair (*The Sickness unto Death,* 1849). He may seek to achieve something more valuable by following the path of duty, but this takes him into a world where general principles and collective aims are apt to obliterate consciousness of individual responsibility. Serious concern with this discloses itself in the feeling of dread (*The*

Concept of Dread, 1844), which "eats away all the things of the finite world and lays bare all illusions." A man in this condition has intimations of the infinite but no rational guarantee of what God requires of him. He must himself decide whether or not to take the "leap" of faith. If he asks for proofs he shows that he does not believe. Hence Kierkegaard considered that all attempts at providing Christianity with a rational justification were fundamentally irreligious. This brought him into conflict not only with orthodox rational theology but also with Hegelian philosophy, which claimed to be Christianity rationalized. Kierkegaard's *Concluding Unscientific Postscript* (1846) was an attack on Hegel's claim to have demonstrated that human history is an intelligible plan in which God's will is manifest. According to Kierkegaard it is ridiculous for any human being to pretend to such knowledge, for he would have to be God to know what only God could know. Kierkegaard considered that a preoccupation with science and with objective thinking ("objectivity") betrayed a desire to remain a mere spectator and to shirk the necessity of choosing for oneself. It was in opposition to this attitude that he proclaimed that "truth is subjectivity." (*See* further EXISTENTIALISM.)

To receive the impact of such major works as *Concluding Unscientific Postscript* and *Training in Christianity* (1850), one must have oneself been attracted by the way in which Hegel puts the notion of reconciliation into metaphysical terms, or have found nothing amiss in conventional pictures of Christ, whether traditional or modernist. Kierkegaard does not offer a metaphysical system or an ethical doctrine; nor can one extract from his religious writings even the outlines of a dogmatic (notwithstanding the influence that they were to have on the development of Karl Barth's thought). He is always concerned to unsettle, to put a question mark against accepted prejudices and habits of thought; and he emphasizes the significance of the particular and individual. Kierkegaard's writings have their obvious inspiration in the traditions of the Romantics, but his very emphasis on interiority (characteristic of the Romantic and idealist temper) drew him eventually into an altogether different world, so that a Thomist can detect in him a blurred, but infinitely subtle, acceptance of the "primacy of being." His hostility to the Hegelian dialectic is rooted in his sense of the incompatibility of its fundamental assumption with a true religious seriousness. Yet his criticism draws its strength from sympathy as well as rejection.

The consideration of his own experience gave Kierkegaard a point of departure for a profound religious evaluation of the whole of human life, but his colossal self-preoccupation (his sense of the significance of the subjective, etc.) was disciplined by a sort of matter-of-fact simplicity.

Important works of Kierkegaard, other than those cited above, include: *On the Concept of Irony* (1841); *Edifying Discourses* (1843–44); *Fear and Trembling* (1843); *Repetition* (1843); *Philosophical Fragments* (1844); *Stages on Life's Way* (1845); *Edifying Discourses in a Different Vein* (1847); *Christian Discourses* (1848); *Two Minor Ethico-Religious Treatises* (1849); and *On My Work as an Author* (1851). A collected edition of the Danish text of works published by Kierkegaard in his lifetime appeared in 14 volumes in 1920–31 (with index 1936). Other writings, including the journals, made up the 11 volumes of *Papirer,* in 20 parts (1909–48). There are English translations of individual works by various hands, notably those undertaken by D. F. Swenson and W. Lowrie from 1936 onward. There are also anthologies in English by R. Bretall (1946) and by W. H. Auden (1955) and a selection from the journals by A. Dru (1938) and by R. G. Smith (1965).

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KIEV (KIYEV), an *oblast* of the Ukrainian Soviet Socialist Republic, U.S.S.R., lies in the north-central Ukraine along the Dnieper river (*q.v.*). Its area is 11,158 sq.mi. Most of the *oblast* is west of the river in the "right-bank Ukraine." The northern part of the right-bank area and that part of the *oblast* east of the Dnieper are lowlands, drained by the tributaries of the Dnieper, the Desna to the east and the Pripet, Teterev and Irpen to the west. There the relief is very level and sand dunes are widespread. Much of the area is swampy and extensive drainage operations have been undertaken. The southwest of the *oblast* is part of the Dnieper uplands, rolling hills covered by loess, which is suffering very severe soil erosion by the formation of gullies. The natural vegetation, where it still exists, consists of mainly deciduous forest in the north, giving way southward to increasingly extensive steppe areas. Soils range from podsols and gray forest soils in the north to black earths in the south. The climate is mild by Soviet standards. Kiev has a January average temperature of −6.1° C. (21° F.) and a July average of 19.4° C. (67° F.). The annual rainfall is 21 in.

The population, largely Ukrainian, was 2,828,206 by the census of 1959. Of these, 1,550,667, or 55%, were urban dwellers. The chief towns are Kiev (1,104,334), centre of the *oblast* and capital of the Ukrainian S.S.R., and Belaya Tserkov (70,633).

Agriculturally, the southwest is most important, particularly for sugar beet; this is part of the major sugar beet region of the U.S.S.R. Winter wheat, barley, corn (for fodder) and rye are also grown. The centre of the *oblast,* on either side of the Dnieper, is mainly concerned with dairying and market gardening for Kiev. In the low, damp north, flax, potatoes and dairying predominate. There too, there is some forestry. Industry is largely concentrated in Kiev, which manufactures a wide range of engineering and consumer products, especially textiles. Belaya Tserkov and the smaller centres of Vasilkov, Fastov and Boguslav have small-scale light engineering, food processing and shoe and leather industries. There are a number of sugar refineries, scattered throughout the south. Kiev *oblast,* which was formed in 1932, is well served by a network of railways and hard-surfaced roads, focusing on Kiev, while the Dnieper is navigable, as are the Desna and Pripet. (R. A. F.)

KIEV (Ukrainian KIIV: Russ. KIYEV), a town and the capital of the Ukrainian Soviet Socialist Republic, U.S.S.R., and Kiev *oblast,* is situated on the Dnieper river, a few miles below its confluence with the Desna. The town is on the high, western bank, which rises up to 300 ft. above the river. On the low, opposite bank are several new suburbs, notably Darnitsa and Poznyaki. The population of Kiev, 248,000 in 1897 and 540,000 in 1914, by the 1959 census was 1,104,334, making it the third largest city of the U.S.S.R.

Kiev is one of the oldest and most historic towns of the U.S.S.R. and has been called "the mother of Russian towns." First mentioned in 9th-century documents, tradition ascribes its founding to Kiy and his brothers in the 8th century. The high bank, with marshy surrounding areas, provided a strong defensive site and the city rapidly rose to pre-eminence. By the late 9th century its princes had established their suzerainty over the other Russian principalities and founded the first Russian state. Kiev's wealth and importance derived chiefly from trade from Byzantium along the Dnieper and over portages to the rivers flowing to the Baltic, the so-called "Water Road from the Varangians to the Greeks." At this time, according to the chronicles, there were 400 churches in Kiev. Throughout the period of Kievan Rus, the city was engaged in ceaseless struggle against the nomadic warriors of the steppes, Khazars, Pechenegs and Polovtsy. In the late 12th century its power declined in the face of constant nomad attacks and internecine warfare by the Russian princes, and in 1240 the city was overthrown and completely laid waste by the Tatars of the Golden Horde, under Batu, nephew of Genghis Khan. Thereafter Kiev passed to the control of, first, Lithuania and, later, Poland. In 1648, the town was involved in the uprising of Ukrainian Cossacks under Bohdan Chmielnicki. With the suppression of the rising the Cossacks appealed to Moscow and, after a Russo-Polish war, in 1667 Kiev became the chief town of an autonomous Cossack state, owing suzerainty to Russia. In 1793 it was incorporated into Russia and became a provincial capital. In the 19th century Kiev began to grow in importance, especially with the coming of the railways, to Moscow in 1863 and Odessa in 1870. In 1917 the Ukrainian S.S.R. was formed and in 1934 its

capital was transferred to Kiev from Kharkov.

Following the destruction of World War II Kiev was rebuilt and most of the buildings are new, including the main shopping street, Kreshchatik. The new city has been attractively laid out with tree-lined streets and it is famous for its public gardens. The steep bank overlooking the Dnieper was made into a wooded park. On the outskirts are a huge forest-park and a permanent exhibition of the agriculture and industry of the Ukraine. Among the larger modern buildings are those of the supreme soviet of the Ukraine and the Ukrainian council of ministers. Survivals of Kiev's earlier history include the 11th-century St. Sophia cathedral, the 18th-century church of St. Andrew (now both museums) and the St. Vladimir cathedral, dating from the 19th century and renowned for its murals. Also of the 11th century are the ruins of the Golden gate of Kiev and the Pecherskaya Lavra. The Lavra, with its labyrinth of catacombs, is now partly a museum and partly in use as a monastery although its Uspenski cathedral was destroyed during World War II.

Besides its administrative function as a capital, Kiev has important industries. Engineering takes first place, including the production of machinery for a wide range of factories, river craft, tramcars, motorcycles, excavators, cables, electrical equipment and radios. The chemical industry makes paints and lacquers, pharmaceutical products and photographic materials. Consumer goods are important, particularly textiles and footwear. In Darnitsa is one of the largest artificial textile mills of the Ukraine, employing more than 7,000 workers. Food production, printing, furniture making and other timber processing are also significant.

Kiev is a major communications centre, with railways to Moscow, Kharkov and the Donets basin (Donbass), Vinnitsa and Odessa and Brest. The Dnieper is crossed there by two railway bridges and a road bridge. The airport has services to the other republic capitals and to several east European countries. For nine months of the year, the Dnieper is navigable and there are regular passenger and cargo services.

The chief cultural centre of the Ukraine, Kiev is the seat of the T. G. Shevchenko State university (1834) and an academy of sciences (1919). There are many other higher educational establishments and a number of theatres, notably the Shevchenko Theatre of Opera and Ballet. *See* also references under "Kiev" in the Index. (R. A. F.)

KIGOMA REGION, TANGANYIKA, established in May 1963 following a reorganization of administrative units in Tanganyika, comprises the Kigoma, Kibondo and Kasulu districts of the former Western region. It is bounded northwest by Burundi, northeast by Shinyanga region, east and south by Tabora region, and west by Lake Tanganyika. Pop. (1957) 382,505. The central plateau of Tanganyika is warped upward in Kigoma region to form the rim of highlands (Mt. Kungwe, 8,230 ft.) and escarpments flanking the trough of the western rift occupied by Lake Tanganyika. The Malagarasi river, with its tributary the Moyowosi, drains the northern part of the region, flowing through extensive swamps before cutting through the western highlands to Lake Tanganyika. The region has a mean annual rainfall of more than 30 in., with 40–50 in. in the highlands. Afternoon temperatures frequently exceed 32° C. (90° F.), but there is a wide diurnal range of temperature, and the nights are cool. There are considerable variations in types of soil depending on drainage conditions. Miombo (*Brachystegia*) woodland savanna is found nearly everywhere, with Acacia savanna around the Malagarasi swamp system and rain forest in the highlands.

The Ha (269,100 in 1957), the largest tribe in the region, are found in all parts. The Rundi (84,400), who live among them, are similar ethnologically and in other ways. Other tribes include the Nyamwezi, Vinza (Binza) and Kiko (Nyahoza); the last-named inhabit the Malagarasi swamp system and are seldom seen. Regional headquarters are at Kigoma (1957 African pop., including Ujiji, 15,205), a port on Lake Tanganyika and the terminus of the central railway from Dar es Salaam.

The main crops include cotton, maize (corn), millet, sorghum, eleusine, peanuts (groundnuts), sweet potatoes, cassava, rice, sunflower and pulses. Tobacco and coffee are also grown. The collection and preparation of beeswax, fishing, the production of clarified butter and the preparation of hides and skins are also important. Considerable areas are tsetse-infested, and sleeping sickness is endemic. The region is a valuable one for timber, and the salt springs at Uvinza produce thousands of tons of salt annually.

KIKINDA (Hung. NAGYKIKINDA), a town in the Zrenjanin *srez* (district), autonomous province of Vojvodina, Serbia, Yugos., lies in the fertile plain of Banat 151 km. (94 mi.) N. of Belgrade by road, and is one of the centres of production of the Banat wheat. Pop. (1961) 33,906. It has a medium continental climate with cold winds in winter and heavy snowfalls. It is a district capital with courts and high school. It is linked by road and rail with Belgrade and with Rumania and Hungary. The main occupations of the inhabitants are agriculture, cattle breeding, food processing and handcrafts. Until 1918 Kikinda belonged to Austria-Hungary. (V. DE.)

KIKUYU (AKIKUYU, WAKIKUYU, GIKUYU), a Bantu-speaking tribe in the highland area of south central Kenya. The Kikuyu include the following traditional subgroups: Embu, Ndia, Mbere, Kichugu, Tigania, Igembe, Imenti, Mutini, Igoji, Mwimbi, Muthambi, Tharaka and Chuka. Together they numbered more than 1,000,000 in the 1960s, forming the largest tribal group in Kenya. Their closest kinsmen are the Kamba (*q.v.*) who occupy the lowland area to the southeast of Kikuyu territory.

The indigenous economy rested upon intensive hoe cultivation of millet, peas, beans and sweet potatoes. At least some groups practised irrigation and terracing. Sheep, goats and a few cattle were kept in the 1960s. In recent times a severe land shortage developed, resulting in overcultivation, overgrazing and large-scale migration to engage in wage labour in towns and on the farms of European settlers. The main modern cash crops are coffee, maize (corn), wattle and fruits and vegetables for sale in nearby towns.

Kikuyu traditionally live in separate domestic family homesteads, each surrounded by a hedge or stockade and containing a hut for each wife. The local community unit is the *mbari,* a patrilineal lineage of males and their wives and children with a membership ranging from a few dozen to several hundred persons. The *mbari* occupies the whole or part of one of the ridges characteristic of local terrain and often has attached to it a number of unrelated tenants (*ahoi*) and clients (*ndungata*). Apparently the Kikuyu moved into their modern territory from the north, acquiring it ridge by ridge from the indigenous Dorobo people through purchase and ritual exchange. The pioneer settler of each ridge ultimately gave rise to an *mbari* lineage and his senior descendant became its *muramati,* or head, controlling the distribution of land within it. Beyond the *mbari,* the people are divided among nine clans and a number of subclans that are traditionally concerned with such problems as homicide and compensation. There is also a division into moieties called "Kikuyu" and "Masai."

Kikuyu also are organized into age groups that have served as the principal political institutions. Groups of boys are initiated each year and ultimately are grouped into generation sets that traditionally ruled for 20 to 30 years. At the end of its period of rule, each set ceremonially handed over authority to its successors. There are also several grades of elders who formed judicial councils; members of the highest grade also exercised certain ritual functions. Kikuyu traditionally believe in an omnipotent creator-god, Ngai, and in the continued spiritual presence of ancestors; both are the objects of prayers and sacrifices.

In recent years the Kikuyu, whose lands are adjacent to European-settled highlands and to the city of Nairobi, came into intense conflict with Europeans through their secret Mau Mau society. Chiefs appointed by the Kenya government lacked traditional sanction; in the religious sphere, conflict centred upon Christian attempts to suppress female circumcision. In the economic field, competition for land, as well as racial segregation and discrimination, stimulated Kikuyu resentment (*see* KENYA).

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KILDARE, EARLS OF: *see* FITZGERALD.

KILDARE (CONTAE CHILL DARA), a county of the province of Leinster in the Republic of Ireland, consists partly of lowland to the west of the Wicklow mountains and partly of a stretch of the great central lowland of the country. Area 654 sq.mi. Pop. (1966) 66,486.

Much of the county is fertile farmland, with some fine demesnes and woods, notably in the Liffey valley. The greater part of the county is floored by Carboniferous rocks, chiefly limestones, though on the flanks of the Wicklow hills there are Silurian slates and shales forming a ridge about 800–1,200 ft. high. The river Liffey cuts through this ridge in a fine gorge at Poulaphouca on the Kildare-Wicklow boundary, runs westward into the Kildare lowland and then gradually turns northwest to Newbridge and northeast to Celbridge and Leixlip. In the west of the county the river Barrow and its tributaries form the boundary with Offaly and Leix for many miles. The general lowland surface is punctured to the north of Kildare by four sharp hills about 700 ft. high formed of Silurian rocks with some igneous materials; they stand out as clear landscape features, and round them are some large bogs, some of which are exploited by an official corporation, Bord na Mona.

Most of the surface of the county is covered with glacial deposits and provides varied soils: over four-fifths of the area is farmland. Apart from the peat bogs, one notable area of open country is the Curragh (*q.v.*), a sandy expanse covering about 10 sq.mi. There the maximum depth of the glacial deposits is 234 ft., probably the greatest anywhere in Ireland.

Traces of ancient settlement are fairly numerous, with some dating back to prehistoric periods, including some burial mounds on the Curragh. The town of Kildare (*q.v.*) is an ancient Christian site, with a magnificent round tower; there are also remains of other towers at Castledermot, Taghadoe and Old Kilcullen, a village of great antiquity on a hilltop which for centuries had fairs. In Norman times more than 100 castles were built in the county; some were merely motes, but there are remains of a small town castle at Athy, a gate tower at Kilteel and the Fitzgeralds' castle at Maynooth. There are also remains of several early medieval churches and abbeys, including two near Celbridge and the cathedral of Kildare. Kildare was defined as a county in 1296, and at the time of the Statutes of Kilkenny (1366) was regarded as part of the "land of peace" in which the king's writ was effective.

Maurice Fitzgerald was among the earliest of the Anglo-Norman or Norman-Welsh adventurers to come to Ireland in the 12th century. The manors of Naas and Maynooth in Kildare were confirmed to his sons William and Gerald Fitzgerald by Henry II. In the troubled times of the invasion of Ireland by Edward Bruce in 1315, Edward II sought to win over some of the great magnates by conferring earldoms, making John FitzThomas Fitzgerald earl of Kildare. In the history of Ireland in the later middle ages the holders of the earldoms of Desmond, Ormonde and Kildare competed to control the Dublin government. During the Wars of the Roses the Fitzgeralds were Yorkists. It was the earls of Kildare who, with their exceptional qualities and their advantageous proximity to the main seat of government, became masters of the Dublin government at the close of the middle ages. From 1477 until his death in 1513, Gerald ("Garret Mor," the Great), 8th earl of Kildare, exercised almost kingly power in Ireland and built up a strong dynastic position by marriage and alliances with other Irish and Anglo-Irish lords. Henry VII made what use he could of the Great Earl and tried to govern through him. Opportunity was also taken to use the Butler interest to undermine Kildare. The Great Earl's son, another Gerald, succeeded to his powers and offices but was gradually weakened and finally ruined with the rebellion of his son Lord Thomas Fitzgerald (*q.v.*). Henry VIII saw to it that the Geraldine family, so far as he could lay his hands on them, perished at Tyburn. (*See* also FITZGERALD [family].)

Proximity to the Dublin area has kept the population of County Kildare fairly stable and it has not participated in the decline of Irish county populations in more remote areas. Almost two-fifths of the people live in towns and villages, including Athy (pop. [1966] 4,055), Naas (4,528), Droichead Nua (4,174) and Kildare ([1961] 2,551). Of the smaller places, the best known is Maynooth (*q.v.*; 1,753), which has a Roman Catholic seminary for priests, a constituent college of the National University of Ireland. Both the towns and the countryside of Kildare have a neat, well-tended appearance.

There is a county council which meets at Naas. For administrative purposes the counties of Carlow and Kildare are grouped together and have the same county manager. Naas and Athy are urban districts, and Droichead Nua is administered by town commissioners. Kildare is represented by three members in the *dáil éireann*.

Agriculturally, Kildare is mainly a county of large farms, averaging over 100 ac. in the lowland near County Dublin and County Meath, but much less—generally over 50–70 ac.—on the flanks of the Wicklow mountains. Much of Kildare has cattle fattening as a main cash resource of its large farms, or the grazing of cattle intended for export. Of the 12 counties in Leinster only 4 have more sheep than Kildare. Wheat, barley and oats are the chief crops.

At Allenwood a peat-fired generating station came into full production in 1952. Athy has a plant for making tractors and agricultural machinery; Naas has cotton mills; Droichead Nua has a ropeworks and a factory making cutlery; and Kildare has a wallpaper factory.

The Grand canal runs through the county to the Shannon. Kildare is crossed by railways from Dublin to Cork and Galway.

(T. W. FR.; HU. S.)

KILDARE (CILL DARA), a market town and the county town of County Kildare in the Republic of Ireland, is located 35 mi. W.S.W. of Dublin by road. Pop. (1961) 2,551. There is a Protestant cathedral church, the diocese of which was united with Dublin in 1846. St. Brigit (Brigid) founded a religious community at Kildare in the 5th century. The cathedral of St. Brigid suffered at the hands of the Danes and the Irish and during the Elizabethan and Cromwellian wars. Extensive restoration was begun in 1875. Close to the church are an ancient cross and a round tower (105½ ft.) with a doorway showing Romanesque ornament. There are remains of a 13th-century castle and monastery. Kildare was incorporated by James II. There are peat-moss works and a wallpaper factory. At Tully, 2 mi. S., is the Irish National Stud.

KILHAM, ALEXANDER (1762–98), English Methodist, was the founder of the Methodist New Connexion, a church started by seceders from Wesleyan Methodism in 1797. He was born at Epworth, Lincolnshire, on July 10, 1762, and became a Wesleyan itinerant preacher in 1785. After John Wesley's death in 1791 the future of Methodism was hotly debated. Kilham championed those who thought that Methodists should immediately break all ties with the Church of England and establish a new denomination on a Presbyterian model. In a series of pamphlets he advocated the right of the laity to an equal share in the government of the church at every level. When he was expelled by the Wesleyan conference in 1796 about a tenth of the membership withdrew with him. He died in Nottingham on Dec. 20, 1798. The constitution of the reunited Methodist Church (1932) takes for granted most of the positions for which Kilham stood. *See* METHODISM.

See W. J. Townsend, *Life of Kilham* (1890). (J. H. S. K.)

KILIAN, SAINT (d. *c.* 689), Irish bishop in Thuringia and eastern Franconia, was active in missionary work in the 7th century. At Würzburg, in or about the year 689, he and two of his co-workers (Colman and Totnan, also called Aed and Tadg) were put to death, by the orders, it was related, of an unjust princeling named Gosbert. In 752 Burchard, the bishop established by Boniface at Würzburg, had their relics solemnly transferred to his cathedral. Their feast day is July 8. Kilian still is a favourite patron in the Würzburg region.

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KILIMANJARO, a volcanic massif in Tanganyika, touching the Kenya border, its central cone, Kibo (latitude 3° 4′ S., longitude 37° 21′ E.), rising from a plateau at about 3,000 ft. to 19,340 ft. at Kaiser Wilhelm Spitze, the highest point in Africa. Like Mt. Kenya, 200 mi. N., Kilimanjaro is associated with Tertiary faulting and lies about 100 mi. E. of the Great Rift valley (*q.v.*), whose fault lines intersect a west-southwest–east-northeast line of volcanic cones, including Mt. Meru (14,979 ft.), 40 mi. W. of Kilimanjaro.

The massif extends approximately east-west for 50 mi. and comprises three principal volcanoes. Kibo, the youngest, retains the form of a crater and is joined by a saddle at about 15,000 ft. with Mawensi (17,564 ft.), 7 mi. E., which is the older core of a former summit, its crater walls removed by denudation. Westward the Shira ridge (13,140 ft.) is but the remnant of an earlier crater. There are several zones of small parasitic cones. The oldest exposed rocks are trachybasalts covered by more recent lavas including nepheline phonolites.

Kibo appears from the plains as a snow-clad dome, but subsidence has created a *caldera* 1½ mi. across and 600 ft. deep on the southern side, where the rim is highest. Within this is an inner cone inside whose crater is an ash cone with a crater 370 yd. across and about 400 ft. deep. *Solfatari* in the inner crater indicate residual volcanic activity. One of the large disjointed glaciers around Kibo breaks the rim on the west and remnants of the ice-cap survive as isolated blocks within the crater. The vertical weathering and fluting of the ice walls and *nieve penitente* are characteristic of tropical ice forms. During the last Upper Pleistocene pluvial period the glaciers descended to 12,000 ft., but they have receded to 15,000 ft. on the southwest slopes and descend little below the summit on the dry northern side. The rapid shrinkage of the glaciers, caused partly by warmer climatic conditions and possibly in some degree by increased volcanic activity, suggests that they may disappear within a century or two.

Below the saddle the mountain slopes in a typical volcanic curve to the plains below. In contrast with Kibo, Mawensi is highly eroded, jagged and precipitous, and is cleft by the gorges of the east and west Barrancos, the former 4,000 ft. deep. Mawensi carries no permanent ice and only a few semipermanent snow patches. The southern and eastern slopes are furrowed by streams feeding the Pangani river and Lake Jipe (south) and the Tsavo river (east).

Like other east African mountains, Kilimanjaro presents well-defined altitudinal zones of vegetation. Above the semiarid scrub of the plateau the well-watered southern slopes between 4,000 and 6,000 ft. are cultivated (bananas, coffee, vegetables) by the Chagga (*q.v.*) with elaborate irrigation, and by European settlers farther west. Dense cloud forest extends from 6,000 to 9,000 ft. on the southern slopes, but narrows northward and almost disappears on the dry northwestern slopes. Above the forest rainfall diminishes and open moorland is characterized by giant heather and by tree groundsels that extend to 15,700 ft. on the sheltered southwest flank of Mawensi. Elsewhere above 13,000 ft. is alpine desert with vegetation in dwarfed patches, and above 16,000 ft. only mosses and lichens occur. The Kilimanjaro massif forms a game reserve (720 sq.mi.) containing elephant, rhinoceros, buffalo, antelope and much small game.

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THE TWO PRINCIPAL VOLCANIC PEAKS OF KILIMANJARO: (LEFT) MAWENSI; (RIGHT) KIBO; (LEFT BACKGROUND) MERU, ANOTHER MOUNTAIN 44 MI. DISTANT

The mountain is easily accessible from the south at Moshi, which lies 228 mi. W. of Mombasa and 225 mi. S. of Nairobi, Kenya, by road. Climbing facilities are organized by the Mountain Club of East Africa. The ascent of Kibo, although exhausting, is without mountaineering difficulty but Mawensi demands climbing experience.

Kilimanjaro was discovered by the German missionaries Johannes Rebmann and Ludwig Krapf in 1848. It was visited by Baron K. K. von der Decken in 1861 and 1862, by Charles New, who reached the snow line in 1867, by Sir H. H. Johnston (1884) and others; and studied by Hans Meyer, who made the first ascent of Kibo with Ludwig Purtscheller in 1889, and Fritz Jaeger (1907). Mawensi was first climbed by Fritz Klute in 1912. Important work was done by R. Reusch (1927), in the 1940s by J. J. Richard (volcanological investigations) and Lieut. Comdr. P. C. Spink (measuring retreat of glaciers) and in the 1950s by expeditions from the University of Sheffield, Eng. (geological surveys). The economic possibilities of sulfur deposits have been investigated by the Tanganyika geological survey.

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KILIMANJARO REGION, TANGANYIKA, established in May 1963 following a reorganization of administrative units in Tanganyika, comprises Kilimanjaro (Moshi) district, formerly part of Northern (Arusha) region, and Pare district, formerly part of Tanga region. It is bounded on the north and east by Kenya, southeast and south by Tanga region, and west by Northern region. Area *c.* 5,000 sq.mi. Pop. (1957) 473,859. Running southeastward from the volcanic Mt. Kilimanjaro (19,340 ft.) are the Pare mountains, consisting of ancient, metamorphosed rocks. Streams rising on Mt. Kilimanjaro flow northward to Lake Amboseli or to the Tsavo river in Kenya and southeastward to the Pangani river. The plains lying to the northeast of the Pare mountains have little running water. Mean annual rainfall varies considerably: the southern and eastern slopes of Mt. Kilimanjaro, which are exposed to the prevailing winds, are well watered (70 in.), whereas the Pare mountains are relatively dry. Maximum rainfall occurs during March–May. Temperature varies with altitude: above the hot plains near-temperate conditions are found on the highlands, and snow and ice on the summit of Kilimanjaro. The volcanic soils on the mountain slopes are among the most fertile in the country; red earths are found on the foot slopes. Vegetation ranges from wooded savannas to montane forests and Afro-alpine communities at high altitudes.

The largest tribe is the Chagga (314,800 in 1957), who live on the slopes of Mt. Kilimanjaro. In the Pare district are the Pare tribe (113,900). In this district also is an ethnologically interesting tribe, the Mbugu (11,800), of Nilo-Hamitic descent. There is a small European settlement on the slopes of Mt. Kilimanjaro. Regional headquarters are at Moshi (pop. [1957] 13,726) at the southern slope of Mt. Kilimanjaro, which is connected by rail with Tanga and is also linked with the Kenya railway.

Kilimanjaro is an important coffee-producing area, the crop being grown by both Africans (the Chagga have a Kilimanjaro Native Co-operative union) and non-Africans. A factory at Arusha Chini extracts sugar from cane grown under irrigation.

Other crops include sisal, maize (corn), beans, bananas, and European and sweet potatoes. The cattle trade and timber production are also important.

KILIS, a town of Gaziantep *il* (province), southern Turkey, 60 mi. N. of Aleppo, Syr., and near the Syrian border. By the Franco-Turkish convention of May 30, 1926, it was assigned to Turkey. Pop. (1960) 33,005. Kilis is connected to the main railway from Turkey to Baghdad, Iraq, by a branch line from Gaziantep and also lies on the road from Aleppo to Gaziantep and Birecik. The country around is fertile; olives, grapes and pistachios are cultivated. The principal industries are silk and cotton manufacture. (N. Tu.; S. Er.; E. Tu.)

KILKENNY (Contae Chill Choinnigh), a county of the Republic of Ireland in the province of Leinster and territory of Ossory, is situated on the southeastern fringe of the central plain. It is bounded north by Leix, east by Carlow and Wexford, south by Waterford and west by Waterford and Tipperary. Pop. (1961) 61,668. Land area 796 sq.mi. The principal rivers are the Barrow, the Suir and the Nore, all with alluvial soils along their banks. The Barrow forms the boundary with Wexford and part of Carlow; the Suir forms the boundary with Waterford.

The climate is mild with an average temperature of over 4.4° C. (40° F.) in January and 15.6° C. (60° F.) in July. The annual rainfall is under 40 in. Roughly two-thirds of the county is of limestone origin, covered with loam, and with some sandstone in the south. Dunmore cave, 7 mi. N. of Kilkenny city, has large stalagmite chambers and a splendid stalagmite column, the Market Cross. Reafforestation has been carried on for many years and the country is well wooded. There are several state forests. Wildlife includes the fox, hare, rabbit, stoat, badger, hedgehog and otter, game birds and wild duck. The Nore is a salmon river.

At Kiltorcan, near Ballyhale, are quarries which yielded plant fossils from sandstone of Devonian age and, associated with these, one of the earliest known fresh-water mollusks, *Archanodon jukesii.* In the worked-out Jarrow Channel coal seam an assemblage of amphibian fossils was found.

There are many prehistoric sites, including the Iron Age fort at Freestone hill built on the site of a Bronze Age burial mound, ogham stones, incised Celtic crosses, cromlechs and souterrains. At Harristown in the south is one of the largest dolmens in Ireland, called *Leac an Scail,* the "flagstone of the warrior."

Kilkenny means the church or cell of St. Canice, who founded his cell and church on the site of the present St. Canice's cathedral in the 6th century. The first record of the name dates to 1085 when the king of Ossory ruled the territory, but after a battle in 1169 the king of Leinster wrested all their property from the Ossorians. Dunmore is mentioned in the *Annals of the Four Masters* which states that in A.D. 928 the Vikings of Dublin raided Dunmore (Derc Ferna) and 1,000 persons were killed there. In 1170 Strongbow came to Ireland and immediately married Eva, the only child of the king of Leinster. Isabel, their daughter, who married William Marshal (created earl of Pembroke) in England in 1189, came with him to Kilkenny in 1191 to enter into possession of the vast estates of Ossory. (*See* also Pembroke, Earls of.) Kilkenny was erected into one of the counties of Leinster in 1210 but for centuries before was a place of great importance, having in it the see of Ossory founded by St. Kieran in the 5th century.

Of the numerous old castles, some were built by the Irish and some by the Anglo-Normans. There are five round towers, one adjoining St. Canice's cathedral in the city of Kilkenny and others at Tullaherin, Kilree, Fertagh and Aghaviller. Freshford has a perfect Hiberno-Romanesque doorway and at Knocktopher are the remains of a Carmelite priory founded in 1356. Thomastown, founded early in the 13th century by Thomas FitzAnthony, has many historic remains, and at Jerpoint are some of the finest Cistercian ruins in Ireland; the abbey was founded in 1158 by Donough MacGillapatrick, king of Ossory. Graiguenamanagh has the remains of a Cistercian abbey founded in 1204 by William Marshal, earl of Pembroke; part of it is used as a church. There are the remains of Augustinian priories at Inistioge, Callan and Kells. The ruins of the ancient Collegiate church at Gowran have been incorporated into a Protestant church, and at Ballyragget, a historic town on the Nore, are remains of an Ormonde castle.

For parliamentary purposes County Kilkenny is united with the adjoining County Carlow to form one constituency, returning five members to the *dáil éireann.* For local government and all administrative purposes County Kilkenny is a separate entity.

Barley, wheat, oats, potatoes, peas, turnips, mangels and sugar beet are grown. Wheat and sugar beet acreages increased considerably after World War II. The southwestern end of the county is noted for apple growing. The principal breeds of cattle used for dairying and beef production are Shorthorns and Herefords and a small number of Friesians. The breeding of thoroughbred horses is carried on to a limited extent. Sheep, pigs and poultry are raised. There is salmon and trout fishing in the rivers.

Linen manufacture, introduced in the 17th century, has long been extinct, but the woolen trade is moderately important. The black marble for which Kilkenny was famous is no longer worked. The brewing of ale and malting of local barley has been carried on since the 13th century. Corn milling, bacon curing, iron founding and the manufacture of boots and shoes, lingerie, factory and mill equipment, tractor trailers, tire remolds, handcraft and pottery are the chief industries.

In the middle of the 16th century lead was mined in large quantities; a lead mine about a mile from Stoneyford contained a percentage of silver. Iron ore, coal and other minerals were mined in Castlecomer between 1620 and 1740. Anthracite coal is still worked in the area.

The county is served by rail and by buses.

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(M. E. S.)

KILKENNY (Cill Choinnigh), a city and municipal borough and the capital of County Kilkenny in the Republic of Ireland, lies on both banks of the Nore, 73 mi. S.W. of Dublin by road. Pop. (1961) 10,159. The ancient capital of the kingdom of Ossory, known as Cill Choinnigh ("the church of St. Canice"), Kilkenny in Norman times had two townships: Irishtown, which had its charter from the bishops of Ossory and was governed by a portreeve, and Englishtown, which was established by William Marshal, earl of Pembroke (*q.v.*), and had its charters from the earls marshal; in 1609 it was raised to the status of a city. Irishtown and Englishtown were united under the Municipal act of 1843.

The castle stands on an eminence 100 ft. over the Nore; its site had been chosen by the kings of Ossory for a palace. Strongbow occupied the castle soon after his marriage to Eva, daughter of the king of Leinster. It was burned in 1175 but was rebuilt about 1192 by Strongbow's son-in-law, William Marshal. In 1391 the 3rd earl of Ormonde bought the castle, which remained with the Butler family, though it is uninhabited. Its collection of historical documents is in the National library at Dublin. There were many parliaments held in Kilkenny from 1293 to 1408. The Confederation of Kilkenny represented the native Irish and the Anglo-Norman Catholics and functioned as an independent Irish parliament for six years; the first meeting was in May 1642. Oliver Cromwell attacked Kilkenny in 1650 and the town surrendered on honourable terms.

St. Canice's cathedral (Church of Ireland) was begun about 1192 and is believed to occupy the site of a 6th-century church founded by St. Canice. It is of considerable size (226 ft. long) and has within its walls a chapter house and a chapel of the Blessed Virgin. In the nave and choir are sepulchral monuments of famous churchmen and noblemen. The round tower close to the south transept is over 100 ft. high. St. Canice's library has many 16th- and 17th-century books. The bishop's residence was founded about 1360. The Roman Catholic cathedral of St. Mary (1843–57) is a cruciform building with a 200-ft.-high tower. A Dominican "Black abbey," founded by William Marshal in 1225, is still used but a Franciscan abbey, founded by Marshal in 1234 on the banks of the Nore, is in ruins. The churches of St. Mary and St. John (both Church of Ireland) date to the 13th century. The Tholsel (1761)

is used for corporation meetings, and among its valuable books is the *Liber Primus* (*c.* 1230). Shee's almshouses date from 1594. Grace's Old castle was built in 1210 and is now used as a courthouse.

Opposite the castle is the Protestant college of St. John, founded in the 16th century, where Jonathan Swift, William Congreve, George Farquhar, and George Berkeley received part of their education. St. Kieran's Roman Catholic seminary, founded in 1782, is in a large 19th-century building.

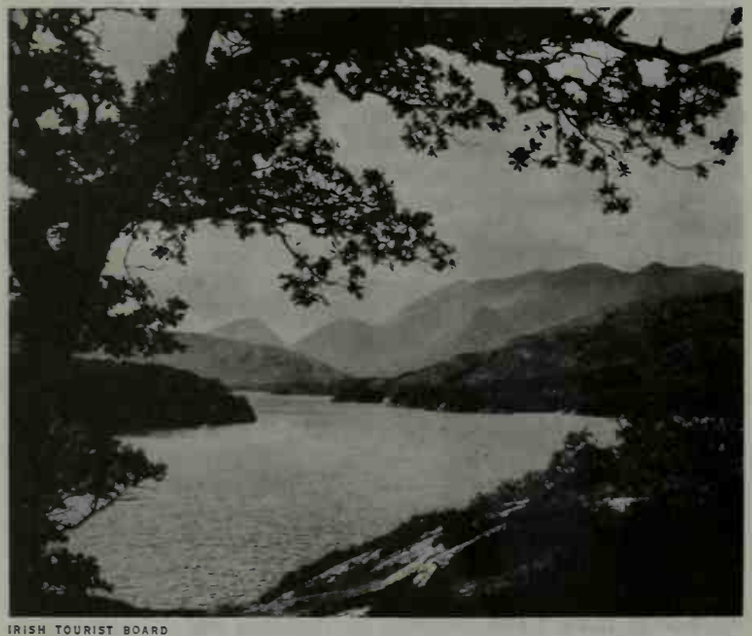
Kilkenny is a market centre and railhead for rich agricultural country. The local black marble is no longer quarried.

(M. E. S.)

KILLALOE (Cill Dalua), a town of County Clare in the Republic of Ireland, lies at the lower extremity of Lough Derg, at the foot of the Slieve Bernagh mountains 14 mi. N.E. of Limerick by road. The town is connected with Ballina (County Tipperary) by a bridge of 13 arches. Pop. (1961) 835. The cathedral of St. Flannan (Church of Ireland) occupies the site of a 6th-century church founded by St. Molua. The present building is mainly of the 12th century and has a Romanesque doorway. An ancient oratory in the churchyard is said to date from the period of St. Molua. Near Killaloe stood Brian Boru's palace of Kincora, the capital of the kings of Munster. Slate is quarried and there are textile industries. Killaloe is a centre for rough shooting and for fishing on Lough Derg and gives its name to Catholic and Protestant dioceses. The level of Lough Derg has been raised by embankments and a weir built below Killaloe for the Shannon hydroelectric station.

KILLARNEY (Cill Áirne), a market town of County Kerry in the Republic of Ireland, which has given its name to a group of lakes famed for their beauty. The town lies 191 mi. S.W. of Dublin by road. Pop. (1961) 6,825. St. Mary's cathedral of the Roman Catholic diocese of Kerry was built of limestone by A. W. Pugin in 1846–55. Cranes are made near the town by a German firm which came in the 1950s; a far older industry is boot, shoe and sandal making in the heart of the town. There are mineral-water (soft drink) factories, a printing works and a small handcraft concern that provides embroidery lace and woolen goods. The oldest industry, based on a 17th-century smithy, is the making of gates, railings and ornamental ironwork.

Killarney's island-studded lakes, surrounded by woods and mountains, lie 1½ mi. S.W. of the town. There are three main lakes: the Lower or Lough Leane, the Middle, Torc, or Muckross, and the Upper lake. Rising steeply to the west are the Tomies and Purple mountain (2,739 ft.) and beyond the Gap of Dunloe are Macgillycuddy's Reeks, the highest range in Ireland. To the southeast, beyond Torc mountain (1,764 ft.), is Mangerton mountain. The Lower lake, which is the northernmost and the biggest (5,001 ac.), is separated from the Middle lake, to the south, by the wooded Muckross peninsula. It contains about 30 islands, the best known of which is Innisfallen with its abbey founded by St. Faithlenn (Fallen) in the 7th century and now in ruins. St. Finian was also connected with its early history. There the Annals of Innisfallen (now in the Bodleian library at Oxford) were written in Gaelic and Latin from the 10th to the 14th century. On Ross Island (or peninsula) is the massive ivy-covered keep of Ross castle, believed to have been the fortress of the O'Donoughues, and destroyed in the Cromwellian wars. Also destroyed then was Muckross abbey, which stands just inside Muckross National park by the wooded eastern shore of the Lower lake. Founded in the 1440s for Franciscans by Donal MacCarthy, chieftain of Desmond, it was suppressed, but not deserted, in 1542, restored in 1626 and finally burned in 1652. Connecting the Middle lake (680 ac. with four islands) with the Upper lake (430 ac. with eight islands), to the southwest, is the Long Range, a broad wooded channel about 2¼ mi. long. The woods round the lakes are mostly of the famous arbutus with oak, birch, holly and mountain ash and a ground flora of saxifrages, ferns, mosses and liverworts. The limestone of the eastern shores has been eroded into curiously shaped caves and indentations; the slatey western shores are precipitous. From Aghadoe hill, at the northern end, on which are the ruins of a round tower, a 12th-century church and a castle, a splendid view of the lakes and mountains can be had. The lakes are drained to the Atlantic ocean by the river Laune. Near the outlet of the Laune stands Dunloe castle, originally a 13th-century stronghold, rebuilt in the 20th century.



IRISH TOURIST BOARD

UPPER LAKE, SMALLEST OF THE THREE KILLARNEY LAKES

Having been in the possession of the Kenmare family for about 400 years, parts of the estate were bought by an American real estate broker, J. S. Robertson, in 1956 following the death of the 7th earl of Kenmare. The 8,320 ac. purchased include the Lower and Middle lakes and Ross castle.

KILLDEER (*Charadrius vociferus*), the commonest American ringed plover, so called in imitation of its whistling cry. About the size of a snipe, it is sooty-brown above, but with cinnamon on the tail coverts, and a white wing bar; beneath it is white except for two black breast bands (instead of one as in other ringed plovers). Wintering in the south or on the seashore, in spring it spreads over the interior. Killdeers are the common noisy plovers breeding on plowed lands or grass fields. The nest is in a slight hollow, and is often surrounded with small pebbles and fragments of shells. There the hen lays her four pear-shaped, stone-coloured eggs, always arranged with their pointed ends touching each other. The subspecies *C. v. vociferus* ranges over most of Canada across the United States to Lower California, central Mexico, the Gulf coast, Florida and the West Indies. Separate subspecies occur in the Greater Antilles and on the coast of Peru. Birds in the far northern range winter from southern British Columbia and the northern U.S. to the West Indies and northern South America. (G. F. Ss.; X.)

ED PARK FROM THREE LIONS

KILLDEER (CHARADRIUS VOCIFERUS) AT NEST

KILLER WHALE (*Orcinus orca*), sometimes called grampus, is the largest member of the dolphin family (Delphinidae) of whales, old males reaching a length of 30 ft. Killers are characterized by a very high triangular back fin. The snout is blunt, as in the common porpoise, and unlike that in most of the dolphins, in which it is prolonged into a beak. The colour is black with white underparts and splashes over the eye, on the back and the flank. The jaws bear 40 to 50 conical teeth.

Killers generally live in small schools and feed on fish, squids, seals, sea birds, porpoises and smaller dolphins. They are found in all seas, from the arctic to the antarctic. (Stories of killer whales trying to upset ice floes on which men were standing are misinterpretations of the behaviour of these animals, who from

curiosity often raise their heads above water to get a better view.) *See* WHALE. (L. H. M.)

KILLIECRANKIE, a pass in Perthshire, Scot., 3¾ mi. N.N.W. of Pitlochry. Beginning close to Killiecrankie station, it extends southward to the bridge of Garry through a narrow, wooded glen in which the Garry flows. A road runs up the pass, and between this and the river is the railway. The battle of 1689 between the Jacobites, under John Graham of Claverhouse, Viscount Dundee (*q.v.*), and the royal force, led by Gen. Hugh Mackay, though named from the ravine, was not fought in the pass. Mackay's troops had marched through it to take up a position in the valley, but before they had time to do so, the Highlanders fell upon them, driving many back into the pass where they were killed or drowned. Viscount Dundee was killed, however, and his death deprived the Jacobites of any hope of final success. (G. S. P.)

KILLIGREW, THOMAS (1612–1683), English dramatist, better known for his wit than for his plays, was born in London on Feb. 7, 1612, the son of Sir Robert Killigrew. Sir John Mennis says that as a boy he satisfied his love of the stage by volunteering at the Red Bull to take the part of a devil, thus seeing the play for nothing. In 1641 he published two tragicomedies, *The Prisoners* and *Claracilla,* both of which had probably been produced before 1636. In 1647 he followed Prince Charles into exile and at the Restoration he became groom of the bedchamber to Charles II, and later chamberlain to the queen. He received in 1660, with Sir William Davenant, a patent to erect a new playhouse, the performances in which were to be independent of the censorship of the master of the revels. This caused a dispute with Sir Henry Herbert, then holder of the office, but Killigrew settled the matter by generous concessions. He acted independently of Davenant, his company being known as the King's Servants. They played at the Red Bull, until in 1663 he built for them the original Theatre Royal in Drury lane. In 1664 his plays were published. One of them, *The Parson's Wedding* (acted *c.* 1640), although an unsavoury play, displays considerable wit, and some of its jokes were appropriated by William Congreve. Killigrew succeeded Sir Henry Herbert as master of the revels in 1673. He died at Whitehall on March 19, 1683. His son Thomas (1657–1719) was the author of a successful comedy, *Chit-Chat* (1719).

See R. Flecknoe, *The Life of Tomaso the Wanderer* (1667), reprinted by G. Thorn-Drury (1925); A. Harbage, *Thomas Killigrew* (1930).

KILLIN, a village of Perthshire, Scot., at the southwestern end of Loch Tay, 45 mi. W. of Perth by road. Pop. (1951) 1,199. It is near the confluence of the Dochart and Lochay rivers where they enter Loch Tay, and is a tourist and winter sports centre. An island in the Dochart, which is crossed at Killin by a bridge of five arches, is the ancient burial place of the clan MacNab. Below the bridge is Kinnell house (*c.* 1654), which has in its vinery a great vine planted there in 1832. Finlarig castle, a ruin that contains the ancient beheading pit with its chains and is described by Sir Walter Scott in *The Fair Maid of Perth,* was a stronghold of the Campbells of Glenorchy, earls of Breadalbane.

KILMALLOCK (CILL MOCHEALLÓG), a market town in the "Golden vale" of County Limerick in the Republic of Ireland, lies 134 mi. S.W. of Dublin by road. Pop. (1961) 1,159. The name means "the church of Mocheallog," a saint who founded an abbey there in the 7th century. The town received a charter in the reign of Edward III when it was walled and fortified with four gates, one of which remains. Its fortifications were mostly demolished by order of Oliver Cromwell. The church of SS. Peter and Paul belonged to a former abbey, and its northwest tower is a converted round tower. The 13th-century Dominican abbey has Early English remains. The history of Kilmallock is closely linked with that of the Fitzgerald family, earls of Desmond. Eight miles from the town is Lough Gur, near which are stone circles and other prehistoric remains.

KILMARNOCK, a large burgh of Ayrshire, Scot., on Kilmarnock water, a tributary of the Irvine, 21 mi. S.S.W. of Glasgow by road. Pop. (1961) 47,509. Though the town has many industries, it still possesses the core of "the streets an' neuks of Killie" celebrated by Robert Burns. The chief buildings are the courthouse; the Palace theatre with the Albert tower, 110 ft. high; the academy where Sir Alexander Fleming, discoverer of penicillin, was educated; the Dick institute, containing a public library, museum and art gallery; and the Laigh kirk, with its high plain tower (1410), a building, like the Angel hotel, associated with Burns. In Kay park (30¼ ac.), purchased from the duke of Portland, stands the Burns memorial, consisting of two stories and a tower and containing a museum in which have been placed many manuscripts and relics of the poet and the McKie library of Burns's books. A marble statue of the poet, by W. G. Stevenson, stands on a terrace on the southern face. The first edition of Burns's poems was published in Kilmarnock in 1786. A Reformers' monument was unveiled in Kay park in 1885. Dean castle, to the north of the town, which was burned down in 1735, was restored in 1915.

Kilmarnock rose into importance in the 17th century by its production of striped woolen "Kilmarnock cowls" (Scotch bonnets), and afterward acquired a name for its carpets, which it still maintains. A large modern factory, completed in 1952 at Burnside, makes carpets which are sent all over the world. In the town, hosiery, bonnets and Madras muslin are made and there are auxiliary industries such as dyeing and wool scouring. Kilmarnock is also known for its engineering, especially locomotives, bearings and hydraulic equipment; its whisky blending (established there in 1820 by Johnny Walker, a grocer); the manufacture of boots and shoes; and its dairy produce.

Alexander Smith, the poet, whose father was a lace-pattern designer, and Sir James Shaw, lord mayor of London in 1806, to whom a statue was erected in the town in 1848, were natives of Kilmarnock. The town dates from the 15th century, and in 1591 was made a burgh of barony under the Boyds, the ruling house of the district. The last Boyd who bore the title of Lord Kilmarnock was beheaded on Tower hill, London, in 1746, for his share in the Jacobite rising. The town was formed into a parliamentary burgh in 1832 and was extended by nearly 2,000 ac. in 1935.

KILMER, (ALFRED) JOYCE (1886–1918), U.S. poet whose "Trees" became one of the most widely known poems of the 20th century, was born at New Brunswick, N.J., on Dec. 6, 1886, and educated at Rutgers (New Brunswick, N.J.) and Columbia universities (A.B., 1908). His first volume of verse, *Summer of Love* (1911), was extremely derivative, with heavy echoes of Yeats and the Irish poets. After his conversion to Catholicism he modeled his poetry upon that of Coventry Patmore and the 17th-century metaphysical poets, although his work retained many of the characteristics of his previous journalistic verse.

His most famous poem, "Trees," appeared in *Poetry* magazine in 1913; its combination of sentiment and simple philosophy made it an immediate—and continuing—popular success. Kilmer subsequently repeated the formula with poems such as "Stars," "Roofs," "The Snow Man" and "Roses," none as popular. His works include: *Trees and Other Poems* (1914); *The Circus and Other Essays* (1916); *Main Street and Other Poems* (1917); and *Literature in the Making* (1917), a series of interviews with writers. He edited, in 1917, an anthology of modern Catholic poetry called *Dreams and Images.*

Kilmer was killed in action during World War I near the village of Seringes, France, on July 30, 1918, and was posthumously awarded the Croix de Guerre.

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KILN, a place for burning, baking or drying. Kilns may be divided into two classes—those in which the materials come into actual contact with the flames, and those in which the furnace is beneath or surrounding the oven. Limekilns are of the first class, and brickkilns, pottery kilns, etc., of the second, which also includes places for merely drying materials, such as hop kilns, usually called oasts, or oasthouses. *See* also references under "Kiln" in the Index.

KILRUSH (CILL RUIS), a port, market town and rail terminus in County Clare in the Republic of Ireland, lies 27 mi. S.W. of Ennis on the estuary of the river Shannon. Pop. (1961) 2,861.

From Cappagh pier small steamers ply between Kilrush and Limerick. Two miles out in the estuary is Scattery Island, the site of a 6th-century monastery founded by St. Senan, with remains of five churches and a well-preserved round tower 115 ft. high. At Killimer, near Burrane, 6 mi. E. of Kilrush, is the grave of Ellen Hanly, the "Colleen Bawn" whose murder in 1819 inspired Dion Boucicault's drama and also the opera *The Lily of Killarney* by Sir Julius Benedict. (Hu. S.)

KILVERT, (ROBERT) FRANCIS (1840–1879), English clergyman, whose *Diary,* discovered in 1937, gives a vivid picture of the life of his time in rural England, and of his own gentle, humane, unusually attractive personality, was born at Hardenhuish, Wiltshire, on Dec. 3, 1840. The son of a country clergyman, after being educated at home and at Wadham college, Oxford, he was himself ordained, and from 1865 to 1872 was curate of Clyro, Radnorshire, the place now chiefly associated with his name. In 1879, when vicar of Bredwardine, Herefordshire, he married, but died suddenly five weeks later, on Sept. 23.

Kilvert's *Diary,* covering most of the years 1870–79, came to light nearly 60 years after his death. Abridged and edited by William Plomer, it was published in three volumes (1938–40; *Selections,* 1944), and is regarded as one of the most notable diaries in the English language. There is no picture of English country life in the 1870s more detailed and engaging or of more value to the social historian. Francis Kilvert's devotedness as a parish priest and his personal magnetism won him the affection of both rich and poor, and particularly of the young. His humanity and his delight in landscape and in local society are reflected in the admirably lucid and unaffected prose of his *Diary.* The Kilvert society (founded 1948) fosters interest in him, and he is commemorated by an annual service at one of the churches with which he was associated. (W. Pl.)

KILWARDBY, ROBERT (d. 1279), archbishop of Canterbury and cardinal, was a master of Paris university before he joined the Dominican Order (*c.* 1240–45). He had been lecturing on theology in Oxford for 13 years when in 1261 he was appointed provincial prior of the English Dominicans. In 1272 Pope Gregory X made him archbishop of Canterbury, against the king's candidate. Consecrated on Feb. 26, 1273, Kilwardby studiously avoided politics and devoted himself to the visitation of his diocese and province. When visiting Oxford university, on March 18, 1277, he condemned 30 propositions, some of which reflected the teaching of Thomas Aquinas. Thus began a long conflict in intellectual circles. On March 12, 1278, Pope Nicholas III translated him to the cardinalitial see of Porto and Santa Rufina, whereupon Kilwardby resigned Canterbury. He died at Viterbo, Sept. 11, 1279.

Among his works are an introduction to philosophy, *De ortu scientiarum,* and a series of *Tabulae* or indices to the Bible and to the writings of the Fathers.

See W. F. Hook, *Lives of the Archbishops of Canterbury,* vol. iii (1865); E. M. F. Sommer-Seckendorff, *Studies in the Life of Robert Kilwardby* (1937). (Pl. Gn.).

KILWINNING, a small burgh of Ayrshire, Scot., lies on the right bank of the Garnock, 24 mi. S.W. of Glasgow by road. Pop. (1961) 7,287. The ruined abbey, originally one of the richest in Scotland, was founded in the 12th century by Hugh de Morville and his son Richard and was dedicated to St. Winnin, who lived there in the 8th century and after whom the town was named. The abbey, a beautiful specimen of Early English architecture, was largely destroyed in 1561 and its lands were granted to the earl of Eglinton and others. Kilwinning is the traditional birthplace of Scottish Freemasonry, the lodge, believed to have been founded by the foreign architects and masons who came to build the abbey, being regarded as the mother lodge in Scotland. The town is mainly residential but has some farming and manufacturing, including textiles. Eglinton castle (1798), 1½ mi. S.E., was the scene in 1839 of the Eglinton tournament, an attempted revival of ancient chivalry, at which Napoleon III was present; it is now a ruin and a factory is housed in the stables. (D. J. M. B.)

KIMBERLEY, a city famed for its diamond mines, lies almost in the centre of the Republic of South Africa and is the principal city of northern Cape of Good Hope province. It is situated near the Orange Free State border at an altitude of 4,012 ft. Pop. (1960) 77,180 (mun.), including 23,987 Europeans.

The civic centre, where formerly stood the 50-ac. Malay camp of the old town, includes the municipal administrative building, the Northern Cape Technical college, the Kimberley theatre, the William Humphreys Art gallery, and sites for a provincial administrative building and new supreme court building. It surrounds the Jan Smuts boulevard, in whose central garden a statue by Herman Wald depicting a diamond sieve upheld by labourers symbolizes Kimberley's early history. In Du Toitspan road dominating the entrance to the civic centre stands an equestrian statue of Cecil Rhodes by Sir Hamo Thornycroft. On Market square are the law courts, post office, city hall and market. Other notable buildings are the Duggan-Cronin Bantu gallery; the McGregor Memorial museum, with mineralogical and Bushman ethnological collections; the municipal library, with a fine collection of Africana; the Anglican and Roman Catholic cathedrals; and the hospital chapel, the first of its kind in South Africa. Diamonds from South African producing centres are concentrated at the Consolidated building in Stockdale street and sold at Kimberley house in Du Toitspan road. On Memorial hill the Honoured Dead memorial to those who fell in the siege (1899–1900) was modeled by Sir Herbert Baker on the Nereid monument at Xanthus in Asia Minor and bears a six-line inscription by Rudyard Kipling. The Queens park contains a fine collection of rock plants and succulents and a municipal swimming bath.

Kimberley is connected with the principal centres of the republic by rail, road, and air services, the latter operating from the airport 5 mi. S. of the city centre. Although the diamond industry is still prominent, Kimberley's importance derives chiefly from its position as the main commercial centre of northern Cape province. Iron ore, salt, gypsum, asbestos, chalk, limestone and manganese are mined locally. The town has clothing factories, heavy engineering works and a creamery.

Kimberley was founded in 1871 by diggers who discovered diamonds on the farms. There were initially three distinct mining camps: one at Du Toitspan; another at De Beers (called De Beers Rush or Old De Beers); and the third at the Colesberg kopje (called De Beers New Rush or New Rush). The Colesberg kopje mine was in 1873 renamed Kimberley in honour of the secretary of state for the colonies, the 1st earl of Kimberley, by whose direction the mines had in 1871 been taken under the protection of Great Britain. Kimberley was also chosen as the name of the town into which the mining camps developed. In 1880 the town was incorporated in Cape Colony. Among those attracted to Kimberley were Cecil Rhodes and Barnett ("Barney") Barnato (*qq.v.*), who in time came to represent two groups of financiers controlling the mines. The amalgamation of their interests in 1888 put the whole diamond production of the Kimberley fields into the hands of one company, the De Beers Consolidated Mines Ltd.

In 1885 the opening of the railway from Cape Town brought new importance to Kimberley. Besieged during the South African War, the town held out for 126 days in the face of near starvation and shelling until relieved by Gen. John French on Feb. 15, 1900. The borough of Kimberley was in 1912 amalgamated with the adjacent diamond mining township of Beaconsfield and granted city status. During World War I and the world depression of the early 1930s the diamond mines were closed, but mining was resumed in 1935. By the 1960s the active mines in the district were Dutoitspan, Bultfontein, Wesselton and De Beers. The Kimberley Open mine, or "big hole," is roughly circular with a diameter of about 1,500 ft. and a circumference of approximately 1 mi.; it was closed in 1914. *See* also Diamond. (P. C. W.)

KIMCHI (Kimhi), the family name of three Jewish grammarians and biblical scholars who worked at Narbonne, France, in the 12th and 13th centuries.

Joseph Kimchi (*c.* 1105–1170), a native of southern Spain, settled in Provence, where he was one of the first to set forth in Hebrew the results of Hebraic philology as expounded by the Spanish Jews in Arabic. His acquaintance with Latin grammar led him to divide the Hebrew vowels into five long vowels and five short, previous grammarians having simply spoken of seven

vowels without distinction of quantity. His grammatical textbook, *Sefer Ha-Zikkaron,* "Book of Remembrance" (edited by W. Bacher, 1888), was marked by methodical comprehensiveness and introduced into the theory of the verbs a new classification of the stems which has been retained by later scholars. In the more ample *Sefer Ha-Galuy,* "Book of Demonstration" (edited by Matthews, 1887), he attacked the philological work of the Frenchman R. Jacob Tam, who espoused the antiquated system of Menahem b. Saruq, and this he supplemented by an independent critique of Menahem. This work is a mine of varied exegetical and philological details.

He also wrote commentaries on various scriptural books, those on Proverbs and Job being published. He composed an apologetic work *Sefer Ha-Berith* ("Book of the Bond"), and translated into Hebrew the ethico-philosophical work of Bahya ibn Pakuda ("Duties of the Heart").

Moses Kimchi (d. *c.* 1190), son of Joseph, was the author of a Hebrew grammar, *Mahalak Shebile Ha-daat.* He was the first to make the verb *paqadh* a model for conjugation, and the first also to introduce the now usual sequence in the enumeration of stem forms. In the first half of the 16th century it became the favourite manual for the study of Hebrew among non-Judaic scholars (1st edition, Pesara, 1508). Of his biblical commentaries, those on Proverbs, Ezra and Nehemiah are in the great rabbinical bibles falsely as the work of Abraham ibn Ezra.

David Kimchi (*c.* 1160–1235), also known as Redak, was also a son of Joseph; he eclipsed the fame of both his father and his brother. His magnum opus is the *Sefer Miklol,* "Book of Completeness," which covers the grammar (first printed in Constantinople, 1532–34) and the lexicon, *Sefer Hashorashim,* "Book of Roots" (first printed in Italy before 1480). In the grammar he combined the paradigmatic method of his brother Moses with the procedure of the older scholars who devoted attention to details. In his dictionary, again, he recast the lexicological materials independently and enriched lexicography itself, especially by his numerous etymological explanations.

Under the title *Et Sofer,* "Pen of the Writer," David composed a sort of grammatical compendium as a guide to the correct punctuation of the biblical manuscripts; it consists mainly of extracts from the *Miklol.* His biblical commentaries include those on Chronicles, on the Psalms, on the prophets and on Genesis. His annotations on the Psalms are especially interesting for the polemical excursuses directed against the Christian interpretation; his commentary on Genesis (edited by A. Günsburg, 1842) explains biblical narratives as visions.

The popularity of his biblical exegesis is demonstrated by the fact that the first printed texts of the Hebrew Bible were accompanied by his commentary.

KIMERIDGIAN: *see* Jurassic System.

KIMMEL, HUSBAND EDWARD (1882–), U.S. naval officer who was in command at Pearl Harbor, Hawaii, at the time of the surprise attack by Japanese carrier-based planes on Dec. 7, 1941. He was born Feb. 26, 1882, in Henderson, Ky., and graduated from the United States Naval academy in 1904. He became a rear admiral in Nov. 1937 and commanded cruiser divisions until his appointment as commander in chief of the U.S. Pacific fleet, with the rank of admiral, on Feb. 1, 1941. Ten days after the Japanese attack on Pearl Harbor he was relieved of his command and was retired two months later. His actions during the period immediately preceding the attack were exhaustively investigated by congress. *See* Pearl Harbor Attack.

Admiral Kimmel's Story was published in 1955. (J. B. Hn.)

KIN, a collective word for persons related by blood, as descended from a common ancestor. In law, the term "next of kin" is applied to the person or persons who, as being in the nearest degree of blood relationship to a person dying intestate, share according to degree in his personal estate. *See* Kinship; Intestate Succession; Inheritance.

KINCARDINESHIRE, the southernmost county of the three which form the northeastern corner of Scotland, has an area of approximately 383.8 sq.mi. Its outline is an irregular triangle with the northeastern angle near Greg Ness, south of the river Dee, the southern angle at the mouth of the North Esk and the western angle between Mt. Battock and the Hill of Cammie, where the boundaries of Angus (Forfarshire), Aberdeenshire and Kincardineshire meet. It has a coast line of about 35 mi. Kincardineshire is frequently referred to as the Mearns. The etymology of Mearns is obscure, as is the origin of the word Kincardine. The latter is believed to be derived from two Gaelic words, *ceann* and *garradh,* meaning the "head field" (the last cultivated part before the mountains are reached), and the word Kincardine occurs in different parts of Scotland where such conditions exist.

The Highland boundary fault approximately bisects the county, crossing from near Stonehaven in the north to near Edzell in Angus in the south. North of the line lies a tract of rolling moorland at 1,500–1,700 ft., rising to occasional higher summits culminating in Mt. Battock (2,555 ft.) in the west. The rocks are mainly Dalradian schists, with a central belt of gray granites and a southern belt of quartzites. The latter partly account for the steep southern face compared with the gentler slope to Deeside where the country is varied by estate woodlands. Mean annual rainfall is about 40 in.; snow falls on an average on 10–30 mornings a year. Much of the county is grazed by Blackfaced sheep or used as grouse moors. *Nardus* or heather moors alternate with cotton-grass bog over peat on ill-drained sites. In the northeast the highland rocks are planed across by a plateau of about 400–600 ft., resembling the country farther south but with colder soils and darker building stone. South of the boundary fault the county is dominated by rocks of Old Red Sandstone age. Fringing the highland are a few conical hills of conglomerate; *e.g.,* Strathfinella hill (1,358 ft.). The Howe (vale) of the Mearns, relatively sheltered and warm in summer though subject to sharp winter frosts, has the "Mearns keel" soil (red, fertile and easily drained boulder clay), alternating with light sands and gravels. Parallel to the coast is a sandstone plateau at about 400 ft., rising to 700–800 ft. in a lava core; it is rather bleak and windswept, with only about 30 in. of mean annual rainfall and rather dry and sunny, if cool, springs and early summers. The whole coast has cliffs up to about 300 ft., broken by picturesque coves above which lie declining fishing villages, the chief of which is Stonehaven, now turning to the holiday trade. The lowlands present a landscape of neat arable fields producing mainly fodder and ley grass, with some potatoes. Warm red tones in a newly turned field are echoed in farmstead walls and in the stone-built market towns. The large estates, the centres of agricultural improvement in the 18th century, were surrounded by fine woods and parks. Many hardwood trees have been felled, *e.g.,* round Dunnottar; they have been only partially replaced and then by conifers, which are also planted by the Forestry commission over wide areas of moorland west of Stonehaven between the Cowie and Carron valleys.

It is accepted that the Roman legions of Severus passed (*c.* A.D. 208–211) through the county, although the events connected with this invasion are obscure. The line of the Roman march through Kincardineshire may be traced by the remains of their encampments—at Fordoun, at Raedykes near Stonehaven, and at Normandykes across the Dee at Peterculter. The Romans are also credited with building the ford over the Dee at Tilbouries. Originally, Kincardineshire formed part of southern Pictavia and from an early period the Scottish kings had a stronghold at the ancient burgh of Kincardine, from which the county derives its name. The remains of the royal castle of Kincardine can still be seen. In 1296, during the Wars of Independence, Edward I of England passed through the county, halting at Glenbervie, Kincardine and Durris. Kincardineshire was also the scene of the battle of Corrichie fought in 1562 on the southeastern slopes of the Hill o'Fare between the forces of Mary, queen of Scots, and the earl of Huntly. After the coronation of Charles II in 1651, the "Honours" of Scotland—the crown, the sceptre and the sword—were deposited for safekeeping in Dunnottar castle, south of Stonehaven. In 1685, during the scare of the 9th earl of Argyll's invasion, 167 covenanters were imprisoned there and suffered much privation. During the Jacobite risings of 1715 and 1745 Kincardineshire came into prominence again. In 1715 the Old Pretender visited Fetteresso castle near Stonehaven and was proclaimed King James VIII by the earl

marischal of Scotland, and in 1745 the duke of Cumberland and his army marched through the county, burning the episcopal chapels as they went—Stonehaven, Drumlithie and Muchalls.

Kincardineshire is rich in buildings of architectural interest, among them St. Ternan's church at Arbuthnott (1276) and the ruined churches of Cowie (1276), Fetteresso (1246) and Maryculter (1240). Castellated buildings include Balbegno, Benholm, Crathes, Dunnottar, Durris, Muchalls and Tilquhillie. Arbuthnott, the Burn, Glenbervie, Kincausie, Netherley and Phesdo are later houses.

At Blairs, in the parish of Maryculter, stands the Roman Catholic college of St. Mary which possesses many interesting relics and works of art including the famous portrait of Mary, queen of Scots.

At the 1961 census the population was 48,820, including the part of the county of the city of Aberdeen in Kincardineshire. Gaelic was spoken by 106 persons, all of whom also spoke English. There are four small burghs: Banchory (pop. [1961] 1,918), Inverbervie (921), Laurencekirk (1,389) and Stonehaven (4,505). Rural and some urban populations have been tending to decline. There are five county districts. The only royal burgh is Inverbervie. The counties of Angus and Kincardine together send four members to parliament, two of these representing the city of Dundee. Kincardineshire is united in one sheriffdom with the shires of Aberdeen and Banff, and one of the Aberdeen sheriffs substitute sits at Stonehaven, the county town since 1600.

About 13% of the county is wooded, while the land by the Dee, the Howe of the Mearns and the coastal strip are scientifically farmed and yield well. Of the total area about half is devoted to the growing of crops, rotation grass and permanent grass. Almost one-third of the arable and grass area is devoted to oats and more than one-fourteenth to potatoes. Livestock is everywhere important—hill sheep on the moors and beef bullocks, together with high-grade and high-yielding dairy cows, on the farms. Apart from agriculture, the principal industry is fishing, of which Stonehaven is the centre; the salmon fisheries of the sea and rivers yield substantial returns. Manufactures are relatively small. Woolens and fish nets are made in Stonehaven; flax is spun at Inverbervie and Johnshaven; and there are distilleries at Fettercairn and at Stonehaven, where there is also a tannery. As a partial counter to the decrease in population there has been some development of the holiday trade in Stonehaven and in villages with declining fishing, and also of light industries such as toys in Stonehaven and furniture in Inverbervie.

The Deeside railway runs through that portion of the county on the north bank of the Dee; another line runs to Aberdeen via Laurencekirk and Stonehaven. (J. F. Ws.; A. T. A. L.)

KINDERGARTEN, the name given by Friedrich Froebel (*q.v.*) to an institution founded by him in Blankenburg, Germany, in 1837, to meet the educational needs of children between the ages of four and six years, through the agency of play. *See* ELEMENTARY EDUCATION: *The Kindergarten Movement. See* also PRE-ELEMENTARY EDUCATION; EDUCATION, HISTORY OF.

KINDI, AL- (YAKUB IBN ISHAK AL-KINDI) (9th century A.D.), the first outstanding Islamic philosopher, called "the philosopher of the Arabs," was of noble Arabic descent and flourished in Iraq under the caliphs al-Ma'mun (813–833) and al-Mu'tasim (833–842). He was evidently appreciated as a philosopher at court. He seems to have died some time after 870. His influence and authority were great for about a century after his death but were then definitely overshadowed and superseded by later philosophers. The Latin scholastic philosophers knew a few of his treatises in translation (*see* texts edited by A. Nagy, 1897).

The titles of more than 270 works by al-Kindi are known; and a considerable number of these works (mostly short treatises) are extant and have been identified as his. Al-Kindi concerned himself not only with various philosophical questions such as had been treated by the Aristotelian Neoplatonists of Alexandria but also with miscellaneous subjects; for instance, astrology, medicine, Indian arithmetic, logogriphs, the manufacture of swords and the art of cookery. He also discussed specific Islamic issues.

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KINEMATICS, the branch of mechanics which treats of the phenomena of motion without reference to force or mass. *See* MECHANICS.

KINESHMA, a town in the Ivanovo *oblast* of the Russian Soviet Federated Socialist Republic of the U.S.S.R., stands on the right bank of the Volga, 217 mi. (350 km.) N.E. of Moscow. Pop. (1959) 85,418. The town, although dating from the 16th century, was small and unimportant before the Russian Revolution, with only 7,600 inhabitants at the beginning of the 20th century. After the Revolution it grew rapidly as the chief river port for the Ivanovo region, handling cotton, petroleum, timber, grain and other goods. The port has a large grain elevator. Kineshma is the terminus of a railway from Ivanovo city, 55 miles distant. Industry has developed in Kineshma itself. The textile industry takes first place, chiefly cottons, and there is a chemical industry, serving the needs of the textile mills and also producing wood chemicals. Machine building is mainly concerned with equipment for the papermaking and food-processing industries. Ceramics and bricks are made and there is timber working. Nearby are two industrial satellite towns, Navoloki, also a cotton centre, and Zavolzhsk on the opposite bank of the Volga, with a chemical industry. (R. A. F.)

KINETICS, the branch of mechanics which comprises the phenomena of motion as affected by force; it is the modern equivalent of dynamics in the restricted sense (*see* MECHANICS).

KINETIC THEORY OF MATTER. The kinetic theory of matter rests upon two distinct but closely related hypotheses: the hypothesis of the molecular structure of matter and the hypothesis that heat is a manifestation of the random to-and-fro motion of the molecules.

In the beginning the hypothesis of the molecular structure of matter merely asserted that all matter is composed of very small particles, which later came to be known as molecules. Soon after 1800 it was recognized that each chemical element consists of small particles that are all exactly alike; these were called atoms. It was concluded further that most molecules consist of two or more atoms in close combination. In the case of such compound molecules, motions of the atoms within the molecules must also be taken into account in considering the heat energy of matter.

The heat motion of the molecules is especially simple in matter that is in the gaseous state. At normal temperature and pressure the density of a substance in the gaseous state is of the order of one-thousandth of the density of the same substance in the solid or liquid state. It follows that the average distance apart of the molecules in the gaseous state is roughly ten times as great as in the solid or liquid state, and hence that in the gaseous state the molecules must be separated by distances that are large compared with their linear dimensions. If the molecules in the air at normal temperature and pressure were arranged in cubical order, the edge of each cube would be about 3.3×10^{-7} cm.; the average diameter of a molecule in air is 3.7×10^{-8} cm. Further important evidence as to the nature of the gaseous state of matter is provided by the experiments of J. P. Joule and W. T. Kelvin. These experiments showed that when a gas is allowed to stream out into a vacuum, its change of temperature is in general very slight. In terms of the molecular theory this indicates that the total energy of the gas is very approximately equal to the sum of the separate energies of its different molecules; the potential energy arising from intermolecular forces between pairs of molecules may be treated as negligible in the gaseous state.

These two simplifying facts bring the properties of the gaseous state of matter within the range of mathematical treatment. The kinetic theory of gases attempts to account, in terms of the molecular structure of matter, for all the nonchemical and nonelectrical properties of gases. A brief statement of the methods and results of the kinetic theory of gases will be given first, followed by a brief consideration of the kinetic theory of matter in the solid or liquid state.

THE KINETIC THEORY OF GASES

One of the earliest triumphs of the kinetic theory was its explanation of the laws that had been found to connect the density, pressure and temperature of a gas. The kinetic theory regards a mass of gas as a collection of independently moving molecules; if these are shut up in a closed vessel, molecules must continually collide with the walls of the vessel, exerting pressure at the moment of collision, and the kinetic theory interprets the pressure of the gas as the aggregate of the pressures exerted by the various molecules when they collide with the boundary. A quantitative relation between the pressure and the molecular velocities is easily obtained.

Calculation of the Pressure in a Gas.—The molecules of a gas will be moving in different ways, but they can be divided up into a system of showers, such that all the molecules in any one shower have approximately the same velocity and are moving in the same direction. Let u, v, w denote the components of the velocity of any molecule in three directions at right angles in space, and let us fix our attention on any one shower, whose molecules have components u_1, v_1, w_1. Let us consider the impact of the molecules of this shower upon an area S of the boundary of the containing vessel, and for simplicity let S be perpendicular to the direction of u. Then each molecule of the shower that strikes the area gives up momentum mu to it before its motion in the u direction is arrested, and as it rebounds with equal velocity it also acquires momentum mu in the opposite direction, so that the total transfer of momentum is $2mu$. The number of molecules belonging to the shower that strikes the area S in a small interval of time dt is equal to the number that lay within a distance u_1dt of S at the beginning of this interval and so occupied a small disk of volume Su_1dt of the gas. If there are ν_1 molecules in unit volume belonging to the shower, the number inside the disk was $Su_1\nu_1dt$.

Thus these molecules transfer momentum $2mu_1^2\nu_1Sdt$ to the area S of the boundary; and the total momentum so transferred by the molecules of all showers can be written

$$2m\,Sdt(\nu_1u_1^2 + \nu_2u_2^2 + \ldots)$$

where the sum includes a term for each shower whose molecules are moving with a component u directed toward S. The sum can also be written $\frac{1}{2}\,\nu\,U^2$ where ν is the total number of molecules in unit volume and U^2 denotes the average value of u^2 for the different molecules; the factor $\frac{1}{2}$ is introduced because half of all the showers will be moving with a component u directed away from S and hence cannot contribute to the pressure on S. Or, let C^2 stand for the average value of $u^2 + v^2 + w^2$, or the square of the actual velocity, for all the molecules. Since as many molecules will be moving in one direction as in another, the average values of u^2, v^2 and w^2 will be the same. Hence $U^2 = \frac{1}{3}\,C^2$; and the momentum transferred to the area S during the interval dt is $\frac{1}{3}\,m\nu\,SC^2dt$.

Since the momentum transferred must be equal to $pSdt$, where p is the pressure or force per unit area on the boundary, the value of p is

$$p=\tfrac{1}{3}m\nu C^2 \qquad (1)$$

or, since $m\nu$ is the total mass in unit volume and hence equals the density ρ, expressed in grams per cubic centimetre,

$$p=\tfrac{1}{3}\rho\ C^2 \qquad (2)$$

Since p and ρ can be measured for any gas, the value of C can be calculated. C is called the root-mean-square velocity of the molecules; the pressure would be the same as it actually is if all the molecules were moving with the velocity C. The distribution of the molecular velocities will be considered presently. Some values of C at 15° C. are as follows:

	Hydrogen	Air	Mercury vapour
C in cm. per sec.	188,800	49,820	18,930
C in ft. per sec.	6,190	1,634	621

The Gas Laws.—It was found by Boyle that as a gas is compressed without change of its temperature its pressure increases directly as its density. This conclusion follows from formula (2) if the assumption is made that C^2 depends only on the temperature. The latter assumption can be shown to be a consequence of the laws of dynamics.

Furthermore, it was shown by J. A. C. Charles and by J. L. Gay-Lussac that when a gas is heated at constant volume its pressure increases at a rate that is the same for all gases. The pressure increases, in fact, in proportion to the thermodynamic absolute temperature T, as can be shown by a thermodynamical argument. Thus the laws for a gas as established by observation can be expressed in the single formula

$$p=\rho\ RT \qquad (3)$$

where R is a constant depending upon the kind of gas, or, as the equation is more commonly written,

$$pv=RT \qquad (4)$$

where v equals $1/\rho$ and represents the specific volume or the volume of a gram. Let T be expressed in degrees Celsius (centigrade).

Comparison of formulas (2) and (3) shows that

$$C^2=3\ RT \qquad (5)$$

Thus the average velocity of the molecules varies in proportion to the square root of the absolute temperature.

The Specific Heat.—The total kinetic energy of translation of all the molecules in unit volume is $\nu(\frac{1}{2}mC^2)$ or $\frac{1}{2}\rho C^2$ or $\frac{3}{2}\ \rho RT$. Since ρ represents the mass in unit volume, the energy in unit mass is $\frac{3}{2}\ RT$. This energy increases by the amount $\frac{3}{2}\,R$ when the temperature is increased by one degree. Hence the specific heat of a gas at constant volume should be $\frac{3}{2}\,R$, provided the molecules contain no variable energy other than that associated with the motion of translation.

The specific heat at constant volume is found by experiment to equal $\frac{3}{2}\,R$ or $\frac{3}{2}\,pv/T$ for helium and the other rare gases, whose molecules consist of a single atom. For gases with polyatomic molecules, the specific heat exceeds $\frac{3}{2}\,R$ except at extremely low temperatures. The difference is ascribed to the existence of energy of rotation of the molecules, or of vibration of the atoms in gases having polyatomic molecules.

The Equipartition of Energy.—According to a famous principle known as the equipartition of energy, when a dynamical system is in statistical equilibrium at a given temperature T, the same amount of average kinetic energy is associated with each degree of freedom; *i.e.*, each independent mode of motion of the system. A molecule in translation has three degrees of freedom corresponding to the three mutually perpendicular directions in which it can move independently. It follows that in gases composed of different kinds of molecules, the average translational energies of the molecules, or the values of $\frac{1}{2}mC^2$, should be the same for all the different kinds of molecules. When the molecules are actually mixed together, this conclusion can be verified by an analysis of the effects of their collisions with each other. Even if the different kinds of molecules are in different vessels, the same conclusion can be reached by a more abstruse argument based upon the Newtonian or "classical" laws of dynamics.

Since C^2 has been found to be proportional to the absolute temperature T, it is possible to write for the average translational energy of a molecule

$$\tfrac{1}{2}mC^2=\tfrac{3}{2}\,kT$$

where k is a constant of proportionality. The average kinetic energy for each degree of freedom, according to the principle of equipartition, is then a third of $\frac{1}{2}mC^2$ or $\frac{1}{2}kT$. Since C^2 also

equals 3RT, it is seen that $k=m\mathrm{R}$. The numerical magnitude of k, which is known as the Boltzmann constant or the "gas constant for one molecule," is 1.38044×10^{-16} in centimetre-gram-second units.

Soon after 1925, however, it came to be realized that the classical laws of dynamics represent only an approximation, which is close to the truth in dealing with masses that are sufficiently large, or moving sufficiently rapidly, or subjected to sufficiently weak forces. The classical laws, one of which has just been used in calculating the pressure in a gas, are sufficiently accurate for a description of the translational motion of the molecules in a gas; but they fail badly in dealing with the rotational and vibrational motions of the molecules. An adequate theory of the specific heat of gases composed of polyatomic molecules must be based upon the newer quantum or wave mechanics.

Counting the Molecules.—Since, as has just been seen, the quantity $\frac{1}{2}m\mathrm{C}^2$ has the same value for all gases at a given temperature, it follows from formula (1) that the number of molecules in unit volume or ν is the same for all gases at the same temperature and pressure. This remarkable fact is known as Avogadro's law (*see* AVOGADRO'S CONSTANT.)

The kinetic theory of gases does not furnish any reliable method of ascertaining the numerical value of ν. The best method is to start from the well-attested fact that in electrolysis each atom of hydrogen carries an electric charge numerically equal to the charge on an electron, which has been measured. The total amount of electric charge delivered by a gram of hydrogen in being deposited electrolytically is also known. (*See* ELECTRICITY, CONDUCTION OF: *Conduction in Liquids.*) The charge on a gram divided by the charge on an atom then gives the number of atoms in a gram of hydrogen; and this number, divided by 2, is the number of molecules in a gram of hydrogen gas. This number again, multiplied in turn by the density or the mass in unit volume, gives the number of molecules in unit volume or ν. It is thus found that in a gas under a pressure of one atmosphere and at a temperature of 0° C.,

$$\nu = 2.69 \times 10^{19}$$

In a similar way it is found that the number of molecules in a gram-molecule of any substance is $\mathrm{N}_0 = 6.02 \times 10^{23}$. This is an enormous number.

The Law of Distribution of Molecular Velocities.—The molecules of a gas are not all moving with the same velocity. When the gas is at rest and free from disturbance, the effect of collisions between its molecules was shown by J. C. Maxwell and L. Boltzmann to be such that the molecular velocities soon come to be distributed in a definite manner. The gas is then in a steady or normal state. When this state has been attained, the statistical equilibrium is actually maintained in a very simple manner. Let us divide all possible velocities into distinct ranges $a, b, c, \ldots$. When two molecules moving with velocities a,b collide, the collision changes the motion of both and they assume new velocities p,q. Thus the collision takes one molecule away from each of the classes a,b and adds one to each of the classes p,q. When the gas is in its steady state, there occur just as many collisions of the inverse type, in which a molecule is taken from each of the classes p,q and added to one of the classes a,b. The statistical effect of the collisions is thus nil.

The distribution of the molecular velocities in the steady state may be described as in fig. 1.

Confining our attention to one component of velocity u, it is found that the values of u for the different molecules conform to what is called the law of trial and error—they are distributed at random around the value $u = 0$ according to the same law that determines the distribution of shots around the middle point of a line-target. To express the result mathematically, if u, v, w denote the three components of velocity in three directions at right angles in space, then the number of molecules whose velocity is such that

u lies between u and $u+du$
v ,, ,, v and $v+dv$
w ,, ,, w and $w+dw$

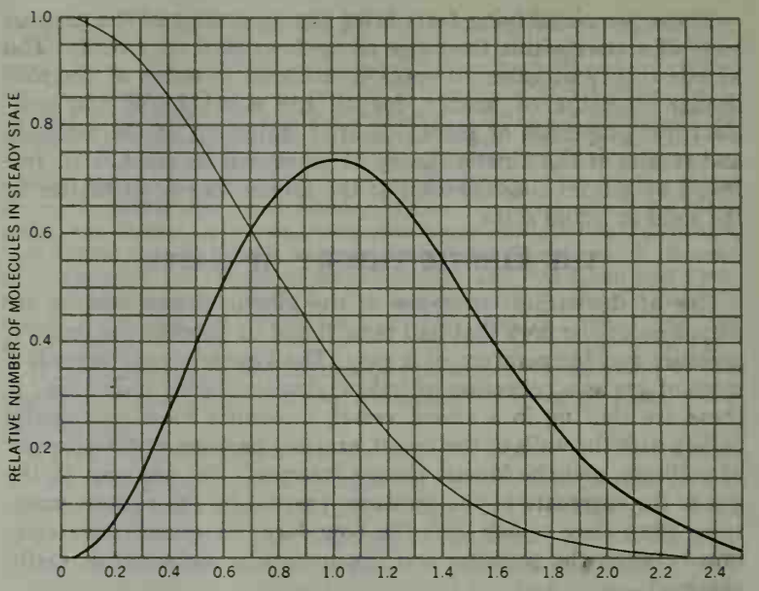

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FIG. 1.—THE LAW OF DISTRIBUTION OF VELOCITIES. THIN CURVE INDICATES NUMBER OF MOLECULES IN STEADY STATE FOR EACH VALUE OF VELOCITY COMPONENT. THICK CURVE INDICATES NUMBER OF MOLECULES IN STEADY STATE FOR EACH VALUE OF THE TOTAL VELOCITY

is found to be

$$\mathrm{N}\left(\frac{hm}{\pi}\right)^{\frac{3}{2}} e^{-hm(u^2+v^2+w^2)}\, du\, dv\, dw \qquad (6)$$

Here N is the total number of molecules and m is the mass of each, while h is a constant, which will be found to depend on the temperature. This law is commonly known as Maxwell's law of distribution of velocities.

If we fix our attention on any one component of velocity, say u, disregarding the values of v and w entirely, it is found that the number of molecules for which this component lies between u and $u+du$ is

$$\mathrm{N}\left(\frac{hm}{\pi}\right)^{\frac{1}{2}} e^{-hmu^2} du \qquad (7)$$

This partition of values of u is shown graphically in the thin curve in fig. 1. The numbers along the horizontal axis represent values of u, and the corresponding height of the thin curve is proportional to the total number of molecules that have this particular value of u in Maxwell's steady state. The whole area of this curve is equal to $100\sqrt{\pi}$, or 177.25, of the small squares. Let us, for instance, suppose that each of these small squares represents a million molecules; then we find that in a gas of 177,250,000 molecules, rather less than 20,000,000 have values of u between 0 and 0.1, about 19,000,000 have values of u between 0.1 and 0.2 and so on, while less than a million have values between 1.7 and 1.8, and less than 40,000 have values between 2.4 and 2.5. These values of u are measured on an arbitrary scale that has not yet been determined. But whatever the scale on which u is measured, we see that high values of u are very rare, the majority of molecules keep to moderate values and the favourite value of all is zero.

In many problems the total velocity of a molecule is of greater importance than its individual components. If c^2 is written for $u^2+v^2+w^2$, so that c is the total velocity of a molecule, it can readily be deduced from formula (6) that the total number of molecules for which c lies between c and $c+dc$ is

$$4\pi\mathrm{N}\left(\frac{hm}{\pi}\right)^{\frac{3}{2}} e^{-hmc^2} c^2 dc \qquad (8)$$

This distribution of velocities is represented graphically by the thick curve in fig. 1. We see that both very high and very low values of c are now rare, the favourite value for c being unity.

From formula (8) it can be shown by integration that the average of the square of the velocity of the molecules, which was previously denoted by C^2, is also equal to $3/(2hm)$. Since $\frac{1}{2}m\mathrm{C}^2$

also equals $\frac{3}{2}k\mathrm{T}$ in terms of the Boltzmann constant k and the absolute temperature T, it follows that

$$h=\frac{1}{2k\mathrm{T}}$$

Dalton's Law.—Imagine that a gas consists of a mixture of gases of different kinds, so that unit volume contains a mass ρ_1 of one kind, ρ_2 of another and so on. The pressure on the boundary is now the sum of the pressures exerted by molecules of all kinds. The pressure exerted by the first kind is $\rho_1\mathrm{RT}$, that by the second kind is $\rho_2\mathrm{RT}$ and so on; hence the total pressure p is given by

$$p = \rho_1\mathrm{RT} + \rho_2\mathrm{RT} + \ldots = \rho\mathrm{RT}$$

where ρ equals $\rho_1 + \rho_2 + \ldots$ and represents the total mass in unit volume. This formula shows that the pressure of a mixture of gases equals the sum of the pressures that would be exerted separately by the several constituents if each were present alone.

Brownian Movement.—From the value $k = 1.38 \times 10^{-16}$ it is readily calculated that a molecule, or aggregation of molecules, of mass 10^{-12} grams ought to have a mean velocity of about 2 mm. a second at 0° C. Such a velocity ought accordingly to be set up in a particle of 10^{-12} grams mass immersed in air or liquid at 0° C., by the continual jostling of the surrounding molecules or particles. A particle of this mass is easily visible microscopically, and a velocity of 2 mm. per second would of course be visible if continued for a sufficient length of time. Each bombardment will, however, change the motion of the particle, so that changes are too frequent for the separate motions to be individually visible. But it can be shown that from the aggregation of these separate short motions the particle ought to have a resultant motion, described with an average velocity which, although much smaller than 2 mm. a second, ought still to be microscopically visible. R. von S. Smoluchowski and Albert Einstein have shown that this theoretically predicted motion is simply that seen in the "Brownian movement" first observed by the botanist Robert Brown in 1827. From observations of the motion, values of ν and N_0 can be deduced that are in fair agreement with those found by the method previously described. Thus the Brownian motion provides visual demonstration of the reality of the heat motion postulated by the kinetic theory. (*See* BROWNIAN MOVEMENT.)

Correction of the Gas Equation.—The laws that have just been stated are obeyed very approximately, but not with perfect accuracy, by all gases whose density is not too great or whose temperature too low. Van der Waals in 1873 ascribed the imperfections of the foregoing formula for the pressure to two causes:

1. The calculation has not allowed for the finite size of the molecules, and their consequent interference with one another's motion.

2. The calculation has not allowed for the attractive force between the molecules, which, although small, is known to have a real existence. The presence of this force results in the molecules, when they reach the boundary, being acted on by forces in addition to those originating in their impact with the boundary.

To allow for the first of these two factors, on the assumption that a molecule is a hard elastic sphere, Van der Waals found that v in formula (4) should be replaced by $v - b$ where b is four times the aggregate volume occupied by all the molecules in a gram; to allow for the second factor, on the assumption that the attraction is weak, he replaced p by $p + a/v^2$ where a is a new constant. He thus obtained for the pressure-volume relation the famous equation

$$\left(p+\frac{a}{v^2}\right)(v-b)=\mathrm{RT}$$

which is known as Van der Waals's equation.

This equation has the great advantage that it predicts a general behaviour of gases under high pressure similar to that which is actually observed. (*See* LOW-TEMPERATURE PHYSICS.) Values can be assigned to a and b that make the equation fit the observations roughly, but it cannot be made to fit exactly for any gas.

Several reasons are recognized for the limited success of Van der Waals's equation. The principal one is that the molecules are not elastic solids and cannot even be said really to possess a definite size. When not too close together, two molecules attract each other; as they approach, this attraction increases to a maximum, then decreases to zero and is replaced by a rapidly mounting repulsion. Because of this strong repulsion when close together, the molecules behave in many respects as if they were hard objects having a certain size and shape. The equivalence is not exact, however, and no simple formula can be written to represent exactly the relation between p,v and T. In dealing with certain other phenomena in gases it is convenient to make the same arbitrary assumption that the molecules are small elastic spheres. The properties of such an elastic-sphere gas can then be deduced, and they are found to agree in large measure, although never exactly, with the properties of actual gases.

The Free Path in a Gas.—Let us regard each molecule of a gas provisionally as a small round shot. Each shot travels on in a straight line until it strikes some sort of target, after which its speed is changed and its direction of motion altered. Some molecules strike the target formed by the boundary of the vessel containing the gas; others strike another molecule. If the diameter of each molecule is σ, two molecules cannot pass so close that the distance between their centres is less than σ without a collision taking place, so that each molecule can be regarded as forming a target of area $\pi\sigma^2$. If there are ν molecules per unit volume, the number in a small layer of thickness t and cross section S is $\nu t\mathrm{S}$, and these form a target of total area $\pi\sigma^2\nu t\mathrm{S}$. This quantity is proportional to t, and for a certain value of t it becomes equal to S. When t has this value, the target formed by the combined molecules precisely fills up the whole area S, so that no molecule can get through without a collision. The value of t which makes $\pi\sigma^2\nu t\mathrm{S}$ equal to S is

$$t=\frac{1}{\pi\nu\sigma^2}$$

so that in traveling through a layer of this thickness in the gas each molecule will collide with some other molecule and have its speed and direction of motion changed.

The foregoing simple calculation requires adjustment, however, in several respects. The molecules are distributed irregularly in space, and allowance must also be made for the variation in their velocities. An exact calculation, first given by Maxwell, shows that the average distance l which a molecule travels before colliding with another molecule is given by

$$l=\frac{1}{\sqrt{2}\,\pi\nu\sigma^2} \qquad (9)$$

In ordinary air the length of the average free path is 0.000006 cm. or $\frac{1}{400,000}$ of an inch. Since the molecule of air travels at a rate of 50,000 cm. a second, it must describe 8,000,000,000 free paths every second, and so collides with 8,000,000,000 other molecules in each second of its existence.

The individual free paths between collisions will be distributed statistically on both sides of l. The favourite length of free path is actually zero; in this case, a molecule stands almost still until another one strikes it. The frequency of free paths of a given length decreases as the length increases, and paths several times as long as the average length l are rare. (*See* fig. 2.)

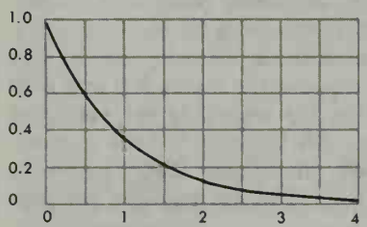
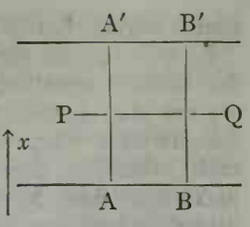


FIG. 2.—THE CURVE REPRESENTS THE RELATIVE NUMBERS OF MOLECULAR FREE PATHS OF VARIOUS LENGTHS. THE LENGTH IS EXPRESSED IN TERMS OF THE AVERAGE LENGTH AS A UNIT

Conduction of Heat.—During the description of any free path the energy of a molecule remains unchanged, although it may gain or lose energy at a collision with another molecule. Consider the motions of molecules in a gas in which the temperature is not uniform. Let one layer AB of the gas be at a

temperature T, while another parallel layer A′B′ at a distance l (equal to the mean free path of the molecules) is at a temperature T′. Owing to the difference of temperature, the average energies of the molecules in the two layers will be different; let them be E and E′ respectively. A molecule that starts from a collision at A and describes the free path AA′ before collision at A′ is likely to have the energy E appropriate to the layer AB, while one that describes the free path B′B in the reverse direction is likely to have the energy E′ appropriate to the layer A′B′. If the temperature T is higher than T′, E will be greater than E′, so that more energy is carried from the hot layer AB to the cold layer A′B′ than travels in the reverse direction, and there is a resultant flow of heat-energy from the hot parts of the gas to the cold. In this way the kinetic theory explains the conduction of heat in a gas.



To study the amount of this flow of heat, let us fix our attention on the molecules that cross a unit area PQ, halfway between the two layers AB, A′B′. Half of these will cross PQ in one direction and half in the other. If there are ν molecules per unit volume each traveling with an average velocity c, then $\frac{1}{2}\nu c$ molecules will cross in each direction per unit time. The stream that crosses in the direction AA′ will transport energy $\frac{1}{2}\nu c$E across the unit area in that direction, while the other stream will transport energy $\frac{1}{2}\nu c$E′ in the reverse direction. The net transport of energy across the plane in unit time is accordingly

$$\tfrac{1}{2}\nu c\,(\mathrm{E}-\mathrm{E}')$$

The foregoing simple discussion needs correction, since the free paths which cross the plane PQ are not, in general, perpendicular to PQ. A simple mathematical investigation shows that the necessary correction consists in multiplication by a factor $\frac{2}{3}$, so that the net transport of energy is

$$\tfrac{1}{3}\nu c\,(\mathrm{E}-\mathrm{E}')$$

Now by definition of ν and E, νE is the total energy per unit volume at A, and this is equal to $\rho\,\mathrm{C}_v\,\mathrm{T}$, where ρ is the density and C_v is the specific heat of the gas at constant volume. Thus the net transport of energy in unit time may also be taken to be

$$\tfrac{1}{3}\rho\mathrm{C}_v c\,(\mathrm{T}-\mathrm{T}')$$

If x is a co-ordinate measured perpendicular to PQ in the direction AA′, we may put

$$\mathrm{T}-\mathrm{T}' = -\,l\,\frac{d'\mathrm{T}}{dx}$$

The flow of heat-energy per unit area per unit time is then

$$-\vartheta\,\frac{d'\mathrm{T}}{dx} \qquad (10)$$

where

$$\vartheta = \tfrac{1}{3}\rho\mathrm{C}_v cl \qquad (11)$$

In the theory of heat the flow of heat is given by expression (10) where ϑ is the coefficient of conduction of heat. Thus the kinetic theory explains the conduction of heat and predicts a definite value for the coefficient of conduction. This value needs minor adjustments of various kinds, and these result in ϑ assuming a value substantially larger than that given by equation (11).

Viscosity.—The phenomenon of gaseous viscosity can be discussed in a similar way. We now suppose the layers AB and A′B′ of the gas to be moving parallel to PQ with different velocities v,v' so that a molecule in the layer AB is likely to have momentum mv parallel to AB. We now investigate the transfer of momentum mv across the plane PQ. The net transfer per unit time is

$$\tfrac{1}{3}\nu c(mv-mv')$$

Since the density ρ of the gas is equal to mv, this may be put in the form

$$\tfrac{1}{3}\rho c(v-v')$$

or

$$-\tfrac{1}{3}\rho cl\,\frac{dv}{dx}$$

This is equal to

$$-\mu\,\frac{dv}{dx}$$

where

$$\mu = \tfrac{1}{3}\rho cl \qquad (12)$$

The coefficient in this equation again requires correction. The best value of the coefficient, for molecules in the form of spheres, is 0.499 instead of $\frac{1}{3}$.

Equations (11) and (12) give the following interesting relation between the coefficient of heat conduction ϑ, the viscosity μ and the specific heat at constant volume: $\vartheta = \mu\mathrm{C}_v$. The fully corrected value, for spherical molecules, is close to

$$\vartheta = \tfrac{5}{2}\mu\mathrm{C}_v$$

This equation is verified experimentally to a close approximation for monatomic gases such as helium or neon. For other gases the coefficient lies between 5/2 and 1, as further analysis indicates that it should do.

Diffusion.—The phenomenon of diffusion can be treated in a very similar manner. We consider a mixture of two gases G_1 and G_2, supposing that the proportion of G_1 in the mixture is θ at AB and is θ' at A′B′. The chance of a molecule that describes a free path AA′ being a molecule of G_1 is θ, so that the mass of the gas G_1 that is carried by each molecule describing such a free path is, *on the average*, equal to θm. As in formula (8), the net transport of G_1 across the plane PQ per unit time is

$$\tfrac{1}{3}\nu c(\theta m - \theta' m')$$

or

$$-\tfrac{1}{3}\nu cl\,\frac{d}{dx}(\theta m)$$

This can be put in the form

$$-D\,\frac{d}{dx}(\nu m\theta)$$

where D, which is the coefficient of diffusion, is given by

$$D = \tfrac{1}{3}cl$$

The coefficient $\frac{1}{3}$ in this formula is again changed considerably when a more exact calculation is made.

The Size of Molecules.—We have seen that the kinetic theory explains the three phenomena of the conduction of heat, viscosity and diffusion as all three are dependent on transport by molecules describing free paths. The three coefficients for these phenomena are all found to be proportional to the average length of the free paths, and this in turn depends in a definite way upon the diameters of the molecules. Thus a comparison of the theoretical values of these coefficients with observational values provides three distinct means of evaluating the molecular mean free path and, from this, the molecular diameter.

The values of the average free path that are obtained in this way from the conduction of heat agree with those obtained from the viscosity as well as could be expected in view of the fact that the heat energy of the molecules includes energy of rotation and vibration, and the effect of molecular collisions in transferring this part of the energy from one molecule to another is not precisely known. The molecular diameters calculated from observations on diffusion are a little smaller. This is not surprising, in view of the fact that the theoretical formulas are based on the assumption that the molecules are elastic spheres, whereas there is no doubt that in reality they do not possess sharply defined surfaces but merely repel each other with a certain finite force when brought close together. A close examination of the collision process shows that the behaviour of molecules of this sort in the phenomenon of diffusion ought to resemble that of spheres of a somewhat smaller diameter than in the phenomenon of diffusion.

In the following table are shown values of the average free path l of the molecules of several gases at 15° C., as obtained by

substituting the observed value of μ for μ in formula (12), with the factor $\frac{1}{3}$ replaced by 0.499, as already explained. Values of the molecular diameter σ calculated from formula (9) using this value of l are also shown. For comparison, there are shown also values of the molecular diameter calculated from the constant b in Van der Waals's equation, in which a and b were chosen to secure the best fit with observations on the gases at ordinary pressures and temperatures. The approximate agreement between the values of σ for many gases as obtained from viscosity and from b furnishes another confirmation of the correctness of the theory.

Gas	Average free path l, centimetres	Molecular diameter σ from viscosity, centimetres	Molecular diameter σ from Van der Waals's b, centimetres
Hydrogen . .	11.8×10^{-6}	2.74×10^{-8}	2.56×10^{-8}
Helium . . .	18.6×10^{-6}	2.18×10^{-8}	2.02×10^{-8}
Nitrogen . .	6.28×10^{-6}	3.75×10^{-8}	3.56×10^{-8}
Oxygen . . .	6.79×10^{-6}	3.61×10^{-8}	3.59×10^{-8}
Carbon dioxide .	4.19×10^{-6}	4.59×10^{-8}	5.60×10^{-8}

In general, the kinetic theory is found to give a satisfactory account of all physical phenomena in gases which are not compressed to too great a density.

Gases at Very Low Density.—As the pressure and density of a gas are reduced, it might be anticipated that the viscosity of the gas and the conduction of heat through it would be reduced, since less density means that less matter is present to cause these phenomena. The kinetic theory indicates, on the other hand, as was pointed out by Maxwell in 1866, that the viscosity and the conduction of heat both ought to be independent of the density. This conclusion appears at once from formulas (11) and (12), in which the average free path increases in proportion as the density is reduced, as is obvious from formula (9). This surprising conclusion from the theory was confirmed by experiment.

Ultimately, however, the viscosity and the conduction of heat must decrease, becoming zero when all of the gas has been removed. The theory indicates that these phenomena should begin to decrease in magnitude when the density has been reduced until the average free path of the molecules becomes greater than the width of the space across which a viscous effect or the flow of heat is being observed. As the density is further decreased, both phenomena should ultimately become proportional to the density of the gas. These conclusions from the theory also have been confirmed by experiment.

CONDENSED PHASES

Kinetic Theory of the Solid and Liquid States.—As has been stated, two molecules are assumed to repel each other only when extremely close together, *i.e.*, when the distance between their centres is about the same as the so-called molecular diameter σ; at somewhat greater distances they attract each other. Under the influence of this attraction, as the temperature is reduced and the molecular velocities are thereby diminished, it eventually becomes possible for groups of molecules to cling together. In this way is explained the occurrence of the liquid and solid phases of matter (*see* PHASE EQUILIBRIA).

Either a liquid or a solid may be in contact with its own vapour at the same temperature, which has the form of a gas. The equilibrium between the vapour and the condensed phase is interpreted in kinetic theory as being statistical in nature. Molecules coming from the vapour are continually impinging upon the liquid or solid phase, and many of them become attached to it, while other molecules which happen to acquire exceptionally high velocities are continually leaving the condensed phase and re-entering the vapour. Thus a continual process of evaporation and condensation is going on. If the temperature is raised, the process of evaporation increases in rapidity and predominates over the process of condensation; the net result is evaporation of the liquid or sublimation of the solid.

As a molecule leaves the liquid or solid phase, it is slowed down in its motion by the attraction of the remaining molecules. In this way, during evaporation or sublimation, heat energy becomes converted into potential energy representing work done against the attractive forces. This process is believed to constitute the chief reason for the large amount of heat that must be supplied in order to convert a substance into the vapour state. Another reason probably lies in a difference between the energy of the molecular motions in the vapour phase as compared with those in the liquid or solid phase at the same temperature. It is only the faster moving molecules that escape in the process of evaporation, and the decrease in their velocities due to the attraction just suffices on the average to lower their kinetic energies to the value proper to the temperature of the vapour. For this reason steam, for example, has the same temperature as the water from which it comes.

The Solid State.—In a solid the molecules are assumed to be so firmly held by their mutual attractions and repulsions that they seldom move far from their equilibrium positions. Thus are explained many facts of everyday experience. For instance, the surface of a finely carved metal (such as a plate used for steel engraving) will retain its exact shape for centuries, and again, when a metal body is coated with gold leaf, the atoms of the gold remain on its surface indefinitely; if they moved through any but the smallest distances they would soon become mixed with the atoms of the baser metal and diffused through its interior.

The molecules composing a solid may be compared with a collection of heavy particles connected by light spiral springs, one spring being supposed to connect each pair of adjacent particles. If left to themselves, the particles would settle into certain positions of equilibrium. By the application of external forces, the entire collection of particles could be either compressed or dilated or twisted, just as solid bodies can be.

Let two such masses of molecules be suspended by strings from the same point, and then let one mass be drawn aside, pendulum-wise, and allowed to impinge on the other. After impact the two masses will rebound, and the process may be repeated any number of times, but ultimately the two masses will be found again hanging in contact side by side. At the first impact each layer of surface molecules that takes the shock of the impact will be thrust back upon the layer behind it; this latter layer will in this way be set into motion and so influence the layer still further behind; and so on indefinitely. The impact will accordingly result in all the molecules in the mass being set into motion, and by the time that the masses have ceased impinging on one another the molecules of which they are composed will be performing oscillations about their positions of equilibrium. The kinetic energy with which the moving mass originally impinged on that at rest is now represented by the energy, kinetic and potential, of the small motions of the individual molecules of which the bodies are composed. Thus, in harmony with common experience, when two bodies impinge, the kinetic energy that appears to be lost from the mass-motion of the bodies is in reality transformed into heat-energy.

Again, suppose that two bodies, both devoid of heat, are placed in contact with one another, and that the surface of the one is then rubbed over that of the other. The molecules of the two surface layers will exert forces upon one another, so that, when the rubbing takes place, each layer will set the molecules of the other into motion, and the energy put into the act of rubbing will be used in establishing this heat-motion. In this we see the explanation of the phenomenon of the generation of heat by friction. At first the heat-motion will be confined to molecules near the rubbing surfaces of the two bodies, but, as already explained, these will

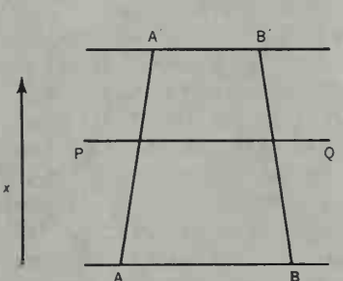


FIG. 3.—THE CONDUCTION OF MOLECULAR HEAT. AB, A'B' REPRESENT LAYERS OF A GAS AT DIFFERENT TEMPERATURES. PQ IS A LAYER INTERMEDIATE BETWEEN AB AND A'B', WHILE AA' AND B'B REPRESENT THE FREE PATHS OF MOLECULES PASSING BOTH WAYS BETWEEN THE TWO LAYERS

in time set the interior molecules into motion, so that ultimately the heat-motion will become spread throughout the whole mass. Here we have an instance of the conduction of heat; it does not, however, explain the whole phenomenon of conduction of heat, for other processes also help in the process, especially in substances that are conductors of electricity.

When the molecules of a solid are oscillating about their equilibrium positions there is no reason why their mean distance apart should be the same as when they are at rest. This leads to an interpretation of the fact that a change of dimensions usually attends a change in the temperature of a substance. Suppose, for instance, that two molecules when at rest in equilibrium are at a distance a apart. It is very possible that the repulsive force they exert when at a distance $a-e$ may be greater than the attractive force they exert when at a distance $a-e$. If so, their mean distance apart, averaged through a sufficiently long interval of their motion, will be greater than a. A body made up of molecules of this kind will expand on heating.

As the temperature of a body increases, the average energy of its molecules will increase, so that the range of their excursions from their positions of equilibrium will also increase. At a certain temperature a stage will be reached in which it becomes a frequent occurrence for molecules to wander so far from their position of equilibrium that they do not return but fall into a new position of equilibrium and oscillate about this. In this way is explained the slow process of diffusion that occurs in solids at elevated temperatures. If the molecules change positions sufficiently easily, the shape of the body can be altered; the substance has become plastic. Finally, when the energy of motion of the molecules is so great that there is constant rearrangement of position among them, the substance attains to a completely liquid state. Crystalline solids, however, appear to pass immediately into the liquid state, without becoming plastic, by a process of progressive melting at the surface of the crystals.

Theory of the Solid State.—If the molecules composing a solid are analogous to a set of heavy particles connected by springs, so that the net force on a molecule is proportional to its displacement from its equilibrium position relative to neighbouring molecules, then the irregular heat motion of the molecules will cause them to possess potential energy, analogous to the work done in stretching or compressing the springs; and it can be shown from Newton's laws of motion that the average value of this potential energy will be the same as the average value of the kinetic energy of translation of the molecules. According to the principle of the equipartition of energy, the average kinetic energy of translation is the same for all molecules. It follows that monatomic molecules should have twice as much heat energy in a solid as in a gas, where potential energy is absent.

In this way was explained the rule that the heat required to raise in temperature by one degree a given number of molecules of a solid consisting of a single chemical element is approximately the same for nearly all elements, and is twice as great as the heat required for the same number of molecules composing a gas such as helium. However, there are notable exceptions to this rule, for example, carbon in the form of diamond; and it was later found that the heat required diminishes for all substances when the temperature is lowered sufficiently, becoming almost zero at 20° or 10° absolute. A mathematical explanation of this failure of equipartition has been obtained from quantum mechanics, but the newer theory does not furnish a concrete picture of the molecular motions.

In the solids for which the rule just mentioned holds, each molecule consists of a single atom. The atoms of many simple chemical compounds also enter into the crystalline structure as independent units in the solid state. The molecule of common salt, for instance, contains two atoms, one of sodium and one of chlorine; but in a crystal of salt the atoms are arranged in a regular crystal lattice so that each atom of sodium is equidistant from six atoms of chlorine and is not united more closely with one than with another. Such a crystal might be said to constitute one big molecule.

In the crystals of other substances, however, the atoms are distinctly grouped into ions or molecules. The heat motion of such crystals can be resolved into a motion of these groups as wholes together with a vibration of the atoms within the groups. *See* SOLID STATE PHYSICS; LIQUID STATE; QUANTUM MECHANICS; THERMODYNAMICS; HEAT; VISCOSITY; ASSOCIATION, CHEMICAL; CHEMISTRY: *Physical Chemistry;* PHYSICS: GENERAL SURVEY; STATISTICAL MECHANICS.

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(J. H. J.; E. H. KD.)

KING, CLARENCE (1842–1901), U.S. geologist, an organizer and for ten years chief of the U.S. geological exploration of the 40th parallel, which laid the foundation of a systematic survey of the country, was born at Newport, R.I., on Jan. 6, 1842. In 1862 he graduated from the Sheffield Scientific school of Yale. In the following years he was a student of glaciology under J. L. R. Agassiz; undertook a trip across the continent on horseback; and accepted a position as volunteer geologist on the California geological survey. The high mountain mass of the southern Sierras was discovered by him at this time, and he explored the desert regions of southern California and Arizona.

King persuaded the government to make a thorough geological survey of California in order to develop its mineral resources, and accomplished the famous exploration of the 40th parallel against almost insuperable difficulties. The final summary of this work, a masterpiece of writing, was published in 1878, under the title *Systematic Geology.* He was instrumental in organizing the surveys of the country into one U.S. geological survey in 1879, of which he was made the first director, but retired in order to devote himself to some of the deeper problems of geology. He also gave much of his time to his profession as a mining engineer and skilled adviser in mining suits, and added to his literary reputation by his occasional articles and his book *Mountaineering in the Sierra Nevada.* He exposed the great diamond fraud in 1872, which might otherwise have equaled the "Mississippi Bubble" as a financial disaster. He died at Phoenix, Ariz., on Dec. 24, 1901.

KING, HENRY (1592–1669), English poet and bishop, the author of one of the great elegies in English, was born at Worminghall, Buckinghamshire, and was baptized on Jan. 16, 1592. His work includes academic Latin verse published while at Christ Church, Oxford; and, later, Royalist satire. His best poetry is found in his songs, where the lover's predicament is treated with grave and unemphatic wit, always with great charm to the ear; and in the more serious occasional poems, the rare intimate discourse of a reticent and thoughtful man. All his best qualities show in the "Exequy to his Matchless never to be forgotten Freind" (in his *Poems, Elegies, Paradoxes, and Sonets,* 1657), on his wife Anne, who died young in January 1624: the dignity and moving grace of his response to this loss found expression in verse which sustains, through a long argument, that peculiar felicity of utterance which sometimes came momentarily to his contemporaries when writing of death.

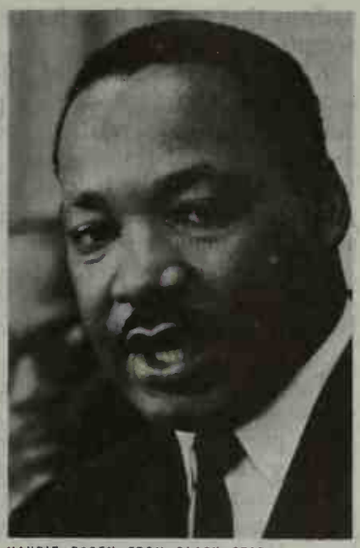
To his father, John King (bishop of London, 1611–21), he owed early preferment in the church. He became a prebendary of St. Paul's in 1616. His friends included John Donne (who was ordained by John King and made Henry his executor), Henry Wotton, and Izaak Walton. His consecration as bishop of Chichester (1642) coincided with the eclipse of Anglican power. Under Parliament he was deprived, and endured a restless seclusion until the Restoration. Part of this time was spent in religious community with friends and family, and he wrote his metrical version of the Psalms (1651; 2nd ed. 1654). He died on Sept. 30, 1669, and was buried in Chichester Cathedral.

See King's *Poems,* ed. by M. Crum, with bibliography (1965).

(M. C. CR.)

KING, MARTIN LUTHER, JR. (1929–), U.S. Negro clergyman, received the 1964 Nobel Peace Prize for his leadership of the nonviolent struggle for racial equality in the United States (*see* NEGRO, AMERICAN: *Political History: Nonviolent Protest*). He combined direct mass action against racial discrimina-

tion and segregation with an appeal to his followers for understanding, even love, for those who opposed human and civil rights for everyone. King came to national attention in 1956 when he led a boycott of the public buses in Montgomery, Ala. (where he had just begun his ministry), to protest racial segregation. A year of economic pressure was crowned with success when the U.S. Supreme Court ruled that racial segregation in intrastate as well as interstate transportation was unlawful. After the Montgomery victory King organized the Southern Christian Leadership Conference, which gave him a South-wide basis of operation and a national platform. He lectured in all parts of the country, conferred with heads of state, and discussed the problems of the Negro with civil rights and religious leaders in the United States and abroad. He played a major role in the civil rights march on Washington in 1963 and in the anti-discrimination and voter registration drives, notably at Albany, Ga., and Birmingham and Selma, Ala., in the early 1960s—campaigns that spurred passage of the federal Civil Rights Act of 1964 and Voting Rights Act of 1965. In 1966 King extended his activities to the North, living for a time in a Chicago slum and leading marches into all-white neighbourhoods. He became a powerful speaker whose voice on occasion rang with a revivalist's fervour. He endured arrests and jailings, was bombed from his home and church, was stabbed by a deranged woman in New York, and stoned by a Chicago mob, and, in the late 1960s, was criticized or ignored by "black power" militants.



MAURIE ROSEN FROM BLACK STAR

KING, PHOTOGRAPHED IN 1966

King was born in Atlanta, Ga., Jan. 15, 1929. Both his father and his maternal grandfather were successful Baptist ministers. He attended the Atlanta public schools and Morehouse College (A.B., 1948), Crozer Theological Seminary (B.D., 1951), and Boston University (Ph.D., 1955). He married Coretta Scott of Marion, Ala., June 17, 1953; she was at that time studying music at Boston University. He made his home in Atlanta with his wife and four children, and there served with his father as co-pastor of the Ebenezer Baptist Church. Among King's published works are *Stride Toward Freedom* (1958), *Strength To Love* (1963), and *Why We Can't Wait* (1964).

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KING, RUFUS (1755–1827), U.S. senator, ambassador, and Federalist presidential candidate, was born on March 24, 1755, at Scarboro, Me., then a part of Massachusetts. He graduated from Harvard in 1777 and was admitted to the bar in 1780. He served in the Massachusetts General Court in 1783–84 and in the congress under the Articles of Confederation in 1784–87. During these critical years he adopted the "states' rights" attitude. On Feb. 21, 1787, he introduced the resolution in Congress sanctioning the call for the Philadelphia Constitutional Convention, in which he supported the large-state party. In 1788 he was one of the most influential members of the Massachusetts convention that ratified the federal constitution. He moved to New York in 1788, was elected to the New York assembly in 1789, and was one of the first representatives of New York in the U.S. Senate (1789–96), where he was a recognized leader of the Federalist Party. He was minister to Great Britain in 1796–1803 and again in 1825–26; was the Federalist candidate for vice-president in 1804 and 1808, and for president in 1816. He was returned to the Senate in 1813 and reelected in 1819. He died at Jamaica, L.I., on April 29, 1827.

Rufus King's son, JOHN ALSOP KING (1788–1867), was a Whig representative in Congress in 1849–51, and in 1857–59 was governor of New York state. Another son, CHARLES KING (1789–1867), was president of Columbia College from 1849 to 1864.

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KING, WILLIAM (1663–1712), English poet, wit and miscellaneous writer who engaged in most of the controversies of his time, was born probably in London and was educated at Westminster school and Christ Church, Oxford. He took the M.A. degree in 1688 and the D.C.L. in 1692, and was admitted as an advocate at Doctor's Commons. He became known as a pamphleteer on the Tory and high church side and contributed a pamphlet to the famous controversy on the Trinity between William Sherlock and Robert South, also writing an amusing ballad, "The Battle Royal," in the form of a dialogue between them. His *Animadversions on a Pretended Account of Denmark* (1694) in answer to Robert (later Lord) Molesworth's attack procured him the thanks of the University of Copenhagen and a secretaryship to Princess Anne. He was involved in the controversy over the *Letters of Phalaris* and wrote several pamphlets supporting Charles Boyle (4th earl of Orrery) and attacking Richard Bentley (*q.v.*). His ten *Dialogues of the Dead* (1699), ridiculing Bentley in the manner of Lucian, contain some of his wittiest writing. In 1701 he made an able defense of the earl of Anglesey in a famous divorce case in the house of lords, and soon after was appointed to a judgeship in Ireland. He held various government posts there, but neglected his duties and spent much of his time at the house of his friend, Judge Upton, near Dublin, where he wrote his admirable ballad "Mully of Mountown" (1704). He returned to England probably in 1707, and in 1708 published his poem *The Art of Cookery*, an imitation of Horace's *Art of Poetry*. His *Useful Transactions in Philosophy* (1709) is a burlesque of contemporary science. He contributed four pamphlets to the Sacheverell controversy (*see* SACHEVERELL, HENRY) and also papers to *The Tatler* and *The Examiner*. He was in financial difficulties in 1711, and Jonathan Swift procured him the office of gazetteer, which, he said, "will be worth £250 per annum . . . if he be diligent and sober." King, however, was incapable of diligence. He resigned on July 1, 1712, and died in London on Dec. 25.

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KING, WILLIAM LYON MACKENZIE (1874–1950), Canadian statesman, three times prime minister, was born in Berlin, now Kitchener, Ontario, on Dec. 17, 1874. A grandson of William Lyon MacKenzie (*q.v.*), he graduated in law from the University of Toronto and studied on fellowships at The University of Chicago, residing at Hull House, and at Harvard. He entered the newly formed department of labour in 1900 where he edited the *Labour Gazette*. He earned a high reputation as a conciliator in labour disputes and as a diplomat in connection with oriental immigration. He resigned as deputy minister of labour, won a seat in North Waterloo in 1908 and was appointed minister of labour in the Laurier government in 1909. His sponsorship of the Industrial Disputes Investigation act, 1907, and the Combines Investigation act, 1910, attests to his initiative and illustrates his concept of the role of government: the public interest was to be protected without interfering with the structure of free enterprise.

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KING, PHOTOGRAPHED DURING WORLD WAR II

He was defeated in the election of 1911. He maintained his con-

nection with the Liberal party but became an industrial consultant for the Rockefeller foundation, acting as a conciliator in a Colorado strike. In 1918 he published his views on industrial relations in *Industry and Humanity* in which he attempted to define the rights of labour, capital, management and the community.

The Liberal convention of 1919 elected him leader of the party, which had been shattered by the conscription controversy in 1917 and which he began to rebuild. Quebec was solidly Liberal and King retained this support throughout his career by respecting French-Canadian identity and by delegating administrative problems in Quebec to Ernest Lapointe and later to Louis St. Laurent. He regained the support of conscriptionist Liberals and won the election of 1921, becoming prime minister Dec. 29, 1921. (For background of the conscription controversy *see* LAURIER, SIR WILFRID.)

King did not have a stable majority in parliament and depended upon support from the Progressives, a farmer's party which drew its strength from western Canada. He won the support of the Progressives by modest reductions in the tariff and freight rates and by his insistence on Canadian autonomy, refusing Great Britain's request for troops in anticipation of war with Turkey (1922), in the negotiation and signing of the Halibut Fisheries treaty with the United States (1923), and at the imperial conferences of 1923 and 1926. His party lost some seats in the election of 1925 but he stayed in office with Progressive support until revelations of corruption in the customs department forced his resignation in 1926. The successive Conservative government was defeated in the house a few days later. Most of the Progressives merged with the Liberal party and King was returned to office with a stable majority in the election of 1926.

King's administration was essentially conservative during the prosperous years that followed. Taxes were reduced gradually but government surpluses were applied to the reduction of the national debt. Old-age pensions were introduced; subsidies to the maritime provinces were increased; and the public domain, which had remained under federal control when the western provinces were established, was transferred to those provinces; but King refused assistance to the provinces for unemployment relief or highway construction. He was defeated in the election of 1930. As leader of the opposition he approved the principles of the social legislation of Richard B. Bennett but challenged their constitutionality, and concentrated his attack on the high tariff policy and the authoritarian methods of the government. He reorganized the Liberal party and adopted a platform of moderate welfare legislation while rejecting the socialism of the new Co-operative Commonwealth federation.

King won the election of 1935. The depression in Canada was still severe, aggravated by crop failures in the west. King continued provincial grants for emergency relief and subsidized housing and farm rehabilitation, but his main reliance was on increasing Canadian exports by trade agreements with the United Kingdom and United States. He refused any international commitments in Europe in order to preserve Canadian autonomy and to avoid domestic conflict on foreign policy. He favoured appeasement to avoid war but increased defense appropriations and tried to foster closer Anglo-American relations. When war broke out in 1939 parliament was assembled and Canada officially declared war on Sept. 10, seven days after the United Kingdom.

King expected Canada's major war effort would be the production of food and munitions. Canadian industrial production expanded rapidly with government assistance and supervision, but Canada contributed men as well as equipment to the commonwealth air training plan and sent five army divisions overseas. King called an election in 1940 to avoid pressure for a union (coalition) government and was returned with a large majority. He promised not to introduce conscription but criticism from English Canadians led to a series of compromises. A majority favoured conscription in a plebiscite (1942) and conscripts were called up for home defense. Overseas casualties in 1944 created a reinforcement crisis, the minister of national defense resigned and in November King reluctantly introduced partial conscription for overseas service. His delays and evasions convinced French Canadians that he had done his best to avoid conscription and they accepted the decision.

King won the election of 1945. His administration carefully supervised the transition to a peacetime economy. A study of dominion-provincial relations completed in 1940 had recommended increased federal responsibility for the national economy. Proposals to modify the federal financial structure were opposed by provincial governments and no final agreement was reached. King accepted Canadian participation in foreign affairs at the United Nations and in the negotiations for the creation of the North Atlantic Treaty organization. He resigned the prime ministership because of illness in 1948 and died at Kingsmere, Que., on July 22, 1950.

The guiding principle of King's career was national unity. His concessions to the Progressives made the Liberal party a national party once more and his respect for French-Canadian cultural identity retained French-Canadian support for federal policies. He selected capable colleagues, rarely interfered in the administration of their departments, and won their respect if not their affection. He was criticized for his evasions and indecisions, especially in his foreign policy, but his record-breaking 21 years as prime minister attest to the public support for his policies and methods.

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KING, WILLIAM RUFUS DE VANE (1786–1853), U.S. senator, diplomat and vice-president, was born in Sampson county, N.C., on April 7, 1786. He graduated from the University of North Carolina in 1803 and was admitted to the bar in 1806. He served in the state legislature, 1806–1809, and in 1810 was elected to the U.S. house of representatives, where he served six years as a supporter of Madison's administration. In 1816 he was appointed secretary of the legation to the Kingdom of Naples and afterward to Russia, serving in both countries under William Pinkney, minister. Upon his return to the United States in 1818 he settled in Alabama, was a delegate to the convention that organized the new state government, and in 1819 was elected U.S. senator from that state. He was repeatedly re-elected and served until 1844. While minister to France, 1844–46, he presented to the French government the case against foreign intervention to prevent annexation of Texas to the United States. From 1848 to 1853 he was again U.S. senator from Alabama. In 1852 he was nominated for the vice-presidency by the Democratic convention that selected Franklin Pierce as its presidential candidate. Although elected, he never served. He was able to take the oath of his office on March 4, 1853, in Havana, Cuba, but he died on April 18, near Cahaba, Ala. (H. S. S.)

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WILLIAM RUFUS KING

KING, a supreme ruler, sovereign over a nation or territory, of higher rank than grand dukes or other secular princes.

Historically, kingship has been a world-wide phenomenon, and its development in the various countries of the world has taken such different courses that little can be said in general about its form. Kingship, for instance, may be elective, as in Germany and in Poland till the latter part of the 18th century, or hereditary; a king may rule more or less absolutely, as in France under the *ancien régime,* or according to a constitution; a kingdom is usually understood to be a monarchy (*q.v.*), but may be a dyarchy as ancient Sparta was, with two kings ruling jointly; a king may recognize no man as his superior, or may yield precedence, tribute or

homage to another, as kings have acknowledged an emperor (*q.v.*) or as kings of Naples or King John of England held their kingdoms as fiefs from the pope. For the position of the king, therefore, in a particular country at a given time the reader should consult the article on that country, where the section *History* and, in the case of kingdoms still in being in the latter part of the 20th century, the section *Constitution* provide details.

One aspect of kingship is peculiar to it and distinguishes it from other sovereign dignities: the special relationship supposed to obtain between the king and his people's god. The growth and modification of this concept can here be briefly surveyed.

Ancient East.—In the great civilizations of the ancient east the king was not only the supreme military commander and the judge of his subjects, but also the privileged intermediary between his people and their god, if not the god himself. In ancient Egypt the Pharaoh was believed to be positively divine in a realistic, physical sense. The earliest kings of Sumer, Assur and Lagash were lieutenants or representatives of the god, members of a dynasty of heavenly origin to whom the god had delegated his authority and his power, but the Akkadian and some of the Babylonian kings sometimes claimed positive divinity. For the Canaanite kings of Ugarit, some scholars interpret the religious literature discovered at Ras Shamra as showing the king to have impersonated the god in dramatic ritual, especially at the feast of the new year, when the death and resurrection of the god-king and his marriage to the goddess of fertility were symbolically performed. The Hittite kings, originally elective, were later deified, at least after their death. The Persian kings were lieutenants of Ahura Mazda, but not gods themselves. The Minoan kings of Crete seem to have taken the role of the bullheaded sun-god as the consort of the goddess and to have been the objects of a cult after death. An analogous form of divine kingship can be supposed to have obtained in the Peloponnese in Mycenaean times. To the ancient Hebrews, kingship as their neighbours understood it was long repugnant, both because of their theocratic and sacerdotal religion and because of their tribal organization. Its institution begins with the priestly anointing of Saul (*q.v.*); the hereditary principle was established under David. The Hebrew kings were militarily and politically supreme and had some degree of authority over the exercise of the cult, but were not high priests, much less divine kings. The expectation of the Messiah (*q.v.*) from the royal house of David is another question.

Theory of the Divine King.—The divine king, incarnation of the god and the repository of his power, is responsible not only for his people's prosperity in matters of human competence, such as successful warfare and the right administration of customary justice, but also for the normal rotation of the seasons, the fertility of the soil, rainfall and freedom from pestilence. This notion of the divine king, moreover, is not confined to antiquity: for modern anthropologists, it is to be studied just as much in its contemporary or nearly contemporary manifestations. The epoch-making account of the phenomenon by J. G. Frazer cited typical examples from India and from Cambodia and, particularly, among African peoples on the upper Nile, in the western Sudan, in the forest area north of the Gulf of Guinea, in the upper Congo basin, in Angola and on the east coast south of the Zambezi. Frazer also insisted on the widespread identification of the king with the sacred animal of his people. What Frazer emphasized, however, was a corollary of the notion of the king's divine power: when this power appears to be waning, the king must die, so that the power can migrate to a fitter receptacle. Apart from misconduct leading either to defilement of the royal sanctity or to national disasters, the king may be discredited by impotence, by disease or by the onset of old age (on his accession he must be physically perfect). Suicide or the putting to death of the king by various traditionally fixed means are the consequence. Frazer drew distinctions between kings who had to die when some defect of their powers was actually apparent and kings who were allowed a reign of a determined number of years. At the end of such a period, the royal power is assumed to have expired, and if the king himself is not to be killed a deputy must then die vicariously for him, whereupon the king's divine power is renewed for a further term. The Shilluk (*see* NILOTES) were advanced by Frazer as having par excellence this type of divine king; but E. E. Evans Pritchard's study (1948) indicated that they had allowed the killing of the king to fall into desuetude. The course of the diffusion of divine kingship across Africa is controversial: it may have spread westward from Egypt; it may have come from Arabia to Meroe and thence spread westward and southward. In America, the divinity of the supreme rulers of the Incas, who were incarnations of the tribal gods, does not seem to have entailed the ritual killing of the king; and it is not proved that the Aztec "rulers of the world," though they eventually approached deification, were themselves supposed to benefit from the sacrifices to the sun-god.

For pagan Europe there are indications that the Swedes and the Old Prussians had divine kings whose death was required for their people's welfare. For pagan Ireland, though there is no indication of the ritual killing of the king, Giraldus Cambrensis describes the mating of the newly chosen king with a mare, which was then killed so that he could bathe in its juices and lap them up, thus completing his symbolic union with the creature. Margaret Murray's contention that the pagan practice of sacrificing the king or his substitute was tacitly observed in Christian England down to James I's time is brilliantly argued but has not found much favour with professional historians.

Greece and Rome.—In classical Greece there is scarcely any ground for seeing a divine kingship of the Frazerian type. The kings of the heroic age, as described by Homer, were mediators between their people and the gods and were responsible for the performance of sacrifices and for averting the wrath of the gods, which might be visited on the entire people in retribution for the king's ill-doing; they were also kings by hereditary right, as heads of the clan or family in which royalty had been vested by sacred tradition. The epithets "god-born" and "god-fed," however, which Homer applies to these kings, are to be regarded as honorific rather than literally expressive of genuine religious emotion; and the Homeric kings are already to a great extent overshadowed by their entourage of nobles. By classical times kingship in Greece proper had been almost everywhere superseded as a form of government by tyranny, oligarchy or democracy: Sparta, with its dyarchy, was the important exception. The standard word for king, *basileus*, survived in Athens as the specific title of the third archon (*q.v.*), who was the chief officer of state for religious purposes.

The Macedonian kings before Alexander the Great were no more divine than the Homeric. It was with his conquest of Egypt and of Persia that Alexander entered into the pretensions to divinity that his predecessors in those kingdoms had had. How far he believed himself to be a god and expected his Greek and Macedonian followers to regard him as a god rather than as a "godlike" hero worthy of divine honours is still vigorously debated. Ptolemy I of Egypt, however, in the interests of his own dynasty, promptly solemnized the deification of the dead Alexander; and the other *diadochi* followed his example. The Hellenistic age thus saw a multiplication of god-kings throughout the near east.

Little that is not obscured by the later mythology of republicanism is known about the early kings of Rome. Legends stress their communing with supernatural beings; and under the republic the term *rex* (king) survived in official use as the designation of the chief priestly magistrate, the *rex sacrorum*, who was responsible for the proper and timely performance of sacrifices. Politically, however, the Romans from republican times considered the name "king" to be odious, in and with the establishment of the principate or imperial regime of the Caesars another term, in English usually translated as emperor, was found for the head of state. The Greeks, however, used the term *basileus* for the emperor. Hellenistic examples of kingship had a great influence on the divinization of the Roman emperors. (*See* EMPEROR.)

Medieval Europe.—Christianity enhanced the status of the emperor insofar as it promoted him from being merely one god in a polytheistic pantheon to the position of vicar of Christ and representative of the only God. After the collapse of the Western Roman empire in the 5th century there was a long interval before the Germanic peoples made any significant change in their notion of kingship. The pagan Germanic kings had traced their descent

from tribal gods and had been endowed with supernatural authority; and Christian baptism, often a political expedient, did not mean that they abandoned their inherited attributes or the visible signs of them: the long hair of the Merovingian kings of the Franks, the shaving of which was degradation from royalty, is a case in point. In the history of kingship the baptism of Clovis, though it ultimately became the focus of royal legend, was of far less consequence than an event which took place about 250 years later, the anointing of the first Carolingian king, Pepin the Short, in 751 or 752. Already by the 7th century the Visigothic kings in Spain were anointed, the ceremony recalling the biblical anointing of Saul; but the Visigothic kings had been the lawfully elected members of the royal dynasty, whereas Pepin's unction was the symbol of the church's consent to his usurpation of the Frankish kingship, which by normal right belonged to the Merovingians. Pepin thus became king "by the grace of God" (*Dei gratia*), and with the spread of anointing this formula became a hallmark of royalty throughout Christendom. (*See* CORONATION.)

Two themes run through the development of Christian kingship in the middle ages: (1) the exploitation of the notion of divine grace against the papacy, to assert the king's direct and immediate tenure of his office from God, so that he was responsible only to God, not to the church (which retaliated by excluding royal unction from the catalogue of sacraments); and (2) the effort to establish the hereditary principle of succession by primogeniture, instead of election, the first step being to procure the election of the king's eldest son during the king's own lifetime. For the course of events, *see* the articles on the various national kingdoms; also EUROPE; PAPACY. For the political relationship of kings to their subjects in the middle ages *see* also FEUDALISM and, for representative institutions, ESTATES-GENERAL; PARLIAMENT.

Rise and Fall of Absolute Monarchy.—The 16th–18th centuries, with the attribution of majesty (*q.v.*) to kings and the subjection of national churches to the temporal sovereign's control, were the age of absolutism. The notion of the divine right of kings was strengthened by the Reformation and by national movements such as Gallicanism within the Catholic Church. Whereas French jurists of the 16th century such as Claude de Seyssel, Bernard du Haillan and Jean Bodin had maintained that the divine right was compatible with a paternalistic monarchy "tempered" by custom and precedent, the notion found its most extreme expression in the *Patriarcha* and other writings of Sir Robert Filmer (*q.v.*). The inherent contradiction in the "enlightened despotism" of the 18th century was that its kings were profiting from the divine authority in which they had no longer any truly religious belief.

After the American Revolution, the French Revolution and the proliferation of secular kingdoms in Napoleonic Europe the divine right of kings could no longer be maintained. In some 19th-century kingdoms (Saxony and King Otho's Greece) the king was even of a different religious persuasion from his subjects. Nationalism created more kingdoms simply in order to assert sovereignty; and royal dynasties which had broken the power of the church and the nobility were reduced by democratic processes to be only the most solemn mouthpieces of public opinion, no longer the voice of a tutelary deity.

See also SOVEREIGNTY.

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KINGBIRD, the name given to several birds of the tyrant flycatcher family (Tyrannidae), of the Americas. The eastern kingbird (*Tyrannus tyrannus*), a common inhabitant of eastern North America, ranges from Nova Scotia to the Gulf of Mexico, wintering in tropical America. The plumage is slaty-gray above and white beneath, with erectile feathers on the crown, which part to reveal an orange base, passing into scarlet and then to white farther back. The kingbird lives on insects. The nest is large, neatly lined with fine grass and containing five or six pale salmon-coloured eggs, spotted with purple, brown and orange, especially near the larger end. The gray kingbird (*T. dominicensis dominicensis*) breeds in the West Indies, Georgia and, rarely, southeastern South Carolina. The Arkansas kingbird (*T. verticalis*), gray above with a conspicuous yellow belly and white edge on either side of the blackish tail, ranges over the western United States. Cassin's kingbird (*T. vociferans*), with white chin, gray breast and yellow belly, breeds in the higher country from Montana, Colorado, central California and western Texas southward. *See* also FLYCATCHER. (G. F. Ss.; X.)

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EASTERN KINGBIRD (TYRANNUS TYRANNUS) AND YOUNG

KINGDOM OF GOD. This term and the synonymous "kingdom of heaven" occur so frequently in the New Testament, particularly on the lips of Jesus Christ in the first three Gospels, that the idea is generally thought to have been central to Jesus' understanding of himself and his mission. Though the phrase itself hardly occurs in pre-Christian Jewish literature, the idea of God as king was fundamental to Judaism, and Jewish ideas on the subject undoubtedly underlie, and to some extent determine, the New Testament usage. Behind the Greek word for "kingdom" (*basileia*) lies the Aramaic term *malkuth*, which Jesus himself must have used; *malkuth* refers primarily not to a geographical area or realm, nor to the people inhabiting the realm, but to the activity of the king himself, his exercise of his sovereign power. The idea might better be conveyed in English by some such expression as "kingship" or "rule" or "sovereignty."

So far as the divine kingship is concerned, three Jewish usages may be distinguished, though they are closely interconnected and must not be too sharply differentiated:

God's ultimate and eternal sovereignty. God created the whole universe and, despite temporary appearances to the contrary, none of his creatures will finally be able to flout his will.

God's sovereignty over all men, who, in view of his sovereignty over the universe, should place themselves unreservedly under his control and shape their lives in accordance with his purposes. This was described by the Jews as "taking on oneself the yoke of the Kingdom."

God's sovereignty as it will be made fully effective in the future. To most Jews of Christ's time the world seemed so completely alienated from God that nothing would deal with the situation short of direct divine intervention on a cosmic scale. The details were variously conceived (*see* APOCALYPTIC LITERATURE) but it was widely expected that God would send a supernatural, or supernaturally endowed, intermediary (the "Messiah" [*q.v.*] or "Son of Man"), whose functions would include a judgment to decide on those worthy to "inherit the Kingdom," an expression which emphasizes that the Kingdom was thought of as a divine gift, not a human achievement.

This third usage is generally agreed to have been dominant in the time of Christ, so it must have been in that sense that his proclamation of the imminence of the Kingdom was understood (Mark i, 14–15). According to the first three Gospels, most of Jesus' miraculous actions are to be understood as prophetic symbols (*i.e.*, signs which help to actualize what they symbolize; *see* MIRACLE) of the coming of the Kingdom (*cf.*, *e.g.*, Luke xi, 20; Matt. xi, 2 ff.) and his teaching was concerned with the right response to the crisis of its coming (*cf.*, *e.g.*, Mark i, 15; xiii, 28–37). The nationalistic tone of much of the Jewish expectation is absent from the teaching of Jesus, according to which the response demanded in the face of the Kingdom is a moral one: honest self-appraisal, repentance and faith.

Scholarly opinion is divided on the question whether Jesus taught that the Kingdom had actually arrived during his lifetime, but the probability is that, while recognizing in his own ministry the signs of its imminence, he nevertheless looked to the future for its arrival "with power" (Mark ix, 1), and he may well have re-

garded his own death as the providential condition of its full establishment (*see* also JESUS CHRIST: *The Mission of Jesus*). Nevertheless, he seems to have expected the final consummation in a relatively short time (Mark ix, 1); this naturally occasioned perplexity to Christians when the end of this world order did not occur within a generation, as Paul, for example, expected it would. However, Christian experience soon suggested that, as the result of Christ's resurrection, many of the blessings traditionally reserved till the life of the age to come were already accessible to the believer in this age (*cf., e.g.,* Heb. vi, 5; I John iii, 2) and thus, though the phrase "Kingdom of God" was used with decreasing frequency (partly no doubt because its Jewish background made it hardly intelligible in an increasingly gentile church), the state of affairs for which it stood was thought of as partly realized here and now in the life of the church—which at various periods has been virtually identified with the Kingdom—but to be fully realized only after the end of the world and the accompanying "last judgment" (*q.v.*). In this transition to the traditional Christian understanding of the matter the Johannine writings in the New Testament played a large part.

It should, however, be added that because of the way the Gospels came into being, the outlook of Jesus is difficult to reconstruct in detail and, so far as the Kingdom of God is concerned, some scholars have felt that it is impossible to recover. Consequently, widely differing views have been held about his teaching on this subject, and its relation to the developed view of the church.

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KINGFISHER, a name applied to any of the large-headed, big-billed birds of the family Alcedinidae. These relatives of the hornbills and rollers are world-wide in distribution but are chiefly tropical, the only North American species being the well-known belted kingfisher (*Megaceryle alcyon*). About 10 in. long, it is a stocky bird with bushy crest; bluish grey above and across the breast, it is white below. The bill, as in others of the family, is large and heavy. The belted kingfisher is an active, pugnacious bird. Each pair has a home territory along some pond or stream and vigorously expels any other kingfisher that happens to come by, all the while uttering loud, rattling cries. The species lives entirely on fish, which it catches by diving headlong into the water from a perch or after hovering some distance above the surface. The fish is whacked against a branch a few times, then bolted entire.

Kingfishers may become pests at trout hatcheries, but usually take worthless minnows and too few of them to be of any economic importance. All kingfishers nest in holes in banks, which they dig themselves, or in hollow trees. As many as six or eight white eggs are laid in a little cavity in the burrow. There is no real nest: the young become surrounded by fish bones and excrement and as a result the nest chamber is sometimes malodorous. The term "halcyon" from the Greek word for kingfisher is based on a belief that these birds build a floating nest on the water, and that the sea is calm and peaceful till the eggs hatch.

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BELTED KINGFISHER (MEGACERYLE ALCYON) OF NORTH AMERICA

The European kingfisher (*Alcedo atthis*), small as a sparrow, is glittering blue and emerald; its habits are much the same as its American counterpart. The long-tailed New Guinea kingfishers of the genus *Tanysiptera* are among the prettiest of all birds. The largest member of the family is the Australian kookaburra or laughing jackass (*Dacelo*). The size of a crow, it often sits stolidly, but then suddenly a pair will launch into a prolonged duet of gurgling, laughterlike cries. Like some other members of the family, the kookaburra does not catch fish but lives on small lizards and snakes (including some poisonous ones) and large insects. It is not above dining on the young of other birds. Often it comes to picnic areas in search of scraps. Instinct seems to demand that a piece of meat or bone be banged on the ground until it is thoroughly "dead" before it is swallowed. (DN. A.)

KINGHORN, a royal and small burgh of Fife, Scot., on the Firth of Forth, 14 mi. E. of Dunfermline by road. Pop. (1961) 2,112. Its golf course and sandy beaches have made it a holiday town. The industries are the making of glass bottles and golf clubs. Alexander III, who created Kinghorn a burgh in 1285, was killed the following year by a fall from his horse on the Pettycur promontory (southwest) where the cliffs were afterward called King's Wud End or King's crag. At Pettycur is a good harbour which has superseded the old Kinghorn harbour. On Kinghorn loch swans and wildfowl can be seen.

Inchkeith, a fortified island in the fairway of the Firth of Forth, $2\frac{1}{2}$ mi. S.E. of Kinghorn, belongs to the parish of Kinghorn. It is a barren rock, with a harbour and a lighthouse, and was visited in 1773 by Samuel Johnson and James Boswell and in 1817 by Thomas Carlyle.

KINGLET (GOLDCREST), the common name for four species of *Regulus,* tiny birds comprising the subfamily Regulinae, closely related to the old world warblers (Sylviidae) but separated by some as the family Regulidae. In North America they are called kinglets; in England generally, goldcrests. They are all rather similar in habits.

The golden-crowned kinglet (*R. satrapa*) is a diminutive olive-green bird ($3\frac{1}{2}$–4 in. long) with, in the male, a black-bordered orange crown (yellow in the female) and a white stripe over the eye; there are two white bars across the dark wing. It is an insect eater that seeks its food in evergreen forests, where it also prepares a bulky, purselike nest, supported by two or three twigs. The five to ten small eggs are dull white, sometimes flecked with reddish-brown. The rather pleasant song consists of a series of thin high notes rising in pitch, then dropping into a chatter. It breeds from Alaska and Canada to the northern U.S. and southward in mountainous areas to North Carolina, New Mexico and California. The ruby-crowned kinglet (*R. calendula*) has a tiny bright-red crown (not bordered in black) in the male.

ERIC HOSKING

GOLDCREST (REGULUS REGULUS)

The goldcrest (*R. regulus*) resembles the golden-crowned kinglet in colour, but lacks the white stripe over the eye. It lives in family parties often in company with titmice, and breeds over most of Europe, with many local races in the British Isles, the Azores, Canaries, Corsica and Sardinia, and others in the Caucasus and Asia. The related species, properly called firecrest (*R. ignicapillus*), is distinguished from the goldcrest by a white stripe above the eye and a black stripe across the eye. It ranges over temperate Europe and north Africa to Asia Minor; unlike the rest of the family, the firecrest is more partial to the shrubby undergrowth in mixed woods. (HT. FN.)

KINGO, THOMAS HANSEN (1634–1703), the chief Danish Renaissance poet, was born at Slangerup, Sjaelland, on Dec. 15, 1634. He studied theology and became a private tutor and later a curate in northwest Sjaelland, where he wrote a series of poems picturing humorous scenes in village life and a pastoral poem "Chrysillis," evidently inspired by a love affair. The latter, by its splendid imagery and smooth melody, marked the emergence of a great Danish poet.

Kingo became rector of his native village in 1668 and soon attracted the attention of King Frederick III, who was eager to create an elite of talented men to support his absolutist regime and who, in 1677, secured Kingo's election as bishop of Fyn. Thereafter he wrote only occasional poetry, in honour of the king and the great men of the time, and the hymns and religious poems which are the most enduring of his works. These were collected in *Aandeligt Sjungekor* ("Spiritual Chorus," 2 vol., 1674 and 1684), chiefly intended for use in private devotion. The best known are the morning and evening songs and the great hymn "Far, Verden, Farvel" ("Father, World, Farewell"). He was commissioned by the king to compile a new official hymnbook, but his first collection was not approved, and the hymnal, revised by a commission, appeared finally in 1699, still with Kingo as the privileged publisher. It contains about 100 of his own hymns and is popularly known as "Kingo's hymnbook."

Kingo's occasional verse expresses his religiously founded political absolutism and as rhetorical poetry fulfills the demand of the period for pomp and ceremonial. His hymns reveal his sense of the great antithesis between this world and heaven, between sin and grace, and are deeply personal in their realistic and suggestive use of language. They mark the zenith of Danish baroque poetry.

Kingo died at Odense, Oct. 14, 1703. A modern edition of his collected works, edited by H. Brix, P. Diderichsen and F. J. Billeskov Jansen, was begun in 1939 (vol. 7, 1945). (O. A. F.)

KINGS, BOOKS OF THE, two historical books of the Old Testament which the Jews reckoned among the Former Prophets (Joshua to Kings) in distinction from the Latter Prophets (Isaiah to Malachi). They were originally one book; they are so written in Hebrew manuscripts (entitled *Melakhim*, or "Kings") and are so printed in the earliest Hebrew Bibles. The division into two books was first made in the Septuagint, where they are called "Third and Fourth Kingdoms" (the two books of Samuel counting as "First and Second Kingdoms"); this division and this nomenclature are followed in the Vulgate and in the English Douai version.

Contents.—The two Books of Kings provide a history of the two Israelite kingdoms, Judah and Israel, from the accession of Solomon to the destruction of the surviving kingdom of Judah, with an account of the chaos which followed in Judah, and a closing paragraph of hope in the release on parole of the captive king Jehoiachin of Judah in 562 B.C. There are four main divisions according to material:

I Kings i, 1–ii, 11:	preface
I Kings ii, 12–xi, 43:	reign of Solomon (*c.* 970–930 B.C.)
I Kings xii, 1–II Kings xvii, 41:	from the accession of Rehoboam to the fall of Israel, the northern kingdom (721 B.C.)
II Kings xviii, 1–xxv, 30:	fortunes of the kingdom of Judah until its fall

The preface gives an account of the plot by which Nathan the prophet and Bathsheba, mother of Solomon, secured the succession for the young Solomon. This section was probably broken off from the story of David the king, told in II Sam. vi, 1–xx, 22. It thus forms an introduction to the full story of Solomon's reign.

Solomon came to the throne of Judah-Israel with every apparent advantage, and to the editors of Kings the earlier part of his reign was characterized by such splendour that men came from near and far to admire and gasp. But the editor had to tell the truth in the end: Solomon built the Temple, but he also built shrines on the Mount of Olives for Chemosh, god of Moab, and Molech (Milcom), god of Ammon (I Kings xi, 7). He lost Edom and he lost Syria. He had to deal with a rising in Israel headed by Jeroboam, son of Nebat, who fled to Egypt for sanctuary; he returned at the death of Solomon, and this time was successful in breaking away from the domination of Judah and the Jerusalem court. (*See* SOLOMON.)

Kings of Judah.—Solomon's son, Rehoboam, was left with two tribes only, Judah and Benjamin. Thenceforward Judah was weak and mostly was in trouble from Israel, sometimes undoubtedly a vassal kingdom. Rehoboam suffered severely from an invasion by Shishak (Sheshonk) of Egypt. Asa, his grandson, was in such sore straits at the hands of Baasha of Israel that he bribed the Assyrians to attack Israel. Asa's son Jehoshaphat controlled Edom and even fitted out a fleet to trade with Ophir. But his son, Jehoram, lost control of Edom. Jehoram's son Ahaziah was murdered by Jehu, king of Israel, and Athaliah (widow of Jehoram, king of Judah) seized the throne for six years. But Ahaziah's son Joash, sole survivor of the massacre by which Athaliah made herself queen, was made king by the high priest Jehoiada. The Temple was restored, but Joash had to buy off Hazael of Syria and so save Jerusalem. Amaziah, the son of Joash, had some success against Edom, but was utterly defeated by Jehoash of Israel. Under Amaziah's son Azariah (Uzziah) Judah achieved its greatest prosperity since Solomon, but the rest of Judah's history is one of dark shadow, relieved only by the temporary success of two kings, Hezekiah and Josiah. Hezekiah revolted against Assyria and for a while met with great success, territorially and in a military sense, but when he met the full might of Assyria he lost all he had gained and was fortunate to escape with Jerusalem unoccupied. But during this period he did much to restore and reform the worship of Yahweh. Similarly Josiah seized his opportunity at the death of Ashurbanipal *c.* 630 B.C., and restored the national fortunes and the national religion. During his work on the Temple *c.* 621 B.C. a scroll of the Law was found by the priest Hilkiah. On the basis of this scroll (which modern scholars identify as the core of the present Deuteronomy), Josiah instituted great centralizing reforms, which were the inspiration of the editors of Kings. But Josiah met with a violent death at Megiddo at the hands of the Egyptians, and the whole movement collapsed. Judah became subject first to Egypt and then to Babylon, until a final revolt led to the extinction of the kingdom.

Kings of Israel.—The story of Israel, the northern kingdom, was ultimately no less disastrous, but more spectacular while it lasted. Jeroboam I, the first king of Israel, established rival cults at Bethel and at Dan in order to prevent the people going up to the shrine at Jerusalem in the kingdom of Judah. This was Jeroboam's great sin, and it was Israel's great sin. It earned the severest and most unrelenting condemnation of the Deuteronomist writers who were responsible for the Books of the Kings. Many kings of the north were murdered: Jeroboam's son Nadab after two years, Baasha's son Elah after two years; then came confusion. Zimri was destroyed after a week, and Omri had to fight against Tibni to establish himself. The dynasty of Omri was strong and lasted for four reigns, till Jehoram was slain by Jehu. Jehu's dynasty lasted for five reigns, and included the reign of Jeroboam II under whom Israel achieved its greatest prosperity since Solomon. This coincided with the success of Judah under Azariah (Uzziah) and was due largely to the temporary eclipse of Syria (Damascus) when Adad-nirari III of Assyria destroyed Damascus *c.* 805 B.C. But Zechariah, son of Jeroboam, was murdered after six months by Shallum, who himself was murdered after one month. Menahem lasted for ten years, but had to submit to the Assyrians and pay heavy tribute. His son Pekahiah was murdered after two years by Pekah, who after 20 years was murdered by Hoshea. Pekah had lost all his more northerly territories to the Assyrians, and Hoshea at last revolted and lost everything. The kingdom was incorporated into the Assyrian province of Samaria, and settlers were brought from other parts of the empire to replace those Israelites whom the Assyrians had deported. The story of the north is enriched by the account of Elijah's fight against the Baal cult, by his experience on Mt. Horeb and by the varied and colourful exploits of Elisha (*see* ELIJAH and ELISHA; for the history of the period, *see* further JEWS: *Early History to the Exile*).

Sources and Treatment.—The original editor of the Books of Kings used three sources, which he names: the Acts of Solomon (I Kings xi, 41), the Book of the Chronicles of the Kings of Israel

(I Kings xiv, 19, and 16 other times) and the Book of the Chronicles of the Kings of Judah (I Kings xiv, 29, and 14 other times). The references are always to the source of further information, and are found for every king of Israel except two (Jehoram and Hoshea) and for every ruler of Judah except five (Ahaziah, Athaliah, Jehoahaz, Jehoiachin and Zedekiah). These three documents, evidently still extant at the end of the 7th century B.C., were the official royal annals, comparable to those unearthed by archaeologists in Mesopotamia in the 19th and 20th centuries. The editor set out to write a history of the two kingdoms in the belief that the summit of excellence had been achieved when King Josiah centralized the worship of Yahweh in Jerusalem and destroyed all the local shrines. All the kings of Israel are condemned by him because they "departed not from all the sins of Jeroboam the son of Nebat, who made Israel to sin"; that is, they continued to worship at the northern shrines, especially at Bethel where Jeroboam had set a Golden Calf. Even Jehu "was not careful to walk in the law of the Lord the God of Israel with all his heart" (II Kings x, 31), although he was a fervent follower of Yahweh and did his best to exterminate Baal and all his worshipers. Southern kings are judged by the extent to which they conformed to this same centralizing pattern. Hezekiah and Josiah are the two best kings of Judah, especially Josiah, who was the perfect pattern of all that a king should be. The original book probably ended with the word "Moses" in II Kings xxiii, 25. This is assuming that the editor wrote at the height of Josiah's success and prosperity, both as religious reformer and political ruler, *c.* 610 B.C., just before the disaster at Megiddo which ended the prosperous reign and falsified the editor's whole theory that success and long life were the inevitable results of centralizing piety. The general opinion is that the editor concluded his work soon after Josiah's death.

The second and final edition of the Books of Kings dates from *c.* 550 B.C., and forms the conclusion of the great history Joshua-Judges-Samuel-Kings which was edited at this time under Deuteronomist influence. It dates from the time when Evil-Merodach released the captive king Jehoiachin (*c.* 562 B.C.) and granted him privileges above the other captive kings, limited perhaps, but nevertheless definite. It was a ray of hope, a turning of the tide, enough to give a loyal Deuteronomist hope enough that perhaps his theory was true after all. This was a time when men could look forward to a restoration not of southern Judah only but also of northern Israel. It is therefore most likely that this was the time when four other elements were introduced into the book: three northern narratives and one southern narrative. The northern narratives are stories about two northern prophets, Elijah (I Kings xvii–xix, 18; xxi; and II Kings i) and Elisha (I Kings xix, 19–21; II Kings ii; possibly iii; iv–vii; viii, 7–15; ix–x; xiii, 14–21), and extracts from a life of Ahab (I Kings xx; xxii, 1–40). The Ahab stories are plainly different in origin from those of Elijah, since in the Ahab group Syria is hostile and Ahab is a capable king and general. In the Elijah group Syria is God's avenger of Israel and Ahab is pictured in a most unfavourable light. The southern narrative is concerned with the life of Isaiah and his relations with Hezekiah; it is contained in II Kings xviii, 13–xx, 19 and is virtually a repetition of Isa. xxxvi–xxxix.

The original editor had a simple task until he had to deal with two kingdoms coexisting side by side. His problem then was to tell the story of each kingdom contemporaneously and consecutively. He had to tell the stories of Rehoboam of Judah and Jeroboam of Israel in an interwoven fashion, but after the death of Rehoboam he continues with the south and deals with Abijah and Asa. By this time Jeroboam of Israel was dead, so he turns to the north and deals with Nadab, Baasha, Elah, Zimri and Ahab. By this time Asa of Judah was dead, so the editor turns to the south and deals with Jehoshaphat and his son Jehoram. The editor continues with this scheme until the end of the northern kingdom, except when complications of the succession were so irregular as to prevent him.

For dealing with the period of the two kingdoms, the editor had a series of stylized formulas. At the beginning of the reign of a king of Israel, he indicates the year of the reigning king of Judah and notes the Israelite king's capital; then the length of the reign and a judgment of the reign, firstly in such specific terms as are necessary and then with a fixed formula of comparison with "the sins of Jeroboam son of Nebat, which he made Israel to sin" (II Kings xiii, 11, etc.). At the beginning of the reign of a king of Judah he indicates the year of the reigning king of Israel, gives the age of the king, the length of his reign, his mother's name and an estimate of his character. At the end of each reign, both north and south, he usually gives the source of further information, notice of the king's death and burial and the name of his successor. *Compare* I Kings xv, 33 ff.; xxii, 41 ff.; xvi, 5 ff.

Themes and Interpretation.—The Books of Kings take their place in the Bible as part of the general unfolding of the purposes of God in the history of his people, Israel. References to them in the New Testament are few, being concerned with particular incidents used as illustrations. Such incidents are Elijah and the widow of Zarephath (Luke iv, 25–26) and Naaman the Syrian (Luke iv, 27). It may well be that the need for one centralized sanctuary had a greater importance than even the editors of Kings realized. Many shrines tended to mean many gods, and it may well be that a necessary stage in the establishment of a true monotheism in the minds of men was this insistence on one shrine only, and that only when this idea was firmly embedded in men's minds could an author write "But will God indeed dwell on the earth? Behold, heaven and the highest heaven cannot contain thee; how much less this house which I have built!" (I Kings viii, 27).

This passage is from the prayer of Solomon at the dedication of the Temple. This prayer is unsurpassed as sacred oratory and it is a supreme expression of the height of Deuteronomic thought. Much of it is due to the final editor (*c.* 550 B.C.), who had learned many things from the disasters of his people and from the exile. There is God's stern denunciation of sin, and a proper realization of the harsh facts of the consequences of sin. But also the editor knew (viii, 44–61) that whenever man repents God will hear and forgive. This is true however far his people are scattered. And it is a happy thing that the release of King Jehoiachin in a kind of "open arrest" should bring to this editor some hope of better days.

Another important element in these Books of Kings is to be found in a pre-echo of the teaching of the 8th-century prophets that God is strong against oppression and injustice of every type, as illustrated in the story of Naboth and his vineyard. It is apparent that the teaching of Amos (*c.* 750 B.C.) against the oppression of the poor and injustice in and out of the courts was no new thing, since already the prophets of Yahweh were standing for justice bravely before kings and queens. *See* also CHRONICLES, BOOKS OF THE.

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KING'S BENCH, COURT OF: *see* QUEEN'S BENCH, COURT OF.

KINGS CANYON NATIONAL PARK lies in the Sierra Nevada mountains of California. It is adjacent to Sequoia National park and is under a common administration, with headquarters at Three Rivers, Calif. Kings Canyon National park, containing 454,650 ac., was established by act of congress in 1940 and assimilated the 2,534-ac. General Grant National park.

Like Sequoia and Yosemite National parks, Kings Canyon National park gives protection to groves of *Sequoia gigantea*, the Sierra redwood. The most spectacular feature of the park, however, is Kings canyon on the south fork of Kings river. This is a glaciated canyon similar to Yosemite, carved out of the westward-sloping fault block of the Sierras.

Kings Canyon and Sequoia National parks contain many lakes, 900 mi. of trails, and large wilderness areas. The John Muir trail follows the crest of the mountains from Sequoia through Kings Canyon to Yosemite. Fishing is considered good. Deer, bear, bighorn sheep and other wildlife may be seen but may not be hunted. The General Grant tree, principal attraction of the General Grant grove, is five feet shorter and two feet greater in

diameter than Sequoia park's famous General Sherman tree.

See SEQUOIA NATIONAL PARK for information on *Sequoia gigantea,* accommodations at the parks, nearest cities and dimensions of the General Sherman tree. *See* also SEQUOIA. (J. E. CL.)

KING'S EVIL, a name applied to scrofula or struma, a tuberculous swelling of the lymphatic glands of the neck, or of the bones and joints, a disease that was very common until the beginning of the 20th century. From biblical and early Roman times it was popularly supposed to be curable by the royal touch; the practice was first adopted on a large scale by the royal houses of France and England. Some trace its origin to Clovis (d. 511), king of the Franks, but it is more likely that the first king to adopt the practice was Philip I who reigned in France from 1060–1108.

In England the practice was begun by Edward the Confessor, and, although not favoured by every king, it came to be attended by great ceremony and was even incorporated in the liturgy. Henry VII elaborated the ritual and gave to each sufferer a gold coin of the realm, called an "angel" because of its design. The minting of gold angels ceased in 1634, and in their place special "touch pieces" were used, which, like the angels, were subsequently worn as amulets or charms. The custom of touching reached its height during the Stuart period, and John Browne tells us in his *Adenochoiradelogia, or . . . Kings-Evil-Swellings* (1684), that Charles II touched 92,107 persons between 1660 and 1682. Richard Wiseman, serjeant-surgeon to King Charles, in his *Severall Chirurgical Treatises* (1676), stated that he had witnessed hundreds of cases cured by the king without the aid of surgery. William III doubted his own ability to heal by touching, and it is said that on the one occasion when he was persuaded to exercise it, instead of using the prescribed formula, "the king touches you; God heals you," he simply remarked, "May God give you better health, and more sense." The last royal healer in England was Queen Anne, who revived the custom and touched 200 victims of King's Evil in 1712. Among them was Samuel Johnson, then a child 2½ years old.

In France the ancient ceremony persisted for another century. Louis XVI is said to have treated by touch no less than 2,400 persons at his coronation in 1775, but by that time the scientific spirit was alive, and an inquiry revealed the fact that only five were cured. Nevertheless when Charles X became king in 1824, he revived the whole ceremonial and touched 121 sick persons; the custom did not survive his abdication in 1830.

See R. Crawfurd, *The King's Evil* (1911). (D. GU.)

KINGSFORD-SMITH, SIR CHARLES EDWARD (1897–1935), Australian aviator whose skill and daring wrote important chapters in the early history of long-distance flight, was born in Hamilton, Brisbane, Feb. 9, 1897.

In World War I he enlisted in the signal engineers of the Australian Imperial Force, and was transferred to the royal flying corps. After retiring with the rank of captain in 1919, he entered civilian flying. In 1927, with Charles T. P. Ulm as co-pilot, he flew around the Australian continent in 10 days. The next year, with Ulm and a navigator and radio man, he flew from Oakland, Calif., to Brisbane. His most celebrated flight, also made with a three-man crew, was a crossing of the Atlantic from Port Marnock, Ireland, to Harbour Grace, Canada, June 23–25, 1930.

During a flight that began in London on Nov. 6, 1935, and was to have brought him and his companion, Thomas Pethybridge, to Australia, they were lost en route to Singapore. They were reported missing on Nov. 8 after no word had been received from them for 24 hours. At the time of his death, Kingsford-Smith held the rank of air commodore in the Royal Australian Air Force.

KINGSLEY, CHARLES (1819–1875), English clergyman, writer and teacher, was a man whose novels were widely read and who exercised a wide influence upon social developments in Britain. He was one of the first churchmen to welcome Charles Darwin's work and to popularize modern scientific interests, and he has claims to be regarded as a typical Victorian Englishman. He was born on June 12, 1819, at Holne vicarage, Devon, his father being a country gentleman ordained at 35 and his mother, Mary Lucas, the daughter of a West Indian judge. Charles, their eldest child, was brought up with a love of the country and natural history at Barnack, Northamptonshire, and Clovelly, Devon, until in 1836 his father became rector of St. Luke's, Chelsea. After graduating at Magdalene college, Cambridge, Kingsley was ordained in 1842 as curate of Eversley, Hampshire, which became his home, apart from short intervals, for the rest of his life. In 1844 he married Fanny Grenfell, a lady well fitted to calm his restlessness and temper his sensitiveness and impetuosity.

In 1848 he published his first book, *The Saint's Tragedy,* a blank-verse drama about St. Elizabeth of Hungary, and with his friends F. D. Maurice and J. M. Ludlow founded the Christian Socialist movement (*q.v.*). As Parson Lot in the Christian Socialist journal *Politics for the People,* in his first novel, *Yeast* (1848), and again in *Alton Locke* (1850), he proclaimed the awakening of the social conscience and used his remarkable power of description to reveal the squalor of the "hungry forties." His human sympathies, his disgust at exploitation and his indignation at cruelty, his fastidiousness and self-consciousness, and his unquestioning acceptance of the prejudices of his class and race, gave him a power of attracting attention and an influence too great for his intellectual equipment and consistency of purpose. He was a publicist of the co-operative movement, of social reform, of sanitation and of adult education, but not the man to lay out a policy or sustain a program.

By 1852 he had developed his literary activities, writing much poetry, including attempts to adopt the classic hexameter, and beginning his historical novels with the most remarkable of them, *Hypatia* (1853). This study of Alexandria in the 5th century gives a picture of the city and its intellectual and religious life which subsequent research has surprisingly validated. It shows that he had not only a real gift for assimilating and visualizing evidence but a flair for its interpretation. The volumes that followed, *Westward Ho!* (1855), an anti-Catholic adventure story set in the Elizabethan period, and *Hereward the Wake* (1866), his last novel, though immensely popular, exciting in incident and splendid in their pictures of the scenery of forest and fen, moorland and sea, are too evidently biased both by his hatred of Roman Catholicism and by his aggressive patriotism. If he has earned a high place as a primary advocate of social revolution, he bears a share of responsibility for the jingoism and British arrogance of the end of the century. The mass of other work which accompanied these books exhausted his health, but led to his appointment as chaplain to the queen in 1859; as regius professor of modern history at Cambridge in 1860; and as a tutor to the prince of Wales in 1861. In 1869, when he resigned his chair, he was appointed to a vacant canonry at Chester, and in 1873 was transferred to Westminster. He died of pneumonia at Eversley on Jan. 23, 1875.

Kingsley, though credited with the advocacy of "muscular Christianity" and always an active and athletic figure, was never robust and had overstrained his health by 1855. In his later years his capacity for hard work, wide interests and ardent loyalties was exhausted. His history lectures at Cambridge, which were popular but unscholarly, and his notorious controversy with J. H. Newman, which stung the latter into writing his *Apologia,* disclosed the limitations of his knowledge and the recklessness of his judgments. So long as he was controlled by the wisdom of Maurice, the integrity of Ludlow and the common sense of Thomas Hughes, he could and did contribute a valuable inspiration to the development of democracy and social welfare. Left to himself and increasingly fatigued, his energies were too dissipated to be effective. Only in one direction does his subsequent influence still remain important. He was one of the few Christians to welcome wholeheartedly the work of Charles Darwin and to devote himself to the spread of the new knowledge of nature. From the time when he wrote *Glaucus* (1855) to the appearance of *The Water-Babies* (1863), a children's story about the strange adventures of a little chimney sweep, partly inspired by Kingsley's thoughts on evolution, and *Madam How and Lady Why* (1869), and above all by his enthusiasm for natural history which resulted in the foundation of the Chester Natural History society, he not only helped bridge the gulf between religion and science opened by the Darwinian controversy but did much to create and encourage a widespread interest in nature among working people.

It is easy to dismiss Charles Kingsley as a man typical of the racial and religious antipathies of his time: but for the historian who would ask how Britain escaped the Chartist bloodshed of 1848 and Christianity the discomfitures of 1859 provoked by Darwin's *On the Origin of Species* and how the social revolution of the past century has been accomplished, his name will arise increasingly as we see beyond the controversies over *Westward Ho!* or Newman's *Apologia* to the profound and far-reaching changes which have shaped the modern world.

See *The Life and Works of Charles Kingsley,* containing letters and memories of his life ed. by his wife, 19 vol. (1901–3); R. B. Martin, *The Dust of Combat* (1960). (C. E. RA.)

KINGSLEY, HENRY (1830–1876), English novelist, several of whose books were popular for half a century. The younger brother of Charles Kingsley, he was born at Barnack, Northamptonshire, on Jan. 2, 1830. In 1853 he left Oxford, where he was an undergraduate at Worcester college, for the Australian gold fields. This venture, however, was not a success, and after five years he returned to England. He then wrote *Recollections of Geoffrey Hamlyn* (1859), a novel of Australian life. This was the first of a series of novels of which *Ravenshoe* (1861), his best work, and *The Hillyars and the Burtons* (1865) are the best known. He edited for 18 months the *Edinburgh Daily Review,* for which he had acted as war correspondent during the Franco-German War. He died at Cuckfield, Sussex, on May 24, 1876.

See S. M. Ellis, *Henry Kingsley* (1931).

KINGSLEY, MARY HENRIETTA (1862–1900), English traveler in and writer on west Africa, in whose memory the African society (now the Royal African society) was founded in 1901 "for enquiry into native law and custom, and for the mutual enlightenment of the black and white man," was born in Islington, London, on Nov. 13, 1862. She was the daughter of George Henry Kingsley (1827–92), an enthusiastic traveler seldom at home, and the niece of Charles Kingsley (*q.v.*). She spent a secluded life until the age of 30 when the death of her parents freed her and she decided to go to west Africa to study African religion and law. During 1893–94 she visited Kabinda, Old Calabar, Fernando Po and the lower Congo, partly to collect west African beetles and fresh-water fish for the British museum. In Dec. 1894 she sailed again for west Africa and in less than a year visited the French Congo, ascending the Ogooué (Ogowe) river and passing through the dangerous and largely unknown country of the Fan (or Fang) tribe from Lambaréné to Agonjo on the Rembwe. She then visited Corisco Island and climbed Mt. Cameroon (13,350 ft.) from a direction not previously attempted. From these journeys she brought back valuable collections, including a fish, new to science, from the Ogowe. Everywhere she had the respect and assistance of both Africans and Europeans, and the knowledge of trade conditions that she acquired subsequently proved of considerable value to west African merchants in Britain. Her adventures appeared in *Travels in West Africa* (1897) and her opinions in *West African Studies* (1899). Between 1896 and 1899 Mary Kingsley lectured extensively in the British Isles at the request of academic and scientific societies and also the Manchester and Liverpool Chambers of Commerce, thus making known the conditions of life and government in west Africa. Her plans to revisit that region were altered by the South African War, in which she nursed sick Boer prisoners at Simonstown until her death of enteric fever on June 3, 1900.

Mary Kingsley's inherited love of adventure, her physical and moral courage, and her disregard of the conventions of her time enabled her personally to investigate conditions in Africa and then to fight to better them by word of mouth and by her pen. Her unique knowledge gave her power, and her enjoyment of this, together with her conviction that she knew what was best for the African, sometimes prejudiced her judgment of those who held different opinions.

See Cecil Howard, *Mary Kingsley* (1957). (R. W. SL.)

KING'S LYNN, a municipal borough and seaport of Norfolk, Eng., on the estuary of the Great Ouse near its outflow into the Wash, 44 mi. W.N.W. of Norwich by road. Pop. (1961) 27,554. The town ranked high among English ports from early times and retains many old houses and streets. As Lynn owes its origin to the trade which was carried by the Ouse and its tributaries, its history dates from the period of settled occupation by the Saxons. It belonged to the bishops of Thetford before the Conquest. Herbert de Losinga (*c.* 1054–1119) granted its jurisdiction to the cathedral of Norwich, but this right was resumed by a later bishop, John de Gray, who in 1204 had obtained from John a charter establishing Lynn as a free borough. A grant in 1206 gave the burgesses a guild merchant. Henry VIII granted Lynn two charters, the first (1524) incorporating it under a mayor and aldermen; the second (1537) changing its name to King's Lynn. Lynn, which had declared for the crown in 1643 and was captured by the parliamentary forces, surrendered its privileges to Charles II in 1684, but recovered its charter on the eve of the revolution. The parishes of Gaywood and West Lynn were added to the borough in 1935.

On the land side the town was formerly defended by a fosse, and there are remains of the old wall, including the 15th-century South gate. The river by-channels—the "fleets"—recall the similar *flete* of Hamburg. In the park area of the Walks is the octagonal Perpendicular Red Mount chapel, an unusual structure dating to about 1485 and once visited by pilgrims. The twin-towered church of St. Margaret, with a fine Early English chancel, was begun in the 12th century and much added to; its two great 14th-century brasses are famous. The St. Nicholas chapel of ease was completed in 1419. In South Lynn is All Saints' church, a cruciform Decorated building. There remain the slim tower of Greyfriars (Perpendicular) and Thoresby college, a 15th-century ecclesiastical establishment. In the old grammar school, founded in the reign of Henry VIII and now removed, the murderer Eugene Aram taught. The Guildhall has a Renaissance porch and many municipal relics; St. George's guildhall, built about 1410 and restored in 1951, is used for a July festival of the arts. Among the many buildings of interest are the customhouse (1683); Clifton house, a merchant's home of the 17th century; the 18th-century courthouse; and many houses of the past merchants of King's Lynn. The writer Fanny Burney was born there and Margery Kempe, the 15th-century mystic and writer of a personal and travel journal, was the daughter of a mayor and wife of a burgess of the town. The chief industries are the making of artificial manures, the refining of beet sugar, the canning and quick-freezing of fruit and vegetables, light engineering, timber importing and all the activities of a small port dealing with traffic from Baltic and North sea ports. There is some fishing. The Tuesday cattle and corn markets and Tuesday and Saturday general and provision markets date from 1524.

KINGSPORT, a city of Sullivan county, Tenn., U.S., in the ridge and valley province of the northeastern part of the state, 25 mi. W. of Bristol (*q.v.*) and 21 mi. N.W. of Johnson City (*q.v.*). Kingsport's history dates from the late 18th century, when it was a boat landing for shipping on the Holston river; in 1774 Col. James King established a mill at the mouth of Reedy creek and later built an ironworks and a nail factory. But the modern city is a 20th-century development: in 1909 a railroad was built to Kingsport and in 1915 a civic improvement association made plans for the orderly development of industry. The city was chartered in 1917 and has had a council-manager form of government since that time. Kingsport has one of the largest book manufactories in the United States, a paper mill and plants that produce chemicals, plastics, glass, leather, textiles and machinery. Nearby mountains and TVA lakes provide recreational facilities.

For comparative population figures *see* table in TENNESSEE: *Population.* (F. B. W.)

KINGSTON (KINGSTON-UPON-HULL), **EARLS AND DUKES OF.** The English earldom of Kingston was first created in 1628 for ROBERT PIERREPONT or PIERREPOINT (1584–1643). The second son of Sir Henry Pierrepont of Holme Pierrepont, Nottinghamshire, he was born on Aug. 6, 1584, became member of parliament for Nottingham in 1601 and was in 1627 made Baron Pierrepont and Viscount Newark. He endeavoured to remain neutral on the outbreak of the Civil War, but in 1643 he joined the king and was made lieutenant general of the eastern counties. He

was captured by the parliamentarians at Gainsborough and was accidentally killed on July 25, 1643, while being taken prisoner to Hull. Robert's second and third sons William (d. 1678) and Francis (d. 1659) were leading parliamentarians, but his eldest son and successor HENRY (1606–80), 2nd earl, represented Charles I during the Uxbridge negotiations. In 1645 he was made a privy councilor and created marquess of Dorchester. He compounded for his estates by paying a large fine in 1647 and during the Commonwealth moved to London where he studied law and medicine. He was restored to the privy council in 1660 and was made recorder of Nottingham in 1666. He died on Dec. 8, 1680, when the marquessate became extinct. The earldom passed successively to ROBERT (d. 1682), 3rd earl, WILLIAM (d. 1690), 4th earl, and EVELYN (*c.* 1665–1726), 5th earl, the grandsons of William, second son of the 1st earl.

The 5th earl, a staunch Whig, was created marquess of Dorchester in 1706, a privy councilor in 1708, and duke of Kingston in 1715. He afterward held the offices of lord privy seal and lord president of the council. He died in London on March 5, 1726. He had five daughters, including Lady Mary Wortley Montagu (*q.v.*) and one son, William (d. 1713). William's son EVELYN (1711–73), 2nd duke, raised a regiment which distinguished itself against the rebels at Culloden and he rose to the rank of general by 1755. He is chiefly remembered for his "marriage" with Elizabeth Chudleigh (*see* BRISTOL, EARLS AND MARQUESSES OF). At his death without issue at Bath on Sept. 23, 1773, his titles became extinct.

KINGSTON, the chief city of Frontenac county, Ont., Canada, and port on the north shore of Lake Ontario at the confluence of the lake and the St. Lawrence river and at the mouth of the Cataraqui river and Rideau canal; it is 165 mi. N.E. of Toronto and 185 mi. S.W. of Montreal. This strategic location, originally called Cataraqui, was the site of Indian councils in 1673 when the governor of New France, the comte de Frontenac, erected a fortified trading post; La Salle, as commandant in 1675, strengthened and rebuilt the fort. Fort Frontenac was a key outpost of exploration and defense against the Iroquois and the English until its destruction in 1758 by the British. In 1783 the site was occupied by United Empire Loyalists who named it Kingston; within the next decade it became the principal naval base of Lake Ontario and as such held considerable military importance during the War of 1812. Kingston was incorporated as a town in 1838 and as a city in 1846; from 1841 to 1844 it was the seat of government for the united provinces of Upper and Lower Canada.

Port facilities include an inner and outer harbour, a 2,500,000-bu. grain elevator, and shipbuilding, salvage and dry-dock facilities. Principal industrial products include aluminum sheets, foils and shapes; diesel locomotives and engines; ships; mining equipment; synthetic yarns; storage batteries; leathers; and ceramics. Military establishments include the Royal Military college, National Defence college and Canadian Army Staff college. Queen's university, St. George's cathedral (Anglican) and St. Mary's cathedral (Roman Catholic) are examples of the large number of limestone buildings. Pop. (1961) 53,526. (F. G. R.)

KINGSTON, a city of New York, U.S., 90 mi. N. of New York city in the Catskill mountains; the seat of Ulster county. Kingston was one of the two first white settlements on the Hudson river above New York city; its origins may be traced to a temporary fur trading post established at the mouth of the Rondout creek within a year or two after Henry Hudson's explorations of the river in 1609. The first permanent settlement, called Esopus, was made by the Dutch in 1658, when Gov. Peter Stuyvesant laid out plans for a stockade with 40 houses. Three years later he issued a charter to the settlement and renamed it Wiltwyck ("wild town"). When the loosely organized Dutch colonies were taken over by the British in 1664, the name Wiltwyck was changed to Kingston. The year 1777 was a year of firsts for this historic city. The first state senate met there, the first state constitution was adopted, the first state supreme court sat under John Jay and Kingston became the first state capital when the legislature convened in September. A month later the British, in revenge for Kingston's spirit of independence, burned the town almost to the ground. But "the colonial city" survived and in April 1805 it was incorporated as a village. On March 29, 1872, the combined villages of Kingston, Rondout, Wiltwyck and Wilbur became the chartered city of Kingston.

The city is in an area noted for its apple and chicken production and is also one of the largest mushroom growing areas. Kingston's economy expanded rapidly after the completion in 1828 of the Delaware and Hudson canal from Honesdale, Pa., to the Hudson at Kingston. The canal brought coal from Pennsylvania to New York markets and carried cement, limestone, sandstone, bluestone and brick to build New York city until increasing rail competition led to its abandonment in 1899. In Kingston a diversity of economic pursuits developed over the years, and the city is a year-round resort area.

Kingston is in the region made famous by Washington Irving in his story of Rip van Winkle. The Old Dutch church, established in 1661, the senate house and the Kingston-Rhinecliff bridge are noteworthy structures.

For comparative population figures *see* table in NEW YORK: *Population.* (E. P. LI.)

KINGSTON, a borough of Luzerne county in eastern Pennsylvania, U.S., on the north branch of the Susquehanna river opposite Wilkes-Barre (*q.v.*). In 1769 Kingston was settled by pioneers from Connecticut and New England holding claims to the land under the Susquehannah company. Before and after the American Revolution the people of Kingston fought against Pennsylvania claimants for the land and during the Revolutionary War against the British and Indians in the disastrous battle of Wyoming Valley (1778), in which the Americans were defeated, and many of those captured were massacred or tortured by the Indians.

Until 1950 anthracite was the dominant industry in both employment and wealth produced. The subsequent decline in anthracite was offset by Kingston's becoming the residential section for Wilkes-Barre and by opportunities offered in the railway repair shops and factories making baked goods, silk, hosiery, aircraft parts, undergarments, foundry machines and tobacco products. A variety of ethnic groups make up the population. For comparative population figures for the borough *see* table in PENNSYLVANIA: *Population.*

Kingston, which became a borough in 1857, is the home of the Wyoming seminary (1844), one of the first coeducational college preparatory schools in the United States.

See also WYOMING VALLEY. (R. D. WI.)

KINGSTON, a village in the town of South Kingstown, Washington county, R.I., U.S., 24 mi. S. of Providence, noted for its elm-shaded main street lined with colonial and early federal period buildings. Founded about 1700 on Little Rest hill, the village was known as Little Rest until 1825. In 1752 the county seat was moved from Tower Hill, the earliest settlement in the area, to Little Rest and from that date to 1854 it was one of the five towns in which the Rhode Island general assembly met. Prior to the American Revolution the village grew rapidly, and became a focal point in the social and political life of the slave-owning planter society whose large estates lay in the surrounding countryside. Loss of the legislative sessions transformed Kingston from a place of flourishing taverns and shops to a quiet relic of a vanished era, though it remained the location of the county courthouse until 1900. The population of the village in the second half of the 20th century was under 5,000.

In 1892 the founding of the Rhode Island College of Agriculture and Mechanic Arts on the outskirts of the village brought new life and an influx of new residents. The college, which became the University of Rhode Island in 1951, expanded rapidly in the following decade.

Near Kingston are some of the best stands of rhododendron and laurel in New England and the Great swamp, noted for wildlife and unusual botanical specimens. A crucial battle in King Philip's War took place there in 1675. (C. A. Co.)

KINGSTON, capital and chief port of Jamaica, sprawls along the southeastern coast of the island, backed by a line of hills. It is famous for its fine harbour, which is landlocked by a narrow

peninsula called Palisadoes, which in the 1960s was being developed as a recreational and tourist resort. The population (1960) was 123,403.

Kingston was founded in 1693, after Port Royal at the mouth of the harbour was destroyed by an earthquake. In 1703 Kingston became the commercial, and in 1872 the political, capital of Jamaica. On several occasions it was almost destroyed by fire, and in Jan. 1907 it suffered a violent earthquake.

In the main streets of the city modern buildings contrast sharply with the architectural relics of former centuries. The church of St. Thomas, in King street, the chief thoroughfare, was first built before 1699 but was rebuilt after the earthquake in 1907; it contains a memorial to Adm. John Benbow (*q.v.*). At the eastern limits of the town stands Rockfort, a moated fortress built at the close of the 17th century and last manned in 1865. In Duke street stands Headquarters house (formerly the seat of government), built by Thomas Hibbert, an 18th-century merchant; it is one of the few remaining architectural showpieces of a city once renowned for its fine houses. The Institute of Jamaica in East street maintains a public library, museum and art gallery especially devoted to local interests. The University of the West Indies, which serves the entire British Caribbean, is at Mona, 7 mi. from Kingston. Kingston race course, on the town's northern boundary, was formerly used for horse racing, political meetings and circuses; today it comprises a cycle-racing track, children's playgrounds and the King George VI Memorial park.

The town's transport facilities include motorbuses and taxicabs, and a government-owned railway running from Kingston to most of Jamaica's 14 parishes. Kingston international airport at the Palisadoes, 3 mi. from the city, is served by world airlines and British West Indian Airways. Ships from all parts of the world dock in Kingston harbour. After World War II the foreshore area became an industrial centre based upon food processing, clothing and shoe production, an oil refinery and many other industries. Knutsford park, north of Kingston, formerly headquarters of the city's horse racing, was renamed New Kingston and in the early 1960s was being developed as a commercial and shopping centre.

KINGSTON UPON THAMES, one of the 32 London boroughs constituting Greater London, Eng., is bounded south and southwest by Surrey, southeast by Sutton, northwest by the Thames, north by Richmond upon Thames and Wandsworth, and northeast by Merton. This outer London borough was established on April 1, 1965, under the London Government Act 1963 by the amalgamation of the former Royal Borough of Kingston-upon-Thames with the boroughs of Malden and Coombe and of Surbiton (all in Surrey). Area 14.5 sq.mi. (37 sq.km.). Pop. (1965 est.) 146,470. The borough, which by grant of Elizabeth II was designated "royal," is administered from the Guildhall, Kingston upon Thames. It comprises two parliamentary constituencies: Kingston upon Thames borough constituency, and Kingston upon Thames-Surbiton borough constituency.

The borough, while mainly residential, is also a commercial centre. Business houses, shops, department stores, and the market at Kingston serve a wide area, complementing other main shopping centres at Surbiton, Tolworth, and New Malden. Also at Kingston are colleges of art, further education, and technology. Local industries include light engineering, boat building, the manufacture or processing of aircraft, electronic equipment, timber, wine, cosmetics, plastics, and paints and finishes.

Alongside modern architectural development older buildings remain. All Saints Church, Kingston, contains 15th-century roofs and brasses. The present Thames bridge, built in 1828 and later widened, replaced earlier bridges dating certainly to the early 13th century. Nearby in the grounds of the modern Guildhall stands the Coronation Stone of gray sandstone, traditionally used in the crowning at Kingston of seven Anglo-Saxon kings from Edward the Elder, 900, to Aethelred II, the Unready, 979. The Lovekyn Chapel, a chantry endowed in 1309, was subsequently granted by Elizabeth I for the use of the grammar school she established in 1561, now a public school. The museum contains the zoopraxiscope of Eadweard Muybridge (*q.v.*), motion picture pioneer. Southborough House, Surbiton, was designed by John Nash in 1808. Fanny Burney, the novelist, often stayed at Chessington, which has an ancient church, and is known for its zoo. Coombe was the birthplace of John Galsworthy, playwright and novelist. Edward Gibbon, the historian, attended school at Kingston, and the artists William Holman Hunt and Sir John Millais had associations with Surbiton and neighbourhood.

Kingston owes its origin to the Thames having been fordable there in earlier times. The name derives from the Saxon *Cyningestun* (King's town). A Great Council under King Egbert met there in 838. Thirty royal charters were granted to the town from John (1200) to James II (1685). The right to appoint a high steward and recorder and to maintain a general market granted by previous charters was confirmed to the London Borough in its charter of incorporation. Surbiton, known as Subertone in 1203, denotes "south barton" in distinction from "north barton," or Norbiton. At Malden (Saxon "mael" a cross, and "dun" a hill) Walter de Merton, lord chancellor of England, founded a college in 1264 for the maintenance of 20 scholars at Oxford. (F. J. Ow.)

KINGSVILLE, a city of Texas, U.S., 38 mi. SW of Corpus Christi on the flat Texas coastal plain; the seat of Kleberg County. The city grew from a tract of 41,820.6 ac. platted on the King Ranch in 1903 by the Kleberg Land and Improvement Corporation, a King Ranch enterprise which started when the St. Louis, Brownsville, and Mexico Railroad, later the Missouri Pacific, built its connection to the Mexican border.

The King Ranch headquarters there has made the city a ranching capital. From an original 15,500 ac. purchased in 1853 for less than two cents per acre, Capt. Richard King, an early steamboat captain, and his heirs built a cattle empire of nearly 1,000,000 ac. Over 50,000 cattle graze its ranges. Ranch holdings have been established also in Kentucky and Pennsylvania and the "running w" brand has been exported to King Ranch properties in Australia, Argentina, and Brazil. The ranch has pioneered in livestock and agricultural research. Its Santa Gertrudis breed, a Brahman-Shorthorn cross, was the first breed of beef cattle to be developed in the Western Hemisphere. A quarter-horse breeding program was expanded to include thoroughbreds. Assault, Middleground, and Bold Venture were notable Kentucky Derby victors from the King Ranch, in 1946, 1950, and 1936, respectively. Kingsville is also a petroleum centre. The King Ranch gas plant, capable of processing 800,000,000 cu.ft. of natural gas per day, and a petrochemical plant are major economic influences in the community. A U.S. naval auxiliary air station for jet training is east of the city. The state-supported Texas College of Arts and Industries, chartered in 1917, is on the west. The city has a council-manager form of government, in effect since 1952.

For comparative population figures *see* table in TEXAS: *Population.* (H. LA.)

ROBERT C. HERMES FROM NATIONAL AUDUBON SOCIETY

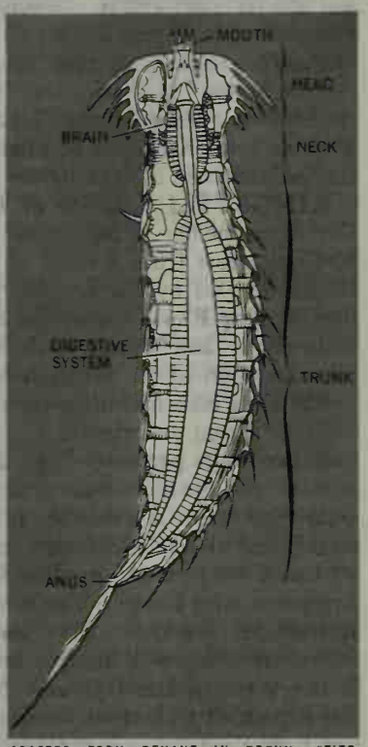
KINKAJOU (POTOS FLAVUS)

KINKAJOU (*Potos flavus*), the single species of a genus of the raccoon family (Procyonidae) native to forests in parts of South and Central America. About the size of a cat, with a prehensile tail, and of a uniform brownish colour, the kinkajou is nocturnal and arboreal, feeding upon fruits, honey, insects and small birds and mammals. A litter consists of one or two young. It is often kept as a pet. *See* also CARNIVORE. (J. N. L.)

KINO, EUSEBIO FRANCISCO (1644–1711), Jesuit missionary and explorer in northern Mexico and southwestern United States, was born of Italian parentage at Chino, Austria. At the age of 21 Kino entered the Society of Jesus and began studying for the priesthood. After completing his studies, he taught mathematics at the University of Ingolstadt until his request to be assigned to the missions of New Spain was granted. Two years after

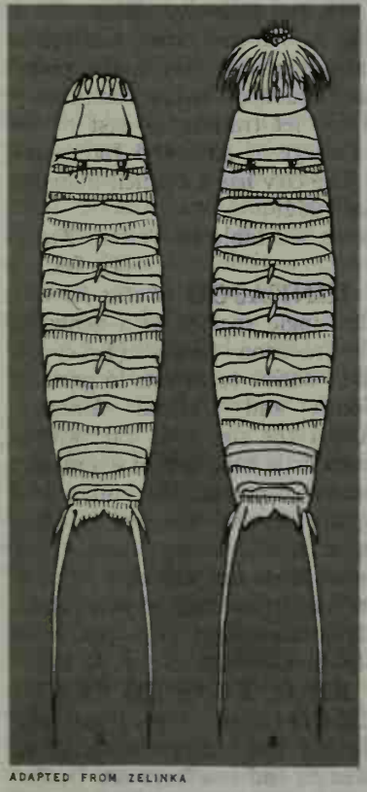
his arrival in Mexico, in 1681, he participated in an unsuccessful attempt to settle Lower California. In 1687 he was sent to the Sonora frontier and for the next quarter-century was the driving force behind establishing missions in that area, extending his work as far north as the Gila valley. San Xavier del Bac is one of his better known missions, although the present church dates from the later Franciscan period. In 1701 Kino definitely proved that Lower California was a peninsula, not an island, a fact that men had once known but had forgotten. Kino died at Magdalena, Sonora, in 1711 after a career which entitles him to rank high among North America's missionary figures. (J. F. Bn.)

KINORHYNCHA, a class of minute (some microscopic) wormlike animals of the phylum Aschelminthes, which dwell chiefly in the slime of the ocean floor, though some species live in sand and others in vegetation. Usually they inhabit the littoral or shore region in shallow waters (areas periodically exposed to the air), but specimens have been taken at depths of several hundred metres. Species that live among algae feed largely on diatoms, while burrowing forms ingest fine organic detritus, mud and sand. The entire body, yellowish or brownish in colour, is covered by a cuticle that in many places is prolonged into spines. From 0.2 to 1 mm. long, the body is externally divided into segments. The first, enlarged and bearing a conspicuous crown of recurved spines, is called the head; the second segment is termed the neck; the remaining segments collectively, the trunk. The mouth, at the anterior tip of the head, is guarded by a circle of spines (stylets) and opens into a tubular digestive system. At rest, the head is withdrawn into the front end of the body.



ADAPTED FROM REMANE IN BRONN, "TIER-REICHS"

FIG. 1.—MEDIAN SECTIONAL VIEW OF A KINORHYNCHA (GREATLY ENLARGED)



ADAPTED FROM ZELINKA

FIG. 2.—SPECIMENS OF ECHINODERES: (A) HEAD DRAWN INTO BODY; (B) HEAD PROTRUDED (GREATLY ENLARGED)

Alternate thrusting forward and withdrawing of the head produces a squirming movement, the chief means of locomotion.

The sexes are separate and similar externally. Laid eggs are unknown and full details of development remain to be reported, although many larval stages have been recognized.

In 1928 Karl Zelinka prepared a comprehensive monograph on the group. About seven genera of adult worms have been recognized (*Echinoderes, Echinoderella, Centroderes, Campyloderes, Semnoderes, Trachydemus* and *Pycnophyes*).

In addition, many provisional genera have been proposed for larval forms, for most of which the adult stage is unknown.

See L. H. Hyman, *The Invertebrates,* vol. 3 (1951); A. Remane, "Kinorhyncha" in Bronn's *Klassen und Ordnungen des Tierreichs* (1936). (H. J. V. C.; Mn. S.)

KI NO TSURAYUKI (d. 945 or 946), court noble, government official, and noted man of letters in Heian Japan. While serving as chief of the Imperial Documents Division, Tsurayuki took a prominent part in the compilation of the 20-volume poetic anthology *Kokinshū* ("Collection of Ancient and Modern Poetry"), which was presented to the court in 905 as the first official collection of its kind. In a prose introduction Tsurayuki discussed the general nature of poetry and the styles of the poets represented. This introduction, which was written in the *kana* syllabic alphabet (*see* Japanese Language: *Writing*), is regarded as one of the early masterpieces of Japanese prose as well as the first serious attempt at literary criticism in Japan; it became the model for many similar essays in later centuries.

Tsurayuki was himself a prolific and highly respected writer of Japanese verse (*uta*), and he ranks among the "36 Japanese Poets," the most illustrious of the 8th–10th centuries. In 935 he wrote *Tosa nikki* (*The Tosa Diary*), an account of his journey back to the capital from the province of Tosa (now Kōchi prefecture, in southern Shikoku Island), where he had served as governor. This was composed in the phonetic script instead of in Chinese, which was normal for men's diaries; accordingly Tsurayuki made it appear that it was being written by a woman, beginning with the oblique comment, "Diaries are usually written by men, but now a woman is going to try her hand at one." *Tosa nikki* is highly regarded for its pure prose style and also for the 60-odd poems by Tsurayuki that it includes.

Few details are available about Tsurayuki's life and character. He appears to have been a quiet, scholarly gentleman, who devoted his life chiefly to literature and never rose high in the government hierarchy. His son, Tokibumi (or Tokifumi), was one of the five poets (later called the Five Men of the Pear-Jar Room) who in 951 compiled the *Gosenshū,* the second official poetic anthology.

Only a small part of Tsurayuki's writings may be read in English: *The Tosa Diary,* trans. by William Porter (1912), and extracts in F. V. Dickins (trans.), *Primitive and Medieval Japanese Texts* (1906). There is an English translation of the *Kokinshū* by T. Wakameda, *Early Japanese Poets* (1929), and a French translation by Georges Bonneau, *Le monument poétique de Heian: Le Kokinshū* (1931).

See also Japanese Literature: *Classical Period (794–1185).*

See Robert Brower and Earl Miner, *Japanese Court Poetry* (1961), which includes selections from the *Kokinshū;* Ivan Morris, *The World of the Shining Prince* (1964). (I. M.)

KINROSS-SHIRE, an inland county in Scotland and its second smallest (81.87 sq.mi.), is bounded on the north and west by Perthshire, south and east by Fife, and southwest by Clackmannan.

The northern quarter comprises the smooth grassy sheep pastures of the Ochil Hills, the plateau surface at 700–800 ft. being overlooked by Innerdoun (1,630 ft.) and other heights. The River Devon cuts a picturesque gorge in coarse breccias at Rumblingbridge in the west. The central farmed lowland shelves eastward to Loch Leven. The steep Benarty and Cleish hills in the south rise to 1,100–1,241 ft. Drift-filled lowland corridors lead southwest (Devon Valley), northeast (Eden Valley), southeast (River Leven), and south. The climate is cool and damp with an annual rainfall of 36 in. in the lowlands and 70 in. in the Ochils. The temperature averages 3.9° C (39° F) in January, 15.6° C (60° F) in July.

For long there were only three parishes, detached from Fife: Kinross, Orwell, and Portmoak to which Cleish, Tullibole, and some smaller areas were added from Perth in 1685. Medieval and Elizabethan times saw many events centred on the island castle of Loch Leven (*q.v.*). For a lowland county Kinross was very late in being enclosed for agricultural improvement, so that parish ministers writing in *The Statistical Account of Scotland* (1793) dealt with change and stress in a country in the course of transition, markedly more rapid along the new turnpike road. Over half of the arable land in Orwell Parish had been enclosed and Kinross Common was divided by agreement in 1708. There was a phase

of industrial activity (cutlery, textiles, whisky) and some cottage and part-time industry largely controlled from Glasgow. In contrast, Portmoak Parish, just a few miles from the road, had little industry (parchment), less than a quarter of the arable land enclosed and little crop rotation, and customs like the "thirling" of farms to particular grain mills, the manured infield and long-fallowed outfield and the keeping of the old small breeds of sheep and cattle survived. Everywhere a vegetarian diet predominated among the poor: oatmeal porridge for breakfast, barley and pease bannocks for dinner, meat rarely. The Scottish poor law was inadequate to relieve the prevailing poverty.

The *New Statistical Account of Scotland* (1845) describes a virtually new landscape and economy, basically modern, with intensive mechanized agriculture and stone-built farmsteads (like the one incorporating the schoolhouse in which Michael Bruce of Kinnesswood, a significant minor poet, taught up to his early death in 1767). Old crafts had died out but a few industries (tartans) were developing in the substantial gray market towns.

In 1961 the population of the county was 6,702. There is one small burgh, Kinross (pop. [1961] 2,355), the county town. The county comprises one district and unites with West Perthshire as a parliamentary constituency.

Some industries survive, like linen and high-grade woolens at Milnathort, which also has a bacon factory and meal mill. Milnathort and Kinross are the chief agricultural markets. With about half the total farmland of 82 sq.mi. in arable farming, Kinrossshire far exceeds the national average; the best land forms a 5-mi. belt north and west of Loch Leven, with heavier clays farther west and marginal land edging the 25 sq.mi. of rough grazing on the hills. Oats yield the biggest crop, followed by wheat, barley, and potatoes. About one-fifth of the cattle are dairy cows.

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(A. M. LE.; A. T. A. L.)

KINSALE (CEANN SÁILE), a market town and seaport of County Cork in the Republic of Ireland, lies on Kinsale harbour, the estuary of the Bandon River, 15 mi. S of Cork by road. Pop. of urban district (1961) 1,587. The present town is mostly of the 18th century, with narrow winding streets climbing Compass Hill, but at an early period it belonged to the De Courcis, who built the castle and a representative of whom was created baron of Kinsale or Kingsale in 1181.

Kinsale received a charter of incorporation from Edward III, having previously been a borough by prescription. It was the scene of an engagement between the French and English fleets in 1380, was forcibly entered by the English in 1488, captured by the Spaniards and retaken by the English in 1601. Until the 18th century it remained an English town, the Irish living outside the walls. William Penn was at one time clerk of the admiralty court of Kinsale and his father, Adm. Sir William Penn, was governor of the town. Kinsale was the scene of the landing of James II and of the French Army sent to his assistance in 1689, and was taken by the earl of Marlborough in 1690.

The parish church of St. Multose was founded in the 12th century. Kinsale, with the neighbouring villages of Scilly and Summer Cove, is much frequented by visitors and there is an annual regatta. The town is the headquarters of the South of Ireland Fishing Company, with a fishery pier and a harbour. The "Lusitania" was sunk off the Old Head of Kinsale in 1915 by a German submarine.

KINSEY, ALFRED CHARLES (1894–1956), U.S. zoologist who made an extensive study of the sexual life of human beings. He was born in Hoboken, N.J., June 23, 1894, educated at Bowdoin College, Brunswick, Me., and Harvard, and was professor of zoology from 1920 and director of the Institute for Sex Research, Indiana University, from 1947 to the time of his death, Aug. 25, 1956. His inquiries into human sex life resulted in the founding of the Institute for Sex Research and the publication of two books, *Sexual Behavior in the Human Male* (1948) and *Sexual Behavior in the Human Female* (1953). These books were based on 18,500 personal interviews. He reported that a wide variation apparently exists in human sexual behaviour. Although scrupulous interviewing techniques were followed and certain statistical criteria met, the study was criticized because of irregularities in sampling and the unreliable personal communication.

(F. PA.)

KINSHASA (formerly LÉOPOLDVILLE), capital of the Democratic Republic of the Congo and of Kinshasa Province. The city extends along the left (south) bank of the Congo River, at the downstream end of the lakelike expansion of Stanley Pool. Pop. (1958 est.) 389,547, including 21,568 nonindigenous inhabitants, chiefly Belgians; (1965 est. 503,432). On the opposite bank is Brazzaville, capital of the Congo Republic.

The town developed from the villages of Kinshasa and Kintambo, the latter of which in 1881 was used as a depot by the explorer Henry Morton Stanley and named by him Léopoldville after his patron Leopold II, king of the Belgians. Christian missions and business firms established posts there in the 1880s. Léopoldville succeeded Boma on the lower river as capital of the colony in the 1920s, and in 1960 it became the capital of the new republic, being renamed in 1966. In April of that year the city was placed under military administration.

In its growth from the two nucleus villages, the administrative quarter of Léopoldville developed in the west, while the terminus of the Matadi railway, the port, and the industrial quarter developed to the east. The city has broad avenues, many tall buildings, and a profusion of trees and flowers. Among the oldest buildings are the chapel of the American Baptist Missionary Society (1891), the Roman Catholic cathedral (1914), and the Protestant church (1915). Many of the chief governmental and business buildings date from 1946–58. Most of the ministerial and official residences are in the riverside suburb of Kalina.

In or near the city are two stadiums, the De Bock Park, ethnographical and geological museums, zoological gardens, and an academy of fine arts. The Lovanium Catholic University (1954) is at Kimuenza, 7½ mi. S.; in addition to its numerous faculties and institutes it has an archaeological museum and an experimental nuclear reactor. Kinshasa also has a National School of Law and Administration (1960) and a Telecommunications School (1962).

Kinshasa is linked with Songololo (Matadi) on the lower river near the Atlantic coast, by a railway, an oil pipeline, and a motor road. An airport for international and local services was completed in 1959. Upstream the Congo is navigable to Kisangani (formerly Stanleyville), about 1,050 mi. (1,690 km.). Kinshasa serves as a centre for distributing imported merchandise to the interior and also for collecting and processing export products. It is the headquarters of numerous business firms and trading agencies. Industries include food processing, brewing, tanning, and building, and there are sawmills, shipyards, and factories producing chemicals, mineral oils, and textiles. *See* also CONGO, DEMOCRATIC REPUBLIC OF THE. (E. T. J. M. N.; X.)

KINSHIP plays an important part in all human societies, both in the regulation of behaviour between persons and in the formation of social, political, and territorial groups. The domestic family survives at least as a residential unit in modern industrial society, while in tribal societies kinship tends to be even more significant for inheritance, group membership, succession to office, and in many other contexts.

Throughout history human beings have typically lived in families, units based on marriage and the recognition of parentage. Sexual reproduction entails two genetic parents, a father and a mother. But the physiology of human reproduction has been elucidated only in recent times; even if genetic theory in the 1960s was well established it was often difficult to identify the genetic father of a given individual, though the social and legal father may have been clearly known. Social kinship is thus seen to be a cultural artifact, not necessarily coincident with genetic connection. Furthermore, in many cultures people believe that reproduction is a process not requiring male intervention (*see* PARTHENOGENESIS) or that several men or spirits can combine to quicken and build a single fetus. Distinctions are therefore made among: a child's genetic father and mother; one or more genitors and genetrix, the

human or supernatural beings believed to have participated in his reproduction; his pater and mater, the social parents who typically accept responsibility for him; and his foster parents who may care for him in place of his social parents. The ties linking a child with his social parents are repeated for his brothers and sisters and link him to them. Since every child is potentially a parent these ties may ramify through the generations, producing a web of recognized cognatic or consanguineal kinship. Spouses are linked by a bond of affinity, reinforced by common ties of cognation or filiation with their children. Indeed, among some peoples a marriage is not ratified until children are born. Two persons are cognates if they have a social ancestor in common, and are affinal kin when they are linked directly or indirectly through marriage. The study of kinship is the investigation of how social ties of cognation and affinity are established, elaborated, fabricated, modified, forgotten, or suppressed; how these ties are related to other manifestations of individual and social action; how sexual alliances are distinguished from social kinship.

When a person addresses or talks about one of his kinsfolk he may call that person either by his or her own name or by some term (*e.g.*, mother, uncle, niece) specific to the relationship between them. There is great variety in the way in which different peoples apply terms of this kind, and early writers paid great attention to these systems of kinship terminology. The systems were classified according to several criteria, and connections were sought between terminology and other aspects of customary behaviour. More attention has now been given to aspects of kinship other than terminology. (*See* KINSHIP TERMINOLOGY.)

The Nuclear Family.—Parenthood manifests itself in the formation of a family. The task of rearing an infant is not shared equally by all members of the community into which he is born, nor does he acquire the same claim on the resources of all members. Usually he is filiated to a married couple and each culture specifies the circumstances in which these parents ought to be, need not be, or ought not to be, his genitor and genetrix. The association of a married couple with their young children is called a nuclear family, and it is frequently a discrete residential and economic unit with its own dwelling and its own property. If the children leave to found families of their own, its numbers decline; and it disappears with the death of the parents. It is therefore not a permanent division of society for new families continually are being founded and old families are fading away.

A multiplicity of tasks are carried out within the family, particularly in the simpler societies, and it is organized accordingly. There are divisions by generation and by sex; the children interact with their siblings, as well as with their parents. The family is not only a reproductive unit but also a unit of economic cooperation, training and mutual assistance.

Social and physical parenthood are distinct concepts, yet typically it is within the nuclear family that sexual reproduction takes place. The marriage bond ensures that a child grows up with two social parents, while within the family the prohibitions of incest maintain the separation of parents and children and require that the children seek their mates outside the family.

Among most peoples, the day-to-day running of a household calls for the co-operation of a man and a woman and, sooner or later, of growing children. This co-operation is assured by the organization of the nuclear family. Even in western society, with its minute division of labour, it is difficult for a woman to earn her living and at the same time to rear her children without the help of a man, while it is even harder for a man to rear children of his own. Where each domestic unit must largely provide its own food, clothing and shelter, these difficulties are increased, particularly when one sex may not perform tasks normally done by the other.

Formal authority within the nuclear family is usually vested in the man, though in some matrilineal (see *Descent Systems*, below) societies, jural authority over his wife and children is largely vested in a brother of his wife. Sometimes the wife rules the household while the husband handles the family's external affairs. Everywhere the training of children represents an investment of time and effort, if not of money, which is generally borne by the nuclear family. Children grow up in the family, and it is the base from which the adult members make their contacts with the wider society. Children acquire knowledge of their culture from their parents, though a considerable amount of teaching is done by older siblings and other playmates outside the family, whether or not there are specialized pedagogic institutions such as kindergartens, schools and universities. Those who are unable to fend for themselves because they are either too young or too weak look to their immediate kin for support; while in old age it is, in general, to their grown-up children that people look for care and attention. Indeed, in many societies the desire for children is phrased in terms of their value as helpers in the productive tasks and as supports in old age.

Resources outlive the people who manipulate them, and some provision has to be made for transferring the control of resources from one generation to the next. Title to resources often does not pass until death, but access and control may well have been abandoned in favour of the next generation many years earlier. Where part of the inheritance cannot be divided and yet is indispensable for maintaining a family, transfer of title to it may precede death, as, for example, in Norway and Ireland, where a peasant transfers title in his farm to a son when the latter marries.

The nuclear family provides for the continuous association of parents and children for a generation, but not for longer. In a kinship system, continuity over the generations is achieved in two ways. First, the interpersonal relations developed in the nuclear family persist even when the members of the family are dispersed. Secondly, in some societies, nuclear families are submerged in larger domestic units that encompass several generations (see *Larger Domestic Units*, below).

The elementary or simple family is the unit consisting of a man and wife and all their children, whether young or old, living at home or outside it, married or unmarried. This unit has a longer life than the nuclear family, and most people in the course of their lives belong to two or more elementary families. In one, their family of orientation, they are children; in the others, their families of procreation, they are parents. Thus each elementary family is simultaneously a family of procreation for the parents and a family of orientation for their children. Interlocking elementary families provide the framework on which the web of kinship is constructed.

Descent Systems.—By virtue of his acknowledged social parentage, a person may succeed to an office, inherit property and become a member of a descent group. Often many persons (*e.g.*, all sons except the eldest) may be excluded from succession; some persons (*e.g.*, daughters) may not inherit; but in general everyone can claim membership in some group or set of kin. W. H. R. Rivers and later writers have stressed these distinctions among succession, inheritance and descent, but in any society all three are closely related and often run in the same direction. This discussion will be based on descent rather than on succession or inheritance, for it has the widest application.

Everyone has two parents, four grandparents, eight great-grandparents and so on; there is no theoretical limit to the total number of his ancestors, and all the descendants of each of these ancestors are potentially kin to him. If no limitation were placed on the recognition of kinship, everyone would be kin to everyone else. Indeed, at one time in Europe it was fashionable to show how thousands of eminent people could trace descent from Charlemagne. But in most societies some limitation is put on the recognition of kinship, so that a person regards at least some of his associates as not his kin.

In urban Europe of the 20th century, for instance, it is rare to find a man who will associate with his wife's brother's wife's mother, even if they might recognize some link of descent or affinity, and even though specific kinship terms may exist for such categories. On the other hand, in Australian aboriginal society, where numbers were small, everyone with whom a person came into contact was regarded as a kinsman; social intercourse was impossible until the kinship connection between them had been ascertained. In China, despite the much larger number of persons who were in

social contact with one another, there was a large-range kinship system, and kinship through males was recognized widely.

It is characteristic that kinship may be recognized further in one direction than in another; so, for example, that links through men may be remembered while those through women may be forgotten, or the reverse may hold. People tend to remember or forget the names of their relatives in conformity with the directions and extent to which they recognize kinship.

Unilineal Descent Systems.—One method of limiting the recognition of kinship is to emphasize the relationships through one parent. Unilineal kinship systems, as they are called, are of two main types—agnatic or patrilineal systems, in which the relationships through the father are emphasized; and matrilineal systems, where the maternal relationships are stressed. Under patriliny a man (or woman) is linked to his patrikin, *i.e.*, his sons and daughters, his sons' children, his sons' sons' children and so on; but he is in certain respects cut off from his daughters' children, his sons' daughters' children and so on, for these are linked to their own agnatic kin. The people who are linked to him are thereby linked to each other and may form a group persisting through the generations, possessing its own internal organization and specific interests. An enduring group of this kind is called a patrilineal lineage or patrilineage.

Each male member of a patrilineage is the potential founder of a branch or segment of the original lineage. Thus in some societies each lineage is a segmented group, dividing into major segments each of which is divided into lesser segments and so on. Groups of this kind may be kept in being by the common interests of their members in rights to land and in the control of marriages of members of the group; by obligations of mutual assistance; or by adherence to an ancestor cult. In some stateless societies, lineages wage war and maintain law and order.

An emphasis on matrilineal descent gives rise to groups of matrikin, consisting of a woman, her sons and daughters, her daughters' children, her daughters' daughters' children and so on. Matrilineages are usually not so highly segmented as patrilineages. Whereas at least the smaller segments of a patrilineal system are formed around a core of men living in close proximity, two modes of residence are found with matrilineages. The local group may be organized around the women of a matrilineage, consisting of them, their husbands and children; or it may be based on the men of the matrilineage, consisting of them, their wives and children. In the first instance, the group of local women may require the counsel and leadership of a man of their matrilineage, who must live locally with his family; conversely, some of the women of the matrilineage may be married to men who are acting as local leaders for their own sisters; the kinship basis of the local group is then complicated and it may split into several units of kin. Similarly, in the second instance, competition among brothers for the allegiance and support of their sisters' sons may split a matrilineal group of organized coresident men. In both instances, the larger matrilineal segments tend to disappear as effective social units. The same arguments do not apply to patrilineages, for a local group of males does not usually need a female leader, while quarrels between brothers merely emphasize the lines of internal segmentation.

In systems of double descent, patrilineal and matrilineal principles are found in the same society, each in its specific context. Thus among the Yako of Nigeria a man lives with his male patrikin, after an initial period of living with his wife's relatives, and cultivates land controlled by his patrilineage. He also belongs to a matrilineage whose members are dispersed, but who provide priests for certain cults. He inherits movable property from his matrikin and is most closely connected with their marriages. Unilineal descent, either patrilineal or matrilineal, can generate organized groups persisting through the generations. In double unilineal systems there are two series of enduring groups, and each person belongs to one or more groups in each series.

Cognatic Descent Systems.—Unilineal systems differ radically from cognatic systems, in which everyone has obligations and duties of much the same kind toward both his paternal and maternal kin and, conversely, can expect rights and privileges from them. In patrilineal descent, an individual is allied to his father's brothers' children, but not to his mother's sisters' children; in matrilineal descent the reverse holds. In a double unilineal system he is allied to both these kinds of parallel cousins but usually in different contexts. In no kind of unilineal system does he share group membership with his cross-cousins; *i.e.*, his father's sisters' children and his mother's brothers' children. In a cognatic system, however, he is in some sense allied to all his cousins, with a possible division between, on the one hand, paternal or patrilateral cousins (*i.e.*, father's brothers' children and father's sisters' children) and, on the other, the maternal or matrilateral cousins (his mother's siblings' children). The kinship system of the United States and most European societies is cognatic.

Whereas unilineal systems give rise to groups with fixed membership, cognatic systems do not. I have my own cousins, but some of their cousins are strangers to me; my set of cognates overlaps, but does not coincide, with theirs. One of the best-known cognatic systems is that of the Germanic peoples, among some of whom compensation paid after homicide was provided by all persons who were fourth cousins or closer cognatic relatives of the slayer, and was distributed among similar relatives of the dead person.

Variant Systems.—A variant of unilineal systems is one in which an individual may choose whether he will belong to his father's group or to his mother's, but he cannot simultaneously belong to both, at least not in the same degree. Among the Mundugumor of New Guinea a man belongs to his mother's group but a woman belongs to her father's.

Some societies apparently do not display the formal regularities of either unilineal or cognatic kinship. Persons are free to choose whether they ally themselves with their father's relatives or with their mother's or with those of a spouse, and they may shift from one to the other. Omnidirectional kinship systems, as these are sometimes called, generate impermanent groupings of kinsfolk, each grouping containing kin of various kinds. There the emphasis is on the person-to-person links of diverse types through which new members gain a foothold in the unit, rather than on the rights and duties associated with a specified kinship link. Every person has a large number of kinship links which he may or may not utilize; not all people utilize the same kind of link, and every cluster of kinsfolk can recruit its members from a large number of other units.

Succession and Inheritance.—Succession and inheritance tend to follow in the same line as descent, whether patrilineal or matrilineal. In double unilineal societies, certain positions may be filled patrilineally and others matrilineally, while some kinds of property may be inherited in one line, other kinds in the other. But this is also true to some extent in unilineal societies. Among almost all peoples, however, men rather than women exercise political functions, and this gives a patrilineal colour to some systems which are basically cognatic. Thus in England the patrilineal inheritance of surnames and noble titles and the succession through males of certain landed estates is often thought to show that the country is strongly patrilineal, although after 1926 the law of intestacy was completely cognatic. Similarly, under modern conditions, the breakdown of many matrilineal systems has been misinterpreted as evidence of a transition to patriliny, when in fact a narrow-range omnidirectional system has been developing.

Holders of important hereditary posts are succeeded by their heirs, but in some societies every person is thought of as occupying an institutionalized position in society which, when he or she dies, must be filled by a successor.

Thus among the Bemba, an African Bantu tribe, when any man dies, his name, his guardian spirit and his bow are all inherited by a kinsman, who also takes over the dead man's place in the kinship system and uses kinship terms appropriate for the dead man. Among the Cewa, another Bantu-speaking group, each old woman should nominate a granddaughter as her successor, who is known by her grandmother's name.

Patterns of Residence.—When a couple marry, they may move to some new abode (neolocal residence); or the bride may go to join her husband's people (virilocal residence); or the groom may move to his wife's group (uxorilocal residence). In a few societies,

the couple never set up a joint household at all; in others they alternate between her group and his group (bilocal residence); in still others bride and groom may already be neighbours before they marry. There is clearly some connection between customs of residence and descent, for no society is known in which descent is markedly patrilineal and residence invariably uxorilocal; yet there are both virilocal and uxorilocal matrilineal societies, and even in patrilineal societies there are usually some couples living uxorilocally. Yet if children do not leave their natal home before they marry, uxorilocal residence causes dispersal of the patrilineal group, and virilocal residence implies matrilineal dispersal; spatial dispersion sooner or later leads to disintegration of the kin group.

In some matrilineal societies, boys move from their natal homes to join their male matrikin before they marry, so that virilocal residence can then be combined with a system of groups of localized male matrikin; analogous arrangements for patrilineal societies are unknown. Among matrilineal virilocal peoples, where men stay in their natal homesteads, marriage with a father's sister's daughter may reduce the discrepancy between ties of descent and local solidarity.

The nuclear family founded by a married couple may be an independent domestic unit, even though it is located near the dwellings of the kin of one or the other spouse. Alternatively it may form part of a larger domestic unit of longer life, as discussed below.

Larger Domestic Units.—In a great many societies the domestic family, *i.e.*, the smallest clearly defined household unit, corresponds with the nuclear family. This is the ideal characteristic of western society, where a married couple seeks to set up housekeeping on its own. In some societies the domestic family is larger, however, containing a number of nuclear families whose members live in close proximity, if not under the same roof, share rights in property and acknowledge a common head. These composite families are of many kinds. In a compound family two or more families of procreation live together, as when a married couple have living with them a child by a former marriage of one or other spouse; in the polygynous compound family a man lives with his several wives and children; in the polyandrous compound family, as found among the Toda of southern India, a woman lives with her husbands and children. A fraternal joint family is a household containing several brothers, their wives and unmarried children.

Other forms of joint, or extended, family include what is sometimes called the patrilineal grand-family, *i.e.*, a man living with his wife or wives, his married sons, the sons' wives and the sons' children; the corresponding matrilineal grand-family contains a married couple, their married daughters, the daughters' husbands and children. These three-generation grand-families often break up on the death of the founding couple, or as married couples break away to begin the formation of similar units on their own. If they persist as social groups, as sometimes happened in China, they change their form as the founders die off; there are then a number of siblings in the oldest surviving generation, with their spouses, while the youngest generation is composed of people who are second cousins to each other.

Some matrilineal peoples, *e.g.*, the Haida of British Columbia, live in avunculocal joint families. Under this system, boys leave their natal homes during adolescence and join the household of one of their mother's brothers; girls remain at home until they marry, when they move to their husbands' households. Hence, in a long-established household dwell a man and his wife, his unmarried daughters and preadolescent sons, some of his sisters' adolescent sons and some of his sisters' married sons with their wives and young children.

Importance of the Nuclear Family.—Even when it does not stand alone as an independent domestic unit, the nuclear family is not entirely submerged in a wider composite group. Within the homestead, each nuclear family may have its own room or separate hut; rights in some property may not be shared equally; children may develop closer affective ties with their own parents than with other adults in the composite family; and it is usually the nuclear family which forms the potential core of a new composite family, seeking to break away from the old unit. Thus, for example, in several African societies where people live in patrilineal grand-families, the house-property complex prevails whereby a man allocates part of his property to each of his wives. On his death, each portion is inherited by the sons of the wife to whom it had been allocated, and sons by other wives have only reversionary rights.

The nuclear family is normally the human unit within which children are born, reared and instructed; it is a unit of economic co-operation and provides the basis for security in illness, infirmity and old age. Family membership supplies a person with a set of kin, with a status in society and with a position within corporate kin groups. These functions are performed in varying degrees in different societies. In western society, many of these tasks have passed to other institutions, yet the nuclear family persists as a social, reproductive and residential unit. In other societies the nuclear family is partially submerged in a larger family unit, while yet retaining its identity in certain contexts.

Only rarely is it completely absent, as formerly among the matrilineal Nayar of Malabar. There the local residential and property-holding unit was a matrilineage segment of about 25 members. Each child was reared by his mother and her matrikin and became a member of her group. His physical father might be unknown, for his mother might be maintaining liaisons, regularized or casual, with several men simultaneously; their obligations toward the child were limited to meeting the mother's delivery expenses. The child had in effect no social father; his mother's male matrikin were his foster fathers; there were merely ritual husbands replaced by groups of matrikin. Among the patrilineal Ngoni tribes of eastern Africa, the nuclear family existed only in attenuated form for, on weaning, a child left his parents and was reared by his grandparents.

In addition to affiliation to a grouping of kin, either permanent or impermanent, every person retains some ties with close relatives who do not belong to his own group, and through these ties he acquires an interest in the kin groups to which these relatives belong. Thus in many patrilineal societies a man is in close touch with his mother's brothers and has a significant interest in the patrilineal group to which they belong. Similarly, in some matrilineal systems a man has certain obligations toward his father's matrilineal group, although this is not the group to which he mainly belongs. Links to more distant relatives, as to a mother's mother's brother in a patrilineal system, may be purely interpersonal and are then not extended to the whole of the mother's mother's brother's patrilineal group.

Unilineal emphasis may conflict with the sentiments of attachment developed within the nuclear family. A man may be denied the affiliation of his own children, as in matrilineal systems, and must fall back on his sisters' children; in patrilineal systems, a woman belongs to one group and her children to another. Among the Nayar this potential conflict was resolved by virtually eliminating the nuclear family. In other unilineal societies, this conflict is partly resolved by utilizing the links a person has to groups to which he does not mainly belong and to relatives not in his own group.

A person often behaves in contrasting manner toward those of his own group and toward those to whom he is related in the suppressed line; as when in a patrilineal society he is reserved and deferential to his father but jokes and laughs with his mother's brothers. Some patrilineal peoples believe that witchcraft is transmitted matrilineally, and "joking relationships" are sometimes maintained with relatives in the suppressed line.

The importance of ties to close kin outside the nuclear family is shown in many patrilineal Oceanic societies where a man acts as counselor and friend, sponsor and patron, to his sisters' children. The paternal aunt also may play a special role in patrilineal societies. Even in Europe, during the middle ages and earlier, a person's mother's brother is often reported as being a special kind of companion, to whom the person was linked by a bond of disinterested and easygoing affection, in contrast with the more respectful and formalized ties to the father. In some matrilineal

societies these relationships are reversed, as in the Trobriand Islands, where a young man works under his mother's brother's direction but has a close friend and companion in his father.

Attitudes toward parents and grandparents are similarly contrasted. A child may be disciplined and instructed by his parents and yet be in league with his grandparents, who joke with and pamper him. Such a behavioural pattern is familiar in western society.

The Regulation of Marriage.—When a person marries, his or her choice of spouse is restricted because of kinship ties. Marriage or sexual intercourse within the elementary family are almost universally prohibited and seen as incestuous. Marriage is also prohibited within many kin groups. Under the rule of exogamy, in a patrilineal society a person may be required to choose a spouse from some patrilineal group other than his own. He may be restricted to certain groups, or even to only one, and he may be prevented from marrying a woman belonging to another generation. In some unilineal societies, marriage prohibitions are also applied to close cognatic kin. For example, among the patrilineal Zulu, a man may not marry a woman of his own or his mother's patrilineage, however distant the genealogical connection; he is also prohibited from marrying any of his first cousins. In many patrilineal societies, however, a man must or should marry into either his mother's group or into the group into which his father's sister married. Similarly, in matrilineal societies a man may be enjoined to marry a woman belonging to his father's group or to that into which his mother's brother married. In this way ties of affinity between kin groups are renewed through the generations.

By the custom of preferential or prescribed cross-cousin marriage, a man is encouraged or required to marry one of his mother's brothers' daughters, or one of his father's sisters' daughters. Where a man and his sister marry a woman and her brother respectively, it is possible in the next generation for a man to marry a woman who is simultaneously mother's brother's daughter and father's sister's daughter to him. Arrangements of this kind prevail in many parts of the world, though they do not always apply to all marriages contracted in a society.

Cross-cousin marriage also acts as a device for resolving conflicts within the nuclear family in unilineal systems. In a patrilineal society a woman can share membership of her natal patrilineage with her daughter's children if her brother's son marries her daughter; similarly in a matrilineal society, a man and his son's children belong to the same group of matrikin when his sister's daughter marries his son. The Ashanti provide an example of a people with preferred cross-cousin marriage. They are organized in localized matrilineal lineage segments which have recognized leaders who control the allocation of lineage land. Although there are no organized groups of agnates, the link between a man and his own child is stressed emphatically by various mystical notions. The ideal match is stated to be marriage between cross-cousins, preferably between a man and his mother's brother's daughter. Yet despite this expressed preference, it appears that even as long ago as 1910 only about 14% of all marriages were between cross-cousins, and by the 1960s even fewer marriages were of this type.

Social relations between rival groups can be maintained by the web of links automatically generated by cognatic kinship. Thus, commonly, the intermediary who negotiates peace in a feud is related to both sides. In unilineal systems affinal links are used in the same way. One of the most striking examples of political relations expressed through marriage was the complex tangle of affinal bonds which linked all the monarchies of Europe; similarly, among the Lele of the Congo, a whole village may stand in the relationship of son-in-law or father-in-law to its chief. Arrangements of this kind not only operate at the political level, but may affect the marriages of ordinary people. Indeed it is said that in some simple societies all marriages are marriages of state. For example, a wife from a distant Ngoni village ranked higher than one from nearby, for the former provided her husband with a set of affines in a locality where previously he had lacked allies.

The Fabrication of Kinship Ties.—When children are born in wedlock their physical and social parentage usually coincide; indeed, there is often a presumption that a woman's husband is the physical father of her child even when evidence is lacking. In western society a child born out of wedlock can subsequently acquire full, or nearly full, rights of descent by the marriage of his physical parents; and by the custom of adoption, a child will lose all or most of his rights in his physical parents in return for acquiring roughly similar rights in another couple who become his social parents. In other societies, particularly where the continuity of a line of descent is valued highly, arrangements exist whereby the social father may be a dead man, or even a woman (*see* below).

The mutual rights and obligations possessed by a married couple are acquired by the ceremonies and formalities of marriage and often by the transfer of property between the bride's people and the groom's people. These ceremonies and transfers can be arranged by others acting as proxies for the principals in the marriage, and in this way rights and obligations can be acquired on behalf of persons not able to exercise or meet them personally. Some of these rights relate to the marital relationship, such as mutual rights of sexual relations, to adequate clothing and shelter and to the provision of meals.

A husband may have other rights in his wife in her capacity not as a wife but as a mother; these are rights to the custody and affiliation of the children she bears, either by him or by another. In matrilineal societies most, if not all, of the rights in a woman as a mother remain with her matrikin and do not pass to her husband, even though he may acquire substantial rights in her as a wife. In patrilineal societies most rights in a woman as a mother pass at marriage to her husband or to his patrikin.

The custom of "marriage" between two women which occurs in some patrilineal societies is related to this transfer of rights. Thus among the patrilineal Zulu, when an eminent man dies leaving a daughter but no sons, the daughter sometimes "marries" another woman and thereby can claim the latter's children as members of her patrilineage. Thus her father's agnatic line is perpetuated and his ancestral wrath avoided. An analogous custom is that whereby, in the absence of sons, a daughter succeeds to the British throne and transmits the succession to her children as though she were a man.

Sometimes the social father is dead before his wife is married or his "child" conceived. Thus among the Nuer, if a man dies unmarried, his brother may arrange a "marriage" between a woman and the dead man. The children of the woman inherit as children of the dead man. In this ghost marriage the live brother acts as foster father to the children. He is often their physical father, though the same rules of descent are followed should they be born in adultery; but he is not their social father.

Where rights in a woman pass to the husband, they may apply to all the children borne by his wife or merely to those of which he is the physical father. Thus an impotent man may acknowledge a child of his wife by one of his kinsmen so as to acquire descendants, or he may claim the allegiance of children born in adultery at the same time as he takes action against the paramour in defense of his sexual rights. Similarly, when he dies, in some societies his rights in his wife as a mother persist, and children borne by his widow count as if they were his own children. Where a kinsman of the dead man cares for the widow and begets children by her who regard the dead man as their social father, we speak of the true levirate. The custom whereby a widow remarries a kinsman of her dead husband and bears children by him who regard her new husband as their social father is correctly described as widow inheritance. Fabrication of maternity is also met with. In some societies where the sororate is practised, a woman's kin are under an obligation to provide her husband with another wife, often one of her sisters, should she die or be barren or bear daughters only. The new wife is then regarded as the social mother of the children previously borne by her kinswoman.

Quasi Kinship and Pseudo Kinship.—The forms and usages of kinship may be extended to relationships in other contexts. One of the best-known extensions is by blood brotherhood, particularly prevalent in Africa. Thus among the Azande a man may enter into a compact of blood brotherhood with someone who is

not a kinsman. The two men then act toward one another with familiarity and render mutual assistance; it is believed that if one seduces the wife of the other he will automatically die; their alliance is in some measure extended to the kin groups to which they belong. In Japan certain craftsmen become quasi fathers to some of their assistants, among whom they distribute their patronage and favours in return for quasi-filial services. Those with the same quasi father are quasi brothers to each other, and he is quasi grandfather to their quasi children.

These relationships of quasi kinship are supplementary to those of true kinship and usually operate over a narrower field. Thus in the Roman Catholic Church, there is spiritual kinship between a sponsor and his or her godchild, and they may not marry one another; this prohibition extends to the child's social parents, but does not apply to the child's siblings or other kin.

The fiction that the grand doge of Venice was wedded to the sea suggests instances in which political offices are said to be connected to one another by kinship. Thus among the peoples of the Luapula river, Northern Rhodesia, a village headman may be called the brother of another headman, the nephew of a third and the son-in-law of a fourth. These links of perpetual kinship endure beyond the death of an incumbent of the headman's position and are taken up by his successor. This can be explained historically by reference to the founding of new villages, when the contemporary headmen may have stood toward one another in the relationships which are now perpetuated; these relationships symbolize the enduring political alliances between the organized groups led by the several headmen.

Sometimes the idiom of kinship is used to cover the whole of society, as when we speak of a king as "father of his people." The notion of common descent of a wide community is often found among the simpler peoples, but frequently the population of a society is divided into several sections, each recruited by descent from its own founding ancestor. Members of 100 or more homologous sections may be found in the same community; in other societies, there are merely two such divisions, with or without a myth of common descent, known as moieties. Moieties may be either patrilineal or matrilineal and are often exogamous, so that a person of one moiety has to find a spouse in the other. Where patrimoieties and matrimoieties coexist, as in parts of Australia, society is divided into four groups or sections, such that a man of one section should marry a woman from only one of the other three sections, while the children belong to a section different from both of their parents. Where, in addition, a man is prohibited from marrying a woman of his mother's patrikin group, as among the Arunta, an eight-section system is found.

Morphologically intermediate between moieties and lineages are clans. These are associations of lineages or lineage segments which have certain interests in common, often the regulation of marriage. Whereas members of a lineage can usually trace out their genealogical relationship to one another, clan members may believe themselves to be related without necessarily being able to specify the connection. In some clans even the notion of common descent is lacking. Clans may be matrilineal or patrilineal; they are sometimes territorially dispersed and may be totemic. If a lineage as a whole is not exogamous, the term clan is sometimes used for its largest exogamous segments. Where there are divisions intermediate between the clan and the smaller lineages or lineage segments, these are called subclans.

Thus in some societies there is a hierarchy of groups, all recruited either patrilineally or matrilineally. For example, all the Gusii people of Kenya claim to be descended patrilineally from their eponymous ancestor MoGusii. His descendants are divided into several patrilineal segments, called tribes, each of which has a distinctive totem and each of which sometimes functions as a unit in the face of external attack. Each tribe is divided into patrilineal segments, exogamous and politically autonomous, called clans, occupying discrete territories. Kinship terms are used between clanmates; within the clan, men fight with clubs, whereas they may attack nonclansmen with spears. Clans are divided into subclans; each subclan is divided into a number of smaller lineage segments, and so on down to the polygynous grand-family, whose head allots land to his wives and married sons and arranges loans of cattle among them. The nuclear family is the unit for cultivating, storing produce and preparing meals.

In societies like the Gusii, lacking a centrally organized judicial and administrative system, many of the tasks of government are performed by unilineal groups. This can happen even where kin groups are not built up in a hierarchy of lineage segments and clans. Thus the Plateau Tonga have neither a unitary state nor a segmented lineage system. People are grouped into small associations of dispersed matrikin, rarely of more than three-generation depth, which readily split as numbers increase and members disperse farther. Yet these groups, apart from regulating marriage and inheritance, also help to preserve law and order by acting in concert to defend the rights of their members and to take vengeance.

It is clear that relations between large enduring groups, even when phrased in the language of kinship, are of a different order from those obtaining within the nuclear family or between a man and those kinsfolk with whom he is in personal contact and to whom he traces a connection through known and remembered people. These political relations may be called pseudo kinship. Within the range of close kin it is sometimes possible to give formal recognition to a change in relations by repudiating kinship (*e.g.*, by deleting a name in a family Bible or by removing an intended beneficiary from a will); or by reaffirming an existing relationship (*e.g.*, by providing a worthy son-in-law with another wife).

Changes in pseudo-kinship relations between large groups are ratified in other ways, for example, by the revision of genealogies. When a man dwells among his wife's patrikin, his own patrilineal descendants may in time become assimilated to their host group, and the woman through whom they trace relationship will be said to have been a man. In this and other ways, the genealogy relating groups to one another becomes a summary of existing political relations rather than a record of former descent. In particular, many genealogies are continually foreshortened, so that the number of generations from the present back to the founder of the society or unit remains constant; this makes the genealogies unusable for dating past historical events.

The Development of Kinship Studies.—Scientific study of kinship dates from the 1860s with the published work of J. J. Bachofen and H. S. Maine; the former asserted that in the earliest times primeval promiscuity was followed by a system in which women were leaders in state and home, and descent was matrilineal; the latter was more modestly concerned with showing the importance of kinship for the early Indo-Europeans. J. F. McLennan, like Bachofen, tried to write universal history, but in his scheme primeval promiscuity was followed by stages of polyandry, through matriliny to patriliny.

Similar interests stimulated L. H. Morgan, whose speculations were backed by a wide collection of evidence, principally of systems of kinship terminology, from many parts of the world. In the same tradition were the writings of F. Engels, Sir E. B. Tylor, E. A. Westermarck, W. H. R. Rivers, R. Briffault and others. In the 20th century writers became less ambitious in suggesting evolutionary schemes, while some eschewed them completely; at the same time interest, as mentioned above, increased in aspects of kinship other than terminology.

Most studies of kinship relate to the simpler societies, for it is there that the most elaborate and pervasive kinship systems are found. The early ethnographers sometimes provided reliable accounts, but their work was increasingly superseded by F. Boas, B. Malinowski and A. R. Radcliffe-Brown and their pupils. More information has been collected on contemporary relations between kin, supplementing statements of what form these relations ought to take; the interdependence of kinship, territorial, judicial and political systems has been explored; some attempt has been made to collate information collected from a number of similar or neighbouring societies, though this last task has not received as much attention as many would wish for.

The comparatively small part that kinship has played in western society since the middle ages has largely restricted studies there

to relations within the elementary family (*see* FAMILY), but modern accounts of peasant communities have described kinship behaviour in a wider frame of reference. *See* AVUNCULATE; CLAN; COUSIN MARRIAGE; COUVADE; DUAL ORGANIZATION; ENDOGAMY; EXOGAMY; GROUP MARRIAGE; KINSHIP TERMINOLOGY; LEVIRATE; MARRIAGE, PRIMITIVE; POLYANDRY; POLYGYNY; SOCIAL ANTHROPOLOGY; SORORATE; TOTEMISM; *see* also references under "Kinship" in the Index.

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(J. A. Bs.)

KINSHIP TERMINOLOGY. Kinship is one of the universals in human society. In the dailv routine of primitive life, relationship terms are important not only as indicating the status of the person addressed or mentioned with reference to the speaker, but also because there often is no other mode of address. This is related to the widespread prejudice against the vocative use of personal names, for which kinship appellations may be substituted even to the extent of assuming relationship where none exists.

But the significance of kinship terms goes far beyond a mode of address. They are studied by the anthropologist not merely as so many words inviting linguistic analysis and comparison, but as correlates of social custom. Broadly speaking, the use of a specific kinship designation, *e.g.,* the maternal as distinguished from the paternal uncle, indicates the two may receive differential treatment from their nephews and nieces. Sometimes the very essence of a social fabric may be demonstrably connected with the mode of classifying kin. Thus kinship nomenclature becomes one of the most important topics of social organization (*see* KINSHIP).

The foundation for the scientific study of kinship terminologies was laid by Lewis H. Morgan (*q.v.*) in 1871. In this work were assembled comprehensive schedules for every major area of the globe except Africa and Australia. Morgan grouped all terminologies under two main heads—the descriptive, which he ascribed to the Aryan, Semitic and Uralian linguistic families; and the classificatory, which was characteristic of the American Indians, the Polynesians and many of the peoples of Asia. As W. H. R. Rivers noted, no contribution in the entirety of science can more certainly be credited to one man than that of the classificatory system of relationship by Morgan.

Morgan's early interest in kinship systems was historical. Discovering in 1858 that the Ojibwa had a pattern of grouping relatives that was substantially the same as that of the Iroquois, who spoke quite a different language, he set out to collect kinship terminologies systematically in order to demonstrate the unity of the American Indians and their origins in Asia. The discovery that the system of terminology used by the Tamil of southern India was practically identical with that of the Seneca, one of the Iroquois tribes, convinced him that he was on the right track, and he extended his inquiries to all parts of the world.

CLASSIFICATION OF KINSHIP TERMINOLOGIES

The initial classification of kinship terminologies by Morgan into descriptive and classificatory types was criticized by A. L. Kroeber and Rivers on logical grounds. The descriptive system describes relatives for the most part by "an augmentation or combination of the primary terms of relationship," whereas the classificatory system ranges them into great classes or categories: "All the individuals of the same class are admitted into one and the same relationship, and the same special term is applied indiscriminately to each and all of them" (*Systems,* pp. 12, 468).

Two varieties of the classificatory type were recognized—the Malayan, which merged all the kindred of one generation under a single category; and the Turanian-Ganowanian, in which certain of the collateral kin of a generation were merged with lineal kin, the remainder having separate terms.

As Kroeber and Rivers pointed out, the distinction between descriptive and classificatory is not borne out by the data. The English words "uncle," "aunt" and "cousin" group relatives into large classes, although the English system generally is nonclassificatory; and, moreover, the collateral terms are rarely built on the primary terms. Rivers attempted to remedy these deficiencies by a tripartite scheme recognizing denotative, descriptive and classificatory types; and he suggested the appellations family, kindred and clan systems, the kindred being a major bilateral unit.

For classification on a world-wide basis it is useful to consider the treatment of collateral as compared with lineal kin in the first ascending and descending generations. This is implicitly the phenomenon that impressed Morgan and that constitutes one of Kroeber's categories. The major logical possibilities are as follows: (1) collateral lines are wholly merged in the lineal within a particular generation (generational or horizontal system); (2) each generation is bisected so that only half the collateral kin are merged in the lineal (bifurcate merging system); (3) the immediate collateral lines are distinguished from the lineal and from each other (bifurcate collateral system); (4) collateral lines are distinguished from the lineal but not from each other (lineal).

In standard samples of these four systems logical coherence prevails: if the father's brother is called father, he addresses his brother's son as son; if there is a separate word for mother's brother, there is likely to be one for nephew. However, discrepancies occur, and a system must sometimes be classed by the preponderance of its affiliations. Taking the classification of uncles for illustration, the scheme may be illustrated by the table.

This fourfold scheme, developed independently by Robert H. Lowie and Paul Kirchhoff, omits certain logical possibilities that occur sporadically. Thus the Chiricahua Apache separate lineal from collateral relatives but merge the father's brother with the father's sister, and the mother's brother with the mother's sister; and the Zulu and some other African tribes classify the father's sister as a "female father" and the mother's brother as a "male mother." There are, in addition, asymmetrical systems in which the treatment of the father's side follows a different pattern from that of the mother's.

In 1925 Leslie Spier proposed an empirical classification of

System	Relatives			Criterion
	Father	Father's brother	Mother's brother	
Generational	father	father	father	one "father" term
Bifurcate merging	father	father	mother's brother	two terms; partial merging
Bifurcate collateral	father	father's brother	mother's brother	three terms; no merging
Lineal	father	uncle	uncle	two terms; merging only of collaterals

North American Indian kinship terminologies based primarily on the pattern of grouping siblings and cousins in one's own generation. His Iroquois type groups parallel cousins with siblings but designates cross-cousins by a separate term; the Mackenzie Basin type classes all cousins as siblings; the Eskimo type uses a separate term for all cousins; the Omaha type classes the mother's brother's children with the mother's brother and mother; and the Crow type classes the father's sister's children with the father and father's sister. The Salishan, Acoma and Yuman types rest on other principles, emphasizing lineal features, specialized grandparental terms, and refined age distinctions, respectively.

Later, G. P. Murdock (*Social Structure,* pp. 223–224) set up six types of kinship terminology, based on the patterns for grouping cross-cousins (mother's brother's and father's sister's children) in relation to siblings and parallel cousins (mother's sister's and father's brother's children), as follows:

Eskimo type—cross-cousins are equated with parallel cousins but both are separated from siblings.

Hawaiian type—cross- and parallel cousins are called by the same terms as siblings.

Iroquois type—cross-cousins are called by the same terms but differentiated from parallel cousins, who are commonly classed with siblings.

Sudanese type—cross-cousins are called by different terms and also are differentiated from parallel cousins and siblings. Generally descriptive.

Omaha type—parallel cousins are generally equated with siblings but the mother's brother's children are classed with mother's brother and mother; and father's sister's children correlatively are classed with nephew and niece (male speaking) or with son and daughter (female speaking).

Crow type—parallel cousins generally are equated with siblings but the father's sister's children are classed with the father and father's sister; and the mother's brother's children as son and daughter (male speaking) or nephew and niece (female speaking).

Murdock utilized these six types in association with patterns of descent to establish eleven major types of social organization into which he grouped his sample of 250 societies. In a later selected sampling of world cultures he employed a more elaborate classification of cousins in conjunction with classification of the parental siblings.

A. R. Radcliffe-Brown, who classified Australian societies into two major types, Kariera and Arunta, on the basis of kinship terminology and patterns of preferential marriage, later proposed a fourfold classification in terms of (1) patrilineal systems; (2) matrilineal systems; (3) cognatic (bilateral) systems; and (4) double-descent (both matrilineal and patrilineal) systems.

C. Lévi-Strauss called attention to the significance of preferential marriage, particularly matrilateral cross-cousin marriage, in the social structure of Australia and of south and east Asian populations.

None of these formulations is an entirely satisfactory classification of kinship terminologies generally, since they are not as yet based on an adequate comparison of whole kinship systems in relationship to total social structures.

DISTRIBUTION OF TYPES OF TERMINOLOGY

Australia.—In Australia, kinship forms an important aspect of social life, and the complexities of terminology have been reduced to systematic rules. In general, kinship terminology is bifurcate merging; that is, the father and the father's brother are called by the same term, as are the mother and mother's sister; but distinct terms are used for the father's sister and the mother's brother. Correlatively, parallel cousins are grouped with brothers and sisters, while cross-cousins are differentiated. These patterns are widely extended via clan and moiety groupings, which serve to bring all social relations within the framework of kinship.

Radcliffe-Brown divided all kinship terminologies in Australia into two main types. Type I, the widely-distributed Kariera system, is based on marriage with the cross-cousin, the father's sister's daughter or mother's brother's daughter (or, for a female, with the mother's brother's son or the father's sister's son). In type II, the Arunta system, marriage is prohibited with the first cross-cousin but enjoined with the second cross-cousin (*e.g.*, the mother's mother's brother's daughter's daughter). It is probable that a third type should also be recognized. In the Murngin and related systems of northern Australia, marriage is enjoined with the mother's brother's daughter and with others in this kinship category, but is forbidden with the father's sister's daughter. Radcliffe-Brown considered type II to be a development from type I, but attempted to fit the Murngin system into the Arunta pattern.

In these Australian systems a noteworthy feature is the absence of terms for affinal relatives. Since marriage is prescribed with particular classes of relatives, there is no need for special terms for connections by marriage since they are already consanguineous relatives.

North America.—North American Indian tribes north of Mexico have predominantly bifurcate merging kinship terminologies in the region east of the Rocky mountains, and predominantly lineal or bifurcate collateral systems in the west and north, although there are many exceptions in western North America. Mexico and Central America are less well known, although Murdock characterized most of the groups in his World Ethnographic Sample as having Hawaiian-type cousin terminology. Much of this latter area has been subjected to long acculturation; in marginal areas Omaha-type terminological systems in association with lineages or clans have been reported.

Spier's classification, based on cousin terms, still retains validity, although later researches extended and modified his results considerably. The Iroquois type, Morgan's model for the classificatory system, is also found among the bilateral Dakota and the patrilineal Ojibwa, as well as in many other areas. Research has suggested a connection with cross-cousin marriage. Spier's Mackenzie Basin type, with Hawaiian-type cousin terminology, is characteristic of most of the High Plains tribes and a considerable number of the Basin populations. The Omaha system, based essentially on the patrilineal lineage, is found in the Prairie Plains and central California regions. The Crow type, based on matrilineal lineages, is found in the southeastern tribes, the northern Plains, the western Pueblos, central California and, in modified form, on the northern northwest coast. The Acoma type, with a restricted distribution among the Keresan Pueblos, is probably best considered a specialized variant of the Crow type; and the Yuman systems are characterized by an elaboration of age distinctions plus some modification of a lineage principle. The Salishan type, with a more restricted distribution in the northwest, has a classification of cousins similar to the Mackenzie Basin type but employs lineal-type terminology in the parental generation. The Eskimo type, similar to the English system, is found among most, but not all, Eskimo groups. The closest cognates are in northeastern Asia, although some of the California systems have Eskimo terminology.

There are no examples in North America of generation systems except possibly the Seri in Sonora; although the Mackenzie Basin systems utilize Hawaiian-type cousin terminology. Lineal systems are little developed except for the Salishan and their neighbours. The bulk of the Iroquois, Omaha, Crow and Mackenzie Basin systems fall under the bifurcate merging category; bifurcate collateral systems include various California and Basin peoples, as well as the Eskimo.

For the plains region and neighbouring areas Fred Eggan proposed a classification of kinship systems into (1) generation type and (2) lineage type; and suggested that the neighbouring Iroquois and Dakota types are essentially based on cross-cousin marriage.

South America.—Paul Kirchhoff's early summary clarified the terminological situation for northeastern and eastern South America, but mainly called attention to the inadequacy of the data. After that, more adequate field research provided better knowledge of the range of types of kinship terminology, although little was still known for many groups in the 1960s.

Lineal and bifurcate collateral systems seem proportionally more prevalent in South America than in North America. Murdock recorded Hawaiian-type cousin terminology from a number of regions; Crow systems for the Guajiro, Siriono and some of the Ge-

speaking tribes of Brazil; Omaha systems for the Araucanians and Sherente; occasional Eskimo-type terminology; and a considerable number of systems with Iroquois terminologies, particularly in the Guianas and the Mato Grosso.

Preferential marriage in a variety of forms was reported for a number of regions, including not only various types of cross-cousin marriage, but also marriage with the sister's daughter—a form not reported for North America.

Asia.—Asia has such a great variety of peoples and cultures that any brief characterization of kinship terminology is difficult. In northern Asia, particularly in the northeast, lineal and bifurcate collateral systems with Eskimo or other cousin terminology are common. Among central Asian pastoral peoples, seniority is of great social importance, and differences in generation are sometimes disregarded or systematically arranged to facilitate adoption and inheritance. The social systems of central Asia depend on strict genealogical control in the patrilineal line and on the ranking of lineages in terms of seniority. In some groups, notably the Kazakh and some of the Mongol groups, terminology follows the Omaha pattern, at least in part.

In eastern Asia, the early Chinese system was bifurcate merging and was probably based on cross-cousin marriage. Their modern, more complex system is perhaps best classified as bifurcate collateral, and as employing descriptive modifiers with basic terms. Japan and Korea are lineal and bifurcate collateral, respectively, and both use Eskimo cousin terminology, but there are local and regional variants.

In southeastern Asia a number of the Tibeto-Burman tribes are bifurcate merging and have Omaha-type systems, sometimes in conjunction with preferential marriage. Groups like the Kachin of northern Burma organize their society in terms of matrilateral cross-cousin marriage.

South Asia, and in particular India, is characterized by bifurcate merging or bifurcate collateral terminology. North India in general does not allow cross-cousin marriage and has Hawaiian cousin terms. South India has a general pattern of preferred marriages, usually with the cross-cousin but sometimes with the sister's daughter, and these are reflected in the Iroquois cousin terminology.

In southwestern Asia, both among the Semitic-speaking peoples and the Iranians, bifurcate collateral systems predominate, with descriptive cousin terminology. Preferential marriage with the father's brother's daughter is common, lending a tightly knit character to the patrilineal lineage.

Europe.—The terminological systems of the European populations are, broadly speaking, descriptive or individualizing. Lineal patterns prevail in the parental generation, although occasional bifurcate collateral or derivative terms are found. Eskimo-type (or English) cousin terms are general. This striking degree of unity reflects the underlying linguistic relationships as well as cultural similarity. G. S. Ghurye concluded from a study of Indo-European kinship terminology that the early social structure was likewise of a similar type: an extended family unit of three or four generations with patrilocal residence and patrilineal descent but with bilateral kinship organization.

A comparison of European kinship terminologies by Munro Edmonson in terms of set-types indicated regional variations within the general European pattern. The commonest pattern is differentiation by sex of the referent, which characterizes all of the Germanic systems and most of the rest. The next most common pattern is an undifferentiated set-type characteristic of Spanish and other Romance language groups. A third pattern, which he called the Swedish set-type, is found mainly in Scandinavia.

Edmonson found European kinship terminology dominated by four concepts, each with a distinctive geographical focus. Lineality he found characteristic of northwestern and southwestern Europe; a three-generational division is characteristic of northwestern Europe; a five-generational system is characteristic of southern and eastern Europe; and differentiation in terms of sex of referent is primarily found in northern and central Europe. These concepts he believed to be primarily cultural and historical.

Africa.—African terminological systems were (1960s) inadequately known, but bifurcate merging systems predominate south of the Sahara with a variety of subtypes; and bifurcate collateral systems with descriptive cousin terms are common in the north. While African social structures are overwhelmingly patrilineal in descent and patrilocal in residence, there are important areas of matrilineal descent, mainly in association with avunculocal residence.

For the Pygmies, Bushmen and Hottentots limited and inadequate data suggest a variety of terminological patterns. The Hottentots have bifurcate merging parental terminology with Iroquois cousin terms and some tendency to develop Omaha patterns. The Bushmen are bifurcate collateral or lineal, with Eskimo-type cousin terminology. Little is known of Pygmy terminology.

The southern Bantu have generally bifurcate merging terminologies with Iroquois cousin terms, but there are occasional bifurcate collateral patterns and some development of Omaha systems. The central Bantu add Crow and Hawaiian cousin patterns to this assemblage.

The northeastern Bantu are likewise bifurcate merging, with Omaha, Iroquois and Crow cousin terminologies; the equatorial Bantu have these patterns with Hawaiian cousin terms. The Guinea coast tribes have bifurcate merging systems for the most part, but with some descriptive types; the cousin terms are divided mainly among descriptive, Omaha and Hawaiian patterns with occasional generation types.

The western Sudan is generally bifurcate merging with Hawaiian, Crow, Iroquois and Murngin cousin terminologies; and parallel patterns are found in the Nigerian plateau with Crow and Omaha patterns added. The eastern Sudan has descriptive cousin terminologies in addition to Hawaiian and Iroquois. The upper Nile region is likewise bifurcate merging, with a concentration of Omaha systems plus descriptive cousin patterns.

For the Horn and Ethiopia, bifurcate collateral parent terms become more characteristic, with a shift to descriptive cousin terms. This pattern is likewise found in the Muslim Sudan, though there are bifurcate merging systems with Hawaiian or Iroquois cousin terms as well. The Sahara region is generally bifurcate collateral with descriptive or Eskimo-type cousin terms. In northern Africa bifurcate collateral parental terminology with descriptive cousin terms is reported for a few groups, but kinship patterns of this region are little known.

If Murdock's sample is generally representative, about 33% of African tribes have Iroquois-type cousin terminology, about 20% have Hawaiian, 20% descriptive, 18% Omaha, 8% Crow and 1% Eskimo, omitting a few variant forms. There are also, as noted above, some patterns of terminology in the parental generation which are largely confined to Africa. Thus the Zulu pattern divides the father's relatives from the mother's, while grouping their siblings together regardless of sex.

Indonesia and Oceania.—Oceania has been of great interest to students of kinship ever since Morgan based his Malayan type on Polynesian terminologies. Morgan would have been highly interested in the later discovery of generation systems in the Philippines but puzzled that their next-door neighbours had lineal systems with Eskimo cousin types, not too different from the European patterns. In general the more complex and varied terminological patterns are found in the Indonesian region; and the terminology becomes simplified in content and pattern as one moves eastward in the Pacific, at least among Malayo-Polynesian speakers.

Western Indonesia has lineal, descriptive, bifurcate merging and bifurcate collateral terminologies, with a variety of cousin patterns, some of which are correlated with preferential marriage patterns. Eastern Indonesia has primarily lineal and bifurcate merging patterns, with Hawaiian cousin terms predominating, but with Eskimo and Iroquois as well. The Philippines have primarily lineal or generational parental groupings, with Eskimo or Hawaiian cousin terms. There the social structure is generally bilateral, with no unilineal descent groups.

The Papuan groups in New Guinea are generally patrilineal, with bifurcate collateral or bifurcate merging patterns in the parental generation, and with Omaha, Iroquois or Hawaiian cousin terms.

Preferential marriage patterns are common in New Guinea and affect the terminological patterns.

Western Melanesia is primarily matrilineal in descent with a number of types of preferred marriage, mainly with cross-cousins. Bifurcate merging patterns predominate, with Crow, Iroquois and Hawaiian cousin terms. Eastern Melanesia is more varied in social structure, but with general bifurcate merging terms in the parental generation and with Omaha, Crow, Hawaiian and Iroquois cousin terms.

Micronesia shows a predominance of matrilineal descent and has generally bifurcate merging terms with Crow or Hawaiian cousin patterns, although a few groups have generation systems.

Western Polynesia has bifurcate merging or generation systems with Hawaiian cousin terms, plus occasional Omaha, Eskimo and Iroquois groupings. Eastern Polynesia has almost entirely generation systems with Hawaiian cousin patterns.

HISTORICAL AND SOCIOLOGICAL INTERPRETATIONS

Morgan inaugurated both historical and sociological interpretations of kinship terminology. He assumed that kinship systems arose in connection with social systems, but changed so slowly that they might survive changes in social conditions and thus reflect earlier conditions of society. He also early rejected the possibility that the same kinship system could arise independently in separate areas, and he accepted the similarity of systems as proof of racial identity. Hence he mistakenly inferred the unity of the Dravidians and the American Indians, and that of the Zulu and the Hawaiians as well. Part of his difficulties were the result of the fact that most of the American Indians east of the Rockies did have similar kinship terminologies, in terms of the broad patterns that he had established, but his failure to recognize the possibility of independent development led him to untenable conclusions.

Sociologically Morgan viewed his nomenclatures as indexes of family life. The Malayan system seemed to be the simplest; and since it could be explained on the basis of a "communal family," and the Ganowanian (American Indian) system could develop from it by the addition of clans, the Malayan system was assumed to be the earliest and to furnish some evidence for a still earlier system of promiscuity from which mankind had emerged. Later the descriptive terminology developed with the rise of property rights and the custom of transmitting them only to direct descendants. These arguments laid the basis for his proposed series of evolutionary cultural stages, starting from an assumed promiscuity and ending with the monogamous family.

This theory of family evolution is no longer tenable. In the arguments that ensued, however, many valid ideas and insights of Morgan were discarded along with his theories of family evolution. England's J. F. McLennan attacked Morgan's use of terminology as evidence for social institutions on the grounds that they were merely a system of mutual salutations without any firm relations to rights and duties in social life. Morgan's speculations led Kroeber initially to reject sociological interpretations almost entirely and to develop an alternative type of explanation in terms of psychological and linguistic principles.

Rivers returned to Morgan's position that kinship terminology "has been rigorously determined by social conditions," and that "systems of relationship furnish us with a most valuable instrument in studying the history of social institutions" (*Kinship and Social Organization,* Constable and Co. Ltd., London, 1914, p. 1).

Kroeber rejected Rivers' extreme views as to determinism, insisting that "the infinitely variable play of the variable factors forbids any true determinations of causality of a sweeping character," and maintained that kinship terms were linguistic phenomena subject to alterations of a linguistic character. However, he did not sufficiently consider that language is quite likely to reflect many of the social phenomena. Kroeber later receded from his extreme position and recognized that kin term systems reflect both "unconscious logic and conceptual patterning *as well as* social institutions" (*The Nature of Culture,* The University of Chicago Press, copyright 1952 by The University of Chicago, p. 171).

Rivers' general views and their documentation with field studies stimulated both more adequate collections of data and an increasing interest in correlations of social custom with nomenclature. His correlations between certain aspects of kinship terminology and cross-cousin marriage were generally accepted, and his suggestions with regard to the probable occurrence of cross-cousin marriage in northern North America on the basis of Morgan's schedules were later fully substantiated. His development of the genealogical method for collecting kinship and other social data was an important advance over Morgan's rather clumsy schedules.

England's Bronislaw K. Malinowski, on the basis of his extensive field research in the Trobriand Islands, emphasized the importance of the domestic family in the development of kinship patterns and attitudes; and Radcliffe-Brown, a student of Rivers, developed the conception of a kinship system as involving both terminology and patterns of social behaviour and attempted to isolate structural factors that might underlie both terminological patterns and particular rights and duties of kinsmen.

In the United States attempts were made by Lowie, E. W. Gifford, Spier, E. Sapir and some others to explain various aspects of kinship patterning in terms of particular social institutions, such as clans, the levirate and sororate, special marriage patterns and so on. These resulted in the establishment of preliminary correlations, but without clear-cut cause and effect relationships. In some cases multiple factors were evidently involved; in others, possible lags in terminology. Diffusion or borrowing presents a further complication, since adjacent tribes often have similar features, although similar forms often are widely distributed.

Murdock, in later studies, attempted to test many of these assumptions explicitly, both with regard to the correlations of various institutions or behaviour patterns with particular aspects of terminology, and in terms of isolating a regular pattern of change from one type of social system to another. Using simplified models based on terms for cousins and on residence and descent patterns, he postulated changes for which he marshaled a considerable amount of evidence. Eggan and A. Spoehr also found evidence of regular patterns of change in Indian tribes of the southeastern U.S. under the influence of common acculturative patterns; and there is mounting evidence that kinship terminologies are sensitive reflectors of social change rather than the stable systems that Morgan envisaged.

As a result of such studies there is less interest in classification of terminological systems as such, and more in understanding such systems as part of the larger kinship system and social structure. Such sociological principles as Radcliffe-Brown's unity of the sibling group and unity and solidarity of the lineage group have achieved growing acceptance in the interpretation of the nature of kinship and social systems, and have been important in the development of social anthropology in Great Britain and elsewhere. In the United States the basic concern with cultural history in anthropology has resulted in a preoccupation with problems of social and cultural change that resulted in significant additions to the interpretation of kinship systems.

Linguists have become interested in terminological systems as linguistic phenomena, following some of Kroeber's early suggestions, and F. G. Lounsbury and J. H. Greenberg have made important contributions in this direction.

The continued recognition of linguistic and logical factors does not invalidate the sociological significance of relationship terminologies. When all allowances are made for disturbing factors, a host of correlations remains between kinship features and sociological factors. When more intensive comparative studies of large linguistic families and culture areas are available, it will be possible to balance the relative importance of sociological and other factors as determinants. In the meantime, kinship terminologies provide important leads to social systems.

See also DESCENT, SYSTEMS OF.

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KINSTON, a city of North Carolina, U.S., the seat of Lenoir county, on the northern bank of the Neuse river near the site of the principal encampment of the Neuse Indians, is in the approximate geographical centre of the North Carolina coastal plain. It was established as a trading post for planters in the 1740s. Incorporated as Kingston by legislative act in 1762, the name was changed to Kinston by a second act of incorporation in 1784. It has a council-manager form of government, in effect from 1948.

An important tobacco market, with several sales warehouses and processing plants, Kinston is also a shipping point for other agricultural products and has shirt factories, a cotton mill, a meat-packing plant and a large synthetic fabric factory. For comparative population figures *see* table in NORTH CAROLINA: *Population.* (DA. ST.)

KINTA, a river flowing into the Perak in the west of the Malay peninsula. With its tributaries it has laid down an alluvial valley rich in cassiterite (tin ore). The ore is scattered as black sandy grains through a surface now extensively mined, and which is one of the most productive and easily worked tinfields of the world. Older mines (largely Chinese and shallow opencast) have given rise to small towns (Gopeng, pop. 4,322, 84% Chinese; and Kampar, pop. 24,602, 84% Chinese). Eccentric to the valley, where the stream lies close to the western side, is Ipoh (*q.v.*) which now overshadows all other settlements and functions as the capital of Perak state. South of Ipoh the ores lie deeper (down to 200 ft.) in wetter ground so that dredges are used. Beneath the Kinta gravels are Triassic limestones which also appear in the 2,000 ft. hills to the east. The Kinta has been so modified by mining and heavily loaded outwash from opencast tin mines that the course bears little resemblance to the original one; there are great swamps near its junction with the Perak. (E. H. G. D.)

KIOWA, an American Indian tribe of the southern Great Plains, linguistically related to the Tanoan Pueblos and numbering about 2,000 in the 1960s. Accounts dating from the 18th century appear to place them farther to the northwest of their present position in southwest Oklahoma where since 1868 they have shared a reservation with the Comanche between the Washita and Red rivers, centring around Anadarko. J. Mooney stated (1898) that "among all the prairie tribes they were noted as the most predatory and bloodthirsty, and have probably killed more white men in proportion to their numbers than any of the others."

The Kiowa were divided into seven bands (one, the Kuato, now extinct), including the associated Kiowa Apache (*see* APACHE), a small southern Athapaskan band or tribelet speaking a different language. Showing a typical Plains culture, the Kiowa were horse-using buffalo hunters, had no agriculture, lived in large skin tepees and had characteristic warrior societies. They believed dreams and visions provided supernatural medicine power in war, hunting and healing. Ten medicine bundles were believed to protect the tribe, and became central in the Kiowan version of the Sun Dance (*q.v.*); the Kiowa were also active in the Ghost Dance (*q.v.*) cult. Along with the Comanche they were instrumental in spreading the peyote religion that involved use of a hallucinogenic cactus (*see* PEYOTISM). *See* also PLAINS INDIANS.

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KIPCHAK, the Turkish name of a tribal confederation, called by the Russians Polovtsy and mentioned in Byzantine and Latin sources under the names Komanoi or Comani (*see* KUMANS) and in other European sources as Falones, Pallidi or Valani. Most of these names have the meaning "pale, sallow." Toward the middle of the 11th century the Kipchaks were occupying the steppe lying north of the Black sea, and they remained masters of those regions until the Mongol invasions. First mention of the Kipchaks is made in Russian chronicles under the year 1054.

The origin of the Kipchaks is obscure; research suggests that they—or at any rate one part of the confederation—may be identified with a people called Sari, a tribe probably related to the Sari Uighurs (Yellow Uighurs) of whom remnants survive in Chinese Turkistan. Though it is not necessary to postulate a Kipchak migration from the far east to the Carpathian mountains, it seems likely that some elements of the confederation may have come from the Chinese borders. It is thus reasonable to suppose that Mongol-speaking Kitai joined the Kipchaks, presumably in western Siberia, where their presence is attested in the 9th century, and whence they emigrated to southern Russia. The first Kipchak-Byzantine clash occurred in 1078, when the Kipchaks, allied to the Pechenegs, attacked Adrianople (Edirne). In 1091, however, the alliances were reversed, and Kipchak auxiliary forces were instrumental in crushing Pecheneg power. In 1094 and 1114 the Byzantine emperor Alexius I waged war against the Kipchaks, who clashed also with Hungarian forces penetrating into Russia. Kipchak forces lingered all along the eastern arch of the Carpathians, eager to offer the services of their battle-hardened but unreliable troops to the highest bidder. In 1205 they served Kaloyan Asen in his war against Baldwin I, the Latin or Frankish emperor of Constantinople. It was St. Dominic's cherished dream to convert the Kipchaks to Christianity. During the first Mongol invasion of Russia (1221–23), the Kipchaks sided at one time with the invaders, at another with the Russians. In the spring of 1237 the Mongols penetrated for the second time into Kipchak territory and killed Bachman, chief of their eastern tribes. The chief of the western Kipchaks (Kumans), Kuthen, whose earlier attempts to organize the resistance of the Russian princes had failed, was given asylum, together with his people, by Béla IV of Hungary. The Mongol invasion of that country in 1241–42 was probably an act of reprisal motivated by this Hungarian action.

Though the Mongol invasion put an end to the existence of the Kipchak confederation, Kuman troops continued to be active; Baldwin II made use of them in 1240, Michael VIII Palaeologus in 1259. The Franks of the Latin empire and the Kipchaks intermarried freely. Kipchak slaves—the so-called Mamelukes—serving in the Ayyubid army were called on to play an important role in the history of Egypt and Syria, where they formed a state the remnants of which survived until the 19th century (*see* EGYPT: *History;* MAMELUKE). Another Kipchak community, that of the Karaims, emigrated as far north as Lithuania, and still survives in Poland.

Kipchak was a Turkish language. Its most important monument is the so-called *Codex Cumanicus*, kept in the library of St. Mark in Venice. Written probably toward the turn of the 13th–14th centuries, this contains some texts translated from Latin and also word lists, including a short Kuman-German vocabulary. The presence on Egyptian soil of Turkish-speaking Mamelukes stimulated the compilation of Kipchak-Arabic dictionaries and grammars, important for the study of the history of the several Turkish languages.

The Kipchaks were nomads. In Robert de Clari's description (1216), "They are a savage people, who neither plow nor sow and they have neither huts nor houses, but they have tents made of felt . . . and they live on milk and cheese and flesh . . . . In winter

they come out of their tents and sally forth from their country when they want to make a raid . . . . Each one has at least ten or twelve horses."

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KIPLING, (JOSEPH) RUDYARD (1865–1936), British author, winner of the Nobel prize for literature in 1907, whose reputation as a serious writer, especially of short stories, has been somewhat eclipsed by the popular view of him as a jingoistic imperialist, was born in Bombay, India, on Dec. 30, 1865. His father, John Lockwood Kipling (1837–1911), an artist and scholar who had considerable influence on his son's work, became curator of the Lahore museum, and is described presiding over this "Wonder House" in the first chapter of *Kim.* His mother was Alice Macdonald (1837–1910), one of whose sisters married Sir Edward Burne-Jones and another Sir Edward Poynter, while a third, who married Alfred Baldwin, became the mother of Stanley Baldwin, later prime minister. These connections were of lifelong importance to Kipling.

Much of his childhood was unhappy. Brought to England by his parents and left there at the age of six, he was placed for five years in a foster home at Southsea, the horrors of which he described in the story "Baa Baa, Black Sheep" (1888). He then went on to the United Services college at Westward Ho!, north Devon, a new, inexpensive and inferior boarding school. It haunted Kipling for the rest of his life—but always as the glorious place celebrated in *Stalky & Co.* (1899) and related stories: an unruly paradise in which the highest purposes of English education are triumphantly furthered amid a tumult of ragging and bullying, a flailing of ground-ashes and canes. The Stalky saga is one of Kipling's great imaginative achievements. Readers repelled by a strain of brutality—even of cruelty—in his writing should remember the sensitive and shortsighted boy whom the demands of self-preservation brought to terms with the ethos of this deplorable establishment.

Kipling returned to India in 1882 and worked for seven years as a journalist. His parents, although not officially important, possessed a distinction which brought them into the best Anglo-Indian society, and their son thus gained opportunities for exploring the whole range of Anglo-Indian life—this while remaining keenly observant of the thronging spectacle of native India, which it is clear had engaged the interest and affection of his earliest childhood. He was quickly providing the journals for which he worked with both prose sketches and light verse. He published *Departmental Ditties* in 1886, *Plain Tales From the Hills* in 1887 and in the following two years brought out six paper-covered volumes of short stories in Wheelers' Indian Railway library. When he returned to England in 1889 his reputation had preceded him, and within a year he was famous as one of the most brilliant prose writers of his time. His acclaim was redoubled upon the publication of *Barrack-Room Ballads* in 1892. Not since Byron had such a reputation been so rapidly achieved. When Tennyson died in 1892 it may be said to have been Kipling who took his place in popular estimation.

In 1892 Kipling married Caroline Balestier, the sister of Wolcott Balestier, an American publisher and writer with whom he had collaborated in *The Naulahka* (1892), a facile and unsuccessful romance. The young couple endeavoured to settle on the family property in Vermont, but their manners and assumptions were ungrateful to their neighbours, and the attempt ended in circumstances of some absurdity. Thereafter Kipling remained very aware that Americans were foreigners, and he extended to them, as to the French, no more than a semi-exemption from his general proposition that only "lesser breeds" are born beyond the English channel. In 1902 he bought Bateman's, a house at Burwash, Sussex, his home until his death, and Sussex was the background of much of his later writing—especially in *Puck of Pook's Hill* and *Rewards and Fairies.* He spent, however, much time in South Africa, where a house was given to him for life by Cecil Rhodes, and this association fostered the imperialist persuasions in which he was progressively to fortify himself during the rest of his life. These persuasions are not to be dismissed in a word; they are bound up with a genuine sense of civilizing mission. But they were not in accord with much that was liberal in the thought of the age, and Kipling as he became older was an increasingly isolated figure. When he died (in London, Jan. 18, 1936), a few days after King George V, he must have seemed to many a far less representative Englishman than did his sovereign.

Kipling is said twice (1921 and 1924) to have held himself excused from accepting the order of merit, the highest distinction that can be conferred upon a British subject, and also to have intimated, in 1895, that he would decline the laureateship, should it be offered to him.

Kipling's Place in Literature.—As a poet Kipling will scarcely rank high, although his rehabilitation has been attempted by so distinguished a critic as T. S. Eliot. His verse is indeed vigorous; and in dealing with the lives of soldiers and sailors in particular it breaks new ground. But balladry, music hall song and popular hymnology provide its unassuming basis; and even at its most serious—as in "Recessional" (1897) and similar pieces in which Kipling addressed himself to his fellow countrymen in times of crisis—the effect is rhetorical rather than imaginative. But it is otherwise with Kipling's prose. The first check to his reputation, indeed, was the discovery that he could not write a novel. *The Light That Failed* (definitive ed., 1891; an earlier version had been published in the United States in 1890) is an insufficiently considered attempt at the kind; *Captains Courageous* (1897) is overweighted with descriptive writing and *Kim* (1901) is essentially a children's book, although one that must rank with *Treasure Island.* Kipling, it is to be noted, wrote much and successfully for children: for the very young in *Just So Stories* (1902); for others in the superb *Jungle Books* (1894 and 1895) and in *Puck of Pook's Hill* (1906) and *Rewards and Fairies* (1910)—two volumes which although devoted to a very simple dramatic presentation of English history, in fact embody some of his deepest intuitions. But far more important is the whole sweep of his adult storytelling from the early Indian volumes through *Life's Handicap* (1891), *Many Inventions* (1893), *The Day's Work* (1898), *Traffics and Discoveries* (1904), *Actions and Reactions* (1909), *Debits and Credits* (1926) and *Limits and Renewals* (1932). And it is a steadily developing art that these volumes deploy. The later stories cannot be called better than the earlier, but they are as good, and they bring a subtler if less dazzling technical equipment to the exploration of deeper though sometimes more perplexing themes. It is a far cry from the broadly effective eruption of the supernatural in "The Phantom Rickshaw" (1888) to its subtle exploitation in "The Wish House" or "A Madonna of the Trenches" (1924) or from the innocent chauvinism of the bravura "The Man Who Was" (1890) to the depth of implication beneath the seemingly insensate xenophobia of "Mary Postgate" (1915). There is much in Kipling's later art to curtail its popular appeal. It is compressed and elliptical in manner, and sombre in many of its themes. But that his reputation among informed critics should have declined steadily during his lifetime can scarcely be accounted for except in terms of political prejudice.

Of Kipling's miscellaneous publications the more notable are a number of early travel sketches collected in two volumes in *From Sea to Sea* (1899); *The Irish Guards in the Great War* (1923), a work undertaken in memory of his son John, killed in action with the regiment; and the unfinished *Something of Myself,* posthumously published in 1936 (title page date 1937), a reticent essay in autobiography.

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KIPPER, properly the name by which the male salmon is known at the approach of the breeding season, when he develops a sharp cartilaginous beak, known as the "kip" from which "kipper" is said to be derived. From the practice of curing the kipper for food by splitting, cleaning, salting and smoking them, the term "kipper" (or the modifier "kippered") is also used of other fish, particularly herrings, cured in the same way. A "bloater" as distinct from a "kipper" is a herring cured whole without being split open.

KIRBY, WILLIAM (1817–1906), Canadian novelist, is remembered chiefly for his historical romance of life in Quebec under the French regime, *The Golden Dog* (1877). Born in Kingston-upon-Hull, Eng., on Oct. 13, 1817, he emigrated to the United States with his parents as a boy, and settled in Niagara, Ont., in 1839. He edited the *Niagara Mail* for more than 20 years, and was collector of customs at Niagara (1871–95). He was elected a charter fellow of the Royal Society of Canada in 1883. He died at Niagara on June 23, 1906.

Kirby wrote five books in all: *The U.E.* (1859), a Spenserian verse epic describing the migration of the United Empire Loyalists; *The Golden Dog; Memoirs of the Servos Family* (1884); *Canadian Idyls* (1894), a series of poems illustrative of Canadian scenery, customs and history; and *Annals of Niagara* (1896), a prose history of the Niagara district. *The Golden Dog* is his masterpiece. Into this romantic story of the life and times of the intendant François Bigot in New France, he wove all his aristocratic and conservative values, his beliefs in chivalry, in rank, in loyalty to crown and empire, in tradition and religious devotion. It has become a classic of Canadian literature.

See W. R. Riddell, *William Kirby* (1923); Lorne Pierce, *William Kirby* (1929). (D. P.)

KIRBY-SMITH, EDMUND (1824–1893), Confederate general during the American Civil War, was born at St. Augustine, Fla., on May 16, 1824. He was named Edmund Kirby Smith, Kirby being his mother's name, but later in life adopted the practice of signing himself "E. Kirby Smith." The hyphenated form of the name was adopted by the family after his death.

After graduating from the U.S. Military academy at West Point in 1845, he distinguished himself at Cerro Gordo and Contreras in the Mexican War. He was assistant professor of mathematics at West Point from 1849 to 1852, was later engaged in Indian warfare on the Texas frontier and attained the rank of major in 1860.

When Florida seceded, he entered the Confederate army, where he was commissioned a colonel and then brigadier general (June 1861). He commanded a brigade at the battle of Bull Run and was seriously wounded. He led the advance in Bragg's Kentucky campaign, defeated the Federal forces at Richmond, Ky. and fought at Perryville and Murfeesboro. In Oct. 1862 he was promoted to the rank of lieutenant general. In Feb. 1863 he was given command of the Trans-Mississippi department. Cut off from the east by the fall of Vicksburg, Kirby-Smith exercised both civil and military powers and made his section self-supporting. In April 1864, soon after attaining the rank of general, he met and defeated the Red River expedition under Gen. N. P. Banks. On June 2, 1865, he formally surrendered the last armed force of the Confederacy at Galveston, Tex. (Articles in preparation for surrender had been signed by Lieut. Gen. S. B. Buckner at New Orleans on May 26.)

After the war he spent several years as head of a military academy and then became president of the University of Nashville in 1870. He resigned in 1875 to become professor of mathematics at the University of the South, where he taught with distinction until his death at Sewanee, Tenn., on March 28, 1893.

See J. H. Parks, *General Edmund Kirby Smith, C.S.A.*, 2nd ed. (1962). (O. A. K.)

KIRCHHOFF, GUSTAV ROBERT (1824–1887), German physicist who established spectroscopy on a sound theoretical basis, was born at Königsberg (Kalingrad) on March 12, 1824, and was educated at the university of his native town. After acting as *Privatdozent* at Berlin (1847–50), he became extraordinary professor of physics at Breslau in 1850. Four years later he was appointed professor of physics at Heidelberg, and in 1875 he was transferred to Berlin, where he died on Oct. 17, 1887.

Kirchhoff's contributions to experimental and mathematical physics were numerous and important. In his work in electricity he was greatly influenced by Wilhelm Weber. He modified the resistance bridge as designed by Sir Charles Wheatstone (*see* INSTRUMENTS, ELECTRICAL MEASURING: *Indicating Instruments*), and developed a theorem which gives the distribution of currents in a network. Kirchhoff extended G. S. Ohm's theory for a linear conductor to the case of conductors in three dimensions, and so generalized the equations dealing with the flow of electricity in conductors. He also tried to establish a connection between electrostatic and electrodynamic conceptions of electricity. Another important piece of work was the demonstration that an electric disturbance is propagated along a wire with the same velocity as light is propagated in free space. In other papers, various miscellaneous topics were treated—the thermal conductivity of iron, crystalline reflection and refraction, certain propositions in the thermodynamics of solution, vaporization and chemical reaction. An important part of his work was contained in his *Vorlesungen über mathematische Physik* (four volumes, 1874–94), in which the principles of dynamics, as well as various special problems, were treated in a somewhat novel and original manner.

His name is best known for the researches (1860), in conjunction with R. W. Bunsen, on the development of spectrum analysis. He can scarcely be called an inventor, for not only had many investigators already used the prism as an instrument of chemical inquiry, but considerable progress had been made toward the explanation of the principles upon which spectrum analysis rests. But to him belongs the merit of having, most probably without knowing what had already been done, enunciated a complete account of its theory and established the method on a solid basis. Kirchhoff gave the explanation of the Fraunhofer lines and thus opened up to investigation a new field in spectrum analysis applied to the composition of celestial bodies. *See* also SPECTROSCOPY: *History*.

Kirchhoff's work is collected in *Gesammelte Abhandlungen* (1882; supplement, 1891). *See* W. Voigt, *Zum Gedächtniss von G. Kirchhoff* (1888).

KIRCHNER, ERNST LUDWIG (1880–1938), one of the leading German artists in the first half of the 20th century, was born in Aschaffenburg, May 6, 1880. In 1905 he helped to found the *Brücke* ("bridge"), a community of artists which gave the initial spark to Expressionism and changed the tenor of German art. At first under the influence of *art nouveau* and Edvard Munch, Kirchner reached the height of his powers after he moved to Berlin in 1911 and painted a series of street scenes, which are remarkable for their intensely emotional content, sensitive line and often violent colour. His work as print maker, especially his woodcuts, shares significance with his paintings. He left the largest body of graphic work of any artist in his time. He continued working in various mediums in Switzerland where he went in 1917 and where he came under the spell of Alpine landscape and peasant life. He died near Davos, Switz., on June 15, 1938.

See Peter Selz, *German Expressionist Painting* (1957). (P. H. S.)

KIREEVSKI, IVAN VASILEVICH (1806–1856), Russian critic and editor who demonstrated by his career the cultured western European character of the leading Russian Slavophils. Born at Dolbino on March 22, 1806, into an aristocratic family, he studied in Germany in 1830, and on his return to Russia founded, in 1832, a literary journal called *Evropeets* ("The European"). This the government banned after two issues. Kireevski's own articles appeared subversive to Nicolas I, because they found fault with official Russian nationalism, and accused it of forfeiting the advantage of many European improvements. The unification of Russia, Kireevski declared, had sprung less from any expression of genuine need, than from plain physical conjunction, brought together by brute force. "Our material hypertrophy has stultified any corresponding spiritual growth. But whence can we acquire our culture, except from Europe?" At the same time

he urged discrimination, and observed that contemporary Europe presented a scene of moral stagnation and suicidal conflict.

In 1845 Kireevski took over the editorship of the *Moskvityanin*, in which he tried to clarify the loose thinking and scholastic verbal squabbles of the Slavophils. The government, however, soon suppressed this journal. A few years later he bravely launched another, the *Moskovski Sbornik* (1852), for which he wrote his best-known article, "About the Character of European Education and Its Bearing on Education in Russia." A chastened Kireevski, seeking in the Orthodox faith a refuge from the harsh blows of fate, now dwelt on the decline of the west and the historical opportunity of Russia. He died at St. Petersburg on June 11, 1856.

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KIRGIZ SOVIET SOCIALIST REPUBLIC (KIRGIZSKAYA SOVETSKAYA SOTSIALISTICHESKAYA RESPUBLIKA, frequently KIRGIZIA or KIRGHIZSTAN), a republic of the U.S.S.R. in the northeast of Soviet central Asia, is bounded north and northwest by the Kazakh S.S.R. (Zailiski Ala-Tau range, the Chu river and the Kirgiz range), west by the Uzbek S.S.R., southwest and south by the Tadzhik S.S.R., and southeast by the People's Republic of China (Sinkiang). Area 76,641 sq.mi.

Physical Geography.—The country is mountainous, most of it lying more than 5,000 ft. above sea level. It contains the western part of the Tien Shan (*q.v.*) system whose two main peaks, Pobeda (24,406 ft., the second highest in the U.S.S.R.) and Khan-Tengri (22,949 ft.), are on the Soviet-Chinese frontier. These two glacier-covered peaks also form a knot from which the Kungei-Ala-Tau range extends to the west and the Kokshaal-Tau to the southwest, the latter's crest being the Soviet-Chinese frontier. The Kungei-Ala-Tau is prolonged to the west by the Kirgiz range, while the Kokshaal-Tau is continued by the Alai range. The major part of Kirgizia is enclosed by this mountain fork.

On a high plateau in the east is Lake Issyk-Kul, one of the deepest lakes in the U.S.S.R. The Terskei-Ala-Tau range (rising to 17,323 ft.) is the third chain extending westward from the Pobeda and Khan-Tengri massif, but it skirts the south of Lake Issyk-Kul. The main mass of this plateau is about 124 mi. wide and consists of broad basins lying about 10,000 ft. above sea level and running in an east-west direction. Two important rivers have their sources there: the Chu flows north through a deep cleft between the Kunghei-Ala-Tau and Kirgiz ranges, then turns northeast and for about 90 mi. forms the boundary between Kirgizia and Kazakhstan; the Naryn river, a right-bank tributary of the Syr-Darya, flows eastward and enters the Fergana valley north of the Fergana range, which branches in a northwesterly direction from the mountain knot where the Kokshaal and Alai ranges join.

Western Kirgizia is lower than the east and is roughly U-shaped, opening to the west and embracing the Fergana valley from the north and south. The main section of the valley, however, is part of Uzbekistan, with an eastern section belonging to Tadzhikistan. The Syr-Darya, there called Kara-Darya, rises in the southwest of Kirgizia.

The climate varies with altitude and exposure. Slopes exposed to the west or north receive winds bearing more moisture and have less sun and are therefore more favourable to vegetation. Rainfall increases steadily with altitude up to 10,000 ft., after which precipitation takes the form of snow, even in summer, and hard frosts occur at night. At Frunze (2,539 ft.) the yearly rainfall amounts to 14.3 in. and at Przhevalsk (5,799 ft.) to 18.1 in.; the January mean temperatures are the same at both places (−4° C. [25° F.]), but the July average at Frunze is 25° C. (77° F.) while at Przhevalsk it is 18° C. (65° F.).

The prevailing vegetation, depending on the precipitation and the altitude, is alpine and subalpine meadow, with luscious grass and many flowers. Forests are rare, except in the valley bottoms and along the northern slopes. Where they do occur, they are coniferous in type, consisting of fir and two species of spruce, with some maple, ash, aspen and the arborescent juniper. The northern slopes may be divided into a fertile belt of loess north of the Kirgiz range, extending east and west of Frunze; a zone of cultivation to 4,000 ft.; the coniferous trees to 8,000 ft.; and subalpine and alpine pastures to 11,000 ft., with perpetual snow above. The Kirgiz part of the Fergana valley, around Dzhalal-Abad and Osh, is also fertile land. In a few valleys apples, pears, plums, apricots and walnuts grow wild. Animal life is scarce, though birds are numerous on the lower slopes. The mouflon, antelope and marmot are found.

History.—For the origin and early history of the Kirgiz people *see* TURKIC PEOPLES. In the first half of the 19th century the people occupying what is now the Kirgiz S.S.R. were mainly nomadic. They preserved some degree of tribal independence, but were partly under the control of the Kokand khanate. During the second half of the 19th century Kirgizia was overrun by the Russians and eventually became a major area of Russian colonization. Most of the best land was given to Russian settlers and this was a major cause of the revolt in 1916, in the suppression of which the Kirgiz suffered very heavily. Before the Revolution of 1917 the Kirgiz were not recognized as a national or political entity. The present territory of Kirgizia was divided between the southern part of the provinces of Semirechye and Fergana. Before the Revolution, and indeed until 1926, the Kirgiz were wrongly known as the Kara-Kirgiz in order to distinguish them from the Kazakhs who were always called Kirgiz by the Russians to distinguish them from the Cossacks (in Russian, *Kazaki*). After the Revolution Kirgizia was the scene of much guerrilla opposition to the Soviet regime. On Oct. 14, 1924, Kirgizia (until then theoretically a part of the Turkistan A.S.S.R.) became an autonomous *oblast* of the Russian Soviet Federated Socialist Republic. On Feb. 1, 1926, it became the Kirgiz Autonomous Soviet Socialist Republic of the Russian S.F.S.R. and only on Dec. 5, 1936, was it proclaimed the Kirgiz Soviet Socialist Republic. During its existence as a constituent republic of the Soviet Union, Kirgizia has never been given a voice in international affairs. Similarly no Kirgiz has made an impact on Soviet affairs except perhaps during the great political purge of 1937 when the prime minister and the chairman of the Kirgiz planning commission disappeared. There has been considerable progress in the republic's economy, in the standard of living and in education. Apart from Frunze, the capital, the republic had not, by the early 1960s, been readily accessible to visitors from non-communist countries.

Population and Administration.—In 1926 the population was 1,001,697 including 665,310 Kirgiz (66.4%), 117,198 Russians (11.7%), 6,565 Ukrainians and 11,211 Uzbeks. According to the 1959 census the population had grown to 2,065,837 of whom 837,000 were Kirgiz (40.5%), 624,000 Russians (30.2%), 137,000 Ukrainians and 219,000 Uzbeks.

Between 1926 and 1959 the urban population increased from 12% to 34%. In Frunze (*q.v.*), the capital, the population rose from 36,610 to 219,711. Other towns are Osh (pop. 65,197), terminus of the Osh-Khorog road and an important centre of the silk industry; Kyzyl-Kiya (38,000), a coal mining centre; Przhevalsk (35,000), a wine and beer producing town on Lake Issyk-Kul; and Tokmak (auto repairing and fibre processing).

As in other union republics Kirgizia has a supreme soviet; this consists of 329 deputies (1959 election) of whom 33.14% are women, 32.83% nonparty members and 51% workers. There is a presidium of the supreme soviet consisting of a chairman, 2 deputy chairmen, a secretary and 11 members of whom at least 4 are Russians. There is a council of ministers with a chairman and a deputy chairman. The republic is within the Central Asian Administrative-Economic region. As elsewhere the Communist party of Kirgizia plays a leading role in all government, economic, social and cultural activities. On Jan. 1, 1960, there were 61,646 members and candidates for membership. In spite of its being officially described as "fully sovereign" the republic has no diplomatic, economic or consular representation abroad and is not an individual member of the United Nations. After the administrative reorganization was carried out in 1962, the Kirgiz S.S.R. consisted of Osh *oblast* (*q.v.*) and a number of *raions* under direct administration of the republic. There are 14 towns, 30 "set-

tlements of town type" and about 330 villages.

In the early 1960s the republic had about 290 kindergartens; also 1,900 general schools including 25 boarding schools, with a total of 360,000 pupils. Higher educational establishments at Frunze include institutes of agriculture, medicine, pedagogy and a state university (founded 1951). An Academy of Sciences was founded in 1954 on the basis of the former branch of the Academy of Sciences of the U.S.S.R.

Apart from the Russian and Ukrainian element the religion of the republic is nominally Muslim. Although not suppressed the practice of religion is discouraged by the authorities and there is no religious instruction in the schools.

The Economy.—Before the Revolution the population of what is now Kirgizia was almost exclusively employed in agriculture. Industries of various kinds have since been developed and the economy is now officially described as specializing from the central Asian point of view in the production of coal, lead ores, grain, milk, milk products and sugar; and from the all-union point of view in nonferrous metallurgy (mercury and antimony), in fine and semifine wool sheep rearing, and in the production of wool, meat, bast (both growing and processing) and medicinal poppy.

By the early 1960s, about 3,000,000 ac. were under cultivation. Of this area just over half was devoted to food grains and the remainder to industrial crops, mostly in irrigated regions. Livestock raising still occupies a leading position in the rural economy and production seems to be steadily rising. Sheep and goats number over 6,000,000, large-horned cattle about 750,000 and the pig population approaches 200,000. Each spring, as soon as the grazing land in the lower valleys is burned by the sun, the herds are driven to the upper valleys, which in the summer abound in rich, luxuriant alpine vegetation.

The major coal deposits exploited are at Sulyukta and Kyzyl-Kiya in the south, and at Kok-Yangak and Tashkumyr in the east. Extraction in the early 1960s exceeded 3,000,000 tons annually. There are oil deposits in the eastern Fergana valley at Changyrtash and Maili-Sai. New deposits are being exploited at Koktash and Izbaskent. There are important mercury and antimony mines at Aktyuz on the south slopes of the Zailiski (Trans-Ili) Ala-Tau. A tungsten and molybdenum mine is producing at Kum-Bel, north of Naryn. Uranium is mined at Tyuya-Muyun and Maili-Sai.

There are a number of light industries centred around Frunze including silk and cotton mills, cottonseed-oil presses, cotton ginning plants, etc. There is also an agricultural machinery works and an instrument plant. Sugar refineries, a large meat-packing plant, flour mills, clothing and shoe factories and fruit canneries are strung along the Lugovoi-Rybachye railway in the Chu valley.

The mountainous nature of the country makes railway construction difficult. Since World War I, 235 mi. of railway have been built, and there appears to be no immediate plan for extension. Eighty per cent of the republic's goods turnover is carried by road, there being 2,000 mi. of metaled road in 1960. The principal roads are Frunze–Rybachye–Naryn–Torugart, Frunze–Alma-Ata via Georgiyevka, Frunze–Namangan via Tashkumyr, Talas–Dzhambul, Kochkorka–Chayek, "the Issyk-Kul ring" (roads along the northern and southern shores of Lake Issyk-Kul, from Rybachye to Przhevalsk), Osh–Khorog, and Osh–Kyzyl-Kiya. Lake Issyk–Kul, which does not freeze in the winter, is extensively used for the transportation of timber, oil products, coal and wheat. Frunze has regular air connections with Moscow and Tashkent.

See S. N. Ryazantsev, *Khirkizia* (1951). (G. E. Wr.; K. Sm.)

KIRIN (Chi-lin), the name of both a province and city of Manchuria in northeastern China. The western part of the province (total area 72,201 sq.mi.; pop. [1958 est.] 13,000,000) consists of lowlands suitable for agriculture, and the eastern part, which extends to the borders of the U.S.S.R. and Korea, comprises uplands, including the Ch'ang-pai mountains. The major crops include kaoliang, corn (maize), rice, millet and soybean, the last occupying about 30% of the sown area. From the 1950s, the majority of the income of the province was derived from industrial enterprises, which include the Ch'ang-ch'un automobile plant, coal, iron, steel, chemicals (Kirin city), electric power, food-processing (at Szep'ing), and sawmills. The industrial centres are linked by a network of railway lines, including the Mukden–Kirin line, the Szep'ing–Tsitsihar line, the Ch'ang-ch'un–T'umen line, the Szep'ing–Tsian (Chi-an) line and the Ch'ang-ch'un–Inner Mongolian line. There are six major cities: Ch'ang-ch'un (the capital), Kirin, Szep'-ing, Liao-yüan, T'ung-hua, and Yenki, capital of the Yenpien Korean Autonomous Chou. At T'ung-hua a modern iron-steel complex was developed.

The city of Kirin was founded in 1673 as a Chinese fortress and administrative centre and was the capital of the province until 1954. The city is on the upper Sungari river in a low basin surrounded by hills. The Mukden–Kirin and Ch'ang-ch'un–T'umen railway lines meet there. A major lumber centre, Kirin metropolis was fast developing its industrial base in the second half of the 20th century. China's first modern chemical centre in the northeast (Manchuria) was established there; products include nitrogenous fertilizer, calcium carbide, dyes, organic chemicals for synthetic fibres, plastics, synthetic rubber and synthetic gasoline, and various other chemicals. The traditional sawmills and match factories were expanded. The city also carries on active grain and tobacco trade. Its power comes from the Fengman hydroelectric stations (70,000 kw. capacity), 15 mi. S.E. of Kirin. Pop. (1953) 435,400; (1957 est.) 568,000. (Kn. C.)

KIRJATH-SEPHER, a town of ancient Palestine, later named Debir. In Josh. xv, 15–19 (and Judg. i, 11–15) it is stated that the town was in the Hebron region and was taken from the Canaanites by Caleb's son-in-law Othniel, otherwise known as the first judge of Israel after the conquest of Canaan by Joshua. Josh. x, 38–39 gives a varying tradition, according to which Debir was destroyed by Joshua himself. All different biblical references to the location of the town agree remarkably well with the large mound of Tell Beit Mirsim, southwest of Hebron, standing on the border between Jordan and Israel. There W. F. Albright directed four campaigns of excavation between 1926 and 1932, finding exceptionally clear stratification, from which he was able to give the first comprehensive description of Palestinian pottery sequences between *c.* 2300 and 588 B.C. The Canaanite town of the 14th–13th centuries B.C. had been destroyed by the Israelites toward the end of the 13th century and the town was finally wiped out by the Chaldeans *c.* 588 B.C. It was never reoccupied in history.

See W. F. Albright, *The Archaeology of Palestine and the Bible,* 3rd ed. (1935); "The Excavation of Tell Beit Mirsim," *Annual of the American Schools of Oriental Research,* vol. xii, xiii, xvii, xxi–xxii (1932–43). (W. F. A.)

KIRK, ALAN GOODRICH (1888–1963), U.S. naval officer and diplomat, commander of naval task forces in World War II and later U.S. ambassador to Belgium, the U.S.S.R. and the Republic of China. He was born Oct. 30, 1888, in Philadelphia, Pa., and at the age of 17 entered the U.S. Naval academy, graduating in 1909. During World War I he was stationed at the naval proving ground, Indian Head, Md., and in later years served in the navy bureau of ordnance and as gunnery officer aboard various ships. Early in World War II he became chief of staff for the commander of U.S. naval forces in Europe. In 1943 he trained and led a task force that successfully put an infantry division ashore in Sicily, and in June 1944 he commanded nearly 1,000 ships of the Western Task Force that landed U.S: troops and supplies at Omaha and Utah beaches for the Normandy invasion.

After retiring from the navy with the rank of admiral in 1946, Kirk served as U.S. ambassador to Belgium (1946–49), the U.S.S.R. (1949–52) and the Republic of China (1962). Forced to return from Taiwan in less than a year because of ill health, he died in New York city, Oct. 15, 1963.

KIRK, SIR JOHN (1832–1922), British naturalist and administrator, who accompanied the explorer David Livingstone on his second expedition into central Africa and was British agent in Zanzibar at a critical period in the history of European intervention in east Africa. He was born at Barry, near Arbroath, Scot., on Dec. 19, 1832, son of the Rev. John Kirk. He studied medicine at Edinburgh, served on the civil medical staff in the

Crimean War and was appointed in Feb. 1858 physician and naturalist to David Livingstone's second expedition. He accompanied Livingstone on most of his African journeys during the next five years and was one of the first four white men to behold Lake Nyasa. He was finally invalided home on May 9, 1863. The reputation he gained during this expedition led to his appointment in Jan. 1866 as acting surgeon to the political agency in Zanzibar. He was made vice-consul of Zanzibar in 1866, became assistant political agent in 1868 and was raised to the rank of consul general and agent in 1873. That year he was responsible for negotiating a treaty with Sultan Barghash which made the slave trade illegal in the sultan's dominions. Kirk was knighted in 1881 and retired in 1887. He died at Sevenoaks, Kent, on Jan. 15, 1922. During the 21 years he spent in Zanzibar he strove wholeheartedly to uphold the interests of Sultan Majid and his successor, Seyyid Barghash. More aware than they of the threat to Zanzibar's economy contained in the activities of other powers on the mainland, Kirk was able in 1875 to enlist the support of the British government in discouraging Egyptian expansion along the east African coast. Great Britain was less willing to antagonize Germany by defending the sultan when Germans began their campaign for annexation in 1884 and Kirk felt that both he and Zanzibar had been let down. (K. I.)

KIRKCALDY (KIRKALDY), **SIR WILLIAM,** OF GRANGE (*c.* 1520–1573), Scottish soldier whose chivalry and courage gained for him a high reputation, despite the inconstancy of his political career, was the eldest son of Sir James Kirkcaldy of Grange (d. 1556), treasurer of Scotland (1537–43). William Kirkcaldy assisted in the murder of Cardinal Beaton at St. Andrews in May 1546; and on the surrender of the castle to the French in July 1547 he was sent as a prisoner to Normandy, whence he escaped in 1550. Thereafter, he was employed in France as a secret agent of England. Kirkcaldy returned home in 1557, after his forfeiture had been rescinded, and he became in 1559 one of the leaders of the Lords of the Congregation opposed to the queen regent, Mary of Lorraine. He attended Mary Stuart on her northern progress in the autumn of 1562, but he opposed her marriage with Lord Darnley and fled to England in Oct. 1565 with the earl of Moray and other Protestant leaders. Kirkcaldy was accessory to the murder of David Rizzio, but he had no share in that of Darnley; and he joined the lords who banded themselves together to rescue Mary after her marriage with the earl of Bothwell. At Carberry hill on June 15, 1567, Mary surrendered to Kirkcaldy; and the repudiation by the lords of some conditions which he had pledged to the queen may account in part for his later transference to her party.

While Mary adhered to Bothwell, however, Kirkcaldy remained her opponent. He led an unsuccessful sea pursuit of Bothwell in Aug. 1567; thereafter he was placed in charge of Edinburgh castle instead of Sir James Balfour who had been appointed by Bothwell; and after Mary's escape from Loch Leven his tactical skill was largely responsible for her defeat at Langside on May 13, 1568. Nevertheless, Kirkcaldy continued to believe with Maitland of Lethington that an arrangement with the queen was possible, especially after she had agreed to be divorced from Bothwell. After the murder of Moray in Jan. 1570 he ranged himself definitely with the queen's party and held Edinburgh castle for Mary in breach of his earlier obligations. Early in 1573 Kirkcaldy refused terms from the regent Morton because these did not include the rest of his party, but the arrival of English troops and artillery forced the surrender of the castle in May. Kirkcaldy's friends offered service and money to Morton to save his life, but the preachers clamoured for blood and he was hanged, as John Knox had foretold, on Aug. 3, 1573. (J. IM.)

KIRKCALDY, a royal and large burgh and seaport of Fife, Scot. Pop. (1961) 52,371. It lies on the north side of the Firth of Forth, 13½ mi. E. of Dunfermline by road. In 1847 Michael Nairn started a factory for handmade floor cloth, using a canvas base on which were put layers of paint. In 1877 this was turned over to the manufacture of linoleum and the town is still one of Britain's largest linoleum manufacturers. Other industries include malting, flax spinning, coarse linen and rope and twine making, and the manufacture of furniture. The town lies near the area of the Fife coal field which employs many of the inhabitants.

Although Columba is said to have planted a church there, the authoritative history of the town does not begin for several centuries after the era of the saint. In 1240 the church was bestowed by David, bishop of St. Andrews, on Dunfermline abbey, and in 1334 the town with its harbour was granted by David II to the same abbey, by which it was conveyed to the bailies and council in 1450, when Kirkcaldy was created a royal burgh. The royal charter was confirmed by Charles II in 1662. In the course of the 16th century it became an important commercial centre and seaport, the salt trade of the district being then the largest in Scotland. Flemish influence is shown in a group of 15th-century houses overlooking the harbour which now belong to the National Trust for Scotland. In 1644 Kirkcaldy was made a free port and six years later it was assessed as the sixth town in the kingdom. After the union its shipping fell off, Jacobite troubles and the American War of Independence accelerating the decline. However, its linen manufactures, begun early in the 18th century, restored prosperity. It is called the "lang toun" because after it absorbed Linktown and Abbotshall on the west, and Pathhead, Sinclairtown and Gallatown on the east, its main street reached a length of nearly 4 mi. The area was extended in 1930 by the absorption of Dysart (*see* below) and again in 1939 by the addition of about 2.7 sq.mi.; in 1950 a further 0.85 sq.mi. was added. The parish church was mainly rebuilt in 1809, but has a Norman tower. The high school (1894) succeeded the burgh school (1582) where Edward Irving taught from 1812 to 1818 and Thomas Carlyle from 1816 to 1818. Kirkcaldy was the birthplace (1723) of Adam Smith.

To the west lies Beveridge park and to the north Ravenscraig park with the ruins of Ravenscraig castle (*c.* 1440). Both these parks and also Dunnikier park were presented to the town, which was given the house and grounds of Forth park, whose former owner, John Nairn, presented a museum and art gallery as part of a World War I memorial. Kirkcaldy harbour has an inner and outer division, with wet docks and wharves. Kirkcaldy returns one member to parliament.

The formerly separate royal burgh of Dysart, merged with Kirkcaldy on May 16, 1930, was a seat of the salt industry in the 15th and 16th centuries. During the time of the alliance between Scotland and Holland, which was closer in Fife than in other counties, Dysart became known as Little Holland. The town is mentioned as early as 874 in connection with a Danish invasion. Its name is said to be a corruption of the Latin *desertum,* "a desert," which was applied to a cave on the seashore occupied by St. Serf. From James V the town received the rights of a royal burgh. In 1559 it was the headquarters of the Lords of the Congregation and in 1607 the scene of the meetings of the synod of Fife known as the Three Synods of Dysart.

KIRKCUDBRIGHT, a royal and small burgh and county town of Kirkcudbrightshire, Scot., is 25 mi. S.W. of Dumfries. Pop. (1961) 2,448. It guards the lowest crossing of the river Dee, 6 mi. from the sea, and is a market town and dairying centre and also a favourite resort of artists. The old form of the name was Kilcudbrit, from the Gaelic *Cil Cudbert,* "the chapel of Cuthbert," the saint's body having lain there for a short time during the seven years between its exhumation at Lindisfarne and the reinterment at Chester-le-Street. The estuary of the Dee is divided near its head by the peninsula known as St. Mary's isle. The harbour is good, but its usefulness is impaired by the distance to which the sea retreats. The market cross (1610) stands in front of the old courthouse, or tolbooth, in which John Paul Jones was once imprisoned for murder. The Hornel museum contains an excellent collection of Galloway literature and many manuscripts and works of art.

The ruins of the third and last castle built at Kirkcudbright, called Kirkcudbright castle or Maclellan's house, founded in 1582 by Sir Thomas Maclellan of Bombie (ancestor of the barons of Kirkcudbright), stand at the end of the old High street. The town was taken by Edward I in 1300. It received its first royal charter in 1455. After the battle of Towton Henry VI crossed

the Solway Firth and landed at Kirkcudbright to join Queen Margaret at Linlithgow. On St. Mary's isle was the seat of the Douglases, earls of Selkirk, at whose house Robert Burns gave the famous Selkirk grace:

Some ha'e meat and canna eat,
And some wad eat that want it;
But we ha'e meat, and we can eat,
And sae the Lord be thankit.

Dundrennan abbey, 4½ mi. S.E., was the greatest achievement of Fergus, lord of Galloway, a celebrated church builder of the 12th century. It was a Cistercian house, colonized from Rievaulx, and was built in 1142. There now remain only the transept and choir, a unique example of the Early Pointed style.

KIRKCUDBRIGHTSHIRE, a county in southwestern Scotland, also called the Stewartry of Kirkcudbright or East Galloway, is bounded on the south by the Solway Firth, west by Wigtownshire along the river Cree, east by Dumfriesshire along the river Nith and north by Ayrshire, partly along the river Doon. Its area is 897 sq.mi. The "Stewartry," an archaic term still widely used, was a stewardship of revenues and justiciary held in the 13th and 14th centuries alternately under the lordship of Galloway and the Scottish crown; its residues were abolished in 1747.

Physical Features.—The county's hills include Criffel (1,866 ft.); Cairnsmore of Fleet (2,329 ft.); in the north the massif including Cairnsmore of Carsphairn or of Deugh (2,613 ft.), and that including Merrick (2,765 ft.) and the Rhinns of Kells (Corscrine 2,668 ft.). The hill climate is harsh with a mean annual rainfall of over 80 in. and 10 to 30 mornings with snow lying. The area was spectacularly glaciated in the Quaternary era. The highlands are granite bosses. Intrusions occurred during the Caledonian orogenesis, which also tightly folded and lightly metamorphosed the dominant rocks—mainly Silurian shales, slates, graywackes, grits and conglomerates. Covering more than half the county, these rocks are planed across by erosion surfaces at 300 to 500 ft. and 800 to 1,200 ft.; the higher surface, with over 50 in. mean annual rainfall, was once forested but now mainly forms grazings of wet grass moor, purple moor grass, sedges, etc., with some peat, alternating with acid grasslands (fescue-purple moor grass with matgrass, heather and bracken) on drier sites. The 300- to 500-ft. plateaus, plastered with boulder clay yielding a fairly deep "hazelly loam" and with mean annual rainfall of 40 to 50 in., are now largely under arable stock farming. Dairying is particularly developed on the true lowlands, which cover about one-sixth of the county. They occur on the broad glens and straths with their well-marked drumlins, fluvio-glacial sands and gravels, and Recent river terraces; on the postglacial raised beaches; and on the estuarine sand and mud deposits of the Cree, Nith, Urr, etc. They have sunny and relatively early springs, rather wet, late summers, sunny autumns and fairly mild winters.

(A. T. A. L.)

G. DOUGLAS BOLTON

THE SOUTH END OF LOCH DOON ON THE KIRKCUDBRIGHTSHIRE–AYRSHIRE BORDER

Climatic and soil conditions favour tree growth, especially conifers. Spruces predominate on peat and bog land, while oak, ash and sycamore are found on more fertile valley soils. The forestry commission had planted a number of forests by the early 1960s and under the Dedication of Woodlands plan 9,670 ac. of private land were devoted to growing timber.

History.—Large numbers of medieval motes occur in the county, and two Roman forts, one on the Dee and the other on the Fleet, have been excavated. During the seven centuries following the departure of the Romans, Kirkcudbrightshire, in common with the rest of Galloway, was subjected to many invasions by the Britons of Strathclyde and Ayrshire, Irish-Scots, Angles, Norwegians and Danes. The Norse invasion took place about A.D. 800 and the Norsemen ruled Galloway for 300 years, partially stamping out Christianity, levying taxes on all tenants of land, but allowing local chiefs to administer their traditional laws. Unlike the rest of Scotland, Galloway retained its own code of laws until nearly the end of the 14th century, a fact which vested great power in the feudal barons who enforced the law.

In 1245 John de Balliol became overlord of Kirkcudbrightshire through the inheritance of his wife Devorgilla, daughter of Alan, lord of Galloway. The Balliols, who owned great estates in England and in France, brought the best features of Norman civilization to the county. Balliol college, Oxford, owes its foundation to them, and the beautiful Cistercian abbey of Sweetheart (1273–1605), near the estuary of the Nith, was founded and endowed by Devorgilla in memory of her husband. Their son John de Balliol became king of Scotland in 1292 after swearing allegiance to King Edward I of England, an act which culminated in Scotland's War of Independence. The power of the great feudal barons was ended when James II besieged Threave castle on the river Dee, stronghold of the Black Douglases, and defeated them in 1455.

The Scottish Reformation in 1560 gave rise to bitter religious controversy. Gilbert Brown, the last abbot of Sweetheart abbey, backed by the Maxwell family, upheld the Roman Catholic Church, and John Welch, son-in-law of John Knox, led a strong Protestant faction. When James VI of Scotland succeeded to the throne of England in 1603, his efforts to impose episcopacy on Scotland began a century-long struggle of the Presbyterian Church against the state, and martyrs' graves from this period are to be found in almost all the old churchyards in the county. Dundrennan abbey (1142–1605), a Cistercian foundation, is a fine ruin near the coast southeast of Kirkcudbright.

The first real progress in land husbandry took place in the 18th century when local marl came into use as a fertilizer, and a Society for the Encouragement of Agriculture was formed in 1776. A railway system was completed in 1870 and opened up the area for commerce and industry.

Population and Administration.—A decline in population took place between 1851 and the end of the century. At the 1951 census the figure was 30,725 and in 1961, 28,877. There are five small burghs: Kirkcudbright (*q.v.*), county town and royal burgh (pop. 2,448); New Galloway, smallest royal burgh in Scotland (327); Castle Douglas (*q.v.*), the market town (3,253); Dalbeattie (*q.v.*), a granite quarrying centre (3,104); and Gatehouse of Fleet (820). There are no large burghs. Kirkcudbrightshire and Wigtownshire combine to form the parliamentary constituency of Galloway which returns one member to parliament. The county is administered by a county council made up of representatives from all the parishes and burghs and there are also five town councils. The sheriffdom is called Dumfries and Galloway and is administered by a sheriff principal and two sheriff substitutes. One court has jurisdiction from Dumfries to the river Urr in Kirkcudbrightshire, and the others are held in Kirkcudbright, Wigtown and Stranraer.

Agriculture and Industry.—Only about 2% of the total land area is unproductive; forest and woodland cover 14%; arable land 15%; permanent grass 13%; rough grazing 56%. More than half the livestock are sheep. Arable land under cultivation is mainly devoted to fodder, root crops and grass. Dairy farming is important and the chief dairy herds are Ayrshires. Galloway, Shorthorn and Hereford beef bulls are used to produce cross calves

as store cattle and fat stock. In 1953 the Stewartry became part of the first "attested" area in Scotland for the production of tuberculin tested milk and later became the first experimental area for the Milk Marketing board's plan for bulk collection.

Small amounts of milling timber are produced for industrial purposes such as chip board.

The water power of the rivers Dee and Ken, their tributaries and lochs, has been harnessed in a hydroelectric system which extends from Tongland at the Dee estuary to Loch Doon in Ayrshire. Five hydroelectric power stations control this system and yield approximately 182,000,000 kw.hr. annually. Some of this power is consumed locally but the major portion of the yield goes to supplement supplies to the Glasgow area and to the north and midlands of England. The Stewartry was one of the pioneer counties in rural electrification. The discovery of some small veins of uranium along the cliff face between Rascarrel and Caulkerbush on the shore was in the early 1960s under investigation by geologists of the U.K. Atomic Energy authority.

Industries are few and mainly dependent on the success of agriculture, which is the principal occupation. There are creameries at Kirkcudbright, Dalbeattie and Twynholm; granite quarries at Dalbeattie and Creetown; and an oil storage depot at Kirkcudbright as a distribution centre for the three southern counties. Fishing with stake nets for salmon is carried on in the estuaries of the Cree, Dee and Urr.

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KIRKINTILLOCH, a small burgh of Dunbartonshire, Scot., is situated 8 mi. N.E. of Glasgow by road, on the Forth and Clyde canal. Pop. (1961) 18,257. The river Kelvin flows past the town, where it receives the Luggie water from the south. The leading industries are iron founding, precast concrete work and engineering. Slide valves made in Kirkintilloch are installed on large ships in all parts of the world, and the town has the most important Scottish manufacture of mining machinery switchgear. The Antonine wall ran through the site of the town, the Gaelic or Cymric name of which (Caerpentulach) meant "the fort at the end of the ridge." The town was granted its charter as a burgh of baronry by William the Lion about the beginning of the 13th century. The lords of the manor at the time of the Scottish wars of independence were the Comyns; the estate was taken from John Comyn, known as "the Red Comyn," who was slain by Robert the Bruce in 1306, and given to the Fleming family who held the baronry of Cumbernauld. The cruciform parish church (1644), with crow-stepped gables, is preserved by the town council. Excavations in Peel park, site of the Comyn castle and a Roman fort, throw interesting light on the line of the Antonine wall built by Lollius Urbicas in A.D. 142.

KIRKLAND, JOSEPH (1830–1894), U.S. novelist and pioneer in the field of realistic fiction in America, was born at Geneva, N.Y., Jan. 6, 1830, and died at Chicago, Ill., April 29, 1894. He wrote only three novels and was 57 when the first, *Zury: the Meanest Man in Spring County,* was published in 1887. He thought that he had begun to write too late and urged his young friend Hamlin Garland to begin writing without delay. It is doubtful, though, that Kirkland could have made the solid contribution to literature that he did had he not been able to draw upon personal experiences gained as a publisher's clerk, railroad auditor, soldier, coal mine operator and lawyer. Important also in this varied background was the influence of his mother, Caroline Kirkland, whose realistic accounts of the family's life in backwoods Michigan were published in the 1840s.

Covering life on the farm, in the village and during the American Civil War, Kirkland's *Zury* (1887), *The McVeys* (1888) and *The Captain of Company K* (1891) constitute a trilogy which explores the pioneering period of midwestern life. But his full-length portrait of the farmer Zury Prouder, first of its kind in American fiction, is his most significant contribution to literature.

John Flanagan's edition of *Zury* (1956) contains a helpful introduction and useful bibliography. (C. A. HY.)

KIRKLAND LAKE, an unincorporated community, pop. (1961) 15,366, in the district of Timiskaming in northern Ontario, Can., 160 mi. N. of North Bay. It is the centre of the Kirkland Lake gold camp, one of the richest concentrations of gold ores in the world. Among the chief producing mines are Kirkland Lake, Teck-Hughes, Lake Shore, Wright-Hargreaves, Sylvanite, Macassa, Toburn and Golden Gate. The first gold discovery in the vicinity was made in 1911, through the opening up of the country by railway. The bonanza years were 1927–28. Although population has remained stationary in the second half of the 20th century the area has become a popular tourist centre. The people are about half of British extraction, and half of French, Finnish, Yugoslav, Polish and Ukrainian origin. (F. A. CK.)

KIRKLARELI, a town and capital of an *il* (province) of the same name in European Turkey. The town (ancient Kirk Kilise, "Forty Churches") lies 34 mi. E.N.E. of Edirne, near the headwaters of a tributary of the Ergene river in the foothills of the Istranca mountains. Pop. (1960) 20,246. It owes its importance chiefly to its position at the southern outlet of the Fakhi defile over these mountains, through which passes the shortest road from the north to Istanbul. The town is linked by road with Edirne and has a rail connection with the main Edirne-Istanbul line. It has an important trade with Istanbul in butter and cheese and also exports cereals and tobacco.

KIRKLARELI IL is in the northern part of Thrace. Area 2,529 sq.mi. Pop. (1960) 241,146. Its northern area is largely covered by the Istranca mountains and their foothills, and has a mild, wet climate, influenced by the Black sea. The northern slopes have dense, deciduous forests which are the main source of Turkey's timber industry; the southern slopes are almost entirely deforested. The southern section of the *il* is the Ergene basin, dissected by tributaries of the Ergene river. It is a rich agricultural area in which wheat, barley, tobacco, sunflowers, vines and sugar beet are the principal products. Stock is raised in both the mountain and the Ergene basin areas, providing the exports of butter and cheese. Besides the capital the chief towns are Babaeski (11,692) and Luleburgaz (22,332), both on the Edirne-Istanbul road.

(N. TU.; S. ER.; E. TU.)

KIRKMAIDEN, a parish of Wigtownshire, Scot., is in the peninsula known as the Rhinns of Galloway. The southernmost point in Scotland, it is bounded west by the Irish sea, east by Luce bay, and ends in the Mull of Galloway. Robert Burns inverted its name in the line "Frae Maidenkirk to Johnny Groats." There are two coastal villages, Drunmore (on the east) and Port Logan (on the west), and many standing stones, cairns, fort circles and other prehistoric remains in the parish. An entrenchment on the Mull is traditionally the last defense of the Picts against the Scots.

KIRKUK, a town and *liwa* (province) of northeastern Iraq, lies on a small intermittent stream in an extensive, fertile basin bordering the Iranian Zagros mountains. The town, pop. (1957) 120,593, is of considerable antiquity, and has functioned as an agricultural market, trading post and military centre from which the Kurdish-Persian hill ranges to the east and south could be controlled. It lies in the part of Iraq known as Assyria, a region of rolling plains, river basins and mountain ridges where, in contrast to conditions elsewhere, there is often sufficient rainfall to allow dry farming.

The oldest part of the town is clustered around a citadel built on an ancient *tall.* On the opposite (west) river bank a newer modern quarter has developed, and farther west lie the main headquarters of the Iraq Petroleum company, spreading northwest to the district of Baba Gurgur (4 mi. from the centre of Kirkuk) which contains the main plant, workshops and residential zones, and the starting point of oil pipelines to the Mediterranean. Kirkuk is a market for the agricultural produce of the region (cereals, vines, olives, fruit and cotton) and an export centre for wool, cereals, cattle, gallnuts and tragacanth, which come from the higher Zagros ranges. Some cotton and woolen textiles are manufactured locally, and Kirkuk acts as a distributing centre in southern Kurdistan for imported consumer goods. After 1918

the town developed considerably because of the oil industry, though the number of workers is less than might be expected. Kirkuk is basically a Turkmen town, with Arabic and Kurdish also spoken; and it has long been a centre of Christianity, mainly of the Chaldean, Gregorian and Syrian rites.

KIRKUK LIWA (area 7,546 sq.mi.; pop. [1957] 388,912; [1960 est.] 417,656), unlike many others in Iraq, has well-defined topographical boundaries. Roughly square in shape, its northern and southern limits are major rivers—the Little Zab and the Diyala, while to the south the Jabal Hamrin separates it clearly from the low-lying alluvial plain of the Tigris. On the east a succession of mountain ridges separates it from the adjoining *liwa* of Sulaymaniyah. Kirkuk *liwa* is, broadly speaking, a foothill zone formed of river basins lying between the Mesopotamian lowland and the main Zagros ranges. The *liwa* is traversed by a main road from Baghdad to Mosul via Kirkuk town, and there are the "pipeline road" westward to Jordan and Syria and a road via Sulaymaniyah to Hamadan and Teheran, Iran. Conversion of a metre-gauge railway from Kirkuk to Baghdad to standard gauge was undertaken.
(W. B. FR.)

KIRKWALL, a royal and small burgh, seaport and the capital of the county of Orkney, Scot. Pop. (1961) 4,315. It is at the head of a bay of the samė name on the east side of the island of Mainland of Orkney, 214 mi. from Leith and 130 mi. from Aberdeen by steamer. Much of the town is old fashioned in appearance, its main street (nearly 1 mi. long) being in parts so narrow that two vehicles cannot pass each other. Kirkwall has very few manufactures, linen, kelp and straw plaiting being extinct, but distilling and boatbuilding are carried on. The town is important for its shipping, as a distributing centre for the Orkneys and as the seat of the sheriff court, county council and agricultural markets of the island. Kirkwall has a creamery and an egg-packing station and there is a large trade in black beef cattle. Steamers sail regularly to Lerwick, Aberdeen, Leith and to other islands in the Orkneys. Southwest of the town is Grimsetter airport which links the island to the Scottish mainland.

Kirkwall received its first charter from James III in 1486, but as it was disregarded by the earls of Orkney and others, parliament passed an act in 1670 confirming the charter granted by Charles II in 1661. The cathedral of St. Magnus, probably the only "Norman" church in Britain built by Norsemen, was founded by Jarl Rognvald (Earl Ronald) in 1137 in memory of his uncle Jarl Magnus, who was assassinated on the island of Egilsay in 1115 and afterward canonized and adopted as the patron saint of the Orkneys. The remains of Rognvald and St. Magnus were found in the cathedral in 1926. Except that the upper half of the original spire was struck by lightning in 1671 and not rebuilt, the cathedral is complete and is one of the finest pieces of Norman and early Gothic architecture in Scotland. The height and narrowness of the red sandstone building lend it an extra distinction. Restored in the 19th century and again in 1915, it belongs to the town council.

Of the church of St. Olaf only a fragment survives and nothing remains of the old castle, founded by Sir Henry Sinclair (d. 1400), earl and prince of Orkney and 1st earl of Caithness. The earthwork to the east of the town was thrown up by the Cromwellians. Adjoining the cathedral are the ruins of the bishop's palace, in which King Haakon died after his defeat at Largs in 1263. By this palace are the substantial ruins of the earl's palace, built about 1600 by Earl Patrick Stewart. (J. GD.)

KIRKWOOD, a suburb of St. Louis, Mo. (*q.v.*).

KIROV, SERGEI MIRONOVICH (1886–1934), Russian Communist leader whose assassination was used to justify the great purge of 1936–38, was born at Urzhum, in Vyatka province, on March 27 (new style; 15, old style), 1886, the son of a peasant, Miron Kostrikov. He was graduated from the Kazan mechanical school in 1904 and got a job in Tomsk, where in 1905 he joined the Bolshevik faction of the Russian Social Democratic party. Active in the 1905 revolution, he was arrested four times. Later he worked ably as a party organizer in Irkutsk and Vladikavkaz (Ordzhonikidze). In 1917–19 he did much to establish Soviet power in northern Caucasia; and in May 1920 he was appointed Soviet envoy to Georgia with the mission of undermining that independent republic. Having achieved this, he was, in the summer of 1921, appointed first secretary of the Azerbaijan Communist party. As such he was one of the organizers of the Transcaucasian Soviet Federated Socialist republic.

In 1926 Kirov succeeded G. E. Zinoviev as secretary of the regional Leningrad party organization. He then became a candidate member and, in 1930, a full member of the politburo. He at first supported Stalin against his rivals, but is believed to have led the opposition to Stalin within the central committee after the 17th party congress (1934). According to some accounts, his election as secretary to the central committee at this congress was intended as the first move to oust Stalin, but he never took this post: he was assassinated in Leningrad on Dec. 1, 1934, probably on Stalin's order. The assassin, Leonid Nikolaev, and his alleged accomplices were shot soon after; and Stalin subsequently could accuse his opponents of having arranged the murder.

KIROV, an *oblast* in the Russian Soviet Federated Socialist Republic of the U.S.S.R., lies in northeast European Russia, occupying almost all the basin of the Vyatka river. The north, where a "panhandle" extends to Luza, belongs to the Northern Dvina basin. Formed as Kirov *krai* in 1934 and made an *oblast* two years later, it covers an area of 47,602 sq.mi. The terrain is a rolling morainic plain, rising from the broad, central valley of the Vyatka to the Severny Uval ridge in the north and the Vyatski Uval and Upper Kama upland in the east. The higher areas are of limestone and are deeply dissected by rivers. Almost the whole *oblast* lies within the taiga forest of pine, fir, spruce and birch. Only in the extreme south do deciduous species such as oak begin to appear. There are many, often extensive, areas of peat bog and swamp, and broad flood-plain meadows fringe the rivers. Soils are generally podsols. The climate is sharply continental, with January average temperatures about −16° C. (4° F.) and July averages about 17° C. (63° F.). Rainfall is about 20–24 in. a year.

The population (1959) was 1,913,600, of which 704,212 (37%) was urban. There are 16 towns and 29 urban districts, the largest, apart from Kirov city, being Slobodskoi and Kotelnich. The bulk of the population is concentrated in the Vyatka valley. The extensive forests have long made timber working a major feature of the economy. The old handicrafts (furniture and toy-making, lacemaking, felt boots) of the region have given way to wood pulp, veneer, wood chemical and saw-timber production. Metallurgical industries use local and Urals iron (the iron deposits near Omutninsk, in the northeast of the *oblast,* have been worked since the 18th century), while phosphorite is mined at Rudnichny. Agriculture is relatively unimportant and is dominated by rye, oats, buckwheat and potatoes. The number of livestock is significantly lower than in neighbouring areas. (R. A. F.)

KIROV (formerly VYATKA), a town and *oblast* centre in the Russian Soviet Federated Socialist Republic of the U.S.S.R., stands on the right bank of the Vyatka river, 480 mi. E.N.E. of Moscow. Pop. (1959) 252,416. The town was founded as Khlynov in 1181 by traders from Novgorod and became the centre of the "Vyatka Lands," settled by Russians in the 14th–15th centuries, and a staging point on early trade routes across the northern Urals. In 1489 it was captured by Moscow. In 1780 it was renamed Vyatka and became the seat of a government, but its development was slow because of its distance from major routes, which also caused it to be used as a place of exile. Even as late as 1906 rail communication with Moscow was by way of Perm, Chelyabinsk and Kuibyshev. Lines now radiate not only to Perm but also to Kotlas in the northwest, to Vologda in the west and direct to Gorki and on to Moscow. The former handicraft industries, for which town and region are noted, have been replaced by large-scale co-operative modern industries, particularly metalworking in chromium and nonferrous metals, and engineering which produces machinery, measuring instruments and agricultural equipment. Timberworking and the manufacture of matches, shoes and artificial leather are important. There are pedagogic and agricultural institutes and a library, founded by Aleksandr Ivanovich Herzen (*q.v.*) during his exile there. It was renamed Kirov

in 1934 for the Bolshevik leader S. M. Kirov. (R. A. F.)

KIROVABAD, the second town (after Baku) of the Azerbaijan Soviet Socialist Republic, U.S.S.R., stands on the small river Gyandzhachai, a tributary of the Kura, 110 mi. S.E. of Tbilisi. Pop. (1959) 116,122. Originally known as Gandzha, the town, which is one of the oldest in Azerbaijan, was founded 4 mi. E. of the modern Kirovabad sometime in the 5th or 6th century. The old town was destroyed by an earthquake in 1139 and rebuilt on its present site. An important caravan centre, famous for its textiles, Gandzha was leveled again in 1231, this time by the Mongols. The town was captured in 1606 by the Persians under Abbas I and became capital of the Gandzha (Ganja) *khanate.* In 1804 it was annexed by the Russians who renamed it Yelisavetpol in 1813 and in 1861 it became the seat of a *guberniya* (a pre-Revolution province). Its population, then 15,000, rose to 35,000 by 1913. After the Revolution the original name was revived but was changed to Kirovabad in 1935. A large textile mill, built in 1928, continues the ancient tradition of this manufacture. Much cotton is grown in the vicinity and there is a cotton-cleaning plant. Oil is obtained from cottonseed and used to make soap. Other industries produce agricultural machinery, flour, wines and spirits. Power is supplied by the town's thermal station and hydroelectric plants on the Gyandzhachai and Kura. A branch line joins the town to the Tbilisi-Baku railway. Kirovabad has a large agricultural institute, a pedagogic institute, and livestock and cotton-growing research institutes. There is a monument to the 12th-century Persian poet, Nizami Gandzhevi, whose grave is in old Gandzha. (R. A. F.)

KIROVOGRAD, an *oblast* (formed 1939) of the Ukrainian Soviet Socialist Republic, U.S.S.R., covers 9,459 sq.mi. on the right bank of the Dnieper river, extending from the Dnieper in the northeast, across the rolling hills of the Dnieper upland into the basin of the Southern Bug. The *oblast* is predominantly agricultural but the fertile chernozem soils, developed on friable loess, have been seriously eroded by gullying. Almost all the natural grass vegetation has been plowed up. Wheat, maize (corn) and sunflowers are the main crops, but sugar beet is important, especially in the north. Many beef and dairy cattle are kept. Lignite is mined near Aleksandriya and the processing of agricultural produce is widespread. The population (1959) was 1,246,197 of which 32% was urban. There are 10 towns and 18 urban districts, but, apart from the administrative centre of Kirovograd, all are small. (R. A. F.)

KIROVOGRAD (formerly Yelisavetgrad, Zinovyevsk from 1924–1936 and Kirovo until 1939), a town and *oblast* centre of the Ukrainian Soviet Socialist Republic of the U.S.S.R., stands on the upper Ingul, where it is crossed by the Kremenchug-Odessa railway 150 mi. S.E. of Kiev. Pop. (1959) 128,207. The town was founded in 1754 as a fortress during the Russian colonization of the right-bank Ukraine, and became a major agricultural and trading centre. It retains its importance as the centre of a rich agricultural area (wheat, sugar beet, sunflowers, potatoes and flax) and has one of the largest agricultural machinery plants in the U.S.S.R. Metalworking and the manufacture of furniture, ropes, shoes, clothing and foodstuffs are also carried on. There are several agricultural technical schools and a pedagogic institute. It was the scene of Jewish pogroms (1881, 1905, 1919) and during World War II was occupied by the Germans. (R. A. F.)

KIRRIEMUIR, a small burgh in the Strathmore district of Angus (Forfarshire), Scot., lies on a height above the glen through which the Gairie flows, 6 mi. W.N.W. of Forfar. Pop. (1961) 3,485. It is the centre of a rich agricultural area. The main industry is jute weaving, but the town also has oatmeal mills. Sir James Barrie was born at No. 9 Brechin road and is buried in the local cemetery. This town of narrow streets is the celebrated "Thrums" of his novels. His birthplace is now a museum belonging to the Scottish National trust. The original secession church—the kirk of the Auld Lichts—was founded in 1806 and rebuilt in 1893.

KIRSCH (Kirschwasser), a potable spirit distilled from a fermented mash of ripe, small, wild black cherries found in the Black Forest (*Schwarzwald*) of Germany, across the Rhine in Alsace, France, and in the German-speaking cantons of Switzerland. Geographically these production areas are one, since they all lie around the edges of the Rhenish plateau, but politically they constitute three separate regions.

Commercial distillation of kirschwasser (cherry water), *i.e.,* true cherry brandy, has been known in Germany and Switzerland since the middle ages; in France it came later, when Cadet de Vaux brought the art to Montmorency valley shortly before the French Revolution. One-third of Switzerland's annual cherry harvest is devoted to production of kirschwasser. It still is primarily the product of small farmer-distillers who ferment and distill the fruit of their orchards and then sell the kirschwasser to blenders who bottle and market it. Some large firms market the product of their own exclusive distillation.

Production methods remain traditional. The fully ripened cherries are mashed in a large wooden tub or vat and allowed to ferment freely. During fermentation the mass is stirred periodically with paddles to assure ample aeration of the whole. Upon completion of fermentation the entire mass—liquid, pulp and cherry stones—is distilled in a pot still. Kirschwasser is distilled off at a low proof—usually between 100 and 110 U.S. proof.

During the mashing some of the cherry stones (pits) are crushed, releasing some of their oils and acids. These include small quantities of hydrocyanic acid, which with benzaldehyde result from the breakdown of amygdalin, and impart the distinctive bitter almond undertone found in the aroma and flavour of good kirschwasser. Such fruit brandy also contains a higher proportion of methyl alcohol than spirits distilled from other materials, such as grain or molasses.

Kirschwasser is not aged. It is marketed at 90 to 100 proof, in the clear white (colourless) state it comes off the still. Whether labeled kirschwasser or kirsch it is a fruit brandy of pronounced character, with a clean cherry fragrance and bitter almond undertone. It is consumed neat, as brandy, and in cocktails. However, one of its principal uses is as a flavouring. (H. J. Gn.)

KIRSEHIR, chief town of the *il* (province) of Kirsehir, Turk., lies on a tributary of the Kizil Irmak, 122 mi. S.E. of Ankara by road. Pop. (1960) 20,229. It has a hot chalybeate spring. Carpets are made in the vicinity, and cereals and fruits are the chief crops of the district, which depends on irrigation because of the continental climate and long drought periods. Kirsehir may be identified with the Byzantine town Mocissus, which as Justinianopolis under Justinian was capital of a large division of Cappadocia. (N. Tu.; S. Er.; E. Tu.)

KIRWAN, RICHARD (1733–1812), Irish scientist and author of a long-standard work on mineralogy, was born at Cloughballymore, County Galway, in 1733. In 1766 he was called to the Irish bar, but in 1768 abandoned practice in favour of scientific pursuits. During the next 19 years he resided chiefly in London, enjoying the society of the scientific men living there. His experiments on the specific gravities and attractive powers of various saline substances formed a substantial contribution to the methods of analytical chemistry, and in 1782 gained him the Copley medal from the Royal society, of which he was elected a fellow in 1780; in 1784 he was engaged in a controversy with Cavendish in regard to the latter's experiments on air. In 1787 he removed to Dublin, where four years later he became president of the Royal Irish academy. He was one of the last supporters in England of the phlogistic hypothesis, for which he contended in his *Essay on Phlogiston and the Constitution of Acids* (1787), identifying phlogiston with hydrogen. This work, translated by Madame Lavoisier in 1788, was published in French with critical notes by A. L. Lavoisier and some of his associates; Kirwan attempted to refute their arguments, but they proved too strong for him, and he acknowledged himself a convert in 1791. His other books included *Elements of Mineralogy,* which was the first systematic work on that subject in the English language and which long remained standard; *An Estimate of the Temperature of Different Latitudes* (1787), which attempted to lay the basis for a theory of winds; *Essay of the Analysis of Mineral Waters* (1799); and *Geological Essays* (1799). He died in Dublin on June 1, 1812.

KIRYŪ, major textile centre in Gumma prefecture, Japan, is on the edge of the Kantō plain, about 60 mi. northwest of Tokyo. Pop. (1965) 127,880. Traditionally silk production was associated with Kiryū but the decline in world silk consumption after World War II caused most of it to be replaced with rayon production. In the 17th century fine Kiryū silks were worn by samurai and court nobles.

In the 20th century the city became a major production centre for brocades, satins and other fine silks for export.

(C. A. Mr.)

KISANGANI (formerly Stanleyville), capital town of the Haut-Congo Province of the Democratic Republic of the Congo, lies at the head of navigation on the Congo River just below the Stanley Falls. Pop. (1960 est.) 126,533, of whom the majority are indigenous. The town proper, with its port, modern and older residential quarters, and airport, extends along the right bank of the river. In the north it reaches the banks of the Tshopo River, where an industrial quarter has developed near a hydroelectric plant harnessing the Tshopo waters. Kisangani is an important shipping, commercial, and administrative centre, but its industrial potentialities are not greatly developed. It is the terminus of the Ponthierville railway, which bypasses the rapids of the Lualaba (or Upper Congo) River. A road north to Buta links Kisangani with the Route Royale Congo-Nil. The international airport maintains service to many African and European capitals. The Université Libre du Congo was founded at Stanleyville in 1963.

Stanleyville (renamed in 1966) dates from the arrival in Central Africa of Europeans, who in 1883 formed a small post upstream from the present town and concluded a treaty with the Arab slave traders who had occupied the region. In 1893 a new post was created on the right bank. The town began to develop on roughly its present site at the end of the 19th century. The railway to Ponthierville was completed in 1906. Most of the town's growth dates from World War II and after. In 1964 Stanleyville became the central stronghold of a rebellion that was suppressed by the Congolese National Army; Belgian paratroopers were also dropped by U.S. transport planes to rescue foreigners held by the rebels. Government troops recaptured the city in November. In July 1966 an army mutiny occurred in the city but was suppressed quickly.

See also Congo, Democratic Republic of the.

(He. Ni.; X.)

KISELEVSK, a town in Kemerovo *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., lies 38 km. (24 mi.) northwest of Novokuznetsk on the main Kuznetsk basin (Kuzbass) axial railway. Pop. (1959) 130,002. Like other towns of the Kuzbass it has grown up since the 1920s as an industrial centre and, in particular, as one of the largest coal mining centres. Much of the coal is good for coking. Kiselevsk's large engineering industries are linked with coal mining, producing drilling equipment and trucks and mechanical horses for underground coal trains. A railway from Kiselevsk joins the Novosibirsk-Bisk line at Chesnokovka. (R. A. F.)

KISFALUDY, the family name of two brothers, famous Hungarian writers of the early 19th century.

Károly Kisfaludy (1788–1830) was born at Tét, Feb. 6, 1788, the youngest of eight children. Violent, frivolous and prodigal, Kisfaludy found it difficult to discover his vocation. He left school to become a soldier (1804) but, though he fought courageously in the Napoleonic Wars, he disliked discipline and in 1811 left the army. He went to Vienna where he tried painting, spent a year in Italy, returned to Vienna and then went to Pest where, disowned by his father, he led a precarious existence as a painter. He had been writing since 1805 and he tried his hand at drama as early as 1811 with a historical play, *A tatárok Magyarországon.* Eight years later the manuscript came into the hands of the director of the repertory company of Székesfehérvár, who produced it, first in his home town, then in Pest, making Kisfaludy famous overnight.

Kisfaludy may be considered the real founder of Hungarian drama. Among his best works are the tragedy *Irene* (1820) and the comedy *A kérök* (1817). He stepped into the literary leadership left vacant by Ferenc Kazinczy's growing isolation and in 1822 he began to publish his literary "almanac," *Auróra,* around which gathered the great names of the coming generation of Romantics: József Bajza, Mihály Vörösmarty, Ferenc Kölcsey. Kisfaludy died on Nov. 21, 1830, in Pest. But the movement he started survived him, and Hungarian literature owes much to his gift of literary editorship.

His collected works, *Kisfaludy Károly Minden munkái,* were edited by J. Bánóczi, 6 vol. (1893).

Sándor Kisfaludy (1772–1844), the eldest of the family, was an outstanding poet and already becoming famous when Károly started to write. Born in Sümeg, Sept. 22, 1772, he studied at Györ and Pozsony. From 1792 he was a soldier, and for three years was a member of the Hungarian noble guard in Vienna. He fought against the French and was taken prisoner, and wrote his first love poems, inspired by Petrarch, in Provence. He married in 1800 and in the following year he published his song cycle *Kesergö szerelem* ("Plaintive Love") which met with unprecedented success. Though somewhat monotonous, this collection contains some real gems. *Boldog szerelem* ("Happy Love") followed in 1807. In the same year he published *Regék a magyar elöidökböl,* containing three poetic romances centring on three castles. Though they were weak in construction, their easy style made them popular. In his later years his work lost its vigour. He died at Sümeg on Oct. 28, 1844. His collected works, *Kisfaludy Sándor Minden munkái,* were edited by D. Angyal, 8 vol. (1892–93). (Ds. Sr.)

KISHINEV, the capital of the Moldavian Soviet Socialist Republic of the U.S.S.R., stands on the right bank of the Byk river, 50 mi. N.W. of Odessa. Pop. (1959) 216,005. The date of foundation of the town is unknown, but the first documentary reference is 1420. Kishinev often suffered severe destruction, notably in the Russo-Turkish War of 1788 and again in World War II. In 1812 the town, with the rest of Bessarabia, was ceded to Russia, when its population was 7,000. Alexander Pushkin, while in exile there (1820–23), wrote some of his best known works. Between the two world wars Kishinev was in Rumania and known as Chisinau. When Bessarabia was ceded to the U.S.S.R. in 1940 and the Moldavian S.S.R. was formed, Kishinev became its capital. Most of its industries are concerned with processing the products of the rich agricultural area for which it is the focus: wines, spirits, flour, bread, fruit and vegetables, tobacco, meat and dairy produce, leather goods and shoes. Kishinev is the cultural centre of Moldavia, with a state university (1945), an academy of sciences, medical, agricultural and pedagogic institutes, several agricultural research bodies (especially in viticulture and wine making), a musical conservatoire and a theatre of Moldavian opera, ballet and drama. The town presents an attractive appearance, with tree-lined streets. The old town, down by the river, is subject to flooding in places. The new town lies on higher ground to the southwest. Kishinev stands on the Odessa-Iași railway and is the focus of a network of roads. (R. A. F.)

KISKUNFÉLEGYHÁZA, a town in Bacs-Kiskun *megye* (county), Hung., 112 km. (70 mi.) S.E. of Budapest. Pop. (1960) 33,126 (mun.). The prefix Kiskun, occurring in a number of place names in the region between the Danube and Tisza rivers, means Little Kumanian (*see* Kumans). Nagykun, in place names farther east, between the Tisza and Körös, means Great Kumanian. The terms derive from the immigrant Kumanian settlements of the 14th century. Kiskunfélegyháza was the capital of Little Kumania, which enjoyed considerable local autonomy before the administrative reforms of 1876. The town was destroyed by the Turks in the 16th century and its restoration as a Magyar town dates from the mid-18th century. It lies on the main road and railway between Budapest and Szeged and is an important rail and road junction. Industry and trade are varied, much being supported by the commercial crops of surrounding farmland: grain, tobacco, fruit and wine. (H. G. S.)

KISKUNHALAS, a town in Bacs-Kiskun *megye* (county) of south central Hungary, lies 55 km. (34 mi.) S.S.W. of Kecskemét on the western and main railway route between Budapest and Belgrade, Yugos., via Subotica. Pop. (1960) 26,226 (mun.). A southwest-northeast secondary railway crosses the main one at Kiskunhalas, and the town is also the intersection point of five secondary

roads, evidence of active local farm traffic. The surrounding farms are noted for poultry, wine and fruit production. Lacemaking was long an established craft. (H. G. S.)

KISLOVODSK, a town and spa of Stavropol *krai* of the Russian Soviet Federated Socialist Republic, U.S.S.R., lies 18 mi. S.W. of Pyatigorsk in the northern foothills of the Caucasus, on the Podkumok river, a tributary of the Kuma. Pop. (1959) 79,097. It is one of the largest health resorts in the U.S.S.R., the centre of an area of abundant mineral springs. Its sheltered position gives mild winters and its height, about 3,000 ft., cool summers. Sunshine hours are many. Founded in 1803, when the springs first became well known in Russia, Kislovodsk now has more than 40 sanatoria and rest homes. Its carbonaceous mineral water, *narzan*, is bottled in large quantities and is sold throughout the Soviet Union. An electrified branch line connects the town with the main Rostov-Baku railway. (R. A. F.)

KISSI, a Negro people who inhabit a belt of hills covered by wooded savannas where Guinea, Sierra Leone and Liberia meet. There were about 220,000 Kissi in the 1960s, including about 160,000 in the Kissidougou and Gueckedou districts of Guinea. The region seems to have taken in refugees from many origins, and the Kissi represent various racial types such as Sudanese and Guinean; however, their language appears unrelated to those spoken by neighbouring peoples.

Cultivated in marshes, rice heads the list of Kissi foods, followed by yams, sweet potatoes, taro and palm kernels. Coffee and kola are used for external trade. Adults wear tunics of home-grown cotton. Kissi build their villages in clearings, erecting round clay huts with conical straw roofs. They have few special crafts, and small stone statuettes (*kissi*) used to represent ancestors (the only means of communication with their creator god) are doubtless the work of former inhabitants. Forest areas immediately surrounding the villages are held sacred and kept from destruction or cultivation. Religious practices include divination with pebbles and sand, and witch-hunting; the dead are buried in the villages. Although many of the neighbouring Malinke (*q.v.*) are Muslims, Islam has made little progress among the Kissi despite the fact that they consider the Malinke relatives and sometimes copy their behaviour. Kissi descent is patrilineal, with families split up into distinct villages. Clans unite families of the same descent, recognize a parent animal and are more scattered. *See* also GUINEA, REPUBLIC OF; AFRICA: *Ethnography* (*Anthropology*): *West Africa.*

See Denise Paulme, *Les Gens du riz* (1954); Republic of Guinea, *Bulletin Statistique Mensuel,* no. 10 and 11 (1959). (HU. DE.)

KITABATAKE CHIKAFUSA (1292–1354), Japanese warrior, statesman and author of an important history of Japan. He was descended from a collateral branch of the imperial house and served as adviser to Emperor Go-Daigo when that monarch returned from exile in 1333. Go-Daigo's (Daigo II) brief restoration ended with a revolt against the throne and the establishment of two courts in Japan. This situation led to the writing of Kitabatake's great politico-historical treatise *Jinnō Shōtōki* ("Legitimate Succession of the Divine Sovereigns"). Written in 1339 and published in 1369, *Jinnō Shōtōki* set forth a profound and mystic nationalism. Its apotheosis of the emperor influenced the Shintō revival of later centuries (*see* SHINTŌ) and was of seminal importance in the rise of modern Japanese nationalism. In his own time Kitabatake was considered the chief military and administrative supporter of the southern court and a model of loyalty. (J. A. HA.)

KITA-KYUSHU, a Japanese city created in February 1963 by the amalgamation of the cities of Wakamatsu, Yahata (Yawata), Tobata, Kokura, and Moji. They now form the five wards of the new city. Located in northern Fukuoka prefecture, Kita-Kyushu contains 452 sq.km., including a long coast line along the Shimonoseki and Tsushima straits. In 1965 it was the seventh largest Japanese city (pop. 1,042,389) and the largest in Kyushu.

Kita-Kyushu is one of Japan's leading manufacturing centres and is the one in which heavy industry is most prominent. The industrial nucleus, Yahata, specializes in iron and steel, heavy chemicals (those produced in large quantities), cement and glass. Wakamatsu produces metals, machinery, ships and chemicals, but is best known as a major port for the shipment of northern Kyushu coal. Tobata is one of the main deep-sea fishing bases of western Japan, has a large output of cotton textiles and also contains a number of metal industries. Kokura, a former arsenal town, specializes in such heavy manufactures as iron and steel, and machinery. Moji, the easternmost ward, has Kita-Kyushu's main port facilities for handling large coastal and international freighters. It is a well-known coal shipping and fishing port and has extensive oil storage facilities. Its diverse manufactures include shipbuilding and foodstuffs.

The main part of Kita-Kyushu's urbanized area is on reclaimed land along the coast. Immediate problems include a shortage of land for further growth and the consequent congestion, and an inadequate supply of industrial water. Two tunnels, one for railroads and one for vehicles, link Kita-Kyushu and the Honshu city of Shimonoseki on the opposite shore of Shimonoseki strait. (J. D. EE.)

KITASATO, SHIBASABURO (1852–1931), Japanese physician and bacteriologist, co-discoverer of the germ that causes bubonic plague, was born Dec. 20, 1852, in Oguni, Kumamoto prefecture, and studied in Germany under Robert Koch from 1885 to 1891. In Koch's laboratory he worked with Emil von Behring (*q.v.*) on the tetanus and diphtheria bacilli; in 1890 they demonstrated for the first time the value of antitoxin in preventing disease. Kitasato became director of the Imperial Japanese Institute for the Study of Infectious Diseases in 1892 and in that same year showed, with L. Brieger and A. von Wassermann, how dead cultures can be used in vaccination. While working in Hong Kong in 1894 he discovered the bacillus (*Pasteurella pestis*) of bubonic plague; this organism was also discovered independently by Alexandre Yersin (*q.v.*) in the same year. At various times Kitasato investigated outbreaks of plague in Kobe, Osaka and Manchuria and issued reports on his observations. He also studied the mode of infection in tuberculosis.

Kitasato was elected an honorary fellow of the Royal society in 1908. In 1914 he resigned the directorship of the Imperial institute and founded a private institute. He was created a baron by the emperor of Japan in 1923 and died in Nakanocho on June 13, 1931. (S. Jo.)

KITCHEN EQUIPMENT: *see* HOME EQUIPMENT.

KITCHENER, HORATIO HERBERT KITCHENER, EARL (1850–1916), British field marshal and proconsul, conqueror of the Sudan, who as secretary for war raised and organized the British armies at the beginning of World War I. He was born near Listowel in County Kerry, southern Ireland, on June 24, 1850, of English Protestant stock. He was educated privately and at the Royal Military academy, Woolwich, and before being commissioned (Jan. 1871) in the royal engineers, he experienced a brief period of active service as a volunteer on the French side during the Franco-German War.

He was employed between 1874 and 1882 on survey and intelligence work in Palestine, Anatolia and Cyprus and was posted to Cairo early in 1883 as second-in-command of an Egyptian cavalry regiment. After earning great distinction with the Nile expeditionary force (1884–85) that failed to rescue Gen. C. G. Gordon, Kitchener served in Zanzibar, as governor of Suakin on the Red sea coast, and as adjutant general in Cairo. He developed an unparalleled thoroughness and drive and on the recommendation of the prime minister, Lord Salisbury, was made commander in chief of the Egyptian army (1892). Kitchener was a bachelor and a natural celibate; he was inspired by a passionate sense of

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KITCHENER

duty and had no home ties. He lived for the day when he could avenge Gordon's death by destroying the religious and politically separatist movement inaugurated in the Sudan (*see* SUDAN, REPUBLIC OF THE: *History*) by the mahdi (*q.v.*). Pleading constantly for war, he had his way in 1896, and brought his campaign to a victorious conclusion with a tremendous slaughter of Arabs at the battle of Omdurman (Sept. 2, 1898). Despite the ruthlessness of his methods, Kitchener's victories thrilled the empire during the period of Queen Victoria's diamond jubilee and he was rewarded with a peerage (Nov. 1898), the thanks of parliament and a large money grant (June 1899). He had further increased his great reputation by a firm, tactful and successful handling (Sept. 1898) of an explosive situation created by the presence at Fashoda (now Kodok) of a French expeditionary force claiming sovereignty over parts of the Sudan.

Kitchener served for a year as governor general of the Sudan, but meanwhile war had broken out in South Africa and he was sent there with Lord Roberts (Dec. 1899) to restore a deteriorating situation. He succeeded Roberts as commander in chief in South Africa (Nov. 1900) and spent nearly two years wearing down a fanatical guerrilla resistance by draconian methods, such as burning farms and herding women and children into disease-ridden concentration camps, which brought the Boers to their knees.

Honours were showered upon Kitchener and he was created a viscount when he returned to England (July 1902). After declining to serve in the war office he went as commander in chief to India, where he reorganized the army with a view to meeting a threat of external aggression instead of internal rebellion. He soon became involved, however, in a resounding quarrel with the viceroy, Lord Curzon, about the system of dual control hitherto exercised over the army in India. Kitchener claimed that the commander in chief and not the viceroy must be supreme in military matters, and Curzon accused him of an ambition to subvert the civil supremacy. The viceroy resigned (1905) when the British cabinet upheld most of Kitchener's proposals, but the commander in chief stayed happily in India until Sept. 1909, when he visited Australia and New Zealand in order to advise about defense policy. The refusal of Asquith's Liberal government to make him viceroy of India was the greatest disappointment of his life, but Kitchener accepted Egypt (1911) as a consolation prize and between 1911 and 1914 ruled that country with the Sudan from Cairo as a benevolent autocrat. He effected a far-reaching reform of the Egyptian and Sudanese economies which placed both countries permanently in his debt. The keystone of his policy was the protection of the peasant and the advancement of the cotton interest, and he tolerated no opposition. He quarreled with the Egyptian khedive Abbas Hilmi and was planning to depose him when World War I broke out.

Kitchener, who was on leave in England and who had just received an earldom (July 1914), obeyed with profound regret an appointment by the prime minister, Herbert Henry Asquith, to join the cabinet as a serving field marshal and nonpolitical secretary for war; but he had little regard for the existing British army. He thought the regular army far too small, and despised the territorial army because he considered it unprofessional in spirit. He warned his colleagues, who all believed that the war would be decided within a few weeks, that it would last for at least three years and that it could be won only by the last million men whom Great Britain could raise, train, equip and hurl into battle. It would be hard to exaggerate the quality of Kitchener's leadership during the early months of the war, and he remained until the end an indispensable symbol of the public will to victory. For many months after he came to the war office he had more volunteers than he could handle, and instead of using Lord Haldane's county territorial associations, which continued to exist, he duplicated the machinery of enlistment by creating a series of great new Kitchener armies to which he gave a monopoly of official favour. He enlisted as regulars the men who flocked to join his armies and had them cut from the outset to the standard pattern of professional soldiers.

Kitchener accepted responsibility not only for conjuring armies of unprecedented size out of the ground, but for mobilizing the nation's industries for war as well as for conducting British military strategy in every corner of the globe. But he lacked, unfortunately, the vital constitutional and administrative aids which enabled Winston Churchill to discharge between 1940 and 1945 the wartime dictatorship entrusted to him by parliament. Where everything had to be improvised some mistakes and confusion were inevitable, and Kitchener was handicapped by his dislike of teamwork and by a fierce reluctance to delegate responsibility. Wrestling with problems that transcended all previous experience, he was borne down under a weight of conflicting pressures that made it constantly more difficult to make swift and effective decisions. Responsibility for industrial mobilization was taken from Kitchener in May 1915, and his colleagues were much relieved when he volunteered during November to visit Gallipoli in order to advise about evacuation. During his absence they stripped him of all authority in connection with strategy, and only a burning sense of duty kept him from resigning, at a time when his continued presence in the cabinet appeared to provide the government with most of the public confidence that sustained it in office. The unparalleled dichotomy between the people's adoration of their idol, and the almost contemptuous indifference of his cabinet colleagues caused Kitchener anguish. Before the end of 1915 he had become convinced of the necessity for conscription but he never publicly advocated it, in deference to Asquith's view that it had not yet become politically practicable.

A mission to Russia, in June 1916, offered a temporary respite from an unhappy situation, but Kitchener was drowned (June 5, 1916) when the cruiser "Hampshire," in which he had embarked, struck a German mine off the Orkney Islands. He had worked out the vivid pattern of a military proconsular career during the period of Great Britain's imperial apogee, and was fortunate that at the moment when that pattern had become too complex to be extended or unraveled, the signature of a soldier's death crowned his work and brought release.

See P. Magnus, *Kitchener* (1959). (PH. M.)

KITCHENER, county seat of Waterloo County, Ontario, Can., 33 mi. NW of Hamilton. The first settlement, about 1807, was known as Sand Hills, then Ebytown after Mennonite Bishop Benjamin Eby. In 1824 it was named Berlin and in 1916 was renamed after Field Marshal Lord Kitchener. It was incorporated as a village in 1854, a town in 1870, and a city in 1912. Most of the first settlers were Pennsylvania Germans and many later settlers came from Germany. There is a large Mennonite community in the surrounding country. Kitchener is situated in one of the more densely populated areas of Canada, being about 12 mi. from the cities of Galt and Guelph and a shorter distance from the large towns of Preston and Hespeler; the city of Waterloo is geographically contiguous to Kitchener, the two being known as twin cities. Kitchener-Waterloo is an important manufacturing centre, particularly in furniture, meat packing, brewing and distilling, rubber goods, and textiles. It is also a financial centre. Pop. (1966) Kitchener 92,966, Waterloo 29,689.

(G. FN.)

WALTER WISSENBACH

COMMON EUROPEAN KITE (MILVUS MILVUS [ICTINUS]), RESTING ON A RING PERCH

KITE, the name of various day-flying birds of prey comprising several genera of the family Accipitridae. While varying in size, most have in common a light structure, weak feet, narrow wings, and a rather long, notched, or forked tail. The common kite (*Milvus milvus*) of Europe, a partial migrant, occurs also in

Asia Minor and northern Africa. It is about two feet long, has brownish plumage, and is distinguished by its long, deeply forked chestnut tail. Formerly common in Britain but now much restricted, it once acted as a scavenger even in London. The black kite (*M. migrans*) is similar but smaller and has a notched tail. It occurs across Europe, Asia, and northern Africa to Australia.

Of the ten species of kite peculiar to the Western Hemisphere four are resident north of Mexico, but only the Mississippi kite (*Ictinia misisippiensis*) occurs much beyond the southern portion of the United States. The Everglade kite (*Rostrhamus sociabilis*) is found in freshwater marshes of Florida and southward. The swallow-tailed kite (*Elanoïdes forficatus*), mainly white, with black flight feathers and tail, is distinguished by its long, scissorslike tail. The white-tailed kite (*Elanus leucurus*) occurs locally from western California, southeastern Texas, and peninsular Florida to Chile and Argentina; the northernmost of its two races (*majusculus*) is now rare, especially in Florida. *See* also HAWK.

(E. R. BE.)

KITES. Kiteflying is the art or sport of sending up into the air, by means of the wind, light frames of varying shapes covered with paper, plastic or cloth (named after the kite bird, a graceful hawk), which are attached to long cords held in the hand or wound on a reel or drum. One tradition holds that kites were invented by the Greek scientist Archytas of Tarentum four centuries before the Christian era, but they have been in use among Asian peoples from time immemorial. The sport has long been a national pastime of the Koreans, Chinese, Japanese and Malayans. Kites flying at night over a house were believed to keep evil spirits away. A religious significance is still connected to some ceremonial kiteflying in Asia.

Practical use has been made of kites through the ages: tradition states that a Korean general once suspended a lantern from a kite as an inspiring signal to his troops; another general of an early era supposedly drew a line across a stream by means of a kite, then used the line to draw a cable across and thus began a bridge, a device which has been used by modern engineers; and a Japanese bandit was said to have suspended himself from a large kite in an effort to steal some golden ornamental fishes from a castle tower. Several series of kites were used as signals at the battle of Hastings; lines to begin rescue work have been carried to stranded ships and to men marooned on ice floes; and cameras hung from kites have taken good aerial photographs.

In his famous experiment of 1752, Benjamin Franklin hung a metal key from a kite line and, by attracting electricity from the air during a storm, demonstrated the electrical nature of lightning. Kites were long used for weather observations, instruments being carried aloft to record otherwise unobtainable data. The record height reached by any kite was 23,835 ft. on May 5, 1910, at Mount Weather, Va., using a train of ten kites on piano wire from a ground winch. In the U.S., kites were no longer used for meteorological work after 1931, being superseded by balloons and airplanes.

Military experiments were carried out before the start of the 20th century in an attempt to lift men into the air to increase the observation powers of armies. Capt. B. S. F. Baden-Powell in 1894 lifted a man 100 ft. with one 36-ft. kite, repeating the feat later with five 12-ft. kites in a train. Alexander Graham Bell, who invented the tetrahedral, or pyramidal, kite, tested on Dec. 6, 1907, a large 208-lb. tetrahedral kite of 3,393 cells, towing it behind a small steamer and lifting both the kite and a man lying in a recess at the kite's centre to a height of 168 ft.

The military forces of most large nations ended their kite experiments with the advent of the airplane. However, it was reported that during World War II some Nazi submarines were equipped with dismountable three-bladed kites, similar to helicopters and designed to be towed by the U-boat on the surface, providing enough lift to hoist an observer aloft and extend the field of vision. Machine gunners in the United States were given antiaircraft training by sending aloft maneuverable kites with the silhouette of an airplane placed as a target on the near surface, hits being noted when the kites were shot down or lowered to the earth.

Types of kites most commonly used are the 3-sticker (hexagonal), Malay (modified diamond) and the box kite. Those with only one flat surface must have tails hanging from the trailing edge to maintain balance. The shape can be designed so that the kite will be self-correcting by incorporating a dihedral (two-sided) angle in the surface or by bowing the main cross stick to a depth of 10% of its length. If not completely self-correcting, the kite will certainly require less tail for stabilization.

In the 3-sticker all sticks are of the same length, crossed and tied in the middle, spread symmetrically, with string run around the border and the whole covered with light material. This makes a flat surface and requires a tail hung from the centre of a short loop attached to the two trailing points. A bridle is composed of three cords connecting the hand line to various points on the kite to hold it into the wind, each of a length equal to half the width of the kite. They lead from the centre and the two highest points to a central knot or ring to which is tied the line to the flier's hand.

The Malay, a tailless 2-sticker, has its sticks of equal length crossed and tied with the centre of one at a spot one-seventh the distance from the top of the other. The bridle has two legs, one from the top of the diamond, and the other from the lowest point, meeting a little below the crossing of the sticks. A string pulled tight across the back of the cross stick will bow the surface to give the effect of the dihedral angle, making the kite self-balancing.

The box kite, an invention of the Australian Lawrence Hargrave in the 1890s, is named for its rectangular shape, the frame being twice as long as the width, ends left uncovered and one-third of the length covered around each end. The bridle consists of two lines, one to each end of one of the vertical sticks, meeting a little above the lower edge of the top panel. The kite flies on one edge and needs no tail. The shape can be other than square in cross section; it may be oblong and fly on a wide side with a four-leg bridle; or triangular, round (barrel kite), or even five- or six-sided.

Kites in the shapes of birds, men, ships, butterflies, etc., have a novelty appeal. The Chinese favourite fancy kite is the dragon, a ferocious-looking head kite with many smaller flat body kites strung behind on parallel tie lines.

Construction and Flying.—With a little ingenuity most models can be made dismountable for convenience in carrying and storing. Tied joints hold better with many turns of light cord than with a few turns of heavy. Shellac, glue or varnish is applied to fix the ties. Tails are effective because of resistance to air, not because of weight; therefore, many light cross pieces of material inserted into knots in a line will do well for a tail. Hand reels are easy to design and make, and save much time in rewinding the line. Decoration may take infinite forms.

Kites are best flown in open spaces with few trees or houses, where the wind can blow steadily and close to the ground. Best wind velocity is 8 to 20 mi. per hour: less makes it difficult to lift the kites and more makes them hard to handle or may even break them. Contact of the hand line with high-tension electric lines or wires must be avoided because of the great danger of electrocution through a damp cord. Kiteflying tournaments are annual events in many communities.

See H. W. Fowler, Jr., *Kites* (1953). (H. W. F., JR.)

KITTEL, RUDOLF (1853–1929), German Old Testament scholar whose edition of the Hebrew Bible superseded all earlier ones, was born on March 28, 1853, in Eningen. He was a professor in Breslau (1888–98) and then in Leipzig (1898–1924), where he died on Oct. 20, 1929.

Kittel was one of the first scholars to use archaeological evidence and inscriptions in his study of the political, cultural and religious history of Palestine and Israel from the Stone Age to the Persian period. In *Geschichte des Volkes Israel*, three volumes (1909–29), which appeared in several editions, and in *Die Religion des Volkes Israel* (1921; English translation 1925) he showed that monotheism had its roots in the period of Moses, long before the 8th-century prophets. Kittel's edition of the Old Testament, two volumes (1905–06) noted all important variants of the Samaritan

Pentateuch and the ancient versions, together with modern conjectures. In the 3rd edition, published in the year of his death, for the text of Jacob ben Chayyim printed by D. Bomberg in 1524–25, which subsequent editions had hitherto used as their basis, he substituted the Leningrad manuscript dated A.D. 1008 which his collaborator Paul Kahle had discovered to be the text of Aaron Moses ben Asher, the outstanding Masoretic authority of the Palestinian school.

Kittel's son GERHARD (1888–1948), a New Testament scholar, edited the *Theologische Wörterbuch zum Neuen Testament* (1933 *et seq.*).

See R. Kittel's autobiographical sketch in E. Stange (ed.), *Die Religionswissenschaft der Gegenwart in Selbstdarstellungen,* vol. i, pp. 113–144 (1925), and in *Die Universität Leipzig im Jahr der Revolution, 1918–19* (1930). (Jo. H.)

KARL W. KENYON FROM NATIONAL AUDUBON SOCIETY

RED-LEGGED KITTIWAKE (RISSA BREVIROSTRIS) AND YOUNG AT NEST

KITTIWAKE, the name, on both sides of the Atlantic, for the sea gull *Rissa tridactyla,* in which the hind toe is reduced to a knob. It inhabits the North Atlantic. Kittiwakes are white, with pearl-gray mantle and black-tipped wings; the feet are yellowish and the bill black in *R. tridactyla,* which is also called the black-legged kittiwake; the bill and feet are red in *R. brevirostris,* the red-legged kittiwake, which is found in the Bering sea. A subspecies *R. t. pollicaris* inhabits the North Pacific south to Lower California. *See* also GULL.

KITWE, a town of Zambia, Africa, and the hub of the copper belt, lies 42 mi. N.W. of Ndola. Pop. (1961/63) 111,450. Bush country until 1936, Kitwe owes its rapid development to copper mining, though secondary industries have been established. It is planned on modern lines, with pleasant surroundings, an abundance of water and a power supply linked to the Kariba hydroelectric plant. From Jan. 1, 1961, most of Nkana Mine township was integrated with Kitwe, which is the main industrial and commercial centre of the region. The town is connected by rail or road to major centres of Rhodesia, Zambia, Malawi, the Republic of the Congo and South Africa. There is an airfield at Nkana-Kitwe but the nearest national airport is at Ndola.

KIVI, ALEKSIS (pseudonym of ALEKSIS STENVALL) (1834–1872), Finnish writer and the founder of the Finnish novel and drama, was born on Oct. 10, 1834, at Nurmijärvi in southern Finland. He studied the humanities at Helsinki university, and carried out his literary work under the patronage of Charlotta Lönnqvist.

In 1860 Kivi won the Finnish Literary society's competition with his tragedy *Kullervo* (revised 1864). The theme was taken from the *Kalevala* (*q.v.*) and the handling showed the influence of Shakespeare. Kivi's most famous plays are the two comedies *Nummisuutarit* (1864), the story of the unsuccessful courting of a simple-minded and gullible youth written in the spirit of Ludvig Holberg, and *Kihlaus* (1866). Of his other plays, the most successful are a historical tragedy, *Karkurit* (1867), and *Lea* (1869), based on a biblical theme. The latter inaugurated Finnish theatrical activity. Kivi's *Seitsemän veljestä* (1870; Eng. trans., *Seven Brothers,* 1929), the first novel of Finnish literature and established as a classic, contains realistic and romantic elements and plenty of humour. It describes the conflict between a band of stubborn brothers and a village community; how they take to the forests and live there as settlers, then mature and return to society. Much of the novel is in dialogue and the plot is interrupted by lyric episodes. A collection of poems, *Kanervala* (1866), which departed strongly from contemporary conventional Finnish poetry, only began to be fully appreciated almost a century later. Kivi died insane on Dec. 31, 1872, at Tuusula near Helsinki.

See V. Tarkiainen, *Aleksis Kivi* (1915; rev. ed., 1950); Lauri Viljanen, *Aleksis Kiven runomaailma* (1953). (K. L. K. L.)

KIVU, LAKE, the highest of the great lakes on the eastern border of the Republic of the Congo, lies 4,790 ft. above sea level between the Congolese province of Kivu and Rwanda. Its length is 55 mi. and its greatest width 30 mi.; it has an area of 1,042 sq.mi. and an average depth of 722 ft. (maximum 1,558 ft.). Its outflow is southward through the gorges of the Ruzizi river (where a hydroelectric plant was installed in 1958) to Lake Tanganyika about 2,300 ft. below. Lake Kivu is the most beautiful of the great African lakes because of its picturesque banks, fretted and indented in some places and steep in others, and its numerous islands, of which the largest is Idjwi along the centre. The banks are composed chiefly of volcanic matter but with some Pre-Cambrian rocks. On the west near Bukavu is the extinct volcano of Kahusi; to the northeast in the Virunga range are the active volcanoes of Nyiragongo and Nyamlagira. The shape of the lake suggests that it was formed by the drowning of valleys in a tectonic trough which probably sloped north toward Lake Edward. These valleys were blocked by volcanic matter, impounding a lake whose level was 300–450 ft. above the present one, and which flowed over the basalts of the Bukavu region into the valley of the Ruzizi, an affluent of Lake Tanganyika. This flow is geologically recent because the fauna of Lake Kivu is unlike that of Lake Tanganyika.

The surface of Lake Kivu is troubled by sudden storms. Its deep waters contain great quantities of dissolved gas, the equivalent of 57,000,000,000 cu.m. of methane produced from the anaerobic fermentation of organic matter; plans were made to exploit this. The lake contains fish and otters but no crocodiles or hippopotamuses; the shores are free from mosquitoes. The banks are densely populated and several townships have sprung up. The principal one is Bukavu (formerly Costermansville), which occupies several peninsulas at the south end and is capital of Kivu province. It is linked by launch services with Goma at the north end. Kisenyi, a settlement on the east bank, is in Rwanda. The first European to visit Lake Kivu was the German explorer Count Adolf von Götzen in 1894. (HE. NI.)

KIWANIS CLUB: *see* SERVICE CLUB.

KIWI, the name, from the shrill call of the male, for the New Zealand flightless birds of the genus *Apteryx,* forming the family Apterygidae and order Apterygiformes. Kiwis, shy, grayish-brown birds the size of a chicken, are closely related to the recently extinct moa (*q.v.*). They are odd in many respects: the rudimentary wings are not evident exteriorly; the nostrils are at

PICTORIAL PARADE

KIWI (APTERYX AUSTRALIS), WHICH, FOR ITS SIZE, LAYS THE LARGEST EGG OF ANY LIVING BIRD

the tip of the long, slender bill; the feathers, which have no aftershafts, are soft and hairlike; the foot has a backward directed toe.

Dwelling in dense forest, kiwis sleep by day in nest burrows under tree roots and forage for food (worms, insects and their larvae) by night. They can run swiftly when necessary; when brought to bay, they use the sharp claws on the feet as weapons. Kiwis apparently mate for life. The egg is, relative to the size of the bird, the largest of any living species; it measures about 3 by 5 in. and weighs more than one pound. The male incubates the egg for about 80 days, leaving the nest only for short periods.

This bird, the national emblem of New Zealand, was in danger of extinction till island sanctuaries were provided and protective legislation enacted; the several species appear now to be prospering. The common kiwi (*A. australis*), with blackish streaking, ranges over North, South and Stewart Islands; the great spotted kiwi (*A. haastii*) and little spotted kiwi (*A. owenii*), both with black barring, are found only on South Island.

KIZILBASH, a nickname meaning "redhead" given by the orthodox Turks to members of the seven Turkmen tribes who supported the founders of the Safawid dynasty in Iran, in allusion to their red caps. It was applied later to the followers of a Shi'ite sect in eastern Asia Minor. The name was given in Afghanistan to the Persian-speaking Turkmens, settled in Kabul and other cities from *c.* 1737 and engaged in government service and trade. (X.; G. E. Wr.)

KIZIL IRMAK ("Red river"; ancient Halys), the longest river of Asia Minor (about 715 mi.), rises in the Kizil Dag in north-central Turkey at an altitude of about 6,500 ft. It runs southwestward past Zara to Sivas, turns northward in a great crescent-shaped bend and flows into the Black sea between Sinop and Samsun, where it forms a large fertile delta. Its principal tributaries are the Delice, Devrez and Goksu.

The river bed is irregular, and with shallow interruptions. The volume of water carried by the river is small and subject to considerable seasonal changes; the maximum is attained during spring, when it is fed by melt water and rain, and the minimum in summer. The variations in its channel and volume make the river unsuitable for navigation. It is, however, a valuable source for the production of hydroelectricity, and a dam (1959) was built at Hirfanli, about 15 mi. N. of the Tuz Golu (lake), to provide 128,000 kw. of power. Other power and irrigation projects were under construction. (N. Tu.; S. Er.; E. Tu.)

KLABUND (pseudonym of Alfred Henschke) (1891–1928), German expressionist writer, was born at Krossen (Oder), on Nov. 4, 1891, and died on Aug. 14, 1928, at Davos, Switz. He wrote verse (*Morgenrot,* 1913, *Die Himmelsleiter,* 1916), short stories (*e.g., Klabunds Karussell,* 1914) and many novels, mainly historical, ranging from *Mohammed* (1917) to *Pjotr* (1923; Eng. trans., *Peter the Czar,* 1925). Notable among his plays is *Der Kreidekreis* (1924; Eng. trans., *The Circle of Chalk,* 1929), an expressionistic drama in an exotic, oriental setting. He also published numerous paraphrased translations, notably from eastern literatures (*e.g., Li-Tai-Pe,* 1916), and a history of German literature (1919).

See *Gesammelte Werke,* 7 vol. (1930–33); H. Grothe, *Klabund, Leben und Werk* (1933). (W. I. L.)

KLACZKO, JULIAN (1825–1906), Polish political commentator and literary critic, notable as a stylist in several languages, was born of Jewish parents in Wilno (Vilnius) on Nov. 26, 1825. Between 1842 and 1847 he studied at the University of Königsberg (Kaliningrad) and between 1847 and 1848 at Heidelberg. After being involved in the revolutionary agitation in Poznan in 1848, he settled in Paris in 1849. Between 1857 and 1861 he was co-editor of *Wiadomosci Polskie,* a Polish review; from 1862 until 1893 he wrote regularly for the *Revue des Deux Mondes.* A Francophile, an Austrophile and a Prussophobe, in two series of articles subsequently published in book form—*Études de diplomatie contemporaine* (1866) and *Les Deux Chanceliers* (Eng. trans. 1876), he warned Europe against Bismarck. In 1870, invited to Vienna as adviser by Count F. F. von Beust, he accepted the dignity of *Hofrat* but resigned it in the same year. Between 1870 and 1873 he was a member of the Galician *sejm* and of the Austrian *Reichsrat.* After 1873 he devoted himself to the study of Italian literature and art and settled in Cracow where he died on Nov. 26, 1906.

See S. Tarnowski, *Julian Klaczko,* 2 vol. (1907); H. Welschinger, "Julien Klaczko," *Revue des Deux Mondes* (Dec. 1907). (L. R. Lr.)

KLADNO, a mining centre of Central Bohemia *kraj* (region), Czech., lies 18 mi. N.W. of Prague. Pop. (1961) 51,698. The Kladno basin is hollowed in Carboniferous rocks and the coal measures have been worked since the 18th century, although active exploitation dates from the mid-19th century. The seams are thick and easily mined, but the reserves are limited and the supply of coking coal is small. The production of hard coal is about 3,000,000 tons annually. A considerable mining settlement developed in the 19th and 20th centuries from the two original forest villages of Kladno and Buschtehrad. Iron ore occurs locally, mainly at Nucice, but much is imported from the U.S.S.R. to maintain the Konev blast furnaces, rolling mill and bridgebuilding plant and the high-quality steel production of the Poldi works, both part of the United steelworks. The deficiency of local water supplies has necessitated piping for industrial purposes from the Vltava (Moldau) and for domestic use from the reservoir on the Klicava. The town has a main rail link with Prague. (H. G. S.)

KLAFSKY, KATHARINA (1855–1896), Hungarian dramatic soprano known for her interpretations of Wagnerian roles. Born at St. János, near Moson, Sept. 19, 1855, she was a chorus singer in Vienna in 1874 and later studied with Mathilde Marchesi. She sang the part of Brangäne in the first Leipzig performance of *Tristan* (1882), and from 1886 to 1895 established herself at Hamburg as one of the greatest singers in Germany. Besides her Wagnerian roles she was known for her renderings of Donna Anna, Fidelio and Norma. She died at Hamburg, Sept. 22, 1896. Her nephew, Anton Maria Klafsky (b. 1877), wrote religious and orchestral works and edited the masses of Michael Haydn.

See L. Ordemann, *Aus dem Leben und Wirken von Katherina Klafsky* (1903).

KLAGENFURT, the capital of the *Bundesland* of Carinthia (Kärnten), Austria, lies in a basin near the eastern end of the Wörthersee and north of the Karawanken range. Pop. (1961) 69,218. The centre of the attractive and tree-shaded town is New square with the dragon monument (1590) and the town hall. In spite of destruction by fires from the 16th to the 18th centuries, some old buildings have been preserved in Herrengasse and around Old square (the old town centre), notably the 16th century *Landhaus,* where the Carinthian diet still sits, with its arcaded courtyard and armorial hall. The principal churches are the Dome and the parish church (baroque interior). The Carinthia local government building stands in a park with the museum containing antiquities and natural history and art collections. There are modern primary, secondary and technical schools, public gardens and an extensive natural park, the Kreuzbergl. The proximity of the Wörthersee, with municipal swimming baths and passenger boats, has made Klagenfurt a tourist centre. The town has good communications: trunk roads, mainline railway and an airport. Industries are various and include iron and woodworking plants, and the manufacture of white lead, matches, leather, shoes, alcohol and confectionery. (Eh. Rr.)

KLAIPEDA (Memel), chief port of the Lithuanian Soviet Socialist Republic of the U.S.S.R., is situated on the bank of the sound through which the Kurisches Haff and the Nemunas (Neman) river connect with the Baltic. Pop. (1959) 89,923.

In the 12th century the Teutonic knights erected a stronghold at the mouth of the river. In the 13th century the Germans established a foothold there and the town (Memelburg) became an outpost of the German drive to the east. The town and the surrounding Memel territory belonged to East Prussia while the hinterland was part of the Russian empire, but having a large Lithuanian population the whole area was assigned to Lithuania after World War I. Under Lithuanian sovereignty Klaipeda, an insignificant fishing port, expanded into a prosperous city and its ice-free port handled about 90% of the country's foreign trade. It became a centre for the timber industry (plywood and cellulose). There are textile and fertilizer plants and food processing is important.

KLAJ (Latinized CLAJUS), **JOHANN** (1616–1656), German poet, who helped to make Nürnberg one of the centres of German literature during the middle of the 17th century, was born at Meissen, Saxony. He studied theology at Wittenberg, and then went to Nürnberg where, with Georg Philipp Harsdörfer, he founded in 1644 the literary society known as the Pegnitz order. He taught at Nürnberg, and in 1650 went as teacher and preacher to Kitzingen, where he died in 1656. He specialized in pastoral poetry, often distinguished by its ingenious sound effects, and wrote, jointly with Harsdörfer, the *Pegnesische Schäfergedicht* (1644) and the *Fortsetzung der Pegnitzschäferey* (1645). He also specialized in religious oratorios and mystery plays, such as *Die Auferstehung Jesu Christi* (1644), *Freudengedicht auf die Geburt Christi* (1645), *Trauerspiel vom leidenden Christus* (1645) and *Herodes* (1645).

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KLAMATH MOUNTAINS, a compact rugged region, lying between the ocean and the Cascade mountains in southwestern Oregon and northwestern California. Underlain by a variety of rock types, sandstone, shale, marble, lava and granite, the region has been deeply dissected by the Rogue and Klamath rivers and by many smaller streams. The highest peaks and ridges reach 9,000 ft.; a number of alluvial valley floors are cultivated. Rainfall varies from 20 to 100 in. Most of the land is forested with Douglas fir, pine, redwood and cedar, the basis of an extensive lumber industry, and also hardwoods, oak and madroña. Brush is common on cutover slopes. (S. N. D.)

KLAMATH RIVER, rising in Lake Ewauna near Klamath Falls, Ore., U.S., flows southwesterly 250 mi. to the Pacific ocean at Requa, Calif. Estimated mean seasonal natural flow is 12,473,000 ac.-ft., from a watershed of 15,900 sq.mi. The river is important for irrigation and hydroelectric generation.

The upstream basin section, above Keno, is characterized by broad valleys, great swamps, dry deserts and extensive irrigation developments. With its national wildlife refuges it is one of the most important wildlife nurseries in the nation. Upper Klamath Lake, terminus of Williamson river, feeds Lake Ewauna through one-mile long Link river. Lower Klamath Lake, dried up when its Klamath river connection was closed in 1917, has been developed as a wildlife refuge and for agricultural uses.

The downstream section, characterized by well-forested, mountainous terrain, contains the principal tributary streams: the Shasta, Scott, Salmon and Trinity rivers. (G. V. SK.)

KLAPKA, GYÖRGY (1820–1892), Hungarian army officer, one of the leaders in the revolutionary war of 1848–49, was born at Temesvár (Timişoara), then in Hungary, on April 7, 1820. He entered the Austrian army in 1838, but on the formation of a Hungarian national force in the spring of 1848 at once joined it (*see* HUNGARY: *History*). His energy and ability won him rapid promotion. He received command of a corps on Jan. 12, 1849, and was made a full general on April 6. He was the most brilliant and reliable of Gen. Arthur Görgey's subordinates, taking a conspicuous part in the famous spring offensive of 1849. In the late spring and summer of that year he commanded a force of 20,000 men, based on the fortress of Komárom (Komarno), whence he carried out a series of operations which greatly hampered the Austrian armies. He was not involved in the capitulation of Világos and held Komárom until Sept. 27, when he surrendered on honourable terms. Thereafter he lived in exile for many years, at first in England and later chiefly in Switzerland, working for Hungarian independence, especially when the European situation seemed favourable, as in 1854, 1859 and 1866. In 1866, as a Prussian major general, he organized a Hungarian corps in Silesia. Then he changed his views, was allowed to return to Hungary and entered parliament as a supporter of the Austro-Hungarian Compromise. In 1877 he was employed on reorganizing the Turkish army in view of the approaching war with Russia. He died in Budapest on May 17, 1892.

Klapka wrote his *Memoiren* (1850); *Der Nationalkrieg in Ungarn,* two volumes (1851); *Der Krieg im Orient* (1855), a history of the Crimean War; and further memoirs, *Aus meinen Erinnerungen* (1887). His recollections are not always consistent. (C. A. M.)

KLAPROTH, HEINRICH JULIUS (1783–1835), German orientalist and traveler, whose work formed a new departure for the classification of the eastern languages, especially those of the Russian empire, was born in Berlin on Oct. 11, 1783, the son of the chemist Martin Heinrich Klaproth (*q.v.*). He received an appointment in the St. Petersburg academy, and in 1805 accompanied Count Golovkin on an embassy to China. On his return he was dispatched by the academy to the Caucasus on an ethnographical and linguistic exploration (1807–08), and was afterward employed for several years in connection with the academy's oriental publications. In 1812 he moved to Berlin; but in 1815 he settled in Paris, and in 1816 Wilhelm von Humboldt procured for him from the king of Prussia the title and salary of professor of Asiatic languages and literature, with permission to remain in Paris as long as was requisite for the publication of his works. He died in that city on Aug. 28, 1835. Klaproth's great work *Asia polyglotta* (1823 and 1831, with *Sprachatlas*), though later superseded, was a résumé of all that was known on the subject.

KLAPROTH, MARTIN HEINRICH (1743–1817), German chemist who discovered the elements uranium, zirconium and cerium, was born at Wernigerode on Dec. 1, 1743. During a large portion of his life he followed the profession of an apothecary, and from 1782 he was pharmaceutical assessor of the Ober-Collegium Medicum in Berlin. In 1792 he was appointed lecturer in chemistry to the Artillerieschule, and when the University of Berlin was founded (in 1810) he was selected to be the professor of chemistry. He died in Berlin on Jan. 1, 1817. Klaproth was the leading chemist of his time in Germany. He was an exact and conscientious worker and did much to improve and systematize the processes of analytical chemistry and mineralogy; his appreciation of the value of quantitative methods led him to become one of the earliest adherents of Lavoisier's antiphlogistic doctrines outside France. He was the first to describe uranium (1789), zirconium (1789) and cerium (1803) and to characterize them as distinct elements though he did not obtain any of them in the pure metallic state. He rediscovered titanium (*q.v.*) about five years after William Gregor's prior discovery of it (1791) and was responsible for its name. He elucidated the composition of numerous substances, including compounds of tellurium, strontium, beryllium and chromium. His papers, over 200 in number, were collected by himself in *Beiträge zur chemischen Kenntnis der Mineralkörper* (1793–1810) and *Chemische Abhandlungen gemischten Inhalts* (1815). He also published a chemical dictionary (5 vol., with F. Wolfe, 1807–10; supplement, 4 vol., 1815–19) and edited a revised edition of F. A. C. Gren's *Handbuch der Chemie* (1806).

See G. Bugge, *Buch der grossen Chemiker* (1955).

KLÉBER, JEAN BAPTISTE (1753–1800), French general of the Revolutionary Wars, especially notable for his part in suppressing the revolt of the Vendée and in the Egyptian campaign, was born on March 9, 1753, at Strasbourg in Alsace, the son of a builder. From 1776 to 1782 he was an officer in the Austrian service. Then he returned to France and practised as an architect until after the outbreak of the Revolution. In 1792 he commanded a battalion of Alsace volunteers. His exploits in the defense of Mainz before its capitulation in July 1793 made him the obvious choice to command the garrison against the rebels in the Vendée, and he was made general on Aug. 17. With his nucleus of solid troops he fought for two months under the sans-culotte generals whom he despised; then the command passed to the young general F. S. Marceau, whom he dominated, and they destroyed the Vendean "grand army" at Savenay, near Nantes, on Dec. 23, 1793.

On April 28, 1794, Lazare Carnot sent Kléber to the army of the North. He commanded J. B. Jourdan's left wing at the battle of Fleurus (June 26); and the assurance with which he swept through Belgium and conducted the siege of Maastricht (Sept.–Nov.) with nearly 100,000 men under him won him a recommendation for a command in chief; but his caustic tone, a certain reluctance to be responsible and bad health kept him back. In June 1795 he had a corps for the siege of Mainz; and when Jourdan had

to order retreat, he showed great firmness in recrossing the Rhine. With Jourdan's left wing he forced the line of the Lahn river in April 1796 and brought the army as far as Bamberg; but though he liked Jourdan he would not accept his orders in the retreat and resigned rather than make the counterattack at Würzburg (September).

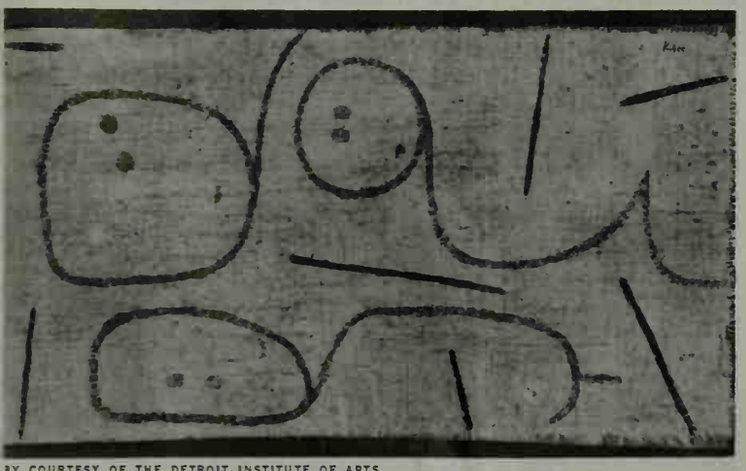
Throughout 1797 Kléber was in retirement. In April 1798 he had a division in Napoleon Bonaparte's Egyptian expedition, which from the first he regarded as "sketchily planned" and "extravagant." A wound at the capture of Alexandria in July kept him there as governor; but in Feb. 1799 he led his division in the Syrian campaign. He covered the siege of Acre and defeated the Turks at Mount Tabor (April 16). Bonaparte left Egypt without a word of consultation other than the letter of Aug. 22 which gave Kléber the command in chief, though he was not the senior general. Kléber prepared for evacuation and thought that this was secured by the convention of El Arish (Jan. 27, 1800), but the British admiral Lord Keith (George Keith Elphinstone) and the Turkish grand vizier repudiated this in March. Kléber left Cairo with 15,000 men, defeated twice that number of Turks at Heliopolis on March 20 and in a fierce siege recaptured Cairo on April 21. He was turning with the same energy to the administration of Egypt when he was murdered by a fanatic at Cairo on June 14, 1800.

(I. D. E.)

KLEBS, EDWIN (1834–1913), German physician and one of the pioneers of bacteriology, was born at Königsberg on Feb. 6, 1834. He became assistant to Rudolf Virchow at the Pathological institute, Berlin (1861–66), and subsequently professor of pathological anatomy at Bern (1866), Würzburg (1871), Prague (1873), Zürich (1882) and Chicago (Rush Medical college, 1896).

F. H. Garrison (*History of Medicine*) calls him "with Pasteur perhaps the most important precursor in the bacterial theory of infection." Klebs discovered with Friedrich Löffler (*q.v.*) the diphtheria bacillus. He preceded Robert Koch in studying the bacteriology of traumatic infections, basing his researches on cases which occurred in the Franco-German War. In 1876 he succeeded in producing endocarditis by mechanical means combined with general infection. In 1878 he successfully transmitted syphilis to monkeys, in this work antedating the experiments of Elie Metchnikoff and P. P. E. Roux by 25 years. He performed a series of researches on tuberculosis and was able to produce bovine infection by means of milk. He also studied malaria, hemorrhagic pancreatitis and gigantism. Klebs died at Bern, Switz., on Oct. 23, 1913. Apart from monographs and articles, his most important works are a handbook of pathological anatomy (1869–76) and a treatise on general pathology (1887–89). (S. Jo.)

KLEE, PAUL (1879–1940), Swiss modernist painter, one of the most inventive and influential artists of the 20th century, was born on Dec. 18, 1879, in Münchenbuchsee, near Bern, his father being German and his mother Swiss. He studied at the Munich academy. After some works in the field of printing and design (including illustrations for Voltaire's *Candide* in 1911), he turned in 1914, on a visit to Tunisia, to colour—first to water colour and after 1918 also to oil painting. He attempted in his pictures to bring the roots of things and their place in the cosmic scheme into an ultimate unity; at the same time he invented his own pictorial means for representing them. In the course of his creations, Klee developed about 30 "schemes," in which he communicated his projects. Classical themes arise from figurations of crossed parallels, flying bodies from tensed surfaces, and light from coloured "dotted seeds." Association leads to a poetic-musical presentation. Klee was also an accomplished musician, and much of his system of form is built up like musical form. From 1911 he belonged to the *Blaue Reiter* group in Munich. From 1921 to 1931 he taught at the Bauhaus in Weimar and Dessau and from 1931 to 1933 at the Düsseldorf academy. Then he returned to Bern, dying at Muralto, near Locarno, on June 29, 1940.



BY COURTESY OF THE DETROIT INSTITUTE OF ARTS

"LYING DOWN," BY PAUL KLEE. OIL ON CANVAS, NOT DATED, BUT PAINTED IN HIS STYLE OF 1936–37. IN THE DETROIT INSTITUTE OF ARTS

Klee's work is widely represented in galleries of modern art throughout the world. His publications include: *Pädagogisches Skizzenbuch* (1925; trans. as *Pedagogical Sketchbook*, 1953); *Das bildnerische Denken* ("Creative Thought," 1956); and *Tagebücher* ("Diaries," 1957). Including unknown works discovered by Felix Klee, the catalogue of Klee's works—paintings, gouaches, drawings, graphics and sculptures—is 9,146 (of which 4,966 are drawings).

See Handzeichnungen von Paul Klee, ed. by W. Grohmann, vol. 1 (1959); W. Haftmann, *The Mind and Work of Paul Klee* (1950); W. Grohmann, *Paul Klee* (1954). (W. Gn.)

KLEIBER, ERICH (1890–1956), Austrian conductor who performed many 20th-century works but was especially known for his performances of Mozart, Beethoven, Wagner and Strauss, was born at Vienna, Aug. 5, 1890. He studied at Prague and between 1912 and 1922 held posts as conductor in several German opera houses. In 1923 he was appointed general music director of the Berlin state opera and gave the first performance of Alban Berg's *Wozzeck* there in 1925. In 1935 he left Germany and conducted German opera at the Teatro Colón, Buenos Aires (1936–49). During this period he also conducted in Mexico, Cuba, New York (1930–31) and at Covent Garden, London (1938 and 1950). His compositions include concertos for piano and violin, orchestral and chamber works and songs. He died at Zürich on Jan. 27, 1956.

See J. Russell, *Erich Kleiber* (1957).

KLEIN, (CHRISTIAN) FELIX (1849–1925), German mathematician who was one of the most powerful influences on mathematics during his own lifetime and whose panoramic view of geometry, known as the "Erlangen program," profoundly influenced mathematical development. He was born at Düsseldorf, on Nov. 25, 1849. After studies at Bonn, Göttingen and Berlin, he became professor of mathematics at the University of Erlangen (1872–75), where his inaugural lecture set forth the views contained in the program. He then taught at Munich, and was professor at the universities of Leipzig (1880–86) and Göttingen (1886–1913). Klein was editor of the *Mathematische Annalen* of Göttingen from 1872, and in 1895 founded the great mathematical *Encyklopädie*, which he continued to supervise. He wrote much and traveled a good deal, lecturing as far afield as the United States. He died at Göttingen on June 22, 1925.

Klein's works on elementary mathematics reached a wide public. Of his more technical writings, *Lectures on the Icosahedron* (2nd ed., rev. 1914, Eng. trans. by G. G. Morrice) are still stimulating reading, and *Vorlesungen über die Theorie der automorphen Functionen* (with R. Fricke, vol. i, 1897, vol. ii, 1902) is perhaps the most important. (L. R.)

KLEIST, EWALD CHRISTIAN VON (1715–1759), German lyric poet, best known for his poem *Der Frühling*. He was born on March 7, 1715, in Zeblin, Pomerania, was brought up by Jesuits and studied law and mathematics at the University of Königsberg. In 1736 he became an officer in the Danish army, in 1740 transferring to the Prussian service. Kleist's military duties gave him the chance to make friendships important for his literary development. In Potsdam he met J. W. L. Gleim and K. W. Ramler and later, in Berlin, C. F. Nicolai. In 1752 he toured Switzerland as recruiting officer to Frederick the Great, meeting J. J. Bodmer and J. J. Breitinger. When the Seven Years' War broke out he rejoined his regiment (he became a major in

1757) and in Leipzig became a close friend of G. E. Lessing. Kleist was fatally wounded in the battle of Kunersdorf and died at Frankfurt an der Oder on Aug. 24, 1759.

As a poet Kleist was inspired by Gleim (*q.v.*) and the anacreontic poets as well as by A. von Haller's nature poetry. *Der Frühling* (1749), written in hexameters, was influenced by James Thomson's *Seasons* and Klopstock's *Messias,* but shows the vivid imagery and feeling for nature characteristic of Kleist's poetry as a whole. He published collections of poems in 1749, 1756 and 1758.

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(K. GE.)

KLEIST, (BERND) HEINRICH (WILHELM) VON (1777–1811), German dramatist and narrative writer of markedly individual creative power. His daemonic genius attached itself neither to the classical nor to the romantic school and he remained a controversial figure whose work first won full recognition during the 20th century. He was born in Frankfurt an der Oder on Oct. 18, 1777. Following family tradition, he entered the Prussian army in 1792 and fought in the Rhine campaign, leaving the service after "the loss of seven valuable years." For a time he studied science and mathematics at the university in his home town, where he became engaged to a general's daughter, Wilhelmine von Zenge. His reading of Kant destroyed his faith in the value of knowledge, however, and in 1801 he fled to Paris and then to Switzerland, where he proposed to become a farmer and where he broke his engagement. Here he wrote his first plays: the Shakespearean tragedy *Die Familie Ghonorez* (published anonymously in Bern in 1803 as *Die Familie Schroffenstein*), the unfinished tragedy *Robert Guiskard, Herzog der Normänner* (printed 1808) and the superb comedy *Der zerbrochne Krug,* which was finished in 1805 and unsuccessfully produced by Goethe in Weimar in 1808.

During the winter of 1802–03 he stayed with Christoph Martin Wieland, who responded with enthusiasm to *Robert Guiskard,* seeing united in it the "spirits of Aeschylus, Sophocles and Shakespeare." He then set out on a new journey and in Paris, in an attack of frantic despair, burned all his manuscripts and tried to volunteer for the French army. Expelled from France by the German ambassador, he applied for a civil service post in Königsberg. He resigned during training, however, and after the collapse of Prussia in 1806 set out for Dresden, where he hoped to continue writing, but was arrested by the French and imprisoned for six months in France as a suspected spy. In Dresden (Sept. 1807–April 1809) he was accepted into a large circle of writers, painters and patrons and, together with the political philosopher Adam Müller, published a distinguished periodical, *Phöbus,* in which some of his own work appeared. While he was still in prison his comedy *Amphitryon* (loosely based on Molière) had attracted attention and he now (1808) published *Penthesilea* (Eng. trans., 1959), a tragedy inspired by the Dionysian side of Greek drama. Toward the end of 1808, kindled by a threatened rising against Napoleon, he wrote some savage war poems and a political play, *Die Hermannsschlacht,* and in the next year attempted to found in Prague a political periodical, *Germania,* which was to call the whole of Germany to arms. In the autumn of 1809 he returned to Berlin. His romantic drama of chivalry, *Das Käthchen von Heilbronn* (Eng. trans. in *Fiction and Fancy of German Romance,* 1927) was performed in Vienna, Graz and Bamberg (1810–11) but the Berlin stage under A. W. Iffland, manager from 1798, remained closed to him. For six months (Oct. 1810–March 1811) he edited the daily *Berliner Abendblätter,* which he filled with polished anecdotes and essays. He also published eight masterly stories (2 volumes, 1810–11; Eng. trans., with preface by Thomas Mann, 1960), of which *Michael Kohlhaas* and *Die Marquise von O. . .* became world-famous. But Kleist felt himself to be primarily a dramatist. When the *Abendblätter* ceased publication he lost his last means of livelihood. Disappointed in his own life and embittered by his contemporaries' lack of understanding, he came to know an incurably sick woman, Henriette Vogel, who begged him to kill her. This gave Kleist, in whom the spell of death had always been strong, the final incentive to put an end to his own life and on Nov. 21, 1811, he shot Henriette and himself on the bank of the Wannsee, near Potsdam.

Kleist had given his last masterpiece, *Der Prinz von Homburg,* to Princess Marianne of Prussia, who for a long time tried to prevent its publication or performance, since it showed her ancestor in fear of death. The play was therefore published as late as 1821 by Johann Ludwig Tieck (Eng. trans., 1959), together with the *Hermannsschlacht.* Tieck also published Kleist's collected works in 1826. Since then his reputation has grown steadily. The poets of the Realist, Expressionist, Nationalist and Existentialist movements all saw in him—his ruthless honesty, his burning feeling for reality, his psychological vision and the immediacy of his sense of being—their prototype; and in both Germany and France he came to be accounted as a poet who anticipated many modern problems in life and literature.

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KLEMM, GUSTAV FRIEDRICH (1802–1867), German anthropologist and man of letters, whose principal contribution was to the development of the concept of culture, was born in Chemnitz, Saxony, on Nov. 12, 1802, but spent most of his life in Dresden, where he was in charge of the royal library. He wrote several books on folklore and travel and a six-volume work, *Die Frauen* ("Women," 1854–59). In *Allgemeine Kulturgeschichte der Menschheit* ("General Culture History of Mankind," 10 vol., 1843–52), he undertook to write the history of mankind in terms of social organization, technology and beliefs. His *Allgemeine Kulturwissenschaft* ("General Science of Culture," 2 vol., 1854–55) was a description of "the material bases of human culture." E. B. Tylor undoubtedly was much influenced by Klemm in establishing culture as a basic concept of anthropology. Klemm distinguished three stages of cultural evolution: savagery, domestication and freedom. He divided mankind into active and passive races and believed that peoples differ in mentality and temperament. He died during the night of Aug. 25–26, 1867, in Dresden.

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(LE. A. W.)

KLEMPERER, OTTO (1885–), German conductor, was born at Breslau, May 14, 1885. He studied at Frankfurt and Berlin and at the recommendation of Gustav Mahler became conductor of the German national theatre at Prague in 1907. Between 1910 and 1924 he conducted opera at Hamburg, Barmen, Strasburg, Cologne and Wiesbaden. In 1925 he first appeared in New York city and in 1928 was appointed director of the Kroll opera house in Berlin, where he gave works of Hindemith, Krenek and Stravinsky. He was conductor of the Los Angeles Philharmonic orchestra (1933–39) and of the Budapest opera (1947–50). In his later years he became especially known for his interpretations of the symphonies of Beethoven and Mahler. His compositions include choral works and songs.

KLERKSDORP, a town in the Transvaal, Republic of South Africa, is located on the Schoonspruit near its mouth on the Vaal river at an altitude of 4,347 ft. Pop. (1960) 43,067, including 19,017 Europeans. It is 102 mi. from Johannesburg and on the main railway line and national road to Cape Town. The town has a regional library, schools, a technical college, a convent and a hospital with a nurses' training college. It is an important gold mining and uranium centre and has several big industries, which include milling, manufacture of breakfast cereals and soft drinks, mining engineering concerns and timberyards. It is also an agricultural centre with weekly stock fairs.

The old village, on the right bank of the Schoonspruit, was founded in 1837, the first Boer settlement in the Transvaal. The modern town on the opposite bank dates from 1888. (E. JO.)

KLESL (KHLESL), **MELCHIOR** (1552–1630), Austrian cardinal and statesman who tried to promote a tolerant religious policy during the Counter Reformation, was born in Vienna on Feb. 19, 1552, the son of a Protestant baker. Converted to Roman Catholicism by the Jesuits, he became an outstanding preacher and was appointed counsel to the bishop of Passau in 1580 and administrator of the bishopric of Wienerneustadt in 1588. He resisted the advance of Protestantism in Austria and acted as bishop of Vienna in the 1590s. From 1599 he devoted himself to serving the archduke Matthias, whose most trusted adviser he eventually became. He helped to procure Matthias' election as Holy Roman emperor and was appointed director of the privy council in 1612. He was made a cardinal secretly in 1615 and publicly in 1616. In the empire he hoped to reconcile the religious parties by means of "compositions," or reciprocal concessions. He failed because of the opposition of the Catholic princes and the archdukes Maximilian and Ferdinand (afterward emperor as Ferdinand II), who resented his conciliatory attitude. When Klesl recommended concessions to the Bohemian Protestant rebels, he was seized by the archdukes on July 20, 1618, and imprisoned at Ambras in Tirol. Pope Gregory XV secured his transfer to Rome in 1622. Ferdinand II allowed him to return to Vienna in 1627 and restored to him most of the fortune that he had made in the imperial service. Klesl then performed his episcopal duties in Vienna until his death on Sept. 18, 1630.

See A. Kerschbaumer, *Kardinal Klesl,* 2nd ed. (1905). (H. J. Co.)

KLEVE: *see* CLEVES.

KLIMT, GUSTAV (1862–1918), Austrian painter, a founder and president of the Vienna "Secession," was born in Vienna on July 14, 1862. His work, on which early Expressionism in Austria was based, shows development from the naturalism of the late 19th century. Klimt formed his specific style after the founding in 1897 of the Vienna "Secession" (the *Jugendstil* or *Art Nouveau* group who reacted against traditionalism). Previously he had painted in an illustrative style both naturalistic and academic, the principal works of this period being the murals in the Vienna Burgtheater (1888) and on the staircase of the Kunsthistorisches museum. Klimt continued to paint murals and achieved a new style. His monumental murals are the allegories for the University of Vienna, "Philosophy" (1900), "Medicine" (1901) and "Jurisprudence" (1903); the Beethoven frieze; and wall decoration in the dining room of the Stoclet house in Brussels (1909–11). This monumental style recognized the importance of the flat surface and with this an ornamental character in representation. Both these aspects are characteristic of Klimt's art. The human figure and the landscape are treated in silhouette form without shadow, several of the principal works of this type being in the Österreichische Galerie in Vienna: "The Kiss" (1908); "Portrait of Frau Fritza Riedler" (1906); "Portrait of Frau Adele Bloch-Bauer" (1907); "Upper-Austrian Farmhouse" (*c.* 1908). Nevertheless, Klimt's painting, in particular his portraits, retains considerable realism, especially prominent in his pencil drawings, in spite of their refined, abbreviated style of drawing. Klimt died in Vienna on Feb. 6, 1918.

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KLING (TLING) in Malaya and Indonesia denotes south Indians (Tamil, Telugu or Malayali). The word derives from the old city of Kalinga on the Coromandel coast of India, once an important centre of trade with Malaysia (*see* TAMIL).

Kling merchants, proverbially industrious and astute, were numerous in Achin, Sumatra and at Malacca and other ports by the 15th century. They brought Islam with them and by intermarriage fathered a hybrid Indo-Malay stock (the *Jawi Pekan*). By the 1920s the Kling element in Malaya had been augmented by south-Indian labourers for plantations and public services and by a professional and white-collar class, both predominantly Hindu.

In Malay usage "Kling" carried associations of disparagement from the start. It ceased to be polite in English and was replaced by "Tamil" early in the 20th century. The same trend is discernible in written but not in colloquial Malay. *See* also MALAYSIA: *History.* (Jo. M. G.)

KLINGER, FRIEDRICH MAXIMILIAN VON (1752–1831), German dramatist and novelist, is remembered as a representative of the *Sturm und Drang* (*see* GERMAN LITERATURE), which took its name from the title of one of his plays (1777). He was born of poor parents at Frankfurt am Main on Feb. 17, 1752, early orphaned and enabled to study only through the generosity of a patron. Goethe, who knew him from childhood, befriended him. With high-spirited recklessness he revolted against routine and circumstances, and seems the very embodiment of the *Sturm und Drang* in its simpler interpretation. His numerous plays, all written at great speed and in the fury of "inspiration," mostly are built round a hero of great power or potentiality, a man of action and a great lover, but are lacking in psychological depth and in dramatic form (*Die neue Arria,* 1776, and *Simsone Grisaldo,* 1776). The best of them, *Die Zwillinge* (1776), is a somewhat rhetorical expression of frustration and was felt to embody the revolt against society characteristic of the young generation. The influence of Rousseau is particularly strong in *Das leidende Weib* (1775), and many scenes and incidents in the early plays are borrowed from Shakespeare.

In 1776 he was appointed "theatre-poet" to an itinerant troupe of actors, but he was already hoping to find in military service an outlet for "the inward struggle of energies and activity against the frontiers imposed on men by the gods." After a short period in Austrian service he went to St. Petersburg in 1780, took a commission and rapidly rose to high rank. He married a natural daughter of the empress Catherine, became a general and filled several posts of importance—from 1803 to 1817 he was curator of the university of Dorpat. He died at Dorpat on Feb. 25, 1831.

After going to Russia Klinger still wrote a great deal. Two tragedies on the Medea theme (1786 and 1790) were followed by a number of philosophical romances, among which are *Fausts Leben, Taten und Höllenfahrt* (1791), *Geschichte Giafars des Barmeciden* (1792), and *Geschichte eines Teutschen der neusten Zeit* (1798). Although the violence of his youth was now past, the novels still express a Rousseauan longing for simplicity and idyllic nature. His *Betrachtungen und Gedanken* (1803–05) express the same philosophy.

BIBLIOGRAPHY.—Klinger's works were published in 12 vol. (1809–15). His *Dramatische Jugendwerke,* 3 vol., appeared in 1912–13 and selections in *Sturm und Drang,* 2 vol. (1959). *See* also M. Rieger, *Klinger in der Sturm- und Drangperiode* (1880), *Klinger in seiner Reife* (1896); R. Pascal, *The German Sturm und Drang* (1953). (Ro. P.)

KLINGER, MAX (1857–1920), German allegorical painter, etcher and sculptor, was born at Leipzig on Feb. 18, 1857. He attended the classes at the Carlsruhe art school in 1874, and went in the following year to Berlin, where in 1878 he created a sensation at the academy exhibition with two series of pen-and-ink drawings—the "Series Upon the Theme of Christ" and "Fantasies Upon the Finding of a Glove." The daring originality of these imaginative and eccentric works caused an outburst of indignation; nevertheless the "Glove" series was bought by the Berlin National gallery. From 1883 to 1886 he studied in Paris and then visited Italy. In 1893 he settled at Leipzig.

His painting of "The Judgment of Paris" caused another storm of protest in 1887, because of its rejection of all conventional attributes and the naïve directness of the conception. His vivid and somewhat morbid imagination, with its leaning toward the gruesome and disagreeable, and the Goyaesque turn of his mind found their best expression in his "cycles" of etchings: "Deliverances of Sacrificial Victims Told in Ovid," "A Brahms Fantasy," "Eve and the Future," "A Life" and "Of Death"; but in his use of the needle he did not aim at the technical excellence of the great masters; it supplied him merely with means of expressing his ideas.

After 1886 Klinger devoted himself more exclusively to painting and sculpture. In his painting he aimed neither at classic beauty nor modern truth, but at grim impressiveness not without a touch of mysticism. His "Pietà" and "Christ in Olympus" are characteristic examples of his art. In sculpture he favoured the use of

varicoloured materials in the manner of the Greek chryselephantine sculpture. His "Beethoven" (1902) is a notable instance of his work in this direction; others include "Salome" and "Cassandra." His last enterprise was a colossal monument to Richard Wagner, which remained unfinished at his death in Leipzig on July 5, 1920.

KLINT, KAARE (1888–), Danish architect, who built the Grundtvig church in Copenhagen, was born at Copenhagen on Dec. 15, 1888. He maintained that it was necessary to acknowledge the present and not falsely endeavour to re-create the past. His work, however, owed something to Danish Gothic. He completed a church and a Y.M.C.A. building at Odense in 1921 and 1923 respectively; the magnificent Grundtvig Memorial church was completed in 1926.

See Kay Fisker and F. R. Yerbury, *Modern Danish Architecture* (1927).

KLIPSPRINGER (*Oreotragus oreotragus*), the little "African chamois," ranges from the Cape to Ethiopia and Nigeria. Its blunt hoofs, touching the ground only at the tips, are specialized for escape among precarious rocks and scrub thickets. The gold-spangled pelage baffles predators by pulling away in patches, but it soon regenerates. *See* ANTELOPE: *The Bovidae: Subfamily Antilopinae.* (H. K. B.)

KLODZKO (Ger. GLATZ), a town in southwest Poland, capital of a district in the Wroclaw (Breslau) *wojewodztwo* (province), lies in the Sudeten mountains in the centre of the Klodzko basin and on both sides of the western Neisse river, 81 km. (50 mi.) S.S.W. of Wroclaw. Pop. (1960) 23,000. The railway lines along the old routes linking Silesia with Czechoslovakia meet at Klodzko. Its border position meant that the town was for long an object of dispute between Bohemia and Polish Silesia. Between the 11th and the 13th centuries it changed hands many times until, in 1327, it was included in the duchy of Wroclaw, which was made subject to the Bohemian crown. From then on the town shared the fate of Silesia, passing from the Habsburgs to the Prussians in 1742. It returned to Poland in 1945.

Klodzko is situated in a picturesque position on the slopes of a valley and, since it contains a number of interesting old buildings, is a well-known tourist centre and starting point for visits to the Klodzko countryside. It is also a centre of the metallurgical, food, leather, textile and timber industries. (T. K. W.)

KLONDIKE, a district in Yukon Territory, northwestern Canada, bordering Alaska, to the west. The limits are rather indefinite, but the district includes the country to the south of the Klondike river, which comes into the Yukon from the east and has several tributaries, as well as the Indian river, a second branch of the Yukon, flowing into it some distance above the Klondike. Rich gold-bearing gravels were found along the creeks tributary to these two rivers within an area of about 800 sq.mi. Exceptionally rich gravel was discovered on Bonanza Creek in 1896, and a wild rush to this almost inaccessible region followed, a population of 30,000 coming in within the next three or four years with a rapidly increasing output of gold, reaching in 1900 a peak of $22,000,000. Thereafter the production steadily declined, until in 1906 it fell to $5,600,000. By 1910, most of the population had left the Klondike for Alaska and other regions; so that Dawson (*q.v.*), which for a time was a bustling city of more than 10,000, dwindled to fewer than 1,000.

Gold production continued into the second half of the 20th century. As the ground was almost all frozen, the mines were worked by a thawing process, first by setting fires, afterward by using steam, new methods being introduced to meet the unusual conditions. Later dredges and hydraulic mining were resorted to with success. The silver-lead ores of Keno and Galena hills, in the Mayo district, have assumed much importance. *See* also YUKON TERRITORY.

KLOOS, WILLEM JOHAN THEODOR (1859–1938), Dutch poet and critic and a master of the sonnet form, was born at Amsterdam on May 6, 1859. He studied classical literature for some time at Amsterdam, but gave up his studies in order to share the bohemian existence of some of his contemporaries, who included writers and painters. Kloos strongly attacked the bourgeois and conventional Dutch poetry of the 19th century, contrasting it with the work of Shelley and Keats, which was little known in Holland at the time. As one of the founders of the magazine *De Nieuwe Gids* (1885–1943), Kloos fought for more modern ideas and condemned the use of conventional poetic language and metaphors. He defined art as "the most individualistic expression of the most individualistic emotion."

His best poetry, collected in *Verzen* (1894), dates from his youth. As a result of great inner tensions and heavy drinking, he collapsed and had to enter a psychiatric clinic. He recovered, but wrote nothing which could compare with the work of his earlier years. He died at The Hague on March 31, 1938.

See K. H. de Raaf, *Willem Kloos* (1934); G. H. 's Gravesande, *De geschiedenis van de Nieuwe Gids* (1955). (GD. W. HS.)

KLOPSTOCK, FRIEDRICH GOTTLIEB (1724–1803), German poet, whose epic *Der Messias* gave a new dynamic thrust to German poetry which broke the ground for a great creative period. He was born in Quedlinburg, Saxony, on July 2, 1724, the eldest son of a prosperous and serious-minded lawyer. He passed a happy and healthy childhood both in Quedlinburg and in Friedeburg, the estate which his father rented on the Saale, where he learned to be an excellent horseman and skater. In 1739 he was sent to the famous classical school of Schulpforta (near Naumburg), where he became adept at writing Greek and Latin verses and began to compose German odes and idylls. It was while he was still a schoolboy that he drafted the plan for the epic that was to make him famous. His original idea was to write a national and historical epic, the hero of which was to be the emperor Henry I; but Milton's *Paradise Lost,* which he read in the translation by J. J. Bodmer, gave his thoughts a new direction. He now decided on a religious theme, *Der Messias,* for which he sketched the outline. In Sept. 1745 he left school, delivering a remarkable Latin "leaving oration" on epic poetry, *Abschiedsrede über epische Poesie, kultur- und literargeschichtlich erläutert.* As a student, first at Jena and after 1746 at Leipzig, he matured his plan for his epic. He completed the first three cantos in prose while he was in Jena and published them anonymously in their final hexameter form in the *Bremer Beiträge* in 1748. Immediately the young poet leaped into fame. Literary youth and the older generation alike greeted his lofty verse with enthusiasm. The direct influence of the *Messias* can be traced down to the 1770s as a charming anecdote in Goethe's *Dichtung und Wahrheit* (Book II) witnesses. There were even public recitations of parts of the poem. While he was in Leipzig Klopstock also wrote a number of odes, the best-known of them being *An meine Freunde* (1747), later recast as *Wingolf* (1767).

He left the university in 1748 and became a private tutor in the family of a relative at Langensalza, Thuringia, where he fell hopelessly in love with a cousin (the "Fanny" of the odes). In 1750 he accepted an invitation from Bodmer to visit him in Zürich, where he rapidly recovered his spirits; but the translator of *Paradise Lost* was disappointed at what he considered Klopstock's undue interest in worldly pleasures and a coolness sprang up between the two men.

At this juncture Klopstock was invited by Frederick V of Denmark (on the recommendation of his minister, Count von Bernstorff) to settle at Copenhagen, with an annuity of 400 talers, with a view to finishing the *Messias.* On his way to Copenhagen Klopstock met in Hamburg Margaret (Meta) Moller (the "Cidli" of his odes), an enthusiastic admirer of his poetry, and they were married in 1754. His grief over her early death in 1758, which is reflected in the 15th canto of the *Messias,* to some extent affected his creativity. He became occupied with technical poetic problems, particularly with prosody, exalting the merits of hexameters and other classical metres, and took up northern mythology, which he thought should replace classical subjects in the new German poetry. In 1770, when Bernstorff was dismissed, Klopstock left Denmark and retired to Hamburg, though he kept his Danish pension. In 1773 he published the last five cantos of *Der Messias* (cantos 1–3, 1748; 1–5, 1751; 1–10, 1755; 11–15, 1768) and in the following year published *Die deutsche Gelehrtenrepublik,* a bold plan for the political and cultural education of the German people

and the regeneration of German life and letters. In the autumn of 1774 he made a triumphal journey south, meeting Goethe on the way and feted by the literary youth of the country. He spent a year in Karlsruhe at the court of the margrave of Baden and then, in March 1775, returned to Hamburg (with a pension from the margrave to add to his Danish one) where he spent the rest of his life. He greeted the American Revolution enthusiastically and at first saw in its French counterpart also a struggle for liberty and humanity to which he ardently assented in some of his odes. But when the French Republic wished to make him an honorary citizen, he refused in protest over the later excesses of the Revolution. When he was 67 he married Johanna Elisabeth von Winthem, a niece of his first wife and a close friend for many years. He died in Hamburg on March 14, 1803.

Although he made his main impact as an epic poet, Klopstock's genius found its most characteristic expression in lyric poetry, where his emotional fire had free play. He was less suited to epic or dramatic form. But although *Der Messias* lacks the graphic power which properly belongs to the epic, its magnificent passages (especially in the earlier cantos), its tension between baroque pathos and deeply felt pietism, its moving expression of emotion, and the nobility of its Christ make it one of the most impressive poems in German literature. It was translated into 17 languages and led to numerous imitations. In his hymnlike odes (*Oden*, final version, 1771) Klopstock, in constantly varied rhythms, evokes an abstract Thou, addressing his solemn entreaties or praises to such lofty themes as Friendship, Love, Fatherland, Immortality and God. Among the best are *An Fanny, Der Zürchersee, Die todte Clarissa, An Cidli, Das Rosenband, Der Rheinwein, Die frühen Gräber, Mein Vaterland* and *Die Frühlingsfeier.* His plays are essentially lyrical in character and lack action; in the *Bardiete* (*Hermanns Schlacht*, 1769; *Hermann und die Fürsten*, 1784; *Hermanns Tod*, 1782) he took as his theme the deeds of the ancient German hero Arminius; others (*Der Tod Adams*, 1757; *Salamo*, 1764) are based on the Old Testament. He also made contributions to philology and literary history in *Fragmente über Sprache und Dichtkunst* (1779) and *Grammatische Gespräche* (1794). For portrait of Klopstock *see* article GERMAN LITERATURE.

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KLUCK, ALEXANDER VON (1846–1934), German general of World War I, was born on May 20, 1846, at Münster and saw service in the Seven Weeks' War (1866) and in the Franco-German War (1870–71). In 1906 he became a general of infantry and in 1913 an inspector general. On the outbreak of war in 1914 he assumed his war appointment as commander of the 1st army on the right flank of the western front. His task was to roll up the left flank of the French armies and thus bring the war in the west to a rapid conclusion. These plans miscarried, mainly because of lack of control by supreme headquarters and a counteroffensive by French and British forces. By Oct. 1914 the German advance had been halted and trench warfare had begun. In March 1915 Kluck was wounded while visiting the front line. He was not employed again in a major capacity and retired in Oct. 1916. He appears to have been a capable, but not specially gifted, man who was given a vital role beyond his capacity. He died in Berlin on Oct. 19, 1934.

He wrote *Der Marsch auf Paris und die Marneschlacht* (1920; 2nd ed., 1926) and *Wanderjahre, Kriege, Gestalten* (1929). (C. N. B.)

KLUGE, GÜNTHER VON (1882–1944), German army officer, a leading field commander in World War II, was born in Posen (subsequently Polish Poznan) of an old Prussian military family, Oct. 30, 1882. Commissioned in the artillery in 1901, he served in various staff and command positions during World War I. He rose rapidly in the postwar years and in 1939–40 led the 4th army with outstanding success in the Polish and French campaigns. In Dec. 1941 he was given command of central army group, facing Moscow. After many severe defensive battles, he replaced Gerd von Rundstedt as commander in chief, west, with headquarters near Paris, early in July 1944.

There Field Marshal von Kluge faced the rapidly growing power of the Allied armies in Normandy, and he realized that destruction of his forces was inevitable when Hitler refused either to send reinforcements or to permit him to retreat. He was relieved of his command on Aug. 17. Two days later, despondent over his failure and knowing that Hitler suspected him of complicity in the July 20 assassination plot, Kluge committed suicide near Verdun by swallowing poison.

Though sharing the motives of the conspirators, and having been involved in earlier discussions within the army of plans to overthrow Hitler, Kluge strongly disapproved of assassination and actually had no knowledge of the plot. (P. N. T.)

KLÜVER, HEINRICH (1897–), U.S. experimental psychologist and neurological scientist, whose many contributions to the analysis and understanding of brain-behaviour relations came to be internationally recognized, was born May 25, 1897, in Holstein, Ger. He was educated at the Universities of Hamburg and Berlin and at Stanford university, where he received the Ph.D. degree in 1924. He became a U.S. citizen in 1934. In 1933 he became a professor at The University of Chicago.

Klüver's investigations ranged from eidetic imagery (photographic visual memory) in children, mescal-induced hallucinations (1928), to comparative studies of neural mechanisms in visual perception in man and in lower animals. His *Behavior Mechanisms in Monkeys* (1933) had far-reaching influence on behavioural and neurological science. The Klüver-Bucy syndrome associates his name with the behavioural and physiological effects expected from removal of the temporal lobes in monkeys. This discovery strongly influenced conceptions of the organization of the associative areas of the brain.

In later years Klüver turned his attention toward the rapidly developing field of neurochemistry (brain porphyrins). His work on the staining of nervous tissue was well known and widely employed by other investigators. (W. C. H.)

KLYUCHEVSKI, VASILI OSIPOVICH (1841–1911), the foremost Russian historian of modern times, was born at Voskresenskoe, in Penza province, on Feb. 4 (new style; Jan. 23, old style), 1841, the son of a poor village priest. He did not persevere in his father's professional footsteps, but, inspired by the general reform movement of the 1860s, switched from the ecclesiastical seminary to the faculty of history and philology at the University of Moscow. From his close association with the countryside and the peasantry during the first 20 years of his life, however, he retained an unusual insight into rural life and problems and the influence of nature on human development; from his study in the seminary he retained an invaluable grounding in Church Slavonic and an interest in ancient Russian sources. On graduation from the University of Moscow (1865), he lectured at the Alexandrian military school, at the University of Women in Moscow and elsewhere, continuing his study and affiliation with his own university. In 1879 he was appointed to the chair of history at the University of Moscow, succeeding his old teacher S. M. Soloviev, by whom he had been greatly influenced.

Klyuchevski's publications were various. His doctoral dissertation was a study of the *duma* of the boyars in ancient Russia. But it was the publication of his lectures, his *Kurs russkoi istorii* ("Course in Russian History"; Eng. trans., *A History of Russia*, 5 vol., 1911–31), which brought him world-wide renown. Origi-

nally published in four volumes (1904–10), with a fifth one appearing posthumously in 1921, this magnum opus traced Russian history in a logical, systematic and highly readable form.

Rising above the controversy of Westernizers and Slavophiles, Klyuchevski wrote from a 19th-century liberal point of view. Blessed with the talents of historian, writer, sociologist and teacher, he gave a broad and living socio-economic analysis of the national process of Russian history. Though he emphasized impersonal forces, such as the succession of classes and the spread of Russian colonization, he painted some of the most memorable images of leading historical figures. Praised, criticized and praised again by historians in tsarist and Soviet Russia, Klyuchevski's writings remain a shining landmark in world historiography. He died in Moscow on May 25 (N.S.; 12, O.S.), 1911.

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KNAPP, SEAMAN ASAHEL (1833–1911), U.S. agriculturalist and educator, originator of the so-called farm demonstration method of disseminating agricultural discoveries and new technologies developed at agricultural colleges and experiment stations to the farmer on his own farm, was born in Schroon Lake, N.Y., on Dec. 16, 1833. He graduated from Union college, Schenectady, N.Y., in 1856. He later lived and worked in Iowa and Louisiana. He was a farmer, stock breeder, banker, publisher, professor and president of Iowa State college, Ames. He played a large role in the passage of the Hatch Agricultural Experiment Station act of 1887 and a decisive part in the formulation of the Smith-Lever Extension Service act of 1914.

During the boll weevil invasion of Texas, Knapp, in 1904, practised good farming techniques on a demonstration tract to prove their effectiveness in controlling the weevil, and thus originated the demonstration method that successfully challenged farmers to teach themselves new and superior farming methods. The teacher in charge of this farm-by-farm demonstration work, which was organized by counties, became known as the county demonstration agent, or county agent (*q.v.*), and the home demonstration program was developed for farm women and the 4-H clubs (*q.v.*) program for farm boys and girls. Knapp's was a radical educational innovation with ever widening applications in the second half of the 20th century, especially in the underdeveloped nations of the world, as a means of transmitting agricultural knowledge and transcending the wide barrier between the agricultural scientist or specialist engaged in research and the working farmer. He died in Washington, D.C., on April 1, 1911.

See J. C. Bailey, *Seaman A. Knapp: Schoolmaster of American Agriculture* (1945). (Jh. C. B.)

KNARESBOROUGH, a market town and urban district of the West Riding of Yorkshire, Eng., lies 18 mi. W.N.W. of York by road. Pop. (1961) 9,309. It stands below a ruined castle on the steep left bank of the river Nidd, which follows a well-wooded valley dominated by limestone cliffs; a high bridge across the river carries the road to Harrogate, 4 mi. E.N.E.

Knaresborough (Chenaresburg in Domesday Book) formed part of William the Conqueror's grant to his follower, Serlo de Burgh, who probably founded Knaresborough castle in 1070. Its remains, which include a massive keep, are mainly of the 14th century. In the reign of Stephen, Knaresborough was forfeited by Eustace Fitzjohn, nephew of de Burgh, and was granted to Robert de Stuteville. From his descendants it passed, through marriage, to Hugh de Morville, one of the murderers of Thomas Becket, who with his accomplices is said to have remained in hiding there for a year. During the 13th and 14th centuries the castle and lordship were held by Hubert de Burgh, Piers Gaveston and finally John of Gaunt, duke of Lancaster, and so to the crown as parcel of the duchy of Lancaster. After the battle of Marston moor the royalists surrendered the castle to Lord Fairfax, and it was dismantled in 1646.

During the 13th century Robert Flower (St. Robert), a Morpeth monk, came to Knaresborough to live as a hermit in the cave which bears his name. It was there that Eugene Aram (*q.v.*), the 18th-century murderer, buried his victim, Daniel Clark. St. Robert's chapel, properly called "Chapel of Our Lady of the Crag," is a Roman Catholic shrine and place of annual pilgrimage. Mother Shipton was born in another cave (*c.* 1488) adjacent to the Dropping well whose waters have petrifying properties. John ("Blind Jack") Metcalf, a pioneer road builder and local guide, was born at Knaresborough in 1717. Guy Fawkes (*q.v.*) spent his childhood at Scotton, 2 mi. N.W.

Knaresborough grammar school was founded in 1616. The church of St. John the Baptist is Early English with numerous Decorated and Perpendicular additions. A charter granted by Charles II, confirming earlier charters, allows a market on Wednesday, which is held in the open market square. The cattle mart is held on Monday.

The main manufactures are clothing, furniture, skin rugs and linen; there is also limestone quarrying, market gardening and the tourist industry.

KNEBEL, KARL LUDWIG VON (1744–1834), German poet, a close friend of Goethe and one of the Weimar circle of neoclassicists, was born at the castle of Wallerstein, near Nordlingen, Franconia, Nov. 30, 1744. After serving in the Prussian army, in 1774 he became tutor to Prince Konstantin of Saxe-Weimar-Eisenach, and, while traveling with him and his elder brother, Karl August, brought about the introduction to Goethe (at Frankfurt am Main, Dec. 1774) which led to Goethe's settling at Weimar in 1775. Knebel became one of Goethe's most intimate friends: his translation of Lucretius (1821) and his work on Pindar inspired Goethe to study them and he took part in the first performance, at the grand duke's private theatre, of *Iphigenie auf Tauris*. He was the author of graceful sonnets as well as translations. He left Weimar in 1781, but the friendship continued until Goethe's death in 1832. Knebel died at Jena, Feb. 23, 1834. His *Sammlung Kleiner Gedichte* were published anonymously in 1815; *Distichen* appeared in 1827.

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KNEE, in human anatomy, the joint between the thighbone (femur) and the larger leg bone (tibia). The kneecap (patella) lies at the front of this joint, which is of the hinge type. *See* Joints and Ligaments. (F. L. A.; X.)

KNELLER, SIR GODFREY (Gottfried Kniller), Bart. (*c.* 1649–1723), notable English portrait painter of German extraction, was born in Lübeck, then a Hanseatic city, Ger., in either 1646 or 1649. He studied in Amsterdam under Rembrandt's pupil F. Bol before going to Italy in 1672; the "Elijah" of that year (Tate gallery, London) shows him working in a style very close to Bol's. In Italy he began to paint portraits and modified his style, partly under the influence of C. Maratta. Arriving in England in 1674 or 1675, he soon established himself as a portrait painter, especially after Charles II sat to him, and he succeeded Sir Peter Lely as principal painter to the king. He was knighted in 1692 and made a baronet in 1715, thus confirming his dominating position.

Kneller's style was broad and free, and it was the established one before the rise of Sir Joshua Reynolds, but many of his works are mechanical or owe too much to his numerous assistants. Among his best works are the series of 42 portraits of members of the Kit Cat club, now in the National Portrait gallery, London. These were painted between about 1700 and about 1720 and are of a size (36 x 28 in.) which allows a half-length portrait showing one or both hands; "kitcat size" is now a generic term. The club itself was a famous meeting place for Whigs, and the portraits are therefore particularly interesting as character studies of leading men. The series of "Beauties" at Hampton court is far less satisfactory because the sitters obviously interested Kneller less. He died in London on Nov. 7, 1723, and is buried in Westminster abbey, where he has a monument.

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Britain, 1530–1790 (1953); M. D. Whinney and O. Millar, *English Art 1625–1714* (1957). (P. J. My.)

KNIFE, a small cutting instrument, with the blade either fixed to the handle or fastened with a hinge so as to clasp into it. For the manufacture of knives of all types *see* CUTLERY.

In England, steel bladed eating knives dating from the Romano-British period have been excavated, but extremely few of the fine medieval knives with handles of precious or semiprecious material have survived; cleaning and grinding wore away the blades. The inventories of the Tudor monarchs show that they possessed many sets of a dozen or more knives, contained in cases of leather or wood and mounted in handles of hard stone or ivory. A set of 14 knives, dated 1607, with ivory handles carved with figures of the kings of England, is preserved in the Victoria and Albert museum, London. Only in the houses of the wealthy were there enough sets for knives to be offered to guests. The ordinary man carried his knife in a sheath attached to his belt or in a compartment on his sword scabbard. Women wore theirs attached to the girdle. A pair of knives in a sheath was considered a worthy gift and it was common for a bridegroom to present his bride with one; such sets were known as "wedding knives." Serving knives, made in pairs and sometimes called *présentoirs,* were used only for passing food.

BY COURTESY OF THE VICTORIA AND ALBERT MUSEUM

(LEFT) ENGLISH SILVER, AMBER AND IVORY WEDDING KNIFE WITH EMBROIDERED SHEATH, 1638; (RIGHT) GERMAN SILVER, ENAMELED AND GILT KNIFE, 1638

In the later 17th century, services of silver cutlery in a gentleman's house were sufficient to provide for his guests; but although individual knives were no longer carried, a set of knife, fork, spoon and beaker was indispensable to the traveler and such sets were made until well into the 19th century. The characteristic 18th-century table knife has a pistol-shaped handle in which is mounted a curved blade of so-called "scimitar" form. With the modern stainless steel table knife, standard patterns have evolved in which practical needs and durability are the first considerations. (J. F. H.)

KNIGGE, ADOLF FRANZ FRIEDRICH, FREIHERR VON (1752–1796), German writer, the author of several novels and a famous work, *Über den Umgang mit Menschen* (1788; modern ed. K. Goedeke, 2nd ed. 1952), in which he lays down rules for a happy life. He was born at Bredenbeck, near Hanover, on Oct. 16, 1752, and died on May 6, 1796, at Bremen. Under the name "Philo," he was one of the most active members of the *Illuminati,* a society founded by Adam Weishaupt, and later affiliated to the Freemasons. Knigge's *Schriften* were published in 12 volumes (1804–06).

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KNIGHTHOOD, CHIVALRY AND ORDERS. Knighthood, now a title of honour bestowed for a variety of services, was originally the quality of a formally professed cavalryman; chivalry came to mean the behaviour expected of a knight, in social as well as in military circumstances; and orders, originally associations of knights with a special devotion or purpose, are now collective bodies to which men or women are appointed in recognition of merit or public service. This article is arranged as follows:

I. History
1. Origins
2. Practice and Principles
3. The Crusades and the Religious Orders of Knighthood
4. Knighthood and Later Feudalism
5. The Decadence of Chivalry
6. The Secular Orders of Medieval Christendom
7. The 16th Century and After
II. Orders in the Modern World
1. British Orders
2. Modern European Orders
3. Latin-American Orders
4. Orders of Other Countries

I. HISTORY

1. Origins.—The origins of knighthood belong to the early centuries of medieval Europe and have been to some extent obscured by the fact that the word "knight," from the Old English *cniht,* came after the Norman Conquest to be established as equivalent to the Romance words derived from the Late Latin *caballarius,* "horseman" (*cf.* Classical Latin *eques*), such as the French *chevalier* (*q.v.*) and the Spanish *caballero,* and likewise to the German *Ritter.* Though *cniht,* meaning "boy" or "servant" (*cf.* Ger. *Knecht*), seems in Anglo-Saxon England to have been used occasionally for one who undertook riding services (the *radcniht* mentioned in Domesday Book was almost the same as the *geneat,* whose duties, according to the *Rectitudines singularum personarum* of *c.* 960–1060, included riding upon errands), there is no indication that the term implied any specific function in warfare, as *caballarius* already did in Charlemagne's time (8th–9th centuries); and it is noteworthy that the *Anglo-Saxon Chronicle,* for the year 1085, describes William the Conqueror's dubbing his son Henry "to ridere," where "knight" would later have been the word used. The development of the term knight service (*q.v.*), for a specific element of feudalism in England after the Norman Conquest, must be attributed to the persistence of the word *cniht* in vernacular usage—with added notions of a tenant's duties of service to his lord—throughout the three centuries or so when English was entirely superseded by Latin and French as the language of written records. Before leaving the question of terminology it can be pointed out that as the notion of knighthood and chivalry became more specific, the terms *chevalier, caballero* and *Ritter* in the simple sense of "horseman" or "rider" had to be superseded in French, Spanish and German respectively by *cavalier, jinete* and *Reiter.*

Knighthood was a product of the interaction of Germanic military custom and Christian influences in an age when cavalry was becoming more and more important to the armies of western Europe. The ceremonial initiation of the young Germans into manhood as warriors is noted by Tacitus, writing at the end of the 1st century A.D., in his *Germania.* The Franks (*q.v.*) must have brought some such custom into Gaul in the 6th century, and its survival in Carolingian times is indicated by records of Charlemagne's girding his son Louis the Pious with the sword in 791 and of the latter's girding his son Charles the Bald in 838. By the middle of the 8th century, however, Charles Martel had already appreciated the Frankish kingdom's need for a strong cavalry force (*see* CHARLES MARTEL). The measures that he took to provide this force had a major effect both on the growth of feudalism and on the sometimes parallel, sometimes interwoven growth of knighthood. The cost of keeping a horse and of providing the arms, armour and attendants for its rider was much heavier than that of maintaining an unmounted warrior, so that the fiefs granted to vassals or subtenants undertaking this service had to be correspondingly greater. The increasing importance of the horseman in the medieval army is reflected in the supersession of the word *caballarius* in formal documents by *miles,* which from its general sense of warrior or soldier came to mean specifically a knight and later, with the crystallization of the idea of nobility, to be used as the generic designation of a nobleman.

The horsemen of the Frankish armies had very little more pretension to humane conduct than those of their barbarian or pagan enemies; and indeed they may well have had much to learn in the way of manners from their encounters with the Byzantines in Italy and with the Muslims from Spain. The introduction of an ethical

element into their behaviour seems to have been achieved by the Catholic Church. The history of the church's attitude to war in general and to private war in particular cannot be analyzed here; but at least from the middle of the 10th century, when Frankish Christendom had long been split between France and Germany, the church's intervention in military matters becomes evident in special liturgies composed to govern the ritual creation of knights; *e.g.*, in the pontifical drafted in St. Alban's abbey, Mainz, *c.* 950–960. These liturgies, however, are no more uniform than the secular rites of creation (*see* below).

2. Practice and Principles.—The first knights, then, were professional cavalry warriors. Some of them were vassals holding lands as fiefs from the lords in whose armies they served; others were not enfiefed with land. And though all knights were free men it was not invariably from the ranks of men born free that knights were recruited. The matter of enfiefment is not essential to the phenomenon of knighthood as a social factor in the period of its apogee, namely in the 10th–12th centuries. What is peculiar is the gradual evolution of a standard of practice (flexible enough in detail) for initiation into knighthood, together with a standard of decent behaviour acknowledged even by those who violated it most readily.

The son of a free man destined for the profession of arms might from the age of seven or so serve his father as a page before joining the household of his father's suzerain, perhaps at the age of twelve, for more advanced instruction not only in military subjects but also in the ways of the world. During this period of his apprenticeship he would be known as a *damoiseau* (literally "lordling") or *valet* (Ger. *Knappe*) until he followed his patron on a campaign as his shieldbearer, *écuyer* or esquire (*q.v.*) or as the bearer of his weapons (armiger). When he was adjudged proficient and the money was forthcoming for his knightly equipment, he would be dubbed knight.

Dubbing (Fr. *adoubement*) was the ceremony whereby the candidate's initiation into knighthood was completed. The knight sponsoring him would gird him with a sword, fix spurs to his heels and give him a blow or slap on the neck or shoulder, uttering a few words of exhortation or welcome. It is uncertain whether the blow symbolized an embrace (as a friendly pat on the back might), a transmission of power (as in an ecclesiastical laying on of hands) or a test of endurance. It was originally administered by hand, but was eventually superseded by the use of the flat of a swordblade for a touch on the shoulder; *i.e.*, the accolade of knighthood as it survives in modern times. Theoretically any knight could dub a candidate to knighthood, but the right to do so was gradually monopolized by the suzerains of the greater fiefs and finally by kings or other sovereign princes, who would however usually concede it to the commanders in chief of their armies in the field. The ceremonial of dubbing varied considerably: it might be highly elaborate on great feast days of the church or on royal occasions; it would be simple enough on the battlefield; and the dubbing knight might use any appropriate formula that he liked.

It cannot be said exactly when the Germanic ceremony of girding with the sword was supplemented by the ritual blow, which may have been established practice by the end of the 9th century —unless of course it was itself part of the Germanic usage. Later, on the occasions when the full ceremonial was used, it became a custom for candidates to spend the night before they were to be dubbed in prayer and vigil, with their weapons exposed on an altar; and the taking of a ritual bath before the vigil gave rise to the designation "knights of the bath" to distinguish knights selected for this treatment from others dubbed more summarily (Henry IV of England made 46 knights of the bath in 1399).

By the beginning of the 12th century, when the Christianization of knighthood was incontestable, an ideal of knightly behaviour had come to be accepted. Much imagination, from the later centuries of the middle ages to modern times, has been put into constructing the "code" of chivalry; but for the early period of knighthood (10th–12th centuries) there is little reason to suppose that anything more was asked of the knight than that he should respect the teaching of the Gospel and the laws of the church, be loyal to his feudal or military superiors and preserve his personal honour both in war and in civil affairs. Under one or another of these general heads all the detail of chivalry—protection of the weak (women, orphans, religious, etc.), obedience, courage, the pursuit of glory and so on—can be included.

On rare occasions, a knight guilty of some grave infraction of the rules of chivalry would be degraded from knighthood; *e.g.*, for treason or some notorious crime that his superiors or comrades could not condone (ordinary lapses from the Christian standard were venial enough, as were successful ruses in war, however dishonourable). His arms and shield would then be publicly smashed and his spurs smitten off.

3. The Crusades and the Religious Orders of Knighthood.—From the end of the 11th century the crusades (*q.v.*) brought the knights of Christian Europe together in a common enterprise under the auspices of the church. For a time the chivalrous ideal seemed to be on the point of realization. Knights dubbed at Christ's tomb were known as knights of the Holy Sepulchre. The first orders of knights came into being. These were the Order of the Hospital of St. John of Jerusalem (*q.v.*), the Order of the Temple of Solomon (*see* TEMPLARS) and, rather later, the Order of St. Lazarus, which had a special duty of protecting leper hospitals. These were truly international and of an expressly religious nature both in their purpose and in their form, with celibacy for their members and a hierarchical structure (grand master, "pillars" of lands or provincial masters, grand priors, commanders, knights) resembling that of the church itself. But it was not long before their religious aim gave place to political activity as the orders grew in numbers and in wealth.

At the same time crusading orders with a rather more national bias came into being. In Spain, for the struggle against the Muslims there or for the protection of pilgrims, the Orders of Calatrava, of Alcántara and Santiago (St. James) were founded in Castile between 1156 and 1171; Portugal had the Order of Avís, founded about the same time; but Aragon's Order of Montesa (1317) and Portugal's Order of Christ were not founded till after the dissolution of the Templars. For the great order of the German knights *see* TEUTONIC ORDER, KNIGHTS OF THE. These "national" crusading orders followed a course of worldly aggrandizement like that of the international orders; but the crusades in Europe that they undertook, no less than the international enterprises in Palestine, would long attract individual knights from abroad or from outside their ranks. Younger sons of feudal families, with neither the hope of inheriting land from their fathers nor any inclination to enter the church, were very ready to seek admission to these orders; and as the endowments of the orders increased, the greatest nobility of western Europe placed its younger sons in them.

4. Knighthood and Later Feudalism.—Between the end of the 11th century and the middle of the 13th a change took place in the relationship of knighthood to feudalism. The feudal host, whose knights were mainly enfiefed landholders obliged to give 40 days' service per year normally, had been adequate for defense and for service within a kingdom; but it was scarcely appropriate for the now more frequent long-distance expeditions, whether crusades or sustained invasions such as those launched in the Anglo-French wars. The proportion of knights with money-fiefs instead of land increased, but still the total of knights fell short of military requirements, as the steeply rising cost of stronger horses and heavier armour made men more and more reluctant to assume the obligations of knighthood. The result was twofold: on the one hand the kings—in particular Henry III and Edward I of England—often resorted to distraint of knighthood, that is to compelling holders of land above a certain value to come and be dubbed knights (it was at these mass dubbings that the ceremonial was most elaborate); on the other hand, the armies came to be composed more and more largely of mercenary soldiers, with the knights, who had once formed the main body of the combatants, reduced to a minority—as it were to a class of officers. In such an army the knight, conspicuous for his personal insignia (*see* HERALDRY), would have a rank according to his retinue or to his prowess. The greater knights displayed a

square banner like that of the feudal magnates and so were called knights banneret (*see* BANNERET), while the others, called knights bachelor, had only a pointed or forked flag, the pennon. The leader of the army could convert a pennon to a banner by cutting its ends off if a knight had earned promotion to banneret status. An esquire's flag was only a narrow strip of cloth, the pencel.

It is obvious that distraint produced a very different sort of knight from the aspiring volunteer. By the 13th century, however, the kings were wanting knights for other purposes besides cavalry fighting. In England, the so-called knights of the shires were important links between the king's court and the local administration of the country, which they were often summoned to represent in parliaments; and the feudal dues obtainable from knights were another motive for distraint. More frequent recourse to the long-standing institution of scutage (*q.v.*), whereby the obligation of military service could be remitted on the payment of a sum of money, shows further the transformation that knighthood was undergoing.

5. The Decadence of Chivalry.—The gradual petering out of the crusades; the disastrous defeats of knightly armies by foot soldiers and bowmen in such battles as those of Courtrai (1302), Crécy (1346) and Agincourt (1415); the development of artillery; the steady erosion of feudalism by the royal power in favour of centralized monarchy—all these factors had their effect on knighthood in the 14th and 15th centuries. In their struggle against the great feudataries the kings were glad enough to have the numerous class of knights on their side; but they were anxious to bring it entirely under their own control. They arrogated to themselves the right to dub and promoted the reduction of knighthood from the status of a supranational confraternity to that of a dependent and domesticated nobility in the modern sense. Chivalry lost its martial simplicity and became a fashion of modish elegance for the sophisticated nobles of a prince's entourage. The change was already foreshadowed in literature by the transition from the *chansons de geste* (*q.v.*), which reflect the old knighthood and indeed constitute the source for much of our information on its ethos, to the *romans courtois* (*see* ROMANCE), with their emphasis on love and on the chivalrous pursuit and service of ladies. Courtly love (*q.v.*) usurped the place of Christian fervour; jousting in tournaments was preferred to battle; and the old sense of personal honour gave way to that petty sensitivity to signs of disrespect from others which was to culminate, in the 16th century, in the vogue of duels of honour (*see* DUEL). The efforts of Philippe de Mézières (*q.v.*), in the latter half of the 14th century, to promote a new knightly order true to the old ideals bear witness against the contemporary state of chivalry.

6. The Secular Orders of Medieval Christendom.—An exalted type of knighthood emerged with the secular orders founded by kings and princes, who exploited the attraction of the chivalrous idea both to satisfy the nobility's thirst for especial lustre without increasing its real power and to form an elite of great nobles bound by an express devotion to the sovereign's person. These secular orders were multiplied throughout Europe and eventually throughout the world from the end of the middle ages onward; and the later ones had nothing in common with the old chivalry but the name of knights, the accolade and insignia. A few of them, however, which were instituted before the total eclipse of chivalry and survived into modern times can be mentioned here.

The Order of the Garter.—This English order was instituted by King Edward III about the middle of the 14th century. According to unauthenticated legend, the king founded it after picking up a garter dropped at a dance by a countess of Salisbury, when he rebuked those who laughed suggestively at his courtesy with the words *Honi soit qui mal y pense* ("Shame on him who thinks ill of it"). Since its original records down to 1416 have perished, the year of its institution is not exactly known. The dates suggested vary between 1344 (Jean Froissart, most probably mistaken) and 1351, but it is unlikely that it existed before the summer of 1346, since neither the prince of Wales (Edward, the Black Prince) nor several others of the original companions had received knighthood, a prerequisite of membership, before the middle of that year; it was in being by 1348. Its membership at first comprised the king and the prince of Wales, each with 12 companions (as they might have had at a tournament). From 1376 to 1495 ladies were admitted to its annual feast, at Windsor on April 23 (St. George's day), for which they were provided with the robes and insignia of the order. The postmedieval development of the order is described below, under *British Orders*.

The Order of the Collar.—This was a Savoyard order, instituted in 1362 by Amadeus VI. Renamed the Order of the Annunziata (Annunciation) by Duke Charles III in 1518, it eventually became the highest order of the kingdom of Italy (*see* below).

The Order of the Golden Fleece (*la Toison d'Or*).—This order was founded by Philip the Good, duke of Burgundy, at Bruges in Flanders in 1430, to commemorate his wedding there to Isabella of Portugal. Its first chapter was held at Lille in 1431, and in 1432 its seat was fixed at Dijon, capital of the duchy of Burgundy. Dedicated to the Blessed Virgin and to St. Andrew, it was first constituted to have a grand master (the sovereign duke) and 23 knights, but membership was subsequently increased to 31 and eventually to 51. The order, founded to defend the Catholic religion and to uphold the usages of chivalry, was itself to settle all disputes between its knights, whose deeds were appraised, commended or censured at its chapters; and the knights had the right to trial by their fellows on charges of rebellion, treason or heresy. Through the marriage of Mary of Burgundy to the Austrian archduke Maximilian (1477) the grand mastership passed to the house of Habsburg. The Holy Roman emperor Charles V (Charles I of Spain), who granted the order exclusive jurisdiction over all crimes committed by its members, left the grand mastership to his son Philip II of Spain, to whose successors it was confirmed by Pope Clement VIII in 1600; but after the extinction of the Spanish Habsburgs (1700) it was disputed between the Bourbon kings of Spain and the Austrian Habsburgs. The emperor Charles VI instituted the order in Vienna in 1713, and thenceforward both the Austrian and the Spanish sovereigns and pretenders continued to award the Golden Fleece as their principal order of knighthood. It was exclusively reserved to Catholics of the highest nobility.

The Order of St. Maurice.—This was another Savoyard order, instituted by Amadeus VIII for his intimates on his retirement from public affairs in 1434. On his becoming antipope as Felix V the order fell into practical abeyance till 1572; but it was subsequently merged with a branch of the Order of St. Lazarus, to survive into modern times as an Italian order (SS. Maurizio and Lazzaro).

The Order of St. Hubert.—This order, founded by Gerhard V, duke of Jülich, in 1444, to commemorate his victory at Ravensberg over Arnold of Egmond on St. Hubert's day, fell into abeyance with the extinction of the house of Jülich in 1609 but was revived in 1708 by the Wittelsbach claimants to the Jülich succession and survived into modern times as the highest order of the kingdom of Bavaria.

The Order of St. Michael.—Louis XI of France founded this order in 1469 (John II's Order of the Star, founded in 1351, had fallen into abeyance in the later course of the Hundred Years' War). Having fallen into disrepute, it was merged with the Order of the Holy Spirit (*Saint Esprit*), founded by Henry III in 1578. Together known as *les ordres du roi* and distinguished by the blue cordon on which the insignia were worn, these two were the most coveted French orders under the *ancien régime*.

7. The 16th Century and After.—The Reformation and its ensuing religious wars, together with the strategic necessity for France, the cradle of chivalry, to seek the help of the Muslim Turks against encirclement by the Habsburg power, completed the process whereby knighthood was reduced to an honorific title that sovereigns could bestow as they pleased. The glory of the sieur de Bayard (*q.v.*), from whom Francis I of France chose to receive his own knighthood, and the archaistic knightliness of the emperor Maximilian I only emphasize by contrast the unchivalrous background to their exploits. The Spanish religious orders of knighthood were subjected to royal control. The grand master

of the Teutonic Order became a Protestant and obtained from Poland the erection of the order's lands in Prussia into a secular duchy for himself (*see* ALBERT, duke of Prussia). And though the Order of St. John of Jerusalem, which had long lost its strongholds in Palestine, distinguished itself in the defense of Rhodes and later of Malta, its membership became more and more a perquisite of exalted families who sought to establish their younger sons in its priories and benefices.

The persistence of feudal theory in Germany led to a peculiar development of knighthood. The greater princes and counts were seeking to mediatize the lesser nobility; but the "immediate" knights of the empire, that is to say knights who had acquired the status of hereditary nobles, who owed allegiance to the German king or Holy Roman emperor alone and whose numbers had been reinforced by the accretion of *ministeriales* (*q.v.*) to their ranks, resisted this pressure, especially in Swabia, in Franconia and in the Rhineland. From 1528 their obligation to personal military service was remitted on payment of the so-called *subsidia caritativa* to the emperor; and from 1577 the collective body of the *Reichsritterschaft* or imperial knighthood was organized in three "circles," Swabian, Franconian and Rhenish, each subdivided into numerous cantons. The threat of mediatization was thus averted till the beginning of the 19th century, but the *Reichsritterschaft* failed to secure the rank of an "estate" of the empire (*Reichsstandschaft*), which it would have attained if it had been accorded a collegiate vote in the council of princes.

In France the style of *chevalier* by itself, as opposed to *chevalier des ordres du roi* or *de Malte* (*i.e.*, of St. John of Jerusalem) came to be used in official documents merely as an alternative to *écuyer, noble* or *noble homme* in order to assert nobility—which was not only a hereditary quality but was also accorded with increasing frequency to persons outside the profession of arms.

In England the quality of knighthood never became hereditary, and the degree of knight bachelor survived. A baronet (*q.v.*) is not a hereditary knight, as the common use of the prefix "Sir" before the Christian name (*see* ADDRESS, FORMS OF) might lead some people to think. However, one of the earliest privileges of baronets was that they and their successors to the baronetcy, eldest sons and heirs apparent, were entitled to receive knighthood, should they wish it, on attaining their majority. This privilege was omitted from patents of baronetcies created after Dec. 19, 1827; and, although earlier creations still possessed it in theory, applications for knighthood by such heirs apparent were discouraged. All claims were refused after that of Ludlow Cotter, son of Sir James Lawrence Cotter, 4th baronet of Rockforest, who was knighted in 1874. The survival of the accolade makes knighthood the only British title still conferred (as all dignities used to be) by a ceremony in which sovereign and subject both take part personally. In its modern form the subject kneels and the sovereign touches him with a drawn sword (usually the sword of state) first on the right shoulder, then on the left.

II. ORDERS IN THE MODERN WORLD

Orders in modern times may belong to one of three groups: (1) the prime orders reserved exclusively to sovereigns and to men of the very highest distinction in the nobility or in the service of their country; (2) dynastic or family orders, bestowed by the sovereign on his kin or on humbler individuals in recognition of "personal" service to the dynasty; (3) other orders awarded for meritorious public service, whether military or civil.

Membership in a modern order does not necessarily mean knighthood, and there are orders which have no knights. An order may consist of a single class, with the title members, companions, or knights companions; or it may comprise three classes, such as knights grand cross, knights commanders and companions; or it may have five, six or more classes. Generally the insignia of knights grand cross consist of a star worn on the left breast and a badge (usually some form of the cross paty) suspended from a ribbon or cordon over the shoulder, or in certain cases from a collar; commanders wear the badge from a ribbon round the neck, and the star on the breast; companions have no star and wear the badge from a narrow ribbon at the buttonhole. Often the word orders is used merely as a synonym of insignia.

1. British Orders.—*The Most Noble Order of the Garter.*—The composition of the Order of the Garter in the 14th century has been noted above. No change in its numbers was made until 1786, when the sons of George III and his successors were declared eligible notwithstanding that the chapter might be complete. In 1805 it was provided that the lineal descendants of George II should be likewise eligible supernumerarily; but while the order was declared to consist of the sovereign and 25 knights companions, without regard to any earlier division between those of the sovereign and those of the prince of Wales, the latter's place in the chapter apart from the supernumerary members of the royal family was assured to him as "a constituent part of the original institution." In 1831 the privilege of supernumerary eligibility was extended to the descendants of George I.

The order has five officers: prelate (the bishop of Winchester), chancellor (the marquess of Salisbury in the 1960s), registrar (the dean of Windsor since Charles I's reign), king of arms (Garter principal king of arms) and usher (the gentleman usher of the Black Rod). The first, third and fifth offices date from the beginning; the fourth was added by Henry V, the second by Edward IV. The chapel of the order is St. George's chapel, Windsor. The insignia comprise the garter itself, with the motto *Honi soit qui mal y pense;* the star, with St. George's cross; and the collar, with a badge representing St. George and the Dragon.

The Most Ancient Order of the Thistle.—Dedicated to St. Andrew, patron saint of Scotland, this order was founded by James II (VII of Scotland) in 1687 for the sovereign and eight knights companions, fell into abeyance in 1688, but was revived by Queen Anne in 1703 with an increase of the knights companions to 12; and the number was raised to 16 in 1827. The officers are chancellor, dean, secretary, Lyon king of arms and the gentleman usher of the Green Rod. The chapel is in St. Giles's cathedral, Edinburgh. The order's collar is of thistles alternating with sprigs of rue and the motto is *Nemo me impune lacessit.*

The Most Illustrious Order of St. Patrick was instituted by George III in 1783, to consist of the sovereign, the lord lieutenant of Ireland (as grand master) and 15 knights companions; the number was increased to 22 in 1833. The king of arms is Norroy and Ulster king of arms. The chapel is in St. Patrick's cathedral, Dublin. The collar is of alternate red- and white-leaved roses and gold harps linked by gold knots; the badge is suspended from a harp surmounted by an imperial jeweled crown. The motto is *Quis separabit?*

The Most Honourable Order of the Bath, established by George I in 1725 for the sovereign, a grand master and 36 knights companions, was a pretended revival of a supposed order of Henry IV's time which had never in fact existed; as explained above, the medieval "knights of the bath" were knights bachelors who had been knighted with full ceremony on special occasions and therefore took precedence of other knights bachelors. In 1815 three classes were instituted to commemorate the end of the Napoleonic Wars; and in 1847 civil knights commanders and companions were added. Apart from the sovereign, royal princes and distinguished foreigners, the order is limited to 68 military and 27 civil knights grand cross, 173 military and 112 civil knights commanders, and 943 military and 555 civil companions. The officers are the dean (the dean of Westminster), Bath king of arms, the registrar and the usher of the Scarlet Rod. The badge shows three crowns, with the motto *Tria juncta in uno.*

The Most Distinguished Order of St. Michael and St. George.—Founded in 1818 by the prince regent, later George IV, to commemorate the British protectorate over the Ionian Islands, this order was later placed on a new basis and extended by letters patent of 1868 and 1877 to high colonial officials. The chapel is in St. Paul's cathedral, London. The knights grand cross have a seven-rayed star of silver with alternating small rays of gold; in the centre a red St. George's cross bearing a medallion of St. Michael encountering Satan, surrounded by a blue fillet with the motto *Auspicium melioris aevi.*

The Most Exalted Order of the Star of India and the Most Eminent Order of the Indian Empire.—The first of these ranks

before, and the second after, the Order of St. Michael and St. George. The viceroy of India was *ex officio* grand master of both. The Order of the Star of India, instituted in 1861, was enlarged in 1866 to consist of knights grand commanders, knights commanders and companions. Its collar is of alternate links of the lotus flower, red and white roses and palm branches enameled on gold, with an imperial crown in the centre. The Order of the Indian Empire, founded in 1877–78 in commemoration of Queen Victoria's assumption of the style of empress of India, includes the same three classes as the Star of India. Its collar is composed of elephants, peacocks and Indian roses.

The Royal Victorian Order was instituted by Queen Victoria in 1896 for personal services rendered to the sovereign. Besides the sovereign, chancellor and secretary there are knights and dames grand commanders, knights and dames commanders, commanders and members (of the fourth and fifth classes).

The Order of Merit does not carry the title of knight. It was founded by Edward VII for those distinguished in the army and navy and in science, art or literature. To the 24 British members may be added such foreigners as the sovereign chooses. The order is open to both sexes. The badge is a cross of red and blue enamel surmounted by an imperial crown; the centre blue medallion bears the inscription "For Merit" in gold and is surrounded by a laurel wreath. The military and naval members add two crossed swords in the angles of the cross. The ribbon, of blue and crimson, is worn round the neck.

The Distinguished Service Order, founded in 1886, recognizes the special services of officers of the army and navy. Members of its one class take precedence immediately before those of the fourth class of the Royal Victorian order. The badge is a white and gold cross with a red centre bearing the imperial crown surrounded by a laurel wreath. The ribbon is red, edged with blue.

The Imperial Service Order, founded in 1902 and several times revised, recognizes the work of commonwealth civil servants. It consists of companions only and ranks after the Order of the British Empire, fourth class (*see* below).

The Royal Order of Victoria and Albert, founded in 1862, was a purely court distinction for ladies only.

The Imperial Order of the Crown of India was a ladies' equivalent to the Order of the Indian Empire, recognizing the services of ladies connected with the court of India.

The Order of the British Empire was instituted in 1917 to reward both civilian and military war service. In 1918 a separate military division was created. The five classes of both civil and military divisions can be conferred on men and women equally. They are: knights and dames grand cross, knights and dames commander, commanders, officers and members. The two highest classes wear an eight-pointed star of chipped silver rays, with a golden medallion in the centre bearing the crowned effigies of King George V and Queen Mary and surrounded by a circlet of crimson enamel with the motto: "For God and the Empire"; the badge is a cross paty with centre medallion and circlet like the star and a gold imperial crown surmounting it. The order has also a medal, awarded to persons not eligible for any of the five classes.

The Order of Companions of Honour, founded at the same time as the Order of the British Empire, recognizes men and women who have rendered conspicuous national services. It ranks next after the first class of the Order of the British Empire and consists of the sovereign and not more than 65 members in a single class.

2. Modern European Orders.—The following select list, in alphabetical order of the sovereign states concerned, includes a number of orders bestowed by dynasties which ceased to reign in the course of the 19th and 20th centuries.

Albania.—Orders of the Black Eagle (1914), of Skanderbeg (1925), of Fidelity (1926), of Valour (1928).

Anhalt.—Order of Albert the Bear (family order, 1836).

Austria.—Apart from the Golden Fleece (*see* above, *History*) and the Hungarian Order of St. Stephen (*see* below), imperial Austria had the orders of Leopold (1808), of the Iron Crown (1816, taken over from a Lombard order founded by Napoleon I as king of Italy in 1809) and of Francis Joseph (1849); the two military orders of Elizabeth Theresa (1750, renovated 1771) and of Maria Theresa (1757); and the orders of the Starry Cross (1668) and of Elizabeth (1898) for ladies. Republican Austria has the Order of Merit (1922).

Baden.—Orders of Fidelity (family order, 1715; reconstituted 1803), of Charles Frederick (military, 1807), of the Zähringen Lion (1812), of Berthold I (1877 as a class of the preceding, 1896 as a distinct order).

Bavaria.—Apart from the Order of St. Hubert (*see* above, *History*), Bavaria had the orders of St. George (1729), of Maximilian Joseph (military, 1806), of St. Michael (1808, taken over from Cologne's order of 1693), of the Crown (1808), of Ludwig I (1827), of Maximilian for Art and Science (1853) and of Military Merit (1866). The orders of St. Elizabeth (1766) and of Theresa (1827) were for ladies.

Belgium.—Orders of Leopold I (for civil and military merit, 1832), of the Crown (originally the premier order of Congo, 1897; transferred to Belgium 1910), of Leopold II (for services to the sovereign, 1900). The orders of the African Star (1888) and of the Lion (1891) were for services in the Congo.

Brunswick.—Order of Henry the Lion (1834).

Bulgaria.—The kingdom had the Order of SS. Cyril and Methodius (1909), taking precedence over the Order of St. Alexander (1881) and various orders of merit. The Communist regime instituted orders of Georgi Dimitrov, of the Republic, of Sept. 9, 1944, of National Freedom, of the Red Flag, of the Red Flag of Labour, of Bravery and of Labour.

Croatia.—Orders of the Crown of Zvonimir (1941), of the Iron Trefoil (1941) and of Merit (1943), instituted by the regime of Ante Pavelic and extinct after World War II.

Czechoslovakia.—Orders of the White Lion (for foreigners only, 1922; for Czechoslovaks also, 1928), of Charles IV (1931), of the White Lion for Victory (military, 1945), of the Gold Star, of the Republic, of Socialism and of Labour.

Denmark.—Order of the Elephant (15th century; revived after abeyance for the sovereign, his sons and 30 knights, exclusively Protestant, with the motto *Magnanime pretium,* 1693), taking precedence as a prime order over the Order of the Dannebrog (1671; legendarily ascribed to 1219, the year of Valdemar II's conquest of Estonia).

Estonia.—Orders of the State Arms, of the White Cross, of the Eagle Cross and of the Red Cross during the period of independence (1918–40).

Finland.—Orders of the White Rose of Finland (for civil and military merit, with six classes, 1919), of the Cross of Liberty (for military and civil merit in wartime and for services to the country's defenses, with five classes, 1940), and of the Lion of Finland (with five classes, 1942).

France.—As well as the orders of St. Michael and of the Holy Spirit (*see* above, *History*), France under the *ancien régime* had the orders of St. Louis (military, 1693) and of Military Merit (for non-Catholic foreigners serving as officers with the French armies, 1759).

For republican France the principal order is the *Légion d'Honneur* (Legion of Honour), founded by Napoleon Bonaparte in 1802 as a general military and civil order of merit irrespective of birth, rank or religion, provided that all admitted swore to uphold the principles of liberty and equality. During the consulate and the first empire Napoleon was grand master, and a grand council of seven grand officers administered the 15 territorial units or "cohorts" into which the order was divided. The various ranks carried salaries, and hospitals were maintained for sick and infirm legionaries. Under the Restoration the *Légion* was adopted a royal order, but ranked below the restored military and religious orders of the *ancien régime.* Under the later republican regimes the president of the republic became grand master; the order is administered by a grand chancellor with the help of a council nominated by the grand master. There are five classes: grand cross (limited to 80 members); grand officer (200); commander (1,000); officer (4,000); and knight or *chevalier* (unlimited). Foreign recipients, however, are supernumerary to the restricted classes. Military and naval members on active service receive

salaries. Promotion from grade to grade is according to service performed in the lower; extraordinary services admit at once to any rank. The ribbon is scarlet.

France also has specialized orders of merit (Agricultural, 1883; Maritime—for the merchant navy—1930; Social, 1939; Commercial, 1939; Public Health, 1939) and the Order of the Liberation (1941).

Germany.—Imperial Germany bestowed orders belonging to the Hohenzollern dynasty or to the kingdom of Prussia (*see* below). The third *Reich* had orders of Blood (1934) and of the German Eagle (for foreigners, 1937). The German Federal Republic recognizes the *Ordre pour le Mérite* (*see* below) and has its own Order of Merit (1951). The German Democratic Republic has the Karl Marx Order (1953), the Patriotic Order of Merit (1954) and the Banner of Labour Order (1954).

Greece.—Orders of the Redeemer (with five classes, all numerically restricted in membership, 1833), of George I (1915), of the Phoenix (1926), of St. George and St. Constantine (1936), of St. Olga and St. Sophia (1938) and of Beneficence (1948).

Hanover.—Royal Guelphic Order (founded during the personal union of the British and Hanoverian crowns, with five classes 1815) and orders of St. George (family order, 1839) and of Ernest Augustus (with five classes, 1865).

Hesse.—Orders of the Golden Lion (for Hesse-Kassel, 1770; for Hesse-Darmstadt, 1876) and, for Hesse-Darmstadt, of Louis (1807), of Philip the Magnanimous (1840) and of the Star of Brabant (1914).

Holy See.—The highest of the pontifical orders of knighthood is the Order of Christ (reserved for heads of state and princes, with one class only). Constituted in 1319 as a military order under the pope and the Portuguese crown jointly, it was governed by the Cistercian rule, but was relieved of the obligation to celibacy in 1499. From 1522 to 1789 the Portuguese and the papal branches became progressively distinct; and thereafter the papal branch survived as a separate order. The Knights of the Golden Spur, who seem originally to have been equivalent to knights of the bath in the medieval sense, emerged as an order, the Milizia Aurata, in the 16th century. This order was reconstituted as the Order of the Golden Spur or Milizia Aurata of St. Silvester in 1841 and again, under its old name (with one class only) in 1905, when the Order of St. Silvester (three classes) came into being as a separate entity. Other orders are those of St. Gregory the Great (for loyal services to the papacy, with four classes in 1831 but with three only from 1834) and of Pius IX (with two classes in 1847 and three from 1856). The rectorate and perpetual administration of the Order of the Holy Sepulchre (1497, reorganized 1746 and, with three classes, 1868), was granted in 1931 to the Latin patriarch of Jerusalem.

Hungary.—The Order of St. Stephen (1764) was sometimes conferred by the Habsburg sovereigns on persons who might have received the Golden Fleece if they had been Catholics. Under the regency there were orders of Merit (1922) and of the Sacred Crown (1943). The republican regime instituted orders of Liberty (1946), of Kossuth (1948), of the Republic (1949), of the Red Flag (labour and military divisions, 1953), of the Red Star and of Labour.

Iceland.—Order of the Falcon (1922).

Italy.—The kingdom of Italy under the house of Savoy continued several orders instituted by the dukes of Savoy or kings of Sardinia. Such were: the Order of the Annunziata, whose origin is described above, under *History*, and whose knights enjoyed the highest precedence and were styled as "cousins" of the king; the Order of St. Maurice and St. Lazarus, formed by the merging of the Savoyard Order of St. Maurice (1434; revived 1572) with a branch of the religious knights of St. Lazarus (dating from the period of the crusades in Palestine; settled in Naples from 1311; tentatively merged with other religious orders of knights in the 15th century, but resurrected in 1517) and completely secularized in the course of the Risorgimento; the Military Order of Savoy (1815); and the Civil Order of Savoy (1831). The Order of St. Maurice and St. Lazarus (transformed into a charitable organization) and the Military Order, now styled "of Italy," were continued by the 20th-century republic, but the other royal orders mentioned above, together with the Order of the Crown of Italy (1868), were officially suppressed. The republic has also orders of Merit of the Republic, of the Star of Italian Solidarity and of Merit of Labour.

Latvia.—Orders of Lacplesis (1919) and of the Three Stars (1924) during the period of independence.

Liechtenstein.—Order of Merit (1937).

Lithuania.—Military Order (1919) and orders of the Grand Prince Gediminas (1928) and of Vytautas (1930) during the period of independence.

Lucca.—Order of St. Louis (1836; transferred to Parma, 1847)

Luxembourg.—Orders of the Golden Lion of Nassau (dynastic; reserved to Luxembourg since the severance of the personal union with the Netherlands), of the Oak Crown (1841), of Adolphus of Nassau (1858).

Mecklenburg.—Orders of the Wendish Crown (dynastic, for both duchies, 1864) and of the Griffin (for Mecklenburg-Schwerin, 1884; extended to Mecklenburg-Strelitz, 1904).

Monaco.—Order of St. Charles (1858).

Montenegro.—Orders of St. Peter (dynastic, 1852) and of Danilo.

Netherlands.—Orders of William (military, with four classes, 1815), of the Netherlands Lion (civil, 1815), of the Golden Lion of Nassau (till 1890; *see* above, *Luxembourg*), of Orange-Nassau (five classes, 1892), of the House of Orange (five classes, for outstanding services to the royal house, 1905).

Norway.—Orders of St. Olaf (with five classes, 1847) and of the Norwegian Lion (one class only, with foreign heads of state and princes admitted, 1904).

Oldenburg.—Order of Peter Frederick Louis (1838).

Parma.—Constantinian Order of St. George (1816; a facsimile of an order, of supposedly Byzantine origin, of which the Farnese dukes of Parma had been grand masters from 1697 to 1731); Order of St. Louis (founded for Lucca, 1836; transferred to Parma by the Bourbons, 1847).

Poland.—Order of the White Eagle (1705; revived as the premier order of the republic, with one class only, 1921); Order of St. Stanislaw (1765); Order *Virtuti Militari* ("for military valour," 1792; revived, 1919); orders of *Polonia Restituta* (five classes, 1921), of the Cross of Independence (two classes, 1928), and of the Grunwald Cross (five classes, 1944).

Portugal.—The old religious orders of knights, namely those of St. Benedict of Avís (founded at Evora in the 1160s; at Avís from 1211) and of Christ (jointly papal and Portuguese from 1319; *see* above, *Holy See*), together with the Portuguese branch of the Order of Santiago (separated from the Spanish in 1290), were secularized in 1789—the first to become an order of military merit, the second to rank as the premier order of the kingdom (accessible only to Roman Catholics) and the third to be conferred, from 1862, for merit in science, literature or art. Later institutions were the orders of Elizabeth (for ladies, 1801), of the Tower and Sword (1808, supposedly reviving the Order of the Sword of 1459; reconstituted as an order of merit, military and civil, 1832), of Our Lady of the Conception of Vila Viçosa (1819) and of Agricultural and Industrial Merit (1893). The republic, which adopted the three orders secularized in 1789 and the orders of the Tower and Sword and of Agricultural and Industrial Merit, also confers orders of Public Education (1927), of Civil Merit (1929) and of the Colonial Empire (1932).

Prussia.—The two highest orders were those of the Black Eagle (reserved for princes and great officers of state, with one class only, 1701) and of the Red Eagle (originated by Brandenburg-Bayreuth, 1705; transferred to Prussia, 1791). Of great distinction also was the *Ordre pour le Mérite* (Order for Merit), established by Frederick the Great in 1740 to supersede the Brandenburg Order of Generosity (1667), with membership both military and civil; entirely militarized in 1810, it recovered its civil class, for the arts and sciences, in 1842. Other orders were those of Louisa (for ladies, 1814), of the Royal House of Hohenzollern (1851; not to be confused with the Order of the Dynasty, bestowed by the head of the Swabian branch of the Hohenzollerns

from 1841), of the Crown (1861), of William (1896) and of Merit of the Prussian Crown (1901).

Rumania.—Orders of the Star of Rumania (1877), of the Crown of Rumania (1881), of Carol I (1896) and of Ferdinand (1929), with others for specialized merit; superseded under the Communist regime by those of the Star of the Rumanian People's Republic (1948), of Labour (1948), of Patriotic Defense (1949), of Maternal Glory (1951), of Military Merit (1954), of Special Services in Defense of the Social and State System (1958) and of August 23 (1959).

Russia.—Orders of St. Andrew (the premier order, with one class only, 1698), of St. Catherine (for ladies, 1714; at first called the Order of Rescue, in allusion to the services rendered by the future empress Catherine I during Peter the Great's difficult campaign on the Pruth river in 1711), of St. Alexander Nevski (1725), of St. George (military and naval, 1769), of St. Vladimir (1782), of St. Anne (founded by Holstein-Gottorp, 1735; taken over by Russia, 1797); also the White Eagle and St. Stanislaw (both taken over from Poland). For orders after the Revolution *see* below, *U.S.S.R.*

San Marino.—Orders of San Marino (with five classes, 1859) and of St. Agatha (with five classes, 1923).

Saxony and the Saxon Duchies.—The Albertine branch of the house of Wettin (electors of Saxony from 1547, kings from 1806) conferred the orders of St. Henry (military, 1736), of the Crown of Rue (reserved for princes and for Saxons of the highest distinction, with one class only, 1807), of Civil Merit (1815), of Albert the Courageous (1850), of Sidonia (for ladies, 1870) and of Maria Anna (for ladies, 1906). For the Ernestine branch, Saxe-Weimar had the Order of the White Falcon (1732, revived 1815) while the three Ernestine duchies of the Gotha line, namely Saxe-Altenburg, Saxe-Coburg-Gotha and Saxe-Meiningen had the dynastic Order of Ernest (1833) in common.

Serbia.—Orders of Takovo (1865; discontinued from 1903), of the White Eagle (the highest order, 1882), of St. Sava (1883), of Milosh the Great (1898; discontinued after 1903), of the Star of Karageorgevich (1904).

Slovakia.—Orders of Pribina and of the Slovakian Cross (from 1940 to 1945 only under Jozef Tiso's presidency).

Spain.—The administration of the religious-military orders of Calatrava, of Alcántara and of Santiago was annexed to the Spanish crown in 1523, that of the Order of Montesa in 1587, while the grand mastership of the Order of the Golden Fleece was an inherited possession of the crown (*see* above, *History*). Apart from the Golden Fleece, these orders (the first three of which were relieved of the obligation to celibacy in 1540) and also those of Charles III (1771) and of María Luisa (for ladies, 1792) were suppressed by Joseph Bonaparte, whose Royal Order of Spain (1809) took their place till they were revived on the Bourbon restoration (1814); they became merely honorific in the course of the 19th century. Other orders include those of St. Ferdinand (military, 1811), of St. Hermenegild (military, 1814), of Isabella the Catholic (originally for service in defense of Spain's American possessions, 1815), of Beneficence (1856), of Military Merit (1864), of Naval Merit (1866), of María Victoria (1871), of Maria Christina (military, 1890), of Alfonso XII (for writers, artists and scientists, 1902; renamed Order of Alfonso X the Wise, 1939), of Agricultural Merit (1905), of Civil Merit (1926), of the Cross and Arrows (1937), of St. Raymond of Peñafort (for judicial services, 1944), of Cisneros (for political services, 1944) and of Africa (1950).

Sweden.—The Order of the Seraphim, said to date from the 1330s if not from 1280, was reconstituted in 1748 as the prime order of the kingdom. With its membership restricted to the sovereign, to princes of the blood, to 23 other Swedish knights (who must preliminarily belong to the Order of the Pole Star or to that of the Sword) and to 8 foreigners, it has the motto *Jesus Hominum Salvator,* recalling the earlier Order of the Saviour (1561); its badge carries the initials I.H.S. with three golden coronets on a blue ground in the centre of a white cross which has golden heads of seraphim in the angles between its arms; and its ribbon is blue. The Order of the Sword (military, with a yellow ribbon), supposed to date from 1522, was likewise reconstituted in 1748, when also the Order of the Pole Star (civil, with a black ribbon) was founded. There are also the orders of Vasa (for industrial services, 1772) and of Charles XIII (for high dignitaries of the Freemasons, 1811).

Tuscany.—Orders of St. Stephen (approved by Pope Pius IV as a crusading order, 1561), of St. Joseph (1807) and of Military Merit (1853).

Two Sicilies (Naples).—Orders of St. Januarius (1738), of St. Ferdinand (military, 1800) and of Francis I (1829); also the Constantinian Order of St. George, transferred to Naples in 1759 by the Bourbon successors of the Farnese dukes of Parma (*see* above, *Parma*).

U.S.S.R.—The Russian republic had instituted an Order of the Red Flag (for heroism in wartime, 1918) and an Order of the Red Flag of Labour (for conspicuous service to the economy, to the government, to science, to literature or to the arts, 1920); and the latter had been reproduced in several of the other Soviet republics before the corresponding all-Union orders came into being (1924 and 1928 respectively). The Order of Lenin, as the highest order of the Union, and the Order of the Red Star were instituted in 1930, the Insignia of Honour in 1935. Orders dating from World War II are those of the Patriotic War (two classes, 1942), of Suvorov (for administrative work in the army, with three classes, 1942), of Kutuzov (for commanders victorious in defensive action, with two classes 1942 and a third 1943), of Alexander Nevski (for commanders victorious in offensive action, 1942), of Bohdan Chmielnicki (Bogdan Khmelnitski, with three classes, 1943), of Victory (the supreme military order, for high-ranking officers, 1943), of Glory (junior officers and lower ranks of the air force, three classes, 1943), of Ushakov and of Nakhimov (both naval with two classes, 1944), of the Heroine-Mother (1944) and of Maternal Glory (three classes, 1944).

Württemberg.—Orders of the Crown (1818, incorporating the dynastic Order of the Golden Eagle of 1702), of Military Merit (1759), of Frederick (1830) and of Olga (1871).

Yugoslavia.—The kingdom inherited the Serbian orders and had also its Order of the Crown (1929). The republic has nine civil orders, namely those of the Yugoslav Grand Star, of the Hero of Socialist Labour, of National Liberation, of the Yugoslav Star (three classes), of the Yugoslav Flag (five classes), of Service to the Nation (three classes), of Brotherhood and Unity (two classes), of the Republic (three classes) and of Labour (three classes); and seven military orders, namely those of Freedom, of the National Hero, of the War Flag, of the Partisan Star (three classes) and of the National Army (three classes) and those for Military Service (three classes) and for Bravery.

3. Latin-American Orders.—*Argentina.*—Orders of the Liberator San Martín and of May for Merit (five classes each).

Bolivia.—Order of the Condor of the Andes (1922).

Brazil.—The imperial regime conferred the Portuguese orders of Christ, of St. Benedict of Avís and of Santiago and its own orders of the Southern Cross (1822), of Dom Pedro I (1826) and of the Rose (1829). The republic revived the Southern Cross (1933) and instituted orders of military and naval merit (1934).

Chile.—Order of Merit (1817; reconstituted after extinction, 1911).

Colombia.—Orders of Boyacá (1922), of San Carlos, of Almirante Padilla, of Antonio Ricaurte, of Gen. José María Córdoba and of Antonio Narino.

Cuba.—Order of Merit (1912), Order of Carlos Manuel de Céspedes (1926), National Order of Carlos J. Finlay (1928) and specialized orders of merit.

Dominican Republic.—Order of Merit Juan Pablo Duarte (with collar for the president and with six other classes, 1931; renamed Order of Merit of Duarte, Sánchez and Mella as from 1955), and Order of Christopher Columbus (1937). The Trujillo Order, with precedence between the aforesaid two, lapsed on the fall of the Trujillo regime.

Ecuador.—National Order of Merit (with four classes).

Guatemala.—Order of the Quetzal (with six classes, 1936), National Order of Pedro de San José Bethancourt (1958), Order of

the Five Volcanoes (1961).

Haiti.—Royal Military Order of St. Henry (1811–19), Order of Faustin I (1853–58), National Order of Honour and Merit (1926), Order of Pétion and Bolívar (1939).

Honduras.—Order of St. Rose and of Civilization (1868), Order of Morazán (1941).

Mexico.—Imperial Order of Guadalupe (1821, extinct with the fall of Iturbide; temporarily restored 1853–55 and 1863–67), Imperial Order of the Mexican Eagle (1865; extinct 1867), Imperial Order of St. Charles (for ladies, 1865–67), Order of the Aztec Eagle (with collar for heads of state and with four other classes, 1933).

Nicaragua.—American Order of San Juan (1857), Order of Rubén Darío (1947; organized with seven classes, 1951).

Panama.—Orders of Vasco Núñez de Balboa (1938) and of Manuel Amador Guerrero.

Paraguay.—Order of Merit (1865).

Peru.—Order of the Sun of Peru (1821), Order of Ayacucho (1932) and specialized orders of merit (from 1946).

Salvador, El.—Order of José Matías Delgado.

Venezuela.—Orders of the Liberator (1825) and of Francisco de Miranda (1939).

4. Orders of Other Countries.—*Afghanistan.*—Orders of the Sun (Almar, with two divisions each of one class), of the Sardar (with two divisions each of one class), of Independence (military, with four classes), of the Star (with four classes), of Loyalty (with three classes), of the Great Khan, of Bravery and of the Afghan Crown.

Burma.—Orders of Thudhamma Thingaha and of Pyidaungsu Sithu Thinga.

Cambodia.—Royal Order of Cambodia (for services to the king, 1862) and orders of Monisaraphon (1905), of Agricultural Merit (1923), of Satrei-Vathana (for women), of Sahametrei and of National Merit.

Cameroon.—Orders of Valour, of Merit, of Co-operative Merit.

Central African Republic.—Orders of Merit and of the Medal of Recognition.

Chad.—National Order and Order of Agricultural Merit.

Chinese Empire.—Orders of the Dragon (with 11 classes, 1862), of the Imperial Double Dragon (for foreigners, 1882), of the Brilliant Jade, of the Cloud and Banner, of the Sacred Tripod.

Congo (Republic).—Orders of Merit and of Devotion.

Dahomey.—National Order and Order of Merit of Benin.

Egypt.—Orders (1915) of Mohammed Ali (for exalted persons, with three classes), of the Nile (five classes), of Agriculture (two classes) and of el-Kemal (for women, three classes).

Ethiopia.—Orders of the Seal of Solomon (1874), of the Queen of Sheba (for ladies), of the Trinity, of Menelik II and of the Star of Honour.

Gabon.—Orders of the Equatorial Star, of the Medal of Recognition and of Merit.

Ghana.—Order of the Star of Ghana (for the president and commanders grand cross, 1960), Order of the Volta (with military and civil divisions, for the president and three classes, 1960), Ghana Service Order (with three divisions, 1960), Order of the Black Star (the highest honour, for the president and three classes, 1962), Most Exalted Order of Africa's Redemption (for the president and commanders grand cross, ranking next to the Black Star, 1962). The Nkrumah Cross (for valour, 1960) gives precedence immediately after the two last-named orders.

Guinea.—Cross of the Companions of Independence.

Hawaii.—The kingdom had orders of Kamehameha I (with three classes, 1865), of Kalakaua (with four classes, 1874) and of Keopuolani (with seven classes).

India.—The republic has the Bharat Ratna (the highest distinction, for public service and for exceptional merit in literature, art or science), the Padma Vibhushan, the Padma Bhushan and the Padma Shri.

Iran.—Orders of the Sun and Lion (1808) and of the Sun (for ladies, 1873) superseded by those of Pahlavi (1926), of Taj Iran, of Humayun, of the Crown, of the Empire and of Science.

Iraq.—The kingdom had orders of er-Rifadain (1928), of the Hashemites (1932) and of the Two Rivers (1932).

Ivory Coast.—National Order (with three grades and two "dignities"), Medal of Merit (with three classes), Order of Merit in National Education (three classes).

Japan.—In line of precedence, there are the Collar of the Supreme Order of the Chrysanthemum (for men only, 1888), the Grand Cordon of the Supreme Order of the Chrysanthemum (for men only, 1877), the First Class of the Order of the Rising Sun with Paulownia Flowers (for men only, 1888) and the orders of the Rising Sun (with eight classes, for men only, 1875), of the Precious Crown (with eight classes, for ladies only, 1888), of the Sacred Treasure (with eight classes, 1888) and of Culture (1937).

Johore.—Orders of the Dynasty and of the Crown.

Korea (South).—Orders of Merit and of the Founding of the Nation.

Laos.—Orders of the Million Elephants and the White Parasol, of the Reign, of Civil Merit, of Agriculture and of the Combatant.

Lebanon.—Orders of the Cedar and of Merit.

Liberia.—Humane Order of African Redemption (1879) and Order of the African Star (1920).

Libya.—Order of Idris I.

Madagascar.—The Hova monarchy, down to 1897, had the Voninahitra honours (1817; still continued under the Malagasy republic), the Order of King Radama II (1861) and the Royal Order of Madagascar (1896). The Malagasy republic instituted the National Order (1959) and the Malagasy Merit (1960).

Mali.—National Order, Silver Star of National Merit and Gold Medal of Independence.

Manchuria.—Orders of the Orchid, of the Dragon Ray, of the Prosperous Cloud (all 1934), of the Upholders of the State (1936).

Mauritania.—Order of National Merit.

Mongolia.—Orders of the Red Flag and of the Red Star.

Morocco.—Orders of Hafid (1910), of the Aliyids and of Merit (1963).

Nepal.—Orders of Ojaswi Rajanya, of the Star (1918), of the Three Divine Powers, of the Gurkha Right Hand (1932), of the Kingdom (the highest, with one class only, 1934).

Niger.—National Order.

Pakistan.—Orders of Pakistan (the highest), of Shujaat (for bravery), of Imtiaz (for writers, artists, sportsmen, doctors and scientists), of Quaid-i-Azam (for services to the state), of Khidmat. Each has four classes: the nishan (crescent and star), the hilal (crescent), the sitara (star) and the tamgha (a plain medal).

Philippine Republic.—Orders of Sikatuna, of the Golden Heart, of the Legion of Honour.

Saudi Arabia.—Order of al-Nahda.

Senegal.—National Order and orders of Merit and of 20 August.

Sudan.—The Republic of the Sudan in 1961 instituted "decorations" distinct from medals and equivalent to orders as follows: the Chain of Honour (for heads of state), the Sash of Honour (limited to 15 Sudanese subjects, apart from supernumerary foreign members), the Decoration of the Republic (five classes), the Decoration of the Two Niles (five classes), the Decoration of Distinction (for ladies, three classes) and decorations for bravery, for long service in the armed forces or police, for meritorious service to the state and for achievement in sport.

Thailand.—Orders of the White Elephant (1861), of the Crown (1869), of Vajiramala (1911), of Rama (1918) and of Vallabhabhorn (1919), as well as the dynastic orders of the Nine Precious Stones (1851; reviving the Sacred Order of ?1782), of Chulah-Chon-Chao (1873) and of Maha Charkrkri (1882).

Togo.—National Order of Mono and National Order of Honour.

Tunisia.—Orders of Glory (1837; reconstituted, with three classes, 1880), of Reconciliation (1859) and of Independence.

Turkey.—The Ottoman empire's Order of Glory (Nishan-Iftikhar, 1831) was superseded by the Mejidie (with five classes, 1852). Later orders were the Osmanie (1862) and the orders of Compassion (Shefakat, originally for ladies who had worked to aid victims of the Russo-Turkish War, 1878) and of Merit (Imtiaz, 1880).

Vietnam.—National Order (1950) and Order of Kim Khanh (1957).

Volta.—National Order and Order of Merit.

Zanzibar.—Orders of the Brilliant Star (1875), of el-Hamudivah and el-Alivah.

See HERALDRY; MEDALS AND DECORATIONS; *see* also references under "Knighthood, Chivalry and Orders" in the Index.

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KNIGHTON, HENRY (d. *c.* 1396), English chronicler, was already an Austin canon of the abbey of St. Mary of the Meadows at Leicester in 1363. The appearance of a Leicester chronicler at this time is yet another proof of the sudden prosperity acquired by the monastery during the abbacy (1345–78) of William Clown, an intimate of Edward III and of Henry of Lancaster. The "most valuable part" of the chronicle, covering the years 1377–95, for long regarded as a continuation by another Leicester canon, was in fact Knighton's original and earliest contribution. It is especially valued for its vivid picture of John Wycliffe and the rise of the Lollards and for its favourable account of the elsewhere unpopular John of Gaunt. To this chronicle of contemporary events Knighton prefaced a "history" which was to have covered the period from 1066 to the "present time." This part of the work falls into two distinct sections: one, to 1337, is a compilation, with occasional emendations, of earlier works, mainly of a version of the *Polychronicon* of Ranulf Higden (*q.v.*), ending in 1337; the other, from 1337, is Knighton's own work, which he tells us he wrote unaided. The author's death, probably in 1396, prevented him from concluding his history, which stops abruptly in 1366. Knighton's chronicle was first printed by Roger Twysden from the author's autograph (*Historiae Anglicanae scriptores* x, 1652). As in the case of Higden, the authorship is revealed by an acrostic.

See J. R. Lumby (ed.), *Chronicon Henrici Knighton,* 2 vol. (1889–95); V. H. Galbraith and R. A. B. Mynors, "The Chronicle of Henry Knighton," in *Fritz Saxl,* ed. by D. J. Gordon (1957). (V. H. G.)

KNIGHT SERVICE was the distinctive service due for tenures held under feudalism (*q.v.*). For a long time fiefs were essentially granted by lords who wanted the military service of knights, *i.e.,* mailed horsemen armed with lance, sword, coat of mail and shield, whether for participation in a war or expedition (*expeditio, hostis*), such as the *Römerzug* or journey of the German kings to Rome for their imperial coronation; or simply for riding and escorting services (*equitatio, cavalcata*); or again for castle guard (*q.v.; stagium, custodia*). To secure this service, lords could either enfeoff one man for direct and personal service or enfeoff somebody more lavishly against the obligation of appearing at summons with a certain number of knights, whose services had been secured by subinfeudation or otherwise. This number usually bore some relation to the size of the fief, though in countries under Norman rule (Normandy, southern Italy and England) it might often be based on the *constabularia* of ten knights and assessed in multiples of five (half a *constabularia*).

Originally service and equipment were supposed to be at the vassal's expense. The normal period of service was 40 days a year. In England this service was held to be due to the king only, so that a tenant in chief or mesne tenant could not summon his vassals for his own private purposes; and in theory the obligation was for service in England only, so that on several occasions in the 13th century the English barons made objections to serving overseas.

As time went on variations developed. Certainly from the mid-12th century it began to suit both king and tenants for fewer knights to be summoned, perhaps then to serve for longer than 40 days; or the balance of service due would be taken in scutage (*q.v.*). By 1300 the decline in the importance of cavalry, the increasing use of mercenaries and the steady resistance of tenants had combined in most places and countries substantially to reduce the number of knights summoned from any fief.

Ecclesiastical tenants holding land by knight service were expected to pay or to enfeoff sufficient knights to meet their obligation in full. All tenures by knight service were also subject to the usual feudal incidents of homage, aid (*qq.v.*) and relief; but ecclesiastical tenants, by their status as corporations, evaded the further incidents of wardship, marriage, escheat and forfeiture.

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(R. C. v. C.)

KNIGHTS OF COLUMBUS: *see* FRATERNAL ORGANIZATIONS.

KNIGHTS OF THE GOLDEN CIRCLE, a semimilitary secret society that was said to exist in the middle western states during the American Civil War. In 1859 George Bickley, a filibuster and adventurer, had launched a fraternal order which proposed to establish military colonies of Americans in Mexico which would lead eventually to the annexation of all Mexico to the United States. This would, according to the claims of the promoter, protect the southern states from being overwhelmed by the industrial and commercial interests of the north. Widespread publicity in southern expansionist newspapers called attention to the new order, and Bickley soon claimed 65,000 members and later increased his claims to 115,000. He was, however, widely denounced as a humbug and knave.

The order itself had little influence in the south, and few or no northern adherents. With the outbreak of the war, however, Republicans charged that Democrats who opposed the conduct of the war were influenced by, or were members of, the Knights. The alleged existence of the order gave excuse for the formation of Union League clubs to carry on counterpropaganda. Although civil and military authorities made strenuous efforts to uncover the order and charges abounded in newspapers and in political oratory and "exposures" found their way into print, no single member or unit of the organization was ever brought to light. As the hollowness of the charges became apparent, Republican propagandists alleged that the Sons of Liberty had taken its place. In the new version, 250,000 to 300,000 oath-bound members existed in the middle west. Fernando Wood, former Democratic mayor of New York city, and C. L. Vallandigham of Ohio were reputed to be the chief officers. They opposed the U.S. government's war policy, actively encouraged desertion, prevented enlistments and resisted the draft. Receiving reports of the activities of the Order of American Knights (a new name for the alleged order) in Missouri and Illinois, Lincoln sent his secretary, John Hay, to investigate. The new charges, said Lincoln on receiving Hay's report, were "as puerile as the Knights of the Golden Circle." Treason trials against members of the Sons of Liberty in Indianapolis on the eve of the election of 1864 furnished campaign material for the Republicans. The leaders were sentenced to death by military commissions, but sentence was suspended, and in 1866 they were released under a decision of the U.S. supreme court. *See* also COPPERHEAD.

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KNITTING is the art of making fabric in which the loop, a segment of yarn disposed in the form of a rounded fold, is the principal element. The structure of every knitted fabric is characterized by successive rows of loops drawn through another series of loops. In the production of the fabric this operation can be con-

tinued indefinitely, and in many tubular and flat fabrics the stitch pattern is complete on one row of loops, all succeeding rows being duplicates of the first.

The two basic types of knitted structures are weft knit and warp knit. Weft-knit fabrics are more generally seen, although after 1940 great strides were made in the manufacture of warp-knit fabrics. In weft-knit fabric the yarn of which the fabric is composed follows a path across the cloth, while in warp-knitted structures a number of warp threads follow a path which is, in general, vertical and parallel with the edges. Both types of fabric can be made by hand or by machine. The production of weft-looped fabrics by either method is known as knitting; the production of warp-looped fabrics by hand is known as crocheting and by machine as warp knitting. (For hand knitting and crocheting *see* NEEDLEWORK.)

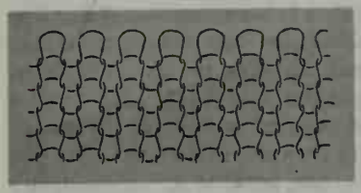

FIG. 1.—WEFT LOOP OR PLAIN FABRIC

The primary device of every knitting machine is the needle. There are two widely used types, the spring beard needle and the latch needle. Both are capable of forming identical structures but in a somewhat different manner. The spring beard needle is a one-piece needle and is formed from thin wire. For many machines one end is turned at a right angle to form an operating butt, and the other is drawn down to thinner dimensions and turned to form an extended hook. The outer portion of this hook forms a spring beard which may be closed by pressing it against the stem of the needle.

Knitting is accomplished by placing yarn under the spring beard, pressing the beard to close it, and then drawing this new loop through the one held on the needle stem. This needle requires mechanical closing and the timing of the stitch-drawing function must be accurately co-ordinated with beard-pressing. The spring beard needle was a part of the original knitting machine invented by William Lee in 1589, and in spite of the development of other needle types it is still used in many knitting machines.

In 1847 Matthew Townsend invented a needle known as the latch or tumbler needle. It is also usually formed from wire, although some very good types have been fashioned from flat stock. The latch needle is formed by making a thin saw cut just below the hook and placing in this a short hinged member known as the latch. The latch swings on a rivet extending through the walls of the needle stem and the latch itself. The function of the latch is to close the hook so that loops or stitches previously drawn can be cast off to join others in the fabric.

Needles are made in various lengths and thicknesses. The degree of fineness is designated by "gauge." Needles for fine hosiery range from 70- to 80-gauge, a thickness of approximately $\frac{12}{1,000}$ in., while those for heavy sweaters may be as coarse as 4-gauge, a thickness of approximately $\frac{90}{1,000}$ in. Between these extremes are those for machines knitting men's and children's hosiery, underwear and many forms of outerwear, which employ needles in the range of 36- to 48-gauge.

In some types of knitting machines the needles are mounted in a circle, in others in a straight line in a needle bar or needle plate. In circular machines the needle-holding device is a cylinder or a dial. Some circular machines have two sets of needles. One set is retained in a cylinder, the other in a dial placed concentrically with the cylinder so that the two sets of needles interlock. The needles are mounted in grooves cut in the dial or cylinder wall. In knitting, the operating butts move through cam tracks, causing the needles to slide up and down in the grooves in order to pick up the yarn, form a new loop and cast off the loop previously formed. The rows of stitches are built up in spiral order. Smaller machines for seamless hose have one or two yarn feeds; in larger circular machines for the manufacture of underwear and outerwear the number of feeds is much greater. In a machine with 64 feeds, for example, each needle will draw 64 stitches for each revolution of the knitting cylinder and the pitch of the spiral will be increased.

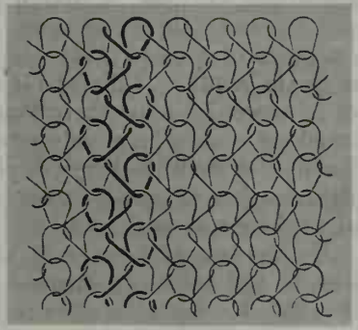

FIG. 2.—WARP FABRIC

Open-top machines with one set of needles in the cylinder generally have also a dial for the co-operating members known as sinkers, thin pieces of polished steel which work between the needles to form a base or support for the rows of stitches. Sinkers have hooks which move in to cover the rows of stitches and prevent their rising up with the needles as they are moved upward and downward. This type of machine can be operated with or without tension on the fabric. In some hosiery machines no tension is applied to the work; one unit is knitted at a time and upon completion is dropped off the needles into a receptacle. Another unit is begun immediately.

Where the fabric is continuous, a set of draw-off rolls applies tension to the work and passes it along to a windup device which forms the cloth into rolls weighing up to 30 or 40 lb. If the fabric is tubular it is drawn over a spreading frame to bring it to a predetermined width. In circular knitting, loop formation continues without interruption from many cones of yarn. Production is rapid and more economical than other methods of making cloth.

In modern circular knitting machines, knitting feeds are placed as close as possible around the circumference of the cylinder to increase the rate of production. Where needles with fairly short latches are employed, it is considered practical to place one feed for each inch of diameter. A 24-in. machine would thus be fitted with 24 knitting feeds, each of which occupies about $3\frac{1}{8}$ in. of the cylinder circumference.

In knitting machines built on the flat-bed or straight-bar principle, knitting is back-and-forth across the fabric and the number of needles may be increased or decreased at any point, thus producing a flat knit article of any desired shape. The fabric may also have selvages on three sides, which is not possible with circular machines. In widening, needles which have been idle at the margins are put into action by raising them to knitting level and causing them to pick up stitches and continue knitting. In narrowing, active needles on the margins are stripped of their stitches, which are moved inward and transferred to adjacent needles; the empty needles are moved to idle position where they remain until needed again. Fabric made in this manner is then joined to make full-fashioned garments—hosiery, sweaters and the like. Because there are no cut stitches, seaming is more secure, the garment is better looking and there is no waste.

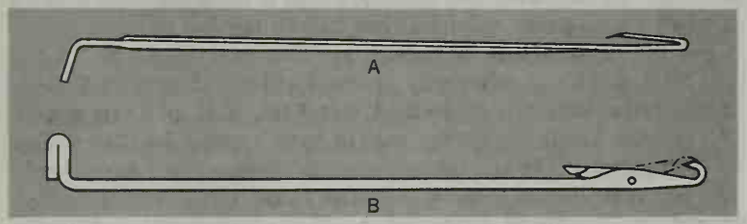

FIG. 3.—(A) SPRING BEARD NEEDLE; (B) LATCH NEEDLE

On commercial equipment widening and narrowing are done automatically. In the Cotton machine narrowing combs, which are fitted with quill points set with the same spacing as the needles, are mounted above the needle bar. Automatic narrowing is accomplished by causing the machine to retain the needle bar in a relatively fixed position while the narrowing combs are lowered into contact with the needles. Narrowing points penetrate the marginal loops, raise them off their needles, shift them inward one or two needle spaces and place them on other needles. The time required for one narrowing or widening movement is equivalent to one knitting course, and production is therefore somewhat slower than in circular knitting.

In flat machines, two methods of mounting, holding and controlling the needles are employed. In one type of flat machine, for example, the Lamb machine, the needles are mounted in grooves

cut in the needle plate, and the movements required for knitting are supplied by moving cams. In other machines the needles are held rigidly in a fixed position in the bar and operated en masse. In some of these machines the needles are clamped to the needle bar by sectional plates and cap screws. In others, the needles are molded in lead or an alloy of lead, antimony and tin. In preparing leaded needles, the needles are placed in a mold with their lower ends extending into a space in the mold where the molten metal is poured. Upon cooling, the metal solidifies and the completed lead is removed from the mold and set in the machine; the entire group of needles (generally one inch) is attached to the needle bar with a single cap screw, and the method therefore requires less machining than does the mounting of needles in individual grooves. The number of needles in one lead may be 2 or 3. Up to 18 or 20 are used in one unit for the raschel machine, a warp knitting machine that can produce intricate eyelet and lacy patterns. Leaded needles were used in the original knitting machine and in systems where the method is applicable it has the advantages of simplicity and cheapness.

In addition to these power-driven knitting machines, there are some very good types, designed for use in the home, which are cranked by hand. Both circular and flat-bed types are manufactured. Circular machines containing about 60 needles in a cylinder about 5 in. in diameter seem to be the most widely used in making hosiery in the home. These units are capable of making socks in both rib and jersey stitch. Flat machines are of the rib or V-bed type and may be operated from the edge of a table. The productivity of these domestic machines is greater than the output of the most skilled knitter working with hand knitting needles.

Gauge as a measure of texture (to be distinguished from the use of the term for the size of needles) varies in different branches of the knitting industry. In tricot warp knitting it is the number of needles per inch. In the raschel system it is the number of needles in 2 in.; a 36-gauge raschel machine, for example, has 18 needles per inch. In full-fashioned hosiery, gauge is the number of needles in 1½ in.; a 60-gauge machine thus has 40 needles per inch.

For the manufacture of hosiery *see* HOSIERY. (W. E. SN.)

KNOCK (CNOC MHUIRE), a small village of eastern County Mayo in the Republic of Ireland, lies 7 mi. N.E. of Claremorris. In 1879 the Virgin Mary was said to have appeared in the village to 15 villagers. The apparitions and miraculous cures are the subject of ecclesiastical inquiry, and the cause for including Knock among the recognized shrines of the Blessed Virgin was still being considered in Rome in the early 1960s. The little church at Knock is a place of pilgrimage visited each year from May to October by many thousands of pilgrims from all over the world who come to pray at the shrine of Our Lady of Knock. The ambulance corps of the Irish Association of the Sovereign Order of Malta cares for the invalids during the pilgrimages; the main one takes place on Aug. 15 (the Feast of the Assumption). (D. V. O'D.)

KNOLLES, RICHARD (*c.* 1550–1610), English scholar, whose *The Generall Historie of the Turkes* (1603) was highly praised for its prose style by Samuel Johnson, Henry Hallam, Robert Southey and Byron, but is of little historical value. It was continued to the treaty of Karlowitz (1699) by Sir Paul Rycaut in an edition of 1687-1700. Knolles was born probably at Cold Ashby, Northamptonshire, and graduated from Lincoln college, Oxford, in 1565, being elected fellow in 1571. He became master of the grammar school at Sandwich, Kent, where he died in 1610. His only other published work was a translation of Jean Bodin, *The Six Bookes of a Commonweale* (1610).

KNOLLYS, the name of an English family descended from Sir Thomas Knollys (d. 1435), lord mayor of London, who may have been a relative of Sir Robert Knollys (*q.v.*). Sir Thomas's great-grandson Robert (d. 1521), a courtier in the service and favour of Henry VII and Henry VIII, was the father of Sir Francis Knollys (*c.* 1514–96), founder of the family's fortune.

Francis entered the service of Henry VIII before 1540 and was knighted in 1547 while serving with the English army in Scotland. He lived abroad during the reign of Mary I, but returned to England to become a privy councilor and vice-chamberlain of the royal household under Elizabeth I. His wife Catherine (d. 1569), daughter of William Carey, was a first cousin to the queen. Knollys was sent in 1566 to Ireland to obtain confidential reports on the lord deputy Sir Henry Sidney and in 1568 was sent to Carlisle to take charge of Mary Stuart, of whom he was afterward guardian at Bolton castle and Tutbury castle. He was treasurer of the royal household from 1572 until his death on July 19, 1596. His seven sons were all prominent at court, and of his four daughters, Lettice (1540–1634) was the wife successively of Walter Devereux, earl of Essex, and of Robert Dudley, earl of Leicester.

William (*c.* 1547–1632), Sir Francis' second son and heir, was knighted in 1586 and became in 1596 a privy councilor and comptroller of the royal household. Later he was treasurer of the household. He was created Baron Knollys in 1603, Viscount Wallingford in 1616 and earl of Banbury in 1626. He died in London on May 25, 1632. He had married in 1605 as his second wife, Elizabeth, daughter of Thomas Howard, earl of Suffolk. She had two sons, born in 1627 and 1631, but, because of her husband's great age and because the second son was born at the house of Lord Vaux, whom the countess married less than five weeks after the death of the earl of Banbury, doubt has been raised as to the paternity of these children. The younger, Nicholas (1631–74), styled himself 3rd earl on the death of his brother in 1645. He sat in the convention parliament but did not receive a writ for the parliament of 1661. His petition for a writ was the first of several that were rejected by the house of lords in the course of the next century and a half. After 1813 when the lords rejected a petition by Nicholas' great-great-grandson William (1763–1834), titular 8th earl, the family made no further effort to claim the earldom.

The 8th earl's son Sir William Thomas Knollys (1797–1883) entered the army and served in the Peninsular War. From 1855 to 1860 he was in charge of the military camp at Aldershot, then in its infancy, and in 1861 he was made president of the council of military education. From 1862 to 1877 he was comptroller of the household of the prince of Wales, afterward Edward VII. From 1877 until his death on June 23, 1883, he was gentleman usher of the black rod; he was also a privy councilor. His son Francis (1837–1924), private secretary to Edward VII and George V, was created Baron Knollys in 1902 and was made a viscount in 1911. Another son, Sir Henry Knollys (1840–1930), was private secretary until 1919 to Maud, queen of Norway.

KNOLLYS (KNOLLES), **SIR ROBERT** (d. 1407), one of the best-known English soldiers of fortune of the 14th century, was born of a modest Cheshire family and achieved fame and wealth through his exploits in France. Knollys first appears in 1346 fighting for John de Montfort in the Breton war of succession; he established his reputation in Brittany, where he acquired the castle of Derval. In 1351 he was captured in the famous "Combat of the Thirty." Later his raids from Brittany at the head of companies of military adventurers made him greatly feared; boasting that he fought only for himself, he burned, plundered or ransomed in Normandy and elsewhere. In 1358 Knollys and his "Great Company" established themselves in the Loire valley and burned the suburbs of Orléans; in March 1359 he captured Auxerre, which was ransomed for a huge sum. Knollys distinguished himself at the battle of Auray (1364), and accompanied the prince of Wales to Spain in 1367. Edward III appointed him senior commander of an expedition to northern France in 1370, but the "old brigand" could not control his unruly subordinates, the army broke up, and Knollys incurred the king's displeasure. After this he returned to Brittany, but he served at sea in 1377 and accompanied the earl of Buckingham to France in 1380 (his last campaign).

Knollys was in London in 1381 at the time of the Peasants' Revolt, and helped to disperse the rebels who had broken into the city. He died at Sculthorpe in Norfolk on Aug. 15, 1407.

(J. W. SE.)

KNOSSOS (CNOSSUS) was a city in ancient Crete. Its site has assumed great archaeological significance, having been identified as the earliest focus of high civilization in Europe. Excavations at Knossos have revealed prehistoric artifacts of a Neolithic people upon which were deposited the remains of the sophisticated Minoan Bronze Age culture. Earliest Minoan evidence dates to about 2500 B.C., but Knossos reached its height about 1,000 years

afterward. Plagued by earthquake and fire, Knossos yielded its dominance to the city of Mycenae (*q.v.*) on the Greek mainland a century or so later. *See* AEGEAN CIVILIZATION; CRETE: *Archaeology.*

KNOT: *see* LOG, MARITIME.

KNOT (*Calidris canutus*), a shore-inhabiting bird of the family Scolopacidae, very abundant at certain seasons on the shores of many northern countries. There are few shore birds that present greater changes of plumage according to age or season. The knot, about 10 in. long, is rather larger than a snipe, but with a shorter bill and legs. In winter the plumage is ash-gray above, except for the white rump, and white beneath. In summer the feathers of the back are black, broadly margined with light orange-red mixed with white; those of the rump, white more or less tinged with red; and the lower parts are of a nearly uniform deep chestnut. The birds that winter in temperate climates seldom attain the brilliancy of colour exhibited by those that arrive from the south. Young birds are ash-gray above, each feather banded with dull black and ochre, while the breast is tinged with warm buff. Usually four protectively coloured eggs are laid in a nest.

D. MUIR FROM NATIONAL AUDUBON SOCIETY

KNOT (CALIDRIS CANUTUS) AND EGGS IN NEST

European birds (*C. c. canutus*), breeding on the Taimyr peninsula and Spitsbergen, winter in Africa; northern Asiatic knots (*C. c. rogersi*), breeding on the New Siberian Islands, migrate to the east coast of Asia and winter in Australia and New Zealand; the American knots (*C. c. rufus*), breeding north of the Arctic circle from Melville peninsula and southeastern Victoria Island north to northern Ellesmere Island and northwestern Greenland, winter in southern South America, south of Peru on the west coast and from Buenos Aires to Tierra del Fuego on the east coast. The name is also applied to the oriental great knot (*C. tenuirostris*), probably breeding in northeastern Siberia and wintering from India to Australia and the Malays. Knots are sometimes called robin sandpipers or robin snipe. (G. F. Ss.)

KNOTS, interlacements of the parts of one or more ropes, cords or other pliable materials, commonly used as devices for binding together various objects. A description of the more familiar knots is given below. The word is also applied to any hard mass resembling a knot drawn tight as, for example, to that formed in the trunk of a tree at the intersection of a branch. "Knot" or "knob" is an architectural term for a bunch of flowers, leaves or other ornamentation carved on a corbel or on a boss. In heraldry a "knot" is an ornamental figure formed by intertwining the parts of one or more cords. The word is used on shipboard to denote the distance marks on a log line, and hence as the equivalent of a nautical mile (6,080 ft.) per hour. When a ship travels 20 nautical miles per hour, her speed is 20 knots. (*See* LOG, MARITIME.) The term is also applied figuratively to any intricate problem, hard to disentangle, a use stereotyped in the proverbial expression "cutting the Gordian knot." *See* GORDIAN KNOT.

KNOTS, BENDS, HITCHES, SPLICES AND SEIZINGS

These are all ways of fastening together the parts of one or more ropes, cords, etc., or of attaching a rope to some such object as a ring or spar. In the narrow sense, a "knot" is a knob on a rope, usually formed by untwisting the strands at an end and weaving them together (*cf.* "wall knot," fig. 2[G]), though sometimes by turning the rope on itself through a loop (*cf.* "overhand knot," fig. 1[A]). A "bend" and a "hitch" are ways of fastening ropes to one another or to spars, etc. A "splice" is made by untwisting two rope ends and weaving them together. A "seizing" is made by fastening together two spars, two ropes or two parts of the same rope by means of another rope. The use of the various terms is, however, often arbitrary. Generally speaking, the knot and seizing are meant to be permanent and must be unwoven in order to be unfastened, while the bend and hitch can be undone at once by pulling the ropes in the reverse direction from that in which they are meant to hold. The governing principle in the design of these last is that the strain which pulls against them shall draw them together. Many forms of fastening are employed on shipboard and in industry. Some of the more important ones are here described and pictured; for further details, the reader is referred to any book on seamanship. In the figures, the knots are drawn very slack and open, in general, so that their structure may be more plainly exhibited.

Knots for Fastening.—*Overhand Knot* (fig. 1[A]). Used to make a knob on a rope, or as the commencement of another knot.

Figure-of-eight Knot (fig. 1[B]). Turned in the end of a rope to prevent unreeving. It will not jam as an overhand does.

Square or *Reef Knot* (fig. 1[C]). Two overhand knots turned in opposite ways. Should be carefully distinguished from the *Granny* (fig. 1[D]), which jams when it does not slip. A square knot is unsatisfactory for uniting ropes of different sizes, as the parts will slip unless stopped down. For fastenings of a temporary nature, the second knot is sometimes turned over a bight in the end *a* of one of the ropes (fig. 1[E]). By a pull on *a*, the knot can be slipped loose. A *Thief's Knot* (fig. 1[F]), though similar in appearance to a square knot, will slip under a strain applied to the two standing parts *b* and *b'*. To make a *Surgeon's Knot* (fig. 1[G]), take an additional twist after turning the first overhand, and draw the partially completed knot taut. The parts will be held in place by the friction of the cord while the second overhand is being tied. Used in tying a ligature around a cut artery.

Half Hitch (fig. 1[H]). Pass the end of the rope round the standing part *b* and through the bight. *Half Hitch Over a Pin* (fig. 1[I]). Should be made so as to continue the lay of the rope about the pin. *Midshipman's Hitch* (fig. 1[J]).

Slippery Hitch (fig. 1[K]). Pass the end *a* under a belaying pin or cleat and tuck a bight under the standing part *b*. Can be slipped loose by a pull on *a*.

Bowline (fig. 1[L]). Forms a loop that cannot slip. A very common and useful knot. Lay the end *a* over the standing part *b*; form with *b* a bight *c* over *a*; take *a* round behind *b* and through the bight *c*. *Running Bowline* (fig. 1[M]) is a convenient temporary running noose. Formed by making a bowline over its own standing part. *Bowline on a Bight* (fig. 1[N]) is a more comfortable sling for a man than a simple bowline. Double the rope on itself; start as if to make a bowline in the doubled rope, but finish by passing the loop *c* around the loop *b*.

Sheepshank (fig. 1[O]). Used for temporarily shortening a rope. A half hitch is taken with the standing parts *a* round the bights *b*.

Blackwall Hitch (fig. 1[P]). Form a bight at the end of the rope and put the hook of the tackle through the bight so that the end of the rope may be jammed between the standing part and the hook. This and the next two are used for hooking tackle to the end of a rope.

Double Blackwall, or *Stunner Hitch* (fig. 1[Q]). Pass the end *a* twice round the hook under the standing part *b* at the last cross.

Cat's-paw (fig. 1[R]). Twist up two parts of a lanyard in opposite directions and hook the tackle through the two eyes thus formed.

Sheet, or *Becket Bend,* also called a *Weaver's Knot* (fig. 1[S]). Suitable for uniting ropes of different sizes. Pass the end of one rope through a bight of the other, around both parts of the other, and under its own standing part. An ordinary net is a series of sheet bends. Similar in principle is the *Double Sheet Bend* (fig. 1[T]).

Carrick Bend (fig. 1[U]). Lay the end of one rope over its own part so as to form a bight. Pass the end of the other rope through the bight, as shown in the figure. *Double Carrick Bend* (fig. 1[V]). Commonly used for bending hawsers together. If the two parts are of different sizes, each part should be seized back on itself. May be tied in either of two ways shown.

Reeving Line Bend (fig. 1[W]). Particularly useful when the lines are to be veered through a small pipe.

English, or *Fisherman's Knot.* Used for fastening gut ends,

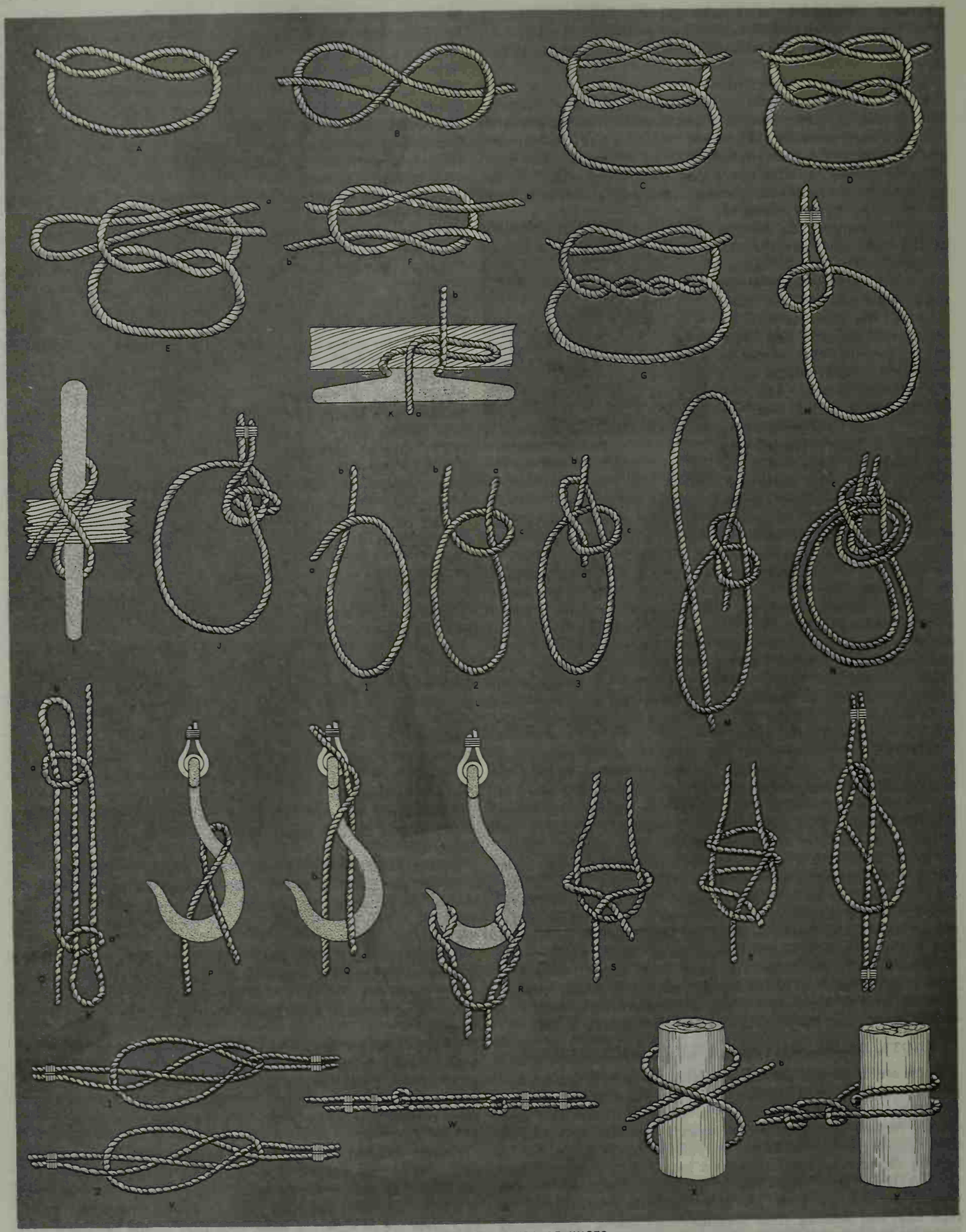

FIG. 1.—DIFFERENT KINDS OF KNOTS

(A) Overhand; (B) figure-of-eight; (C) square, or reef; (D) granny; (E) temporary square; (F) thief's; (G) surgeon's; (H) half hitch; (I) half hitch over a pin; (J) midshipman's hitch; (K) slippery hitch; (L) bowline; (M) running bowline; (N) bowline on a bight; (O) sheepshank; (P) Blackwall hitch; (Q) double Blackwall, or stunner hitch; (R) cat's-paw; (S) sheet, or becket bend; (T) double sheet bend; (U) carrick bend; (V) double carrick bend; (W) reeving line bend; (X) clove hitch, or builder's knot; (Y) round turn and two half hitches

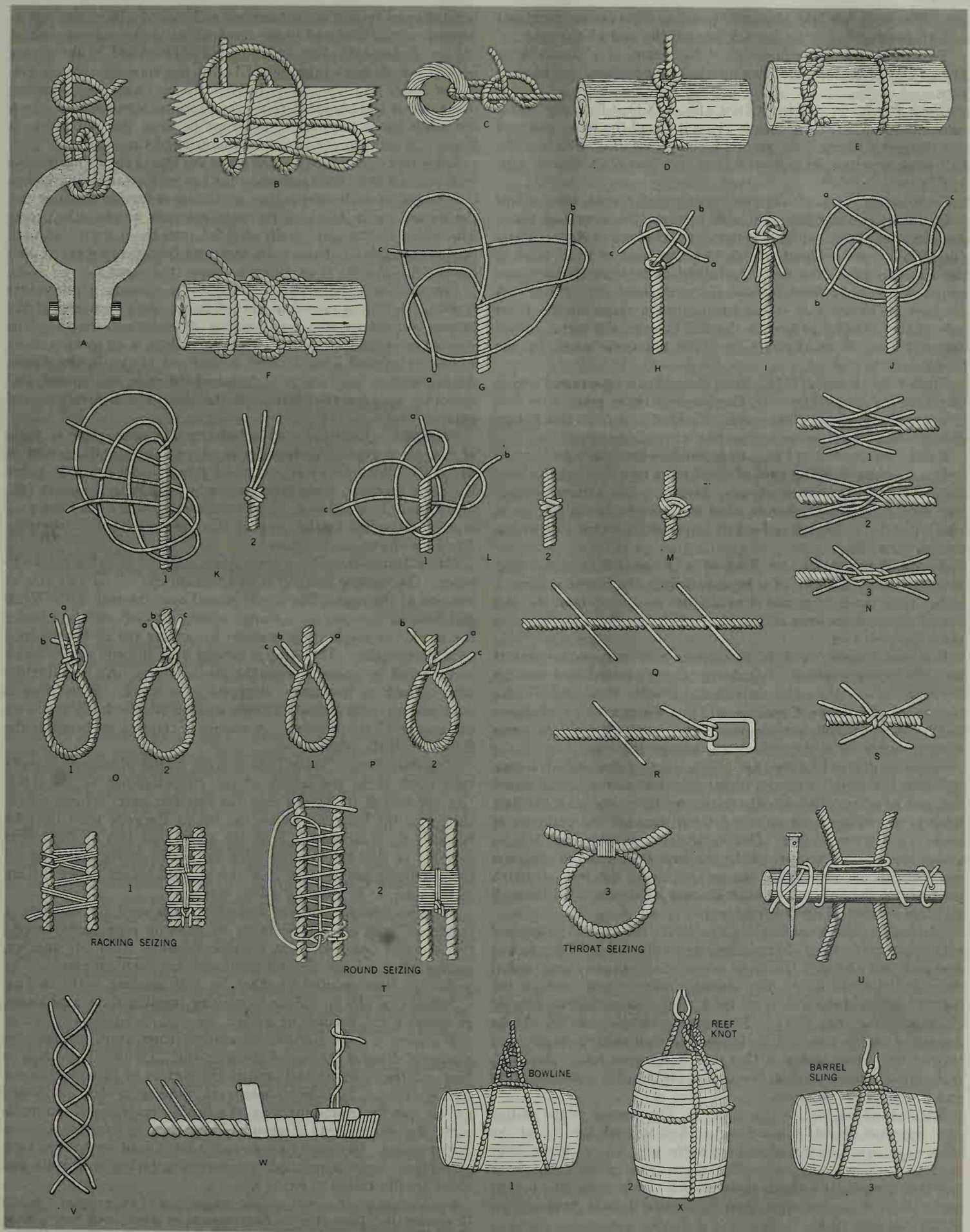

FIG. 2.—KNOTS AND SPLICES

(A) Anchor bend; (B) studding-sail halyard bend; (C) studding-sail tack bend; (D) timber hitch; (E) timber and half hitch; (F) rolling hitch; (G) wall; (H) wall and crown (I) double wall and double crown, or man rope; (J) single Matthew Walker; (K) double Matthew Walker; (L) single diamond; (M) double diamond; (N) short splice; (O) eye splice; (P) sailmaker's eye splice; (Q) long splice; (R) chain splice; (S) shroud knot; (T) seizings; (U) Spanish windlass; (V) sennit; (W) worming a rope; (X) methods of fastening tackle to barrels

etc. The ends are laid alongside pointing in opposite directions and an overhand is made in each around the end of the other.

Two ropes are sometimes united by means of a square knot (fig. 1[C]) or by means of two interlinking bowlines, one on each rope.

Clove Hitch, or *Builder's Knot* (fig. 1[X]). Pass the end *a* round a spar and cross it over *b*. Pass it round the spar again and put the end *a* through the second bight. *Two Half Hitches:* the half hitch repeated; or a *Round Turn and Two Half Hitches* (fig. 1[Y]).

Fisherman's Bend. Take two turns round a spar, then a half hitch round the standing part and between the spar and turns. An added half hitch round the standing part gives an *Anchor Bend* (fig. 2[A]), used to bend a cable to an anchor; or if, in place of the last half hitch, the end *a* is tucked under one of the round turns, we obtain a *Studding-sail Halyard Bend* (fig. 2[B]). A *Magnus Hitch* has two round turns, then a third on the other side of the standing part, with the end through the bight. *Studding-sail Tack Bend* (fig. 2[C]). Will not come adrift by the flapping of the sail.

Timber Hitch (fig. 2[D]). Take the end of a rope round a spar, then round the standing part, then several times around its own part against the lay of the rope. *Timber and Half Hitch* (fig. 2[E]). Used for towing or dragging a spar.

Rolling Hitch (fig. 2[F]). Very handy when one rope is to be fastened to the standing part of another or to a spar, as the rope can be put on and taken off very rapidly. For hauling a spar, two round turns are taken around the spar in the direction in which it is to be hauled and a half hitch on the other side of the hauling part.

Knots Worked in the End of a Rope.—*Wall Knot* (fig. 2[G]). Unlay the end of a rope and with the strand *a* form a bight; take the next strand *b* round the end of *a*; take the last strand *c* round the end of *b* and through the bight made by *a*. Haul the ends taut.

Wall and Crown (fig. 2[H]). Form a wall knot and lay one of the ends *a* over the knot. Lay *b* over *a* and *c* over *b* and through the bight of *a*. Haul the ends taut. *Double Wall and Double Crown,* or *Man Rope Knot* (fig. 2[I]). Form a wall and crown and let the ends follow their own parts round until all the parts appear double. Put the ends down through the knot.

Single Matthew Walker (fig. 2[J]). Unlay the end of a rope and with the strand *a* form a bight; take the next strand *b* round the end of *a* and through the bight made by *a*; take the last strand *c* round the ends of *a* and *b* and through the bight made by *b*. Haul the ends taut. *Double Matthew Walker* (fig. 2[K]). Unlay the ends of a rope. Take the first strand round the rope and through its own bight; the second round the rope, through the bight of the first and through its own bight; the third through all three bights. Haul the ends taut.

Single Diamond Knot (fig. 2[L]). Unlay the ends of a rope and with the strands form three bights down the sides. Pass strand *a* over *b* and through the bight of *c*; pass strand *b* over *c* and through the bight of *a*; pass strand *c* over *a* and through the bight of *b*. Haul the ends taut, and lay the rope up again. *Double Diamond Knot* (fig. 2[M]). First make a single diamond. Make strands *a* and *b* (fig. 2[L]) follow the lead of the single knot through two single bights, so that they come up on top of the knot; make strand *c* pass through two double bights. Haul the ends taut and lay the rope up again.

Splices.—*Short Splice* (fig. 2[N]). The strands at the end of each rope are unlaid, married and tucked through the lay of the other rope, over one strand and under the next, two or three times each way. To render the splice neater the strands should be trimmed down to two-thirds their original size before being tucked under for the second time, and to one-third their original size before the last tuck.

Eye Splice (fig. 2[O]). The strands at the end of a rope are brought back on the body of the rope at such a distance as to give an eye of the size wanted. The unlaid strands are then tucked through the strands of the rope (which are opened out by a spike), in the manner shown in the figure. They are then trimmed and tucked again, trimmed and tucked a third time, passing over one strand and under the next, as in the case of a short splice. *Sailmaker's Eye Splice* (fig. 2[P]). Used in the roping of sails. Continues the original lay of the rope around the eye.

Cut Splice and *Horseshoe Splice.* Similar to an eye splice but made out of two pieces of rope; therefore with two splices. In a horseshoe splice the part of one rope between the two splices is much shorter than the corresponding part of the other.

Long Splice (fig. 2[Q]). The ropes are unlaid for a considerable distance and their ends brought together with strands interlacing. One strand of each rope is then unlaid for a further distance and the vacant space filled by the adjacent part of the other rope. The splice is thus practically divided into three parts; at each the two strands are halved, knotted and turned in twice. *Chain Splice* (fig. 2[R]). For splicing a rope to a chain.

Shroud Knot (fig. 2[S]). Used when shrouds or stays are broken. A stop is passed at such distance from each end of the broken shroud as to afford strands of sufficient length. The strands are then unlaid, the parts married as if to make a short splice, and a wall knot formed in each, as shown in the figure. After the knot has been well stretched the ends are tapered, laid smoothly between the strands of the shroud, and firmly served over.

Seizings.—These are used to lash together spars, ropes or parts of the same rope. Various types of seizings are illustrated in fig. 2(T). With heavy ropes, where power is necessary to heave the parts together, some such device as a *Spanish Windlass* (fig. 2[U]) may be employed. The marlinspike, which may act as a lever, is attached to the rope of the windlass by a *Marlinspike Hitch,* as shown in the figure.

Miscellaneous.—There are various ways of securing blocks to ropes. One simple method is to splice an eye of suitable size at one end of the rope. The eye is passed over the end of the block and held in position by a round seizing clapped on close under the block. A *single strap* is made by joining the ends of a rope by a short splice. The strap is passed over the end of the block and secured by a seizing, as in the previous case. An iron thimble with a hook is frequently strapped to a block. When this is done the strap is reeved through the eye of the hook and over the groove of the thimble. A seizing is clapped on between the thimble and the block.

Grommet Strap. Made from a single strand of somewhat more than three times the length of the circumference of the strap. Lay one end of the strand over the standing part to form a ring, then with the long end follow the lay of the rope until the ring becomes three-stranded. Split the ends, knot two of the halves together so that the knot will fall in the lay of the rope, cut off the remaining halves, and tuck the knotted halves under the lay of the rope, as in finishing a long splice.

Selvagee Strap. This is a pliable strap used for clapping a tackle on gear, etc. It is made by winding rope yarns around two or more pegs placed at suitable distances from one another, until a strap of the desired stoutness has been obtained. The yarns are then secured together by half hitching with marline.

Sennit (fig. 2[V]). Made by plaiting together three rope yarns. It makes a flat lashing, or gasket.

Worming a rope consists in winding spun yarn between the strands, following the lay of the rope (fig. 2[W]). This helps to keep out the moisture and renders the surface of the rope smooth for parceling. *Parceling* consists in winding a strip of tarred canvas spirally around the rope, as a further protection from moisture. *Serving* consists in wrapping spun yarn or wire snugly over the parceling. Ordinarily a serving mallet is used for hauling each turn taut. Various methods for fastening tackle to barrels and casks are illustrated in fig. 2(X).

BIBLIOGRAPHY.—Raoul Graumont, *Handbook of Knots* (1945); Raoul Graumont and John Hansel, *Encyclopedia of Knots and Fancy Rope Work* (1952); Cyrus Day, *The Art of Knotting and Splicing* (1955).

KNOTWEED (SMARTWEED), the common name particularly for *Polygonum aviculare,* also called knotgrass, though not a grass, and in general for various plants of the genus *Polygonum* (family Polygonaceae). All members of the genus, which contains

about 200 species, mostly in temperate regions, are herbaceous. Many of them have an acrid or peppery juice. The flowers, mostly with a five-lobed perianth and about eight stamens, are white, greenish or brightly coloured, and consequently visited by insects. In some species, however (*e.g., P. aviculare*), cleistogamous flowers are produced, while in *P. viviparum* many of the lower flowers are replaced by bulbils. In North America more than 70 species are found, among which are several that have been introduced from the old world, but most of them are native in the western part. About 12 species occur in the British Isles.

The name knotgrass is sometimes used in the southern United States to denote the joint grass (*Paspalum distichum*), which is a true grass (Gramineae) and a good fodder plant.

KNOWLEDGE, THEORY OF, that branch of philosophy which has for its field of operations a range of problems concerned with the nature of knowledge in general. The questions which it investigates are those such as the character of knowledge itself and the relation between it and belief; the validity and reliability of our claims to knowledge of the external world through sense perception; the propriety of claims to knowledge beyond the limits of sense perception; our use of general concepts and of general words; and the presuppositions required for our use of memory and by our claims to recognize objects or kinds of object as being the same as what we have met with before.

The main divisions of the present article are as follows:

I. General Considerations
II. Theory of Knowledge in Greek Philosophy
  1. Plato
  2. Aristotle
III. Scholastic Epistemology
IV. Cartesian Rationalism
V. Empiricism and the Critical Philosophy
  1. Locke
  2. Berkeley
  3. Hume
  4. Kant
VI. Epistemology in the 20th Century
  1. Perception and Memory
  2. Linguistic Analysis

I. GENERAL CONSIDERATIONS

Theory of knowledge has always been a branch of western philosophy, from the earliest Greek philosophers onward, although it has not always been explicitly acknowledged as a branch or given a name of its own. Plato, for instance, made early and very substantial contributions to the subject but nowhere marked it off from other branches of philosophy. "Epistemology," the name by which it is now commonly known, was first used in J. F. Ferrier's *Institutes of Metaphysic* (1854). Traditionally, it has been thought to be the business of philosophy to provide us with knowledge of reality; that is, the reality behind the appearances, or reality as contrasted with the appearances by which we are, or may be, deluded. This traditional view, which was natural and acceptable throughout the period before the distinction began to be drawn between philosophy and the sciences (in the 16th and 17th centuries), continued even after the sciences set up on their own; and only in the 20th century was it generally recognized that the position of philosophy is not, after all, that of the supreme authority on the nature of reality.

Throughout the reign of the traditional view it seemed natural to suppose that while one, indeed the main, function of philosophy was to provide knowledge of reality, another necessary function was to answer questions about knowledge itself, to examine the credentials of what men, in the first function, claimed as knowledge. Typical questions would be those mentioned at the beginning of this article; and the task of answering them was the role of epistemology.

Some philosophers, of whom Descartes and Locke would be classic instances, have held that it must be impossible for us to perform the first function of philosophy, namely to acquire knowledge of reality, until we have completed the performance of the second function; *i.e.,* until we have established what are the conditions necessary and sufficient for the acquisition of knowledge and what are the possible extent and limitations of human knowledge. As Locke put it, a sailor needs to know the length of line that he has available before he goes out to sound the depths of the ocean with it.

Although nowadays almost all philosophers, accepting the distinction between philosophy and the sciences, would deny that philosophy has the first function at all (or, at the least, they would regard it as transformed from the task of acquiring new knowledge to that of understanding or analyzing more fully the knowledge that we already have), they would still, for the most part, uphold the second function, that of epistemology. For, even if it is the business of the sciences rather than of philosophy to pursue and to attain new knowledge, we must still ask what constitutes knowledge; and that will be a question for philosophers. But there is another shift of view also to be recognized: whereas until quite recently philosophy was regarded (and regarded itself) as the queen of the sciences, that is to say, as deciding what scientific claims to knowledge were to be accepted, nowadays a less authoritative role is claimed for it. Physicists and chemists are, in general, the best people to decide whether something in physics or in chemistry is a matter of knowledge or not. It is hardly for philosophers to tell them or to put them in their place, except, say, where they are inconsistent in the demands which they require for knowledge in different contexts. In epistemology the business of philosophers is again that of helping our understanding what is involved in the claim to know that something is the case, what we are committed to in making that claim, etc. Their answers to such questions might incidentally have the effect of querying, or even of rejecting, a piece of what had hitherto been accepted as knowledge; but that would not be very likely, especially in the established sciences, where methods are rigorous enough without a philosopher's interference. In ordinary life, however, many people are careless enough, if they are firmly convinced that something is the case, to suppose that they know that it is the case; and here some understanding, even elementary, of theory of knowledge might have a practical value.

Knowing might seem and has often been taken to be a relationship between two terms: the subject (the knower) and the object (the known). The relationship has been conceived as an act of awareness or acquaintance, as though knowing was to be regarded as in this respect like seeing. The defects of this view, which has a fairly continuous history right back to Plato, and the errors of the analogy with seeing are generally recognized among philosophers today. The attempt to give an account of knowledge on the lines of that analogy and on the supposition that it is an act or a process and the attempt to find a characteristic of such a process that will guarantee that it is indeed a process of knowing tend to lead to a confusion between epistemology and psychology.

But even if the supposedly simple model of seeing is given up, knowing still seems, in a general way, to require the antithesis of knower and known. And while philosophers as such do not now undertake the task of investigating "the structure of the subjective process called knowing," they still undertake the task of analyzing the nature of knowledge, part of which task will be to ask questions about the objects of knowledge. For example, do we have direct knowledge of the external world? Can we ever really perceive the material objects which we say that we perceive? Are the intellectual difficulties of supposing that we can and that we do so perceive them much greater than we ordinarily recognize? Are we entitled to suppose that what we perceive exists unperceived? Are physical objects really coloured? Do they in themselves possess any of the colours which we say that we see in them? Such questions about objects are among the traditional questions of epistemology. In the middle of the 20th century the most current modern view would be that such questions are not rightly conceived, or not rightly framed. For they look to be factual questions, to which an answer "Yes" or "No" ought to be attainable, at least with the acquisition of more empirical knowledge. This, it is held, is to misconceive the questions, for philosophical questions are not in this way questions of fact. But this modern view would not rule out epistemology in general, or questions about our knowledge of the external world and about the objects of perception in particular; it would say again that the problem is one, not of discovering

new facts (that is the job of science), but of understanding old and, in a way, quite familiar facts.

The difference between the philosophical and the scientific approach can be brought out in detail only by considering the doctrines of various philosophers as summarized below. But the contrast can be sufficiently indicated by taking one example, that of belief, and by considering the differing interests of the psychologist and of the philosopher in it.

The psychologist's interest is that of the scientist. He will look for a causal explanation of, say, Jones's believing that the earth is round, and he will be interested in the emotional associations, if any, of the belief. He will want to generalize, if he can, from examining a number of particular such beliefs, so as to correlate: (1) in the case of Jones, beliefs of a certain kind with circumstances of a certain kind and, (2) more widely, if the evidence allows, beliefs of a certain kind held by a certain group of persons with circumstances of a certain kind and, further, variations in belief with variations in circumstance. The fields of propaganda (whether of politics or of commercial advertising) and of evangelical and revivalist religious movements are interesting to the psychologist. He is concerned, not with the truth or the truthlike value of any of these beliefs, but only with questions about the beliefs as natural phenomena and with their capability of explanation in a causal or a statistical way.

The philosopher asks none of those questions about belief. His questions are broadly of three types. First, he asks about the nature of belief: "What is it?"; "Is to believe to be in a given introspectible mental condition?"; "Or is a behaviouristic account needed?"; "Does believing imply a feeling of doubt, or at least of uncertainty?"; "Or is to say that Jones believes that the earth is round not necessarily to say anything at all about the limitations of Jones's confidence?" Secondly, he asks about the truth or falsity of belief: "What is it for a belief to be true or false?"; and "Is there some special kind of relation between belief and the facts present in the one case, but not in the other?" Thirdly, he asks about the justification for the belief: not "What made you believe it?" (*e.g.*, "Did your parents bring you up that way?"), but "What reasons can you offer in defense of the belief?" Reasons will be good or bad, strong or weak. The philosopher will want, if he can, to characterize the conditions of reasons in general being good or bad. It is not necessary that there should be one general answer to that question, but a number of considerations might be mentioned, which would be more clearly specified in particular cases.

The antithesis between psychology and epistemology might be summarized as follows. The psychologist is interested in causal relations of beliefs, in treating beliefs as part of the subject matter of a natural science. The philosopher is interested in questions about the nature of belief itself and about the validity of beliefs irrespective of their causal associations. The two subjects are distinct, not as one science is from another science, but as something which is a science is from something else which is not a science, or as different aspects of a single subject matter, so that they do have a certain overlap or common ground.

Philosophers have not always kept this distinction in mind. For example, Locke and, to a smaller extent, Hume thought it necessary to inquire into the origins of "ideas" in order to settle philosophical questions about the validity and reliability of our supposed knowledge of the external world. Fortunately, although Locke's declared approach to epistemology was what would now be called psychological, his actual approach was much more philosophical, so that his not distinguishing psychology from epistemology did no great harm.

II. THEORY OF KNOWLEDGE IN GREEK PHILOSOPHY

As an attempt to inquire into the nature of knowledge as such is more sophisticated than attempts to gain knowledge, it is natural that epistemology should not have played any very conspicuous part in early Greek philosophy. Although Plato, in the 4th century B.C., was not the first to discuss its problems, he was the first to give them any marked prominence. They provided either the central or a major topic for more than half a dozen of his dialogues.

1. Plato.—As Plato had little enough to go on in the way of sustained examination of epistemology by his predecessors, and as his own discussions belong to dialogues ranging over a period of some 30 years, it is hardly surprising that we do not find in him a unitary finished system. He was well aware of the criticisms to which some parts of his theory lay open and he remained to the end of his life dissatisfied about the adequacy of his own answers to them. In the circumstances, it is surprising how nearly it is possible to represent him as holding a single coherent doctrine.

The first development of his views, emerging in the *Meno* and in the *Phaedo*, is fulfilled in the *Republic*, where it is summarized in the three central books. Plato's procedure is to start from what he takes to be a fact, that knowledge (*episteme*) is possible, and to ask what is required for it to be so. Knowledge must be of what is real, stable and unchanging, since a claim to know that something is the case is invalidated if later, or even as you make the claim, the thing changes. So-called knowledge cannot be knowledge at all if, because of change or of things' being different from what they seem, or seeming different in different circumstances, it has to be abandoned. What will in this way be liable to modification or abandonment will be belief, not knowledge. The next step for Plato is to inquire what will satisfy the conditions of being real, stable and unchanging. The obvious and natural answer, that the field for knowledge which he wants is to be found in the external world of material objects and events with which we are all familiar from our sense experience, Plato unhesitatingly rejects. We call this world real only because we have never thought about the problems which it raises. The most marked characteristic of the sensible world is its susceptibility to change. Plato held, following the Heraclitean doctrine, that every thing is in a state of change, all material objects are subject to the constant process of coming-into-being and passing-away. The very multiplicity of material objects seemed to count against their being real (and therefore possible objects of knowledge) for Plato. So also did the fact that they appeared to have contradictory characteristics at the same time: what seemed beautiful, or large, to one man or in one situation would be ugly, or small, to another man or in another situation. Clearly the world of our sense experience could not satisfy the demands of knowledge.

Further it was plain that at least some of our ideas are such that we could not possibly have gained them from sense experience, notably those of mathematics (more specifically, geometry) and of ethics. We have never actually seen a perfectly straight line, or a perfect circle, and yet the ideas of these are what we use in geometry; we can think about virtue or courage, although we have never met with better than defective instances of them. Again, when we do geometry with the aid of diagrams on the blackboard, it is not the diagrams that we are thinking or talking about, but something else which the diagrams imperfectly represent.

The case of geometry and the inadequacy of the material world as the subject matter for knowledge led Plato to the view that there must be another world, accessible only to the intellect, a world free from the imperfection, inconsistency and mutability of the material world. The intelligible world, as opposed to the familiar sensible world, was not for Plato a piece of imaginative speculation. He saw its necessity as the conclusion of an argument. We do have knowledge; knowledge cannot be of the sensible world; therefore it must be of an intelligible world; therefore there must be an intelligible world.

The intelligible world is the world of forms (*see* IDEALISM; UNIVERSAL), which are accessible, not to the senses at all but to the intellect alone. Plato was not entirely happy about the exact status of the forms, for, as is shown by the discussion in the *Parmenides* (a later dialogue than any so far mentioned), he was well aware of the difficulties, which were presumably much discussed in the Academy; many of them recur in the writings of Aristotle, who was one of Plato's pupils in the Academy. But there are enough points which are definite beyond doubt to give a general picture.

The forms are real entities, quite independent of the sensible world, although it is dependent on them. In this sense, it is important always to remember that Plato was a realist: we are not to think of the forms as in any way mind-dependent, or as mental concepts or abstractions; they are substantial entities, which would

exist even if there had been no minds to stand in need of them or to apprehend them. For Plato the theory of forms is as much metaphysical as it is epistemological, a point which is clearly emphasized by the discussion in the *Republic*. The forms are needed, both to confer on sensible objects such degree of reality as they have and to be the objects of knowledge. Thus there is, on the one hand, the intelligible and real world of forms, of which knowledge is attainable; and, on the other hand, there is the sensible, only half-real world of particulars, of which only belief is possible. To every class of particulars of a given kind a single form corresponds: *e.g.,* corresponding to the numerous men that exist we have the single form Man; to all tables and beds, the forms Table and Bed; to the acts that are in some degree courageous or just, the forms Courage and Justice.

Because Plato's doctrine was metaphysical as well as epistemological, he does not always speak with a single voice. Thus, while epistemologically he finds it necessary to believe that to every kind of particular a form must correspond (*Republic,* 596 *a*), metaphysically he is reluctant to admit forms for what might be called low-degree particulars like mud and hair (*Parmenides,* 130 *d*). Metaphysically, the forms were regarded as ideals, to which their particulars approximated, but of which they were always in some degree bound, because of their infection with growth and decay, to fall short. This view readily accommodated the concepts of mathematics (the imperfectly straight line almost but not quite achieving the form of straightness) or of morals (an act is never so virtuous that it could not have been more virtuous), with which Plato was mainly preoccupied in his earlier Socratic dialogues; about other concepts his views were less clear, as can be seen from the discussion in *Parmenides* (130 *d*). On the other hand, when epistemological considerations were uppermost, no exceptions could be made. Thus, while metaphysically he tended to treat a form almost as a perfect particular, epistemologically he did not: the form there was more like the modern universal, with different levels of forms, suggesting the later genus and the various species subsumed under it.

His general position is summarized in his Simile of the Divided Line and in the Allegory of the Cave which immediately follows it, in the *Republic* (books vi–vii). Imagining a line divided unequally and then each division again subdivided in the same ratio as before, he assigns to each of the four subdivisions an object and a corresponding cognitive faculty. The lower main division represents the sensible world, the upper main division the intelligible world. In the former, the lower subdivision contains images and reflections as seen in a mirror or in water, and, corresponding to them, the faculty of conjecture; in its upper subdivision come the material objects, of which the reflections below *were* the reflections, and, corresponding to them, the faculty of perceptual assurance or acceptance. This division as a whole represents belief and its objects, and the objects of the lower subdivision stand to those of the upper in the relation of likeness to original (*e.g.,* in that of the reflection of a tree in the water to the actual tree standing beside the water). This relation is repeated between the lower division as a whole and the upper division as a whole—where the objects, namely the forms, are the originals of which the particulars of the world of belief are in some way copies or reflections.

The upper division as a whole represents two kinds of knowledge: in the lower subdivision, the limited, incomplete and provisional knowledge or understanding (*dianoia*) of the forms attainable in the mathematical sciences; and in the upper subdivision, the full and complete knowledge (*episteme*) of the whole hierarchical system of forms, a knowledge of which is only attainable after a long and arduous philosophical training, which culminates in the apprehension of the ultimate form, the Form of the Good, on which the whole system depends.

Thus we have the division of knowledge and belief, with the division of forms and particulars corresponding to it; and the four grades stand at different points on an ascending scale, a scale of increasing reality on the one hand and, corresponding to it, of increasing comprehension and knowledge on the other. In the Allegory of the Cave, Plato symbolically describes the higher education which is needed to win us away from our earth-bound delusion that it is the material objects of the material world that are real, first to a recognition, via the mathematical disciplines, of the need for and of the existence of the forms (at which stage a fragmentary and conditional knowledge is attained); and then, via philosophy, to the final peak where the whole unity of knowledge is revealed.

Not only does Plato find the forms both metaphysically and epistemologically necessary, but also epistemologically they fulfill two different purposes: on the one hand, to account for our ordinary experience, that is, for our ability to recognize similar particulars, to form concepts and to use general words; on the other, to make knowledge possible, knowledge which turns out to be of nothing with a status lower than that of a mathematical system and which in the full sense is attainable only philosophically. The consequences of this view of knowledge are mainly threefold and are clearly related. First, the distinction between knowledge and belief is determined by a difference of objects. Knowledge is of the forms; of material objects not more than belief is possible. Thus, it would not be possible to have first belief and later knowledge of the same thing. Secondly, because he characterizes them in terms of their different objects, Plato seems to be thinking of knowledge and belief as though they were some kind of acquaintance, on the analogy of sight. We may see an object clearly, if we look at it directly, less clearly, if we look at its reflection in a pond. That is, where we ordinarily say that we knew or believed *that* something was the case, Plato would have to say that we knew or believed an *object* of a certain kind. Or it may be that he used his word *episteme* ambiguously, either to mean knowledge of (or acquaintance with) certain objects, namely the forms, or to mean knowledge that certain propositions about the forms were true; in both cases it must be limited to the forms. Thirdly, it may be suggested that Plato has, in effect, given an account, not of knowledge as such, but of a special kind of knowledge; viz., the knowledge attainable of necessary relations within a deductive system such as mathematics. As has been shown above, his argument for the existence of the forms depends in part on his so defining *episteme* as to preclude from it knowledge of matters of fact (as opposed to matters of necessity). Whether he would also have denied the possibility of empirical knowledge at all is less clear. His insistence on the changeability of the material world would prevent him from allowing knowledge of general matters of fact, such as the generalizations of an empirical science; but, by the use of tensed verbs, he could (unless the Heraclitean doctrine of flux were carried to the extreme of making thought or communication impossible) have admitted knowledge of singular facts (*e.g.,* that Socrates committed suicide by drinking hemlock). A singular statement, recording a particular occurrence, will not be affected by what may happen thereafter, even although a general lawlike statement (*e.g.,* that heated metals expand) may be upset by a later occurrence which is an exception to the law.

In the *Theaetetus,* a dialogue slightly later than the *Republic,* Plato returns to the question "What is knowledge?" and adopts a quite different approach. There he considers in return three suggested answers: (1) that it is sense perception; (2) that it is correct belief; (3) that it is correct belief, with an account given of it. All are rejected, but not on the ground that the objects of belief must be different from the objects of knowledge. The possibility that a man might come to have knowledge of what he had previously only believed is, by implication, admitted; and the forms are nowhere mentioned in the course of the dialogue, so that the difference of status between forms and particulars does not come under discussion.

The first suggestion, that knowledge is identical with sense perception, is coupled in the discussion with the view of Protagoras, that perception is infallible because for any given man things are as he perceives them. To the man to whom the wind feels cold, the wind is cold; and this is not incompatible with the wind's being simultaneously not cold to another man. Plato seems prepared to allow the infallibility of perception, although not to go further and say that in every matter each man is his own judge of what is true. But what permits each man's perception to be infallible, namely that it is of his own private experience, also prevents it from being knowledge, which must be of what is ob-

jectively existent. Knowing and perceiving cannot be identical; even if perceiving were a way of knowing, it would not be the only way; and by itself it is not a way of knowing, for knowing involves more than perceiving—in perceiving we do not grasp what really exists. The second proposed answer, that knowledge is the same as true belief, is rejected on two counts. In the first place, belief, even true belief, can be induced by a variety of methods—for instance, by propaganda or by playing on the emotions—but knowledge can be induced only by instruction. Here Plato is pointing toward an important distinction, which any theory of knowledge requires to recognize, that while you can make a man believe something, you cannot make him know something; belief is a state of mind but knowledge is not, or is not only, a state of mind. Plato's second argument to disprove the alleged identity of knowledge and true belief is to point out that one can in a state of true belief make a correct judgment about a matter, without having knowledge of it. A jury may arrive at a correct verdict in a case where the facts at issue could only have been known by an eyewitness of the crime. Correct weather forecasts, bets on a horse race, or predictions of the results of a general election are all familiar examples of true beliefs which are not knowledge.

The third suggested solution, that knowledge is true belief with the addition of an account of it, is rejected because Plato can find no adequate interpretation of "account." He considers three possibilities. First, if it means simply that the belief is put into words, this is not enough to make it knowledge; for whether a belief is spoken or not is irrelevant to its status as a belief, since an uttered belief is still a belief as much as a silent belief. Secondly, if it means an enumeration of all the factors or elements in a belief, that still will not do; for if a man had a true belief as to what a wagon was and if, in addition, he had been taught to recite a complete catalogue of all the parts of a wagon, the ability to recite the catalogue would not turn his belief into knowledge (to take a modern example, the difference between a man who knows how an electric motor works and another man who has a correct belief about it is not simply that the former can give a list of all the parts involved). Thirdly, if to give an account of a thing is to specify what distinguishes it from other things, not even this will be enough; for ability to spot the distinguishing mark of an object which differentiates it from other objects is needed even for true belief about the object and so cannot be the further factor, additional to true belief, which would constitute it knowledge. And it will be no improvement to say that knowledge is true belief *plus* the knowledge that we have specified the correct distinguishing mark; for then the definition would be circular—we should be using knowledge as one of the terms in its own definition.

On this negative and inconclusive note the *Theaetetus* ends, but it would be difficult to overrate the importance of its contribution to the subject. Plato has come tantalizingly close to a solution of a kind that would now be acceptable. He has not suggested the rigid divorce between knowledge and belief on which he insisted in the *Republic*. Having shown the inadequacy of the attempt to identify knowledge with true belief, he does not then separate them. He tries a modification, that knowledge is true belief *plus* something else: he is still prepared to consider the idea that there is some close relation between belief (where it is true) and knowledge. By the end of the dialogue the relation is not established; but it has not been rejected either.

One further point in Plato's epistemology needs to be mentioned —his treatment of error, or false belief. The question was raised in the *Theaetetus,* but was not answered until the *Sophist,* which purports to be a continuation of the earlier dialogue. The problem was indicated in the *Theaetetus* by the discussion of true belief. For, if there is true belief, then false belief must be possible. But how can it be possible? For it seems that to think what is false is to think what is not; to think what is not is to think nothing; to think nothing is not to think at all; so, the only thought that is possible is of what is true. Either we must accept that to think what is false is to think what is not, or we must deny it. If we accept it, we must conclude that thinking what is false is impossible. If we deny it, we have to give some different account of false judgment. Plato adopts the second alternative and offers his account in the *Sophist*, which turns on the distinction between the existential use and other uses of "to be"; *e.g.,* on the one hand, "There are horses" and, on the other, "Horses are quadrupeds," or "Horses are not cows." To believe that horses are not cows is not to deny the existence of horses, that is to say, it is not to think what is not; it is to have a relational belief, to believe that horses are *different* from cows. The man who falsely believed that horses were cows would not be thinking of nonexistent entities, but would be believing that the relation between horses and cows was one of identity, when in fact the relation is one of difference. Epistemologically, the man who holds a false belief is not performing the logically impossible feat of thinking in nonexistent terms, but is making the mistake of relating his terms in thought differently from the way in which they are actually related.

2. Aristotle.—As a pupil of Plato, Aristotle was for a long time under his influence. He joined the Academy as a student at the age of 18 and spent the next 20 years there as a member of the group that centred round Plato, during which time he wrote a large number of works, all now lost, giving more or less popular expositions of the Platonism with which he was imbued. On his master's death he left Athens for 12 years. On his return, instead of going back to the Academy, he founded the Lyceum as a rival institution, where for the next 12 years he gave lectures and instruction on philosophical and scientific, particularly biological, subjects. It is from this period that his surviving works come, in the form of lecture courses rather than finished philosophical treatises; and at this stage he is most anxious to emphasize his points of disagreement with Plato, a disagreement which in his epistemology, although substantial enough, should not be allowed to obscure the extent to which their views harmonized.

Aristotle agreed with Plato that scientific knowledge must be of what is necessary, as opposed to the merely contingent, but he came to reject Plato's view that this required the existence of forms transcending the particular objects or situations which manifested them. For Aristotle, while form and matter were intellectually distinguishable they were not separable (*see* FORM). Forms were immanent, not transcendent; they were predicates, not substances. They were neither more nor less real than the particulars which they characterized, and neither could exist without the other. But forms were more important than the material which they informed: teleologically, for they determined its becoming what it did; and epistemologically, for apprehension of them was necessary to the attainment of any knowledge at all. Aristotle's rejection of the Platonic theory of transcendent forms in favour of his own view of immanence reflects the contrast between Plato's preoccupation with the pure, deductive abstractions of mathematics and Aristotle's greater interest in the natural, empirical sciences. For Aristotle the world around us was reality in a way in which it could never be for Plato. But in respect of the forms of things—the prerequisites of knowledge—both philosophers, although their views differed, were equally realists. In saying that forms were predicates, Aristotle was not for a moment suggesting that they were abstractions, or mind-dependent. They were the real properties of real objects, with which we could have sensible acquaintance. The presence of a given form in one object and its absence from another were actual facts of nature, which could thus be divided up into real kinds, each further subdivisible, according to the cleavages of the forms. It is not implausible to maintain that the prevalence of this rigidly schematic view of forms and real kinds, backed by the authority of Aristotle, did as much as anything else to retard the development of the biological sciences, the progress of which became far more rapid once they emancipated themselves from it.

Aristotle's views on sense perception (*aisthesis*) as they are to be found in *De Anima,* while in general agreeing with Plato's in being causal in character (*i.e.,* giving an account of perception in terms of the physical interaction of the object perceived, the appropriate sense organ and the intervening medium), differed considerably from Plato's in detail. Aristotle's account, which is largely determined by his general views of form and matter, emphasizes that sense perception is a discriminatory activity, not a mere passive reception of what is given. The soul itself takes

on the form of the object which is perceived; it becomes qualified by a real quality of the object, as a lump of wax becomes qualified by a real quality (the shape) of the seal with which it is impressed. More specifically, the sense organ involved becomes assimilated to the object: thus the eye, beholding an object coloured red, itself becomes red; and similarly for the other senses. What was before the perception only potential (both in the case of the sense organ and in the case of the object) becomes in perception actual: thus, for example, a thundering waterfall would not, strictly speaking, be making a noise at all unless there were somebody present hearing it; there can be no actual sound without actual hearing.

Aristotle's account, which is a curious mixture of the philosophical and the physiological, raises many difficulties, widely discussed in the commentaries on him. They can, in the main, be indicated by three questions. Why should it be supposed to be necessary to perception that the sense organ should literally take on the form of the object? How does the supposition that the organ does take the object's form explain perception? When Aristotle says the soul takes the form of the object, is he talking literally or figuratively?

Common to but distinguishable from the five particular senses, each of which has its own peculiar sensibles (as sight has colour, visible shape and size; as hearing has pitch, volume, and so on), there must be a further general sense, without a special sense organ of its own, but with a function superordinate to those of the special senses. Its function is fourfold. First, it perceives the common sensibles, those qualities which are perceivable by more than one sense (*i.e.*, size, shape, number, motion and rest): without it we could not recognize that the shape which we saw and the shape which we felt as we looked at a stone in our hands were the same. Its second function is to perceive what Aristotle calls the "incidental sensibles": as the result of previous association we may perceive with one sense what does not belong to it, such as perceiving the sweet by sight. More importantly, in the third place, it accounts for self-consciousness, for our perception of the fact that we are perceiving: it is not by sight that we perceive that we are seeing, nor by hearing that we perceive that we are hearing. Fourthly, it discriminates between the objects of two different senses: we can distinguish white from sweet but we cannot do it by sight alone, taste alone, or both together, for neither is capable of perceiving both objects. The *sensus communis,* as that faculty of sense common to all the others, while not being a special sense and therefore not having a sense organ of its own, does have its own physiological seat, in the heart, which, rather than the brain, Aristotle held to be the centre to which the impressions received by all the sense organs were transmitted. Finally, sleep and unconsciousness must be due to the inactivity of the *sensus communis;* otherwise there would be no reason not to suppose that some of man's senses might sleep at the same time as others were active (*e.g.,* one might see in one's sleep).

With regard to knowledge, Aristotle made a distinction between matter-of-fact knowledge (*empeiria*) of the contingent and scientific knowledge (*episteme*) of the necessary, which closely resemble Plato's contrast between belief and knowledge. Scientific knowledge is knowledge not merely that something is so, but also why it is so. To know in this sense is to know the causes of things' being as they are, or the reasons why. And this is achieved within a science when the conclusions are deductively derived from the premisses. So the ideal of knowledge is, as in Plato, that of strict demonstration, the establishment of necessary connection between premiss and conclusion. Scientific knowledge of material objects is an ideal to be desired and is partially attainable to the extent that the form of the objects can be intellectually grasped, but it can never be completely attained, just because the objects are not pure form. They have and must have their matter, which prevents complete generalization or full insight into their essence; *cf.* Plato again. Where Aristotle differs from Plato is: (1) in his view of principles, and (2) in the way in which the principles are to be known.

Whereas Plato thought that all knowledge was essentially one, comprising a single deductive system depending on the Form of the Good, Aristotle insisted on the autonomy and independence of individual sciences. While there were some principles or axioms common to all sciences, such as the laws of contradiction and of excluded middle, each science would have in addition its own particular principles, which would consist of definitions of the terms used in the science and of assumptions of the existence of things corresponding to the definitions. The business of a science then would be not merely to verify the empirical characteristics of the objects which were its subject matter, but also to show by argument in conformity with the common axioms that the possession of those characteristics followed from the first principles of the science.

It remained to say how these principles were themselves to be known. They cannot be demonstrated or known by proof, for all proof depends on them. They must therefore be known immediately and not by inference. Aristotle's answer (in *Posterior Analytics*) is that the process must be double, involving both perception (*aisthesis*) and intelligence (*nous*). We come to learn them by a kind of induction from our sense experience, and yet we know them by an intellectual intuition. The apparent contradiction in this account disappears when we understand what Aristotle was trying to do. He was trying to explain both how we come to think of these principles at all and are inclined to accept them and how we recognize their truth when we are faced with it. The function of perception is to provide us with particular examples or applications of the principles, the repetitions of such examples helping to fix our attention on the principles. But such empirical induction does nothing to prove or to establish the principles. At this point intelligence just sees or intuits the truth of the principle in question.

The role of perception is thus to place the principle in a favourable light for the insight of intelligence. (To this extent, one might compare a child learning by experience that two beads and three beads are equal in sum to five beads, and his coming to "see" that $2 + 3 = 5$.) In short, for Aristotle each science has its own set of ultimate principles which on the one hand are indemonstrable, but on the other hand can be and need to be seen to be self-evident.

Thus, while Aristotle differs from Plato in allowing the mutual independence of the sciences, he agrees with him both as to the structure of a science, the deduction of conclusions from first principles, and as to the minor role of sense perception, which is no more than to suggest the propositions of the science. The rest is the work of pure intellect. From this it may be seen that emphasis (of which Aristotle himself was fond) on the contrast between the empirical Aristotle, with his insistence on the reality of the particulars of our sensible world, and the abstract rationalist Plato, for whom such particulars had only a second-best quasi-reality, should not be overdone. Aristotle may have been the natural scientist, as opposed to Plato the pure mathematician, but Aristotle's view of a natural science, as given by his theory of knowledge, was far more rationalist and less empirical than his tough-minded treatment of Platonism would sometimes suggest.

III. SCHOLASTIC EPISTEMOLOGY

Between the theories of classical Greece and the resurgence of interest in epistemology in the 17th century A.D. there falls a long period in which, although little attention is paid to it now, philosophy was neither moribund nor dormant. For the medieval philosophers, however, epistemology was only a minor interest and centred chiefly round the question of universals or general ideas. The Platonic tradition, according to universals a status independent of the particulars that might instantiate them (*universalia ante rem*), may be seen in the realism of St. Augustine (354–430) and was subjected to the criticisms of Peter Abelard (1079–1142) and of St. Thomas Aquinas (1225?–74), who represented the Aristotelian version of realism, according to which universals were characteristics common to particulars (*universalia in rebus*) and not independent of them.

In the 14th century new versions of nominalism (universals are general words) and of conceptualism (universals are general concepts, mind dependent, formed by abstraction from particular experiences), advocated by William Ockham, prepared the way for

the various empiricist versions of Hobbes, Locke, Berkeley and Hume in the 17th and 18th centuries.

The Platonism of Augustine is directly clear, revealing itself in his insistence on the existence of realities which are not sensible but purely intelligible, of which mathematical ideas are his favourite example. Mathematical truths are there for anyone to grasp, they are apprehended by reason and understanding, they remain necessarily, unchangeably, eternally true, independent of the success or failure of the efforts of individual men to grasp them. The great problem for Augustine, as it had been for Plato, was what he was to say of the relation between ideas and the objects of sense. His reply, that as knowledge of ideas was necessary to knowledge of material objects, so the existence of the ideas was necessary to that of the objects, involves making the sensible world causally or formatively dependent on the intelligible: the essence of everything that there is is number, illuminated for the human spirit by the light of God. The idea of there being another and more intelligible world more real than that with which we are sensibly familiar had been absorbed into the Christian tradition.

The intellectual difficulties of such a view, being the same as those recognized by Plato himself in the *Parmenides,* were soon fastened on by men like Boëthius (*c.* 480–524), whose commentary on Porphyry, by its exposition of the Aristotelian outlook, inspired subsequent criticisms. Universals, which are genera and species, being present as a whole in their individual objects, cannot themselves be individual entities and must therefore be features of their objects. The attack on Augustinian realism was carried on by Abelard, who, finding equally objectionable the extreme nominalism that had made its appearance in the 11th century with Roscelin of Compiègne (*c.* 1050–*c.* 1125), argued for a modified realism, according to which the nature of a universal was its *status,* its being the principle of classification of a group of objects; universal terms are abstract, not concrete. It should be said that Abelard was more successful at criticizing the opposed extremes of transcendent realism and of nominalism than he was at clearly stating his own view, with the result that he has been subjected to considerably differing interpretations. The Thomist view, which was more directly Aristotelian, emphasized the work of active thought (*intellectus agens*) in abstracting the general features of objects perceived in sensation. In the first half of the 14th century William Ockham, rejecting all brands of realism on the principle that *nihil est in rerum natura extra animam nisi singulare* ("everything that exists outside the mind is particular"), expressed more than one positive view himself: notably, a moderate nominalism, according to which universals are in effect the meanings of general words, signs standing for a class of particular objects or qualities. Later, he came to regard universals as aspects of the mind itself. By insisting that everything that exists is particular and that all generalization is the work of the human mind, Ockham marks the end of scholasticism and the beginning of modern epistemology.

IV. CARTESIAN RATIONALISM

The transition from scholastic to modern philosophy and the revolutionary process by which it was achieved are by general consent accredited to the French thinker René Descartes (1596–1650). While he was not the only man responsible and while he was not such a rebel as not to be intellectually a child of his age, it was he who, more than anyone else, liberated subsequent thought from its allegiance to the doctrines of the Catholic Church and who determined that henceforward claims to truth were to be made good before the bar of reason rather than to be reconciled to the dogmatism of faith. Although he professed himself a good Catholic and refrained from publishing his acceptance of the Copernican hypothesis and of the consequences which he derived from it, this profession must be put down to disingenuousness or at least to prudence on his part, to his desire to continue working in peace instead of expending his energy in open conflict with the theologians and thereby risking the fate of Galileo. He marks the beginning of the rationalist movement carried on by Spinoza, Malebranche and Leibniz (*qq.v.*) and will here be taken as the representative of it, partly because he was its source, partly because through his epistemology can most clearly be exhibited the connection and contrast of the empiricist epistemology, which shortly afterward arose in England to challenge the philosophy of Cartesianism.

What was revolutionary in Descartes' epistemology was: (1) his insistence that nothing was to be accepted as true that did not satisfy the demands or conditions of reason; and (2) his proposal to determine what those conditions would be and to elaborate a method of complying with them before proceeding to attempt to acquire a corpus of knowledge, either in philosophy itself (*i.e.,* metaphysics) or in any of the sciences such as physics. In his first published work, *Discours de la méthode* (1637), he adumbrated the method which he claimed to be both necessary and sufficient; and in the second, *Meditationes de Prima Philosophia* (1641), he gave the results of his application of it to metaphysics. The fundamental problem was to discover a criterion of truth or certain knowledge that could be used to test the claims of any piece of putative knowledge so as to establish their validity or failure. Such a criterion could not be discovered in isolation from knowledge itself; it could be found only by discovering some proposition the certainty of which would resist any attempt to shake it and by seeing what was the distinguishing mark of this proposition; thereafter, any other proposition that revealed the same mark was legitimately acceptable and any proposition that failed to exhibit it must be rejected. Descartes' policy was, therefore, to subject to a systematic doubt, or suspension of belief, all that hitherto he had accepted as knowledge and to continue in this way until he ran into an absolutely indubitable proposition. If he could find such a proposition and if he could evolve a satisfactory method of proceeding positively from it, the previous direction of methodical doubt could be reversed and the beginnings made of the construction of a body of knowledge. At the outset he could not know whether there was such a proposition or whether there was such a constructive method; but unless they were found, the program of methodical doubt must be relentlessly pursued.

That we should, as we naturally do, accept the supposed knowledge of our senses Descartes unhesitatingly rejected, for two reasons. First, as we all experience, our senses do in fact often deceive us: objects seen at a distance may look different in colour or shape from what they appear near at hand. Any instance of perceptual illusion is enough to refute the claims of sense to provide us with knowledge of a kind rigorous enough to meet Descartes' demands. Secondly, even if all the information of our senses were, as a matter of fact, correct, by our senses alone we could not know that it was; it is not in any way self-guaranteeing. A dream may seem real enough at the time; and if we subject the whole of our so-called waking life to the Cartesian doubt and suggest that perhaps the whole of that is a dream, our senses can provide no way of removing the doubt or refuting the hypothesis. For practical purposes we might, as we do, treat our sense information as veridical, in default of positive evidence against it. But, philosophically, we are bound to recognize the possibility of its all being an illusion, the hoax of a malignant demon; and therefore we cannot hope to find any indubitable knowledge, or criterion of certainty, there.

It should be said that Descartes' two reasons for rejecting the senses are very different from each other and not strictly compatible with each other. The first, that our senses sometimes deceive us, does not entail that they always do, or even, what his second objection suggests, that, for all we know, they always may. Indeed his first objection requires us sometimes to be able to know that our senses are, on that occasion at least, veridical. I have no ground for saying of one sense experience that it is a delusion or fallacious, unless I can say of another, which contradicts it, that it is not a delusion. Yet his second objection is more sweeping and important, for it amounts to saying that, however good our empirical evidence may be for any given proposition of sensible experience (*e.g.,* that I see a book in front of me), it will never be good enough, never be so conclusive that reason must accept it. It might be a diabolically ingenious conjuring trick by the malignant demon. And this possibility of error will apply to any empirical proposition at all, however well-attested its truth may appear. A proposition

which we are entitled to say that we know to be true must be certified, or self-certifying, in a way stronger than any amount of empirical evidence could ever provide: as long as there is, in some sense, any possibility of my being wrong, the proposition has not got the necessity which knowledge must have.

Descartes' solution to his problem is to be found in the autobiographical section of the *Discours,* where, reflecting on his general dissatisfaction with the studies that he had pursued during his education at the Jesuit college of La Flèche, he singles out for exception mathematics, as being a discipline with the rigour and method that he is seeking. He was struck with the contrast between the certainty and clarity of mathematical demonstrations and the insecure fumblings of the other sciences. The characteristic of primitive mathematical propositions was that they could be clearly and distinctly perceived to be true, so that "a child, instructed in arithmetic, having made an addition according to the rules can be certain of having found, with regard to the sum he was examining, all that the human mind could find." The method of mathematics is the twin method (1) of intuition, whereby we clearly and distinctly perceive the logical necessity of a mathematical proposition (*e.g.*, $2 + 3 = 5$), and (2) of deduction, which is made up of a sequence of intuitions, whereby we clearly and distinctly perceive that the next step in a mathematical argument is logically necessitated by the previous step. In putting forward the procedure of mathematics as the solution to his search for a criterion of certainty and for a method of proceeding securely from the base of an indubitable proposition, Descartes probably failed to recognize a distinction which was going to cause him trouble throughout the rest of his theory of knowledge: the distinction between the mark of a proposition's being certainly true (viz., its being logically necessary) and the mark of our recognizing, beyond possibility of error, that logical necessity. If there were such a mark as the latter, it would be different from the first, for we can make mistakes about logical necessity as about anything else. That a given proposition is logically necessary does not itself necessitate that we shall recognize that necessity. Descartes had some awareness of this difficulty, for, although he was inclined to give a logical analysis of clear and distinct perception in terms of its objects, "simple natures" and their combinations, he admitted and never succeeded in meeting the point of the question posed by his critics: if we are to accept a proposition as true only when we clearly and distinctly perceive it to be so, how are we to tell when we are clearly and distinctly perceiving such a truth? May we not be deceived into thinking that we have a case of clear and distinct perception, when we have not?

From his examination of mathematical procedure Descartes abstracted four practical rules: (1) the rule already mentioned, to accept as true only what he clearly and distinctly perceived to be so; (2) to analyze any problem into its simplest possible elements; (3) to proceed from the simple elements to the more complex whole in due order; and (4) to make the enumeration of elements so complete as to be certain of having left nothing out. But the mathematical method Descartes saw to have one inherent defect and one extrinsic uncertainty, both of which would need to be removed if the method was to be of epistemological use to him. The defect was the use made of memory: in any but the shortest chains of deductive argument the mind could not hold the entire argument before itself at once and therefore had to rely on its memory that the earlier steps of the argument had been satisfactorily traversed. But all the objections which Descartes had raised to relying on the senses he felt equally strongly in the case of memory: often enough memory deceives us, and in no case do we have a guarantee from memory itself that it does not. To the extent that a strictly deductive argument depends on memory, then, even that argument must be treated as doubtful until we can produce independent proof that memory is to be trusted. The extrinsic uncertainty about the mathematical method was whether it would be applicable outside mathematics. Descartes was in the position of having, as he supposed, provided himself with the one secure way of attaining knowledge as attested by its success within mathematics. What he could not yet say was whether it could be applied outside mathematics, whether it could be used in answering philosophical questions about what does and what does not exist.

Descartes found his answer in his famous proposition *Je pense, donc je suis* (or, in its later but better-known Latin form, *Cogito, ergo sum*—"I think, therefore I am"). Although he might doubt the truth of everything else, even the existence of his own body, he could not doubt the existence of himself, his mind. Thought of any kind (and doubt is a mode of thought) requires a thinker. From the fact, therefore, of his doubting all else Descartes was assured of the necessity of his own existence. The importance of the *Cogito* for the architecture of Descartes' scheme was not, as is often supposed, that it was for him the first indubitable proposition (any simple proposition of mathematics would have done for that) but that it was the first indubitable existential proposition. His claim was to have found a proposition outside mathematics which had the required certainty as of any proposition within mathematics. It provided him with the sure foundation for erecting, by the process of intuition and deduction (if memory could be validated), a structure of certain knowledge of what exists. More detailed interpretation of Descartes' epistemology becomes at this point very difficult. For instance, while in the *Discours* he had held up a mathematical proposition as the very paradigm of what was indubitable and indeed as the key to the discovery of attaining a certainty wherever it was attainable, in the first *Meditatio* he appears to allow that even in mathematics we might be deceived. It may be that in the latter he is acknowledging the point, mentioned earlier, that we can make mistakes even over what was logically necessary. But the more probable explanation of his apparent inconsistency is that between the *Discours* and the *Meditationes* his conception of knowledge had altered. In the *Meditationes* he insists that knowledge must be of what exists, which would have the queer conclusion that pure mathematics, while exhibiting logical necessity, could not be knowledge: and, at the present stage of his program, applied mathematics, which is concerned with what exists, does not yield knowledge, for the existence of its objects may still be doubted.

From the *Cogito* and some axioms which he does not scrutinize or subject to doubt Descartes deduces (by arguments so short that memory is not involved) the existence of God; and from the veracity of God who, having provided us with our senses and memory, will not have done so for the purpose of deceiving us, Descartes infers the reliability of the two faculties which hitherto he had treated with systematic skepticism. Even now it is not because we clearly and distinctly perceive it to be true (for we do not, it having no necessity about it), but because it is guaranteed by the infinite perfection and goodness of God that their information is to be accepted. To complete his scheme, Descartes must now give his account of error. For, having started with the problem how knowledge could be possible and having, as he supposed, solved that by bringing in the truthfulness of God, Descartes now has to explain how we could ever make mistakes. It seems a fact that we often make them, and yet that we should do so appears incompatible with the very properties of God to which Descartes has just appealed to make any systematic knowledge possible. His solution turned on contrasting the human understanding, which is limited in its capacity for clarity of conception and of apprehension, with the human will, which is unlimitedly free. Error is due to will's outrunning understanding, to our committing ourselves in affirmation or in negation to more than we have intellectually grasped. Because our wills are free, there is nothing to stop us judging in a matter as though we understood it more thoroughly than we do; and in such a case we run the risk of error. In particular, we are liable to persist in beliefs because they are familiar and because it has never occurred to us to question them. To pursue certainty of knowledge and to minimize the risk of error, we should scrutinize the credentials of every belief according to the criteria of the method and should not pretend to ourselves that we do clearly and distinctly perceive a truth unless we really do. It may be seen that the whole of Descartes' elaborate scheme continues to be infected by his tendency to assimilate the two quite different concepts of logical necessity and of epistemological certainty; it may indeed be asked how clearly he ever acknowledged the difficulty to himself.

In holding that all thought and conscious experience consisted of having ideas which were private and mind dependent, Descartes recognized that he had the problem of determining the extent to which ideas could be held to represent their objects. Starting by maintaining that all ideas which were not the constructions of the imagination were either adventitious, causally produced in us by experience, or innate, inherent in the mind from birth, Descartes was eventually driven by his metaphysical dualism to conclude that all ideas must be innate (*see* INNATE IDEAS). It was this side of the Cartesian epistemology that was fastened on for attack by his empiricist successors such as Locke, wishing to maintain that all knowledge must have its origin in experience. The empiricists continued the psychologism of Descartes in regarding ideas as private mental entities or occurrences, a causal explanation of which was required if the possibility and limits of knowledge were to be made intelligible, while they either modified the rigidity of his dualism between mind and matter (*e.g.*, Locke), or abandoned the dualism altogether (*e.g.*, Berkeley and Hume). But the more serious quarrel between empiricist and rationalist than that of the origin of ideas concerns the extent to which knowledge of the world is attainable by pure reason. The striking failure of Descartes both to apply to metaphysics the method which he professed to be employing (whatever necessity the *Cogito* may possess, it is not the necessity of a mathematical proposition which it would be self-contradictory to deny) and to assimilate empirical knowledge to the deductive ideal revealed the weakness of thoroughgoing rationalism; it appeared to make headway in the Cartesian philosophy only to the extent that it proceeded with less than the full rigour of its principles.

V. EMPIRICISM AND THE CRITICAL PHILOSOPHY

To empiricists the problem of knowledge appears, with a changed emphasis reminiscent of Aristotle, to consist mainly in determining what is the relation between the human mind and the external world of our sensible experience and what knowledge of reality that relation permits. That is to say, whereas for Plato sense experience was both inferior to and, to a high degree, obstructive of the findings of pure reason and whereas for Descartes the aim was to subordinate sense experience to reason, limiting our knowledge of the external world to what can be made good by reason, for the empiricists sense experience is basic, where we start and what we have to stand on. They do not necessarily maintain that all knowledge is limited to sense experience, nor that that experience is infallible; but sense experience is the best that we have available, and such knowledge as is attainable by reason must conform to it. In fact, Locke, whether knowingly or not, went exploring beyond the limits of sense experience and committed himself to propositions which as an empiricist he must be precluded from verifying, while Berkeley (to the extent that he was an empiricist) and Hume more severely restricted themselves to determining what knowledge was possible within the limits prescribed by sense experience. In turn the limitations which Hume's treatment appeared to establish gave rise to the critical philosophy of Kant, who, by contrasting what in human experience is provided by the senses with what is contributed by the faculty of understanding, himself paved the way for more recent versions of empiricism and positivism.

1. Locke.—John Locke (1632–1704), while arriving at conclusions diametrically opposed to those of Descartes, was inspired in the composition of his *Essay Concerning Human Understanding* (1690) by very similar motives; indeed he emphasized his own debt to Descartes. Locke agreed that the first task of philosophy was to devise a method for itself, to "see what objects our understandings were or were not fitted to deal with." And in his polemic against the then widely held view, derived in part from the Cartesian philosophy, that the human mind possessed innate ideas and principles, Locke was doing what Descartes had done in his revolt against scholasticism: protesting that truth must stand on its own feet, not lean on authority, whether of the church, of the schools or of Aristotle. That there should be any principles that were to be treated as above scrutiny was as abhorrent to Locke as it had been to Descartes. His *Essay* soon became a university textbook, and the part which it played in liberalizing British thought may be indicated by the fact that in Locke's century an undergraduate at Oxford could still be fined by the university for disputing Aristotle's doctrines.

It is impossible to state Locke's own epistemological views both briefly and clearly without oversimplifying and misrepresenting them, because in expounding them at great length himself and in spreading the work out over 20 years he involved himself in a number of confusions and inconsistencies. But the general outline may be given. The human mind, being at the time of birth a blank, a *tabula rasa*, gains all the knowledge and all the materials of knowledge that it ever does gain from experience, the twin sources of experience being "sensation" and "reflection"; *i.e.*, sense experience of the external world and introspective experience of the mind's own operations. This was Locke's basic thesis, that all concepts are empirical in their origin and that any concept may be (indeed must be) accounted for by tracing it back to an experience from which it could have originated, or, in the case of more complex concepts, by deriving the different elements in the complex from several different experiences, their unification in a single concept being the work of the mind. Thus, on the one hand, a man acquires his concepts of "red," "sweet," "tables," "trees," etc. by seeing red objects, tasting sweet things, seeing and touching tables and trees. On the other hand, he might imagine a zebra before seeing one, by thinking of an animal as being both like a donkey and striped at the same time (provided that he had already seen donkeys and something that was striped); similarly, he might conceive of nonexistent things like unicorns, gingerbread houses and so on, always provided that he had, by his own experience, acquired the concepts of the less complex elements involved. Unfortunately, by choosing to follow the conventional terminology of the day and by expressing his empiricist thesis in terms of "ideas" Locke led himself astray and laid his theory of knowledge open to the criticisms which have been familiar from Berkeley's time onward. Although at the outset of the *Essay* Locke uses "idea" in the widest and most noncommittal way, so that to say that he had certain ideas in his mind would be to say that he was having certain thoughts, or thinking of certain things, yet before long he was using the term "idea" in a much more technical way, such that an idea was now a mental entity of some kind which, in the case of sensation, represented the objects, or qualities of objects, of which it was an idea. Thus in his theory of perception Locke found himself a thoroughgoing representationalist, holding that, although there was a real, physical world external to the observer, all that he could know of it was mediated by the ideas which it produced in him. As Berkeley was not slow to point out, anyone holding such a view was, by his holding it, precluded from maintaining that there was a world beyond the ideas at all, let alone going to the lengths that Locke did of specifying which ideas actually resembled the qualities which they represented (ideas of primary qualities) and which did not (ideas of secondary qualities). It is a striking fact that Locke was not prevented by this obvious formal inconsistency in his scheme from talking a great deal of philosophical good sense throughout the rest of his work, which suggests that his robust common sense carried his epistemological dualism and his representationalism very lightly. And it should be emphasized that, in the particular case of perception, some form or other of representationalism has retained a hold on many philosophical minds ever since, the problem for such philosophers continuing to be basically Locke's problem; viz., how to reconcile the view that we do perceive public and independently existing physical objects with the view that the sense impressions or sense data actually received in perception are not or may not be themselves literally parts or qualities of the physical objects themselves.

Locke's classification of the kinds of knowledge humanly attainable does something to anticipate Kant's later treatment—just as Locke's account of the formal concepts of experience, such as substance and cause, hesitating and doubtfully empiricist as it was, points in the direction of Kant's much fuller and more carefully argued proposals. Following his general theory of ideas, Locke maintains that knowledge "is only conversant about them"

and defines it as "the perception of the agreement or disagreement of two ideas." There are four kinds of knowledge: (1) of identity or diversity of ideas; (2) of relation, that is, necessary connection, of ideas; (3) of coexistence of ideas, where no necessary connection can be established; and (4) of real existence, that is, of objects and their properties corresponding to our ideas. Strictly, only the first and second kinds fit Locke's definition of knowledge, for the other two go beyond ideas, in the same way as his theory of perception went beyond what was permitted by its principles. The first kind is knowledge of analytic propositions, what Locke called "trifling propositions," such as "Red is red," "Red is not blue" and "Whatever is red is coloured." The second kind is knowledge of necessary connections which are not trifling because they do not consist simply of partial or complete identity or difference: for Locke, both mathematical and moral knowledge belonged to this category, and he followed Descartes in distinguishing between intuitive knowledge of self-evident propositions (*e.g.*, that 2 + 1 = 3) and demonstrative knowledge of what was entailed by such self-evident propositions (*e.g.*, that the sum of the interior angles of a Euclidean triangle equals two right angles). Thus the first and second kinds approximately correspond to Kant's later distinction between analytic and synthetic a priori propositions. The third kind is knowledge of empirical generalizations, the denial of which might be false but would not be self-contradictory (*e.g.*, that gold is not combustible). The fourth kind is knowledge of actual existence, our knowledge here (as also is knowledge of the third kind) being both limited and uncertain (save in the case of our own existence and of God's, where again Locke followed Descartes), just because we are here not perceiving necessary connections but depending on the matter-of-fact connections which our experience leads us to accept. Locke appreciated that the third and fourth kinds did not fit his requirements for knowledge and that the fourth was not concerned with relations between ideas at all. But he could not abandon them, for he recognized that although they did not fit his scheme, he had marked the important distinction between necessary and empirical knowledge, and he rightly insisted that claims to knowledge were not to be invalidated simply on the ground that they were not logically guaranteed. In this, he performed the important task of preparing the way for much that has followed.

2. Berkeley.—George Berkeley (1685–1753) came from the first under the influence of Locke's *Essay* which, by the time that he entered Trinity college, Dublin, had become one of the standard philosophical textbooks there. Although signs may be found in Berkeley's earliest writings of his acceptance of a Lockian position in epistemology, it cannot have been either wholehearted or long-lasting. For Berkeley's own theory, which he developed as a young man (his most important work, *A Treatise Concerning the Principles of Human Knowledge,* was published in 1710, when he was only 25), had its origin in his conviction of the inadequacy of Locke's theory of knowledge. Seeing the difficulties of Locke's dualism between mind-dependent ideas and the independent things which they represented, Berkeley carried the theory of ideas to its extreme and, as he saw it, logical conclusion. Apart from the impossibility in principle, given that dualism, of verifying the existence of material objects beyond the screen of ideas, or any proposition about them, Berkeley thought that he had found insuperable reasons why Locke's account must be unacceptable. In the first place, from ideas alone nothing could be learned about anything else that they might be alleged to represent, because an idea could resemble only another idea: the whole basis for Locke's distinction between primary and secondary qualities was thus destroyed. Secondly, from our own experience we know that ideas are passive and can be produced only by minds; they could not be produced by matter, even if we had independent evidence that there was such a thing. Berkeley therefore proposed the original solution, not of cutting out material objects, but of denying the dualism between ideas and objects. Material objects *were* ideas or collections of ideas; and reality consisted, not of minds, ideas and material objects, but of minds and their ideas. An idea being passive, its existence consisted in its being perceived: *esse est percipi.* A mind or spirit being active, its existence consisted in its perceiving or having ideas: *esse est percipere.* In these two complementary formulas the whole of Berkeley's epistemology is summarized. As he repeatedly insisted, this is in no way to deny the existence of material objects or of the sensible world. Their existence is affirmed, as ideas or collections of ideas belonging to the finite minds of humans and to the infinite mind of God. What is denied is the existence of matter, as an unknowable somewhat lying behind and producing the ideas which we have in perception. Our view of the sensible world as consisting of publicly observable objects may remain as before; what is altered is our account of what it is to be a material object. Thus at one stroke Berkeley claimed to have removed the difficulties of Locke's dualism and to have made empiricism more faithfully empiricist. Distinguishing between the fleeting, fragmentary ideas which a man's imagination produces and the stability, coherence and inescapability of those which he receives from his senses, Berkeley concluded that the latter could be produced only by God: nothing less than a mind of infinite power and purpose could account for the orderliness and design which they displayed. In turn, the problem of continued existence of material objects in the absence of finite observers was solved, for they would never be absent from the mind or will of God. Thus, while it would be for Berkeley self-contradictory to assert the existence of an unperceived object, he was not asking common sense to suppose that, say, a visible object vanished and then reappeared every time a man looking at it closed and reopened his eyes: its continued existence was literal and real, guaranteed by the omnipotence and omniscience of God. There are hints in Berkeley's writings of a quite different, more directly phenomenalist account, in which to say that an object existed unperceived would not be self-contradictory but would be to make a hypothetical statement, to say that certain perceptions would be had, given certain conditions. "The table I write on, I say, exists, that is, I see and feel it; and if I were out of my study I should say it existed, meaning thereby that if I was in my study I might perceive it" (*Principles,* 3). But such a view is nowhere further developed and can hardly be attributed to Berkeley as part of his doctrine. Although Berkeley repeatedly claimed that his theory in no way conflicted with the beliefs of the plain man or "the vulgar," but only with those of philosophers who had been corrupted by abstract thought, his claim can hardly be upheld. Indeed he seems to have confused the proposition that the plain man is only interested in the existence of material objects at the times at which he (or someone else) is perceiving them with the proposition that the plain man believes that they exist only at such times. The first proposition, while in general it may be true, is not identical with, and does not logically imply, the second, which on its own account is highly doubtful.

Berkeley himself attached the greatest importance to his attack on Locke's theory of abstract ideas, because he supposed that the theory supported the view of matter which he himself denied. In fact it did not; and the theory of general ideas (that a general idea is a particular idea made general by its function of standing for other ideas of the same class), which Berkeley put in its place and for which he was applauded by Hume, is to be found unambiguously stated by Locke himself. Berkeley, while engaged in the valuable task of working out the implications of what he held to be true in Locke's empirical epistemology, was not always as fair-minded to his predecessor as a more careful study of the *Essay* would have made him.

3. Hume.—David Hume (1711–1776), insofar as he covers the same ground as his two predecessors, comes somewhere in between them. Thus, distinguishing as Locke did between ideas of sensation and ideas of reflection (in Hume's terminology "impressions" and "ideas," the latter being copies of the former in memory and imagination), he veers strongly toward Berkeley's solution of the dualism between impressions and objects, but takes a more agnostic view: he does not so much deny the existence of material objects over and above the impressions which we receive in sense as say that we cannot know it; the existence of such material objects is a hypothesis which, while it involves no contradiction, must remain for us in principle unverifiable. But Hume's importance in the history of epistemology lies in the new ground that he himself broke, for he carried pure empiricism to the logical conclusions

of which both Locke and Berkeley had stopped short. His rigorous insistence on analyzing any concept at all solely in terms of actual and possible impressions led to original results in at least two major topics: (1) the nature of self and (2) the status of inductive beliefs, both of which, especially the latter, have vexed philosophers ever since. Hume's treatment of the notion of cause, which is involved in the latter topic, so impressed Kant with the challenge which it posed as to change the whole course of his philosophy.

1. Berkeley, while disposing of Locke's notion of material substance (or what he thought was Locke's notion) as an unknowable something underlying the qualities accessible to sense, had retained substance in the case of the self. For him the self was a real persisting particular, which continued the same throughout all its successive experiences. But Hume opposed to that the same challenge as Berkeley had made to Locke in the case of material substance. Denying that a man ever had an impression of himself as an entity over and above the perceptions which comprised his stream of consciousness, Hume posed the question: from what impression (or impressions) can the idea of self be derived? Satisfied that all that could be found were the impressions or perceptions themselves, Hume found himself faced with an uncomfortable dilemma: on the one hand a man has the idea of himself as a unity, as a persisting identity, as the subject of his experiences, an idea which seems inescapably necessary to any continuity of experience at all; on the other hand there is no impression from which such an idea can possibly be derived. In the course of his principal work, The *Treatise of Human Nature* (1739), two different solutions are propounded, although it may be doubted whether Hume himself recognized their difference. One solution is to explain away the idea of personal identity as a mistake which we all make because of the action of our imagination: "the identity which we ascribe to the mind of man, is only a fictitious one." The other solution is to explain the idea in terms of those impressions which we do have: "mankind . . . are nothing but a bundle or collection of different perceptions." "When I turn my reflexion on myself, I never can perceive . . . any thing but the perceptions. 'Tis the composition of these, therefore, which forms the self." On this second view, Hume is not explaining away as a mistake the idea of personal identity, but giving an analysis of what it is; denying the substance theory of the self, he is propounding a serial theory, consistent with his program of reducing every concept to a combination of constituent impressions and ideas.

2. Applying the same analytic technique to the concept of cause, Hume found that while it contained as an element the idea of necessary connection between two events, where one may be said to have caused the other, yet such a connection neither is empirically observable as holding between the events, nor is deducible from the concept of either. All that is observable is matter-of-fact conjunction and sequence; *e.g.*, a lump of sugar placed in water just does dissolve, and that is all that can be observed. Nor can there be any logical necessity between events: there is nothing self-contradictory about the suggestion that a lump of sugar would not dissolve in water. Hume concluded that the idea of necessary connection involved in our concept of cause was contributed by the imagination and that all that could be asserted of objective nature was what could be empirically observed, namely, matter-of-fact conjunctions and sequences: every event is a discrete particular. But this, in turn, raised a serious problem for inductive belief in general and for prediction in particular. However often a given conjunction of events, such as the putting of a lump of sugar in water and its dissolving, may have been repeated in the past, and however often attempts to produce a different conjunction may have failed, yet, if there is no causal connection between the events beyond their actual concomitance or sequence hitherto, what reason could there be for expecting similar conjunctions in future? How can it be more rational to expect the next lump of sugar placed in water to dissolve than to expect it not to dissolve? More generally, how can it be more rational to accept the past as a guide to the future than not to accept it so—unless one assumes real laws or connections in nature of a kind which a Humian empiricism must deny? Hume professed himself baffled by the problem. He recognized that we do all draw on our experience of the past to help our predictions and plans for the future and that it would be suicidal not to do so; and yet he could see no rational justification for our attitude at all. In presenting the problem thus fearlessly and honestly Hume bequeathed to his successors the task of deciding whether the principle of induction can be caught within the limits of empiricism; that this task has even yet been successfully completed few philosophers would confidently maintain. Although at the time of its publication Hume's *Treatise* caused no stir at all, greatly to its author's disappointment, it has more than any other single work shaped the subsequent course of epistemological thought in the English-speaking world, and its influence more than 200 years later is greater than ever.

See CAUSALITY; INDUCTION.

4. Kant.—Immanuel Kant (1724–1804), unlike the leading empiricists in being a professional philosopher, claimed to have staged a revolution in philosophy by the introduction of what he called his critical method. But the philosophical link with his predecessors, particularly with Hume, whom he greatly admired, and perhaps even more with Berkeley, of whom he expressed a very low opinion, is of at least as much importance. For the essence of the critical method was its insistence on inquiring into the limitations imposed on the possibility of knowledge by the nature of the human mind itself (in this there is a faint echo of Locke); his originality and his departure from empiricism lay in the extent to which he held that knowledge depended on the formal contribution of the mind itself. For him experience was not the reception of the given *plus* the formal structure disclosed in the given, it was the interpretation of the given according to the formal organization of it by the experiencing subject. In this he not merely made more explicit what might be held to be implicit in Hume's treatment of the function of the imagination, but also claimed a validity for empirical knowledge based on the nature of the mind's contribution which the empiricists would not have allowed. Kant's epistemology in his chief work on the subject, the *Kritik der reinen Vernunft* (1781; translated as *The Critique of Pure Reason*), shows him to have been impressed with two points and with the problems raised by them: (1) claiming that there are synthetic a priori judgments, he asks how they are possible; and (2) claiming that empiricist attempts to abstract all concepts from experience fail, he asks how a priori concepts are applicable to experience. Summarily, his solution to both problems lies in his thesis that in objective experience and judgment the thinking mind applies to the manifold of sense the a priori forms of intuition (space and time) and the appropriate formal categories of experience, of which he claimed to have established that there were 12 and only 12.

Kant's epistemology derives from a number of distinctions with which he begins, as follows:

1. *Analytic and Synthetic Judgments.*—Accepting as correct and complete the traditional Aristotelian logic of his day, Kant distinguished between an analytic judgment, in which the concept of the predicate is contained in the concept of the subject, and a synthetic judgment, in which the concept of the predicate lies outside the concept of the subject. Thus an analytic judgment, such as "Whatever is red is coloured," is necessary (being coloured is part of what it is to be red), for its denial would be self-contradictory (to assert that something was red but not coloured would be self-contradictory); and it is uninformative, for it serves at most to explicate the meanings of the terms involved. A synthetic judgment, on the other hand, such as "Whatever is red is round," might or might not be true and is not guaranteed as it would be if its denial were self-contradictory (to assert that something was red but not round might be false but would not be self-contradictory); and it is, or might be, informative (even if the information is false), for the concept of the predicate adds something to what is given in the concept of the subject.

2. *Synthetic A Posteriori and Synthetic A Priori Judgments.*—Some synthetic judgments assert a merely matter-of-fact connection between subject and predicate. Particular judgments describing sense experience and general judgments which entail such particular judgments will be of this kind, called by Kant synthetic

a posteriori judgments, commonly called empirical judgments. They may or may not be true, and even where true they have no necessity. Contrasted with them are synthetic a priori judgments, where the connection between subject and predicate is necessary (although not analytically necessary) and independent of any particular sense experience. This class was crucial for Kant, for such judgments had a necessity which other synthetic judgments did not have, and at the same time were informative or gave new knowledge, which analytic judgments could not give. The prime examples for Kant were the judgments of arithmetic and geometry. Such judgments were for Kant, as it were, a hybrid of his original synthetic-analytic distinction and had the advantages of each, being both necessary and informative. They were the key to the possibility of certain knowledge, of objective experience; and the problem for Kant was to explain how they could be possible, for their existence could not be established by a purely logical analysis, as in the case of the distinction between analytic and synthetic judgments.

3. *A Posteriori and A Priori Concepts.*—Many concepts are derived by abstraction from particular sense experiences; these are a posteriori. But whereas the empiricists held all concepts to be of this kind, Kant maintained that some were a priori, not abstracted from experience, but applicable to it. The problem was how such concepts, if not abstracted from sense experience, could properly be applicable to it. By his answer to this problem, how to make proper application of these concepts in a priori principles, Kant claimed to have solved the question of the extent and validity of possible knowledge and to have shown how their improper application engendered the illusions and inconsistencies of metaphysics.

The a priori character of mathematics depends for Kant on the use of the a priori notions—not strictly concepts, he said, for they are not discursive—of time (arithmetic) and space (geometry). The possibility of genuine science, or nonmathematical knowledge, depends on the existence of other nonmathematical a priori concepts and on their application to experience in a priori principles; *i.e.*, synthetic a priori judgments. These concepts, which he called categories or concepts of pure understanding, are to be found from the study of logical forms of judgment. Study of logic, which is the study of the forms of thought, reveals these concepts, but cannot alone validate their application to experience. For example, from the categorical form of judgment Kant derived the category of substance, from the hypothetical judgment the category of cause. Now, if we turn to experience, we find a further distinction: between a purely subjective sequence of sense impressions, which we describe subjectively ("This *looks* red to me," "This impression comes after that in my stream of consciousness"), and an objective order, which we assert when we say, for instance, "This *is* red," "This event *follows* that" or "This event is *caused* by that event." The difference between the subjective report and the objective judgment lies in the connection between perception and thought which characterizes only the latter. In objective experience and judgment we are applying to what is given in sense the forms of thought, or the categories. Objective experience is only possible and only distinguishable from subjective experience to the extent that we apply to the latter the categorial forms of thought. Objective knowledge is thus only made possible by the ordering which the mind imposes upon the manifold given in pure sense; it presupposes the unity of the perceiving subject, the synthesis of the given by the appropriate a posteriori concepts (the work of imagination and memory) and the application of the appropriate category. Kant claims to have proved that objective experience presupposes the truth of his synthetic a priori principles; *e.g.*, we could not make the distinction which we do between a subjective and an objective temporal order unless the principle that every event must have a cause were true. Thus knowledge is made possible by the mind's formal contribution to experience, without which contribution experience would not be objective.

Kant was careful to insist that his scheme could only be said to apply to experience such as ours, the perception of the phenomena of sense by the combination of sense and thought. It would not apply to nonsensible things-in-themselves or noumena (that way lay the confusion of metaphysics), nor to any beings that had reason but no senses. For us the objects of our familiar external world are empirically real; here Kant was wrong in thinking that he disagreed with Berkeley. We may not say the same about things-in-themselves, about which strictly we may say nothing; here Kant was right in thinking that he disagreed with Berkeley. Where Kant differs from the pure phenomenalist is in his insistence that objective experience cannot be had or described without the application of categories (*e.g.*, cause and substance); the failure of pure phenomenalism to reduce an empirical judgment to a compendious description of sense underlines the strength of Kant's challenge to empiricism and suggests the need for a priori categories, even if Kant's own list proves inadequate in detail.

The main defect of Kant's system, which has led to subsequent attempts to refine empiricism, lay in his failure to keep the concept of a noumenon, or thing-in-itself, a negative concept. It is required both to be a negative concept, about which nothing can be known, and not to be a wholly negative concept, for the system depends on the assumption that things-in-themselves do somehow produce the phenomena of our experience. This basic contradiction in Kant's transcendent idealism, not unlike that in Locke's empiricism, prompted G. W. F. Hegel (*q.v.*; 1770–1831) to attempt an idealism without the assumption of a noumenal reality beyond the reach of knowledge.

VI. EPISTEMOLOGY IN THE 20TH CENTURY

Developments in epistemology in the 20th century, chiefly in Great Britain and in the United States, have in general stemmed from the empiricist tradition set by Hume and modified by Kant; the absolutist movement deriving from Hegel reached a culmination in Great Britain in the philosophy of F. H. Bradley (1846–1924) but had little following thereafter. Largely because of the rapidly growing influence and authority of the natural sciences, epistemology has mainly concerned itself with questions of the knowability of the external world as accessible to empirical observation for the verification of hypotheses. As a result there can be seen, at least until recently, a considerable preoccupation with problems of perception; and solutions offered have been in a broad sense realist in character, not necessarily empiricist in the narrowest and sceptical sense, but taking the familiar external world of common sense as base and as what philosophy must come to terms with. Similarly, and again as a reaction against the supposedly sweeping system-building of post-Hegelian idealists, there has been little attempt at synthesis. Philosophers have preferred to attempt piecemeal solutions of relatively isolable cruces within a general realist view, proceeding by one form of analysis or another, the three leading figures being the Cambridge philosophers G. E. Moore (1873–1958), Bertrand Russell (1872–) and Ludwig Wittgenstein (1889–1951).

1. Perception and Memory.—In the earlier part of the modern period the cases of perception and of memory may be taken as typical and central examples of the empiricist inheritance.

Perception.—Starting from the common-sense belief that there is an external world, populated by real objects both natural and artificial (*e.g.*, horses, trees, rocks and tables, buildings, machines), the problem was how such objects could be accessible to perceptual knowledge. The simple answer, that perception was a direct relationship between observing subject and the object observed, was generally found unacceptable, under the influence of varying considerations. Take as an example the particular case of sight, the sense most often selected by philosophers for investigation. Quite apart from the alleged difficulty of supposing that the complicated physiological causal process involved in seeing was compatible with claiming that seeing was a direct and unmodified apprehension of external objects as they really were, and apart again from the question how what started as a material relationship (involving, for instance, light rays, retinal images and nervous impulses) could end up as a mental awareness of material objects, there appeared to be a host of other awkward facts to be accommodated. Perceptual illusions are familiar, and perceptual hallucinations occur. The straight stick that looks bent when partly

immersed in water still looks bent even although we know (in some sense) that it is not and even although we know the physical explanation of its looking so. What is the relation between the appearance which we cannot help seeing as that of a bent stick and the straight stick which is really there and which we expect to see when we pull it out of the water? What are we seeing when we see what is not there at all (*e.g.*, Macbeth's dagger or the Angels of Mons)? To call them images seems insufficient, for they appear to have a projection and a spatial location which the images of daydreaming and of memory do not. If we look squintingly at a single object, for instance a lamppost, and see it double, which, if either, is the real lamppost? What, even if one is the real lamppost, is the other that we are seeing? And what are we seeing, if neither is the lamppost? The same object looks to have different visual shapes from different angles and distances, even although we are in no ordinary sense deluded: two observers looking at a penny lying on the table between them will simultaneously see different visual ellipses; although both will unhesitatingly say that the penny is and looks round. What is to be the relationship between the infinitely various ellipses and the supposedly real round shape of the penny? When we look at a distant star in the night sky, can we be seeing the real star if, as is often the case, it became extinct countless years before the time of our observation? How are we to say what, if any, is *the* colour of an object, when what colour we see is partly determined by the state of our optical nervous system, by the aids to seeing which we employ, by the condition of the intervening medium and by the distance of the object from our point of observation? Where is the blue of the sky, the rainbow, the mirror image, or the after-image, all of which we say we see? Such questions led philosophers to distinguish between the object perceived and the sense-data by which it was perceived, the latter allegedly being what were immediately given in sense (*e.g.*, the various ellipses of the penny or the differing colours of a woman's dress as seen under different lights). But such a solution, in line with the dualism of Locke's empiricism, engendered new problems of its own about the relation between the sense-data and the objects of which they were sense-data. Were sense-data private or public? If the former, are we any nearer to real knowledge of the objects than Locke was? If the latter, what can be the relation of visual space to physical space? Are some sense-data, but not others, literally parts of the surfaces of their objects? And, if so, how may we decide which are the privileged, authentic ones? Along these lines, it appeared that only statements about sense-data could be certain and that no statement about a material object could possess more than some degree or other of probability. But if statements about sense-data were as personal and as subjective as they appeared, what sure or initial foundation could they provide for any degree of probability at all for the corresponding objective statements about the physical world? To some it seemed that the claim to knowledge of sense-data was in principle no more secure than a claim to knowledge of material objects. The supposed incorrigibility of a statement about sense-data lay, not in its certainty of being correct, but in the usually complete absence of any means of correcting it: any sense-datum was gone as soon as succeeded by another, and no two persons' sense-data could be directly compared. If, as for some philosophers, sense-data are public entities, existing independently of observers, will not the same questions break out over them as those questions about perception of material objects which they were postulated to solve? And is any visible material object to be thought of as a physical nucleus with an infinite cluster of sense-data somehow surrounding it? Or is, as was maintained by early phenomenalists following Berkeley's lead, a material object simply a collection of all actual and possible sense-data obtainable of it? This naïve phenomenalism seemed the logical conclusion of applying in this field Russell's version of Ockham's principle of economy: "wherever possible, substitute constructions out of known entities for inferences to unknown entities." But, in that case, what could be the status of a "possible sense-datum"? Its claim to be a "known entity" seemed highly dubious. The intractability of these hydra-headed questions suggested a radical defect in all such versions of the sense-datum theory, the defect of treating the technical term "sense-datum" as though it were the name of some special kind of sensed object; philosophers had unwittingly been led astray by their own language.

Memory.—The treatment of memory followed a roughly parallel, although simpler, direction, ending in a similar impasse. Here the question seemed to be primarily temporal: how could an act of remembering, occurring in the present, have as its object an event that had already occurred in the past and was now over? What is there about remembering that entitles us to place any reliance at all on our supposed recollections of the past, including the belief that events happened in the order and at the times when our memories tell us that they did happen? Broadly, two kinds of solution were attempted: the first was the dualist solution, namely to suppose, following Hume, that remembering consisted of having mental images of a certain kind, related as copies to the original events of which they were the images or pictures. But while such a view might be at least partially correct as an account of the phenomenology of remembering, it could answer no questions about the veracity or reliability of memory—as Hume himself had pointed out. No images are self-authenticating: as Russell argued, there was nothing logically absurd about the suggestion that "the world sprang into being five minutes ago, exactly as it then was, with a population that 'remembered' a wholly unreal past." Russell's own theory, that remembering consisted of having images characterized by a feeling of familiarity which would mark off the images of memory from those of imagination, was no improvement on Hume's original version. As an account of the experience of remembering, it seemed unplausible, for a feeling of familiarity appears far more to mark the experience of being unable to remember, of being troubled by the seeming familiarity of a face or a scene while being unable to identify or to locate it in one's past. And Russell's theory, like Hume's, conferred no dependability whatever on supposed memory experiences.

The second line of solution was to suppose, as argued by G. F. Stout (1860–1944), that remembering had as its direct object the event remembered. It was immediate (*i.e.*, noninferential) knowledge of the event remembered. Images occurring in a memory situation are to be distinguished from the perceptions that occurred in the original situation; and we do not in remembering immediately experience what we are remembering; but present image and "original content" of the perception are only to be distinguished as "successive stages in the history of the same thing." C. D. Broad (1887–), while not accepting this naïvely realistic theory of memory, did not reject it on metaphysical or temporal grounds: he suggested that the event remembered, while not *present* at the time of remembering, might be *presented* then. But such a notion of being presented without being present is not easy to accept, or even to understand. And in any case, as he pointed out, the occurrence of delusive memory situations will not square with such a realist theory of memory, so that it succeeds no more than the dualist theory in solving the epistemological problem which it was intended to answer.

2. Linguistic Analysis.—The general approach to epistemology illustrated by these two examples had been to a great extent inspired by the Russellian idea of making philosophy scientific, of determining how much of our so-called knowledge of the external world could properly be called knowledge; but the process of paring, of refining and of disclosing the details of complexities seemed to lead only to the conclusion that virtually no such knowledge was possible at all. Later, philosophers tended to progress by a different and more hopeful technique, derived from Moore and Wittgenstein. Regarding as misconceived the problems as posed by their predecessors, they shifted from attempting descriptions and theories of the phenomenology of experience to attending more carefully to the uses and implications of language as employed in claims to knowledge. The model hitherto used (unconsciously), due largely to preoccupation with the single sense of sight, had been that of the lens of the eye or the camera recording the scene, producing a picture of it, with the attendant problems how far the picture was a duplication, how far a distortion, of the original. This had appeared even in the act-object interpretation of knowing itself, the assumption that knowing was an act of one kind and

that the difference between it and the different act of believing was to be found in the nature of the acts themselves; such psychologizing of epistemology reached back at least as far as Descartes and was largely the result of his influence. But, by attending more critically to the use of the verb "to know" and by ridding themselves of the inertia of the assumption that all active verbs designate acts of one kind or another, philosophers have been able to set their questions in a new light. Instead of trying to treat knowing as a special kind of act of acquaintance or awareness, they took their stand on paradigms of common-sense knowledge and asked under what conditions we would reflectively say that we know what we do know. Again, in the particular case of seeing, instead of starting with an apparently unexceptionable example of visual knowledge, for instance that this is a book in front of me, and working to the paradoxical conclusion that I cannot ever directly see a book or know that it is a book that I see, they ask under what conditions we would reflectively accept a claim to see a book in front of me. The sense-datum terminology is held simply to be an alternative terminology to that of common sense, over which it might have technical advantages for philosophers, enabling them to express themselves more clearly and minutely. It has had the grave disadvantage of laying its users open to the temptation to reify sense-data, thus generating unnecessary puzzles about the epistemological linkage between the sensing of the sense-datum and the perceiving of the material object supposedly achieved thereby. We do better to regard as the only object of a perceptual situation that which actually is perceived, even although, as a result of the observer's inattention or of the difficulties of conditions of perception, it may be misperceived. For instance, what I see as I look at what is in fact a squirrel in the branches of a tree is a squirrel, even although I may, from whatever cause, suppose that I see a cat. There is no need to postulate feline sense-data which I am to be held actually to have sensed, although wrongly to have interpreted. What I saw was a squirrel which, to me at any rate, looked enough like a cat for me to think that what I saw was a cat. A squirrel must look like something; and, even if most often it looks like a squirrel, it is hardly surprising if under some conditions it looks fleetingly like a cat. It is not surprising that pennies lying on the table look elliptical; it would be much more surprising if they did not. But they do not even look elliptical in the way in which the squirrel may look like a cat, for a penny does not look as if it were elliptical, but normally looks as if it were, as in fact it is, roughly circular. We do not see an elliptical sense-datum belonging to a round penny, we see a penny which is round and which looks elliptical only in the way in which it must so look if it is to look as if it really is a round penny. The illusion of the bent stick arrests attention only because of the comparative infrequency of its occurrence: we see a stick which looks as if it were a bent stick only until we know how the trick is done. Thereafter what we see is a straight stick which looks bent only in the way in which the penny looks elliptical, but which does not look as if it is bent any more than the penny looks as if it is elliptical.

The assertion that "he knows that . . ." can be seen not to be reporting a present, occurrent act of a special kind, for it does not report an act at all, let alone a present one. A man knows that many things are the case, even though he may not be thinking of them at the time at which the assertion "He knows that. . . ." is truthfully made of him. He does not cease to know that Adolf Hitler was the leader of Nazi Germany when he thinks about something else or when he falls asleep. A schoolboy answering an examination paper on physics does not on that account or for the period of that examination cease to know that Roger Bannister was the first man to run a four-minute mile, that Gen. Dwight D. Eisenhower was successively a soldier and president of the United States, and that his own name is William Brown. Knowing, in fact, is not an act, still less an act characterized by a feeling of certainty or conviction, for the latter is neither sufficient nor necessary; we are often enough firmly convinced of something but mistaken, and we may know that something is the case, even although we think that we do not. Belief again, like knowledge, is not an act, and for the same reasons: it is a disposition or a tendency to act (including to speak) in certain ways under certain conditions, marked less by a subjective feeling of incomplete certainty or of partial dubiety (although these may often enough be present) than by an inability to establish beyond doubt or to produce conclusive evidence for the belief in question. The temptation to treat knowledge as a special kind of mental condition and consequently to look for a reliable or even infallible criterion of that condition is natural enough, but has now been shown to be delusive. It is natural, for the verb "to know" *prima facie* appears to belong to the class of cognitive "psychological verbs," with others such as "to think," "to wonder," "to imagine," "to believe," etc. But this rough classification is misleading: in the first place, unlike some of the others, "to know" does not designate a mental act, and in this respect it resembles "to believe." Secondly and more importantly, "to know" does not designate wholly a mental condition or state, and in this respect it differs even from "to believe." To say that a man believes something (*e.g.*, that today is Jan. 1) is to say something solely about the man's view on today's date and is not to commit oneself to agreeing with him: one may report that he believes something, without oneself either agreeing or disagreeing with him. But to say that he knows that today is Jan. 1 is not merely to say something about the man's view about today's date, it is also to commit oneself to agreeing with him: it is to endorse his claim (if he makes it), to say that he is right. Thus the statement that a man knows that something is the case is not, as is so with the other cognitive verbs, a statement entirely about the man's state of mind; and consequently to know is not simply to be in a particular state of mind. In fact, as Plato came so near to saying in the *Theaetetus*, a man knows that something is the case if (1) he can give the correct answer to the question and if (2) he can show that it is the right answer, or produce conclusive evidence for his assertion; what will count as conclusive evidence will depend on the particular circumstances and the context, about which no rules that are both completely precise and completely general can be given in abstraction. The problem about memory will be the problem of determining the conditions under which we could accept a man's claim to remember a certain event: if we are satisfied that he could have remembered it—or, in other words, that it is an event which occurred within his conscious lifetime, that he was a witness of it or that we can find no evidence that he was not, that he can now give a substantially correct account of it, which we can find no reason to suppose that he could have got, or did get, from another source—then we have no reason for not accepting his claim; if he survives tests of being deceived or of trying to deceive us, we can ask no more.

Thus, by showing that the act-object account of knowledge and belief which runs through philosophy from Plato's *Republic* onward is at times an oversimplification—and, more often, a positive error which, by misframing the questions, has necessarily produced erroneous answers—20th-century philosophers suggested a more fruitful line for epistemology to follow. By paying more attention to linguistic expressions and to the contexts of their use, they laid bare the assumptions—exposing the errors of many of them—from which the subject had so long been proceeding and indicated the lines of a program for its future progress.

See EMPIRICISM; METAPHYSICS; PSYCHOLOGY, HISTORY OF; QUALITIES; RATIONALISM; SCHOLASTICISM; SCIENCE, HISTORY OF; SKEPTICISM; and the biographies of philosophers—ARISTOTLE; DESCARTES, RENÉ; KANT, IMMANUEL; PLATO; etc.; *see* also references under "Knowledge, Theory of" in the Index.

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KNOWLTON, CHARLES (1800–1850), U.S. physician and author of a treatise on birth control which became the subject of celebrated court actions in the United States and England, was born in Templeton, Mass., on May 10, 1800, the son of a farmer. He acquired his early education chiefly through his own efforts, and was graduated from Dartmouth college, Hanover, N.H., with a degree in medicine in 1824. In 1832 Knowlton published anonymously a treatise on birth control entitled *The Fruits of Philosophy: or, The Private Companion of Young Married People.* The following year the second edition appeared, crediting him as the author. Nine American editions eventually were published. The book was first reprinted in England in 1834.

Though the book presented a temperate discussion of the medical, social and economic aspects of birth control, it violated current conventions of taste. Prosecuted in the United States, Knowlton was ordered to pay a fine at Taunton, Mass., and was imprisoned for three months in Cambridge. An action against him in Greenfield was unsuccessful, however. In England *The Fruits of Philosophy* became the subject of a test case, *The Queen* v. *Charles Bradlaugh and Annie Besant* (*2 Law Reports, Queen's Bench Division,* 569, and the reversed decision in *3 Law Reports, Queen's Bench Division,* 607), the courts eventually (1877) deciding in favour of the defendants (*see* BESANT, ANNIE; BRADLAUGH, CHARLES). Knowlton died on Feb. 20, 1850.

KNOWLTON, FRANK HALL (1860–1926), U.S. paleobotanist who made his chief contribution to science in his studies on the distribution and structure of fossilized plants, was born at Brandon, Vt., on Sept. 2, 1860, and was graduated at Middlebury college in 1884. He became an aid at the U.S. National museum in Washington, D.C., and in 1887 was made curator of botany and fossil plants at that institution. He resigned in 1889 to take a position as assistant paleontologist with the U.S. geological survey. In 1900 he became paleontologist and, in 1907, geologist of the survey, serving in the latter position until his death at Ballston, Va., on Nov. 22, 1926. His investigations led him on many field trips throughout the western states. He was the founder of *The Plant World* and its editor from 1897 to 1904. The author of more than 200 papers in scientific journals, he also did a considerable amount of popular writing on botanical and other subjects including *Birds of the World* (1909).

KNOW-NOTHING PARTY (AMERICAN PARTY), a U.S. political party that flourished in the decade before 1860 and stressed a strong nativist or pro-American viewpoint. Its roots lay in the Federalist-Republican struggles of the early years under the constitution when the foreign ideas and influences of Jefferson's followers aroused strong opposition. Later, in the years 1830–60, as immigration increased and Roman Catholic immigrants grew in numbers, the geographical segregation and the clannishness of foreign city voters gave them a power that politicians strove to control. In labour disputes and political feuds such immigrants—especially the Irish and Germans—displayed great power, and at times gave offense by their criticism of American institutions.

At immigration centres, such as Boston, Philadelphia and New York, the Roman Catholic Church was held by some to be perpetuating foreign power on American soil. Many regarded it as a transplanted foreign institution, un-American in organization and ideas. Thus numerous nativists became involved in anti-Catholic and anti-Irish city riots, and in local elections they endorsed anti-foreign candidates for public office in order to uphold "Americanism."

First known by a variety of names, including the Order of the Star Spangled Banner, the Native American party began its national career in 1845. With Whig support the nativists carried New York city and Boston, but they soon lost the support of the Whigs and by 1847 the national organization diminished. In the early 1850s nativism was revived politically by a rising tide of immigrants. The phantomlike Know-Nothing movement had sprung from nativist secret societies and lodges whose main attraction was their ritualistic mysteriousness. The use of handclasps, signals and passwords formed a part of the Know-Nothing lore. Emulating the Masons, the organization was secret; when interrogated about it, the members were supposed to answer that they knew nothing, hence the name.

The times were propitious for the success of such an aggressive third party. In entering national politics the party abandoned its mysteries. When compelled to publish a platform of principles, factions arose in its ranks as it straddled the slavery question. In 1854 the Know-Nothing gains were remarkable. That year, American party became its official name, and the party reached its greatest strength during the height of the national struggle over slavery. It elected governors, legislatures or both in four New England states and in Maryland, Kentucky and California. Thereafter the organization spread like wildfire—especially in the south, where there were, paradoxically, few immigrants. Know-Nothing evasion of the slavery question was popular in the south, but neither Republicans nor Democrats could condone such an evasion permanently. Northern Know-Nothings were swept into the antislavery movement in 1854. The national platform of 1856 (adopted by a secret grand council) included antialien and anti-Catholic planks and offered political sops to both north and south on the slavery issue. The party's unsuccessful presidential nominee that year was Millard Fillmore. Eight months later a Republican wave swept the Know-Nothings out of the north, and by 1859 the party was confined to the border states. The equally unsuccessful antiwar Constitutional Union party—the "Do-Nothing" Bell-Everett party of 1860—was mainly composed of Know-Nothing remnants. The year 1860 practically marked their disappearance as a political power.

Two other groups that took the name American party appeared in the 1870s and 1880s. An antiliquor, Bible-quoting party organized itself as the National Christian association in 1872. It proved ineffectual and was reduced by the 1880s to backing Prohibitionist candidates for office. In 1886 another American party appeared in California. This group elected various state and local officials, participated in pro-vigilante activities and took part in the anti-Chinese agitation that rocked San Francisco. With unemployment rampant, the party's demands for oriental exclusion, and delayed naturalization for other aliens, proved temporarily popular.

Except in city politics, nativism showed no sustained vitality in the United States. Public opinion never fully accepted its low estimate of immigrants or Catholics.

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KNOX, (WILLIAM) FRANKLIN (1874–1944), U.S. newspaper publisher and secretary of the navy during World War II, was born in Boston, Mass., on Jan. 1, 1874. After graduating from Alma college, Alma, Mich., in 1898 he served with the 1st

U.S. volunteer cavalry, known as the "Rough Riders," in the Spanish-American War. He became a newspaper reporter in Grand Rapids, Mich., and from 1901 to 1912 was publisher of the *Sault Ste. Marie News*. He later published two newspapers in Manchester, N.H., and two in Boston. During World War I he served overseas with the 78th division. After the war he returned to the publishing business and in 1927 became associated with the Hearst publications. In 1931 he became publisher of the *Chicago Daily News*. In 1936 Knox was nominated for the vice-presidency by the Republican convention on the ticket headed by Alfred M. Landon. In July 1940 Pres. F. D. Roosevelt appointed him secretary of the navy, a post he held until his death on April 28, 1944, in Washington, D.C. (J. B. Hn.)

KNOX, HENRY (1750–1806), general in the American Revolution and first secretary of war under the U.S. constitution, was born in Boston, Mass., on July 25, 1750. Forced by family circumstances to leave school at the age of nine, he worked in a Boston bookstore and by the age of 21 had acquired his own store. He was present at the clash known as the "Boston massacre" in 1770 and unsuccessfully urged the British commander not to allow his troops to fire on the Americans.

Having been active in the colonial militia, Knox joined the continental army at Cambridge, Mass., in 1775. He was commissioned a colonel and placed in charge of the artillery. During the winter of 1775–76 Gen. George Washington sent him to Fort Ticonderoga to bring back captured British artillery. In a remarkable feat the 25-year-old Knox brought back 55 pieces of artillery totaling 120,000 lb. in weight, using oxen, horses and men to transport the guns over snow and ice 300 mi. to Boston. These weapons were used to drive the British from that besieged city and formed the basis for the U.S. army artillery. At the battle of Trenton, the artillery under Knox was decisive, mowing down the Hessians as they ran out into the icy streets, and his guns helped much in the victory at Princeton. At Morristown, Knox, now a brigadier general, conducted an artillery school called the academy, a forerunner of the U.S. Military academy at West Point, which Knox is credited with founding. In the Philadelphia campaign Knox used questionable judgment in extensively bombarding the Chew House filled with British soldiers but distinguished himself highly in commanding the artillery at Monmouth and at Yorktown. Knox was made a major general, the youngest American to hold this rank in the continental army, and at the end of the war succeeded Washington as commander of the army.

Knox became secretary of war in the government under the Articles of Confederation and was carried over into Washington's first cabinet in 1789. He founded the Society of the Cincinnati, an organization of officer veterans and their descendants. (*See* Cincinnati, Society of the.) As secretary of war he negotiated successful treaties with the Indians. Knox retired in 1795 to a large estate at Thomaston, Me., where he died on Oct. 25, 1806.

See North Callahan, *Henry Knox: General Washington's General* (1958). (No. C.)

KNOX, JOHN (*c.* 1514–1572), leader and historian of the Scottish Reformation. Almost nothing is known of Knox's life before 1540, the accounts given by his earlier biographers being mostly fanciful. He was born in the vicinity of Haddington, East Lothian; the traditional date of his birth (1505) has been seriously questioned, and a date *c.* 1514 is more probable. Of his parentage it is known only that his mother's name was Sinclair (Knox used the name "John Sinclair" as an incognito in times of danger); that his father's name was William, and that he and both Knox's grandfathers had fought, and two of them had died, perhaps at Flodden, under the standard of the earl of Bothwell, their territorial superior. The family may have been engaged in farming.

Early Life.—It is supposed that Knox trained for the priesthood under the scholar John Major, most probably at St. Andrews university. (The statements of his biographers T. McCrie and P. Hume Brown concerning his connection with Glasgow university should be heavily discounted.) Knox did not take a master's degree, but he ended his training with a mind imbued with that delight in abstract thought and dialectical disputation which, even in that age, was recognized all over Europe as typical of Scottish scholarship. It has been conjectured that, while still at the university, his studies in Jerome and Augustine may have led him to doubt the teachings of the Roman Church, and that he scrupled to take his degree because of the oath against heresy demanded of masters of arts at St. Andrews. Yet the first scanty historical notices of Knox, dating between 1540 and 1543, hardly bear out this conjecture. It is clear from them that he was in priest's orders by 1540, though apparently he did not hold a cure of souls; and this makes it improbable that he entertained serious doubts about the teaching of the church at an early age. It is clear also that he was at this time practising as an apostolic notary in the Haddington area, which would seem to indicate that he was in good standing with the ecclesiastical authorities down to 1543.

Spokesman of the Scottish Reformation.—Two years later, however, Knox was in more equivocal company as tutor to the sons of Hugh Douglas of Longniddry and Alexander Cockburn of Ormiston, gentlemen of East Lothian deeply involved in the intrigues of political Protestantism. Under their protection the reformer George Wishart began a preaching tour in the Lothians in Dec. 1545. Knox was much in his company, and whatever Knox's previous religious views may have been his complete confirmation in the Reformed faith dates from his contact with Wishart, whose memory he cherished with tenderness and reverence ever afterward. Wishart was burned for heresy in March 1546 by Cardinal David Beaton, archbishop of St. Andrews, who, rather than the weak governor, was the real ruler of Scotland. Three months later Beaton was murdered by certain Protestant gentlemen of Fife, partly as an act of retribution and partly from private motives. The conspirators, joined by others, fortified themselves in St. Andrews castle and appealed to England for help while the governor sought French assistance against them. The illness and death of the kings of both England and France delayed assistance to either side, and in the interval the Protestant garrison in the castle controlled the town and neighbourhood of St. Andrews.

Meantime Knox, accompanied by his pupils, was moving from place to place to escape persecution and arrest. His desire was to go to Germany to study there at the Protestant seats of learning; but his employers sent word to him to take their sons to St. Andrews and continue their education under the protection of the castle. Thus in April 1547, 11 months after the cardinal's murder and against his own desire, Knox arrived with his pupils in St. Andrews—still an obscure and unknown man. The three months he spent there transformed him, bitterly against his own will, into the acknowledged spokesman and protagonist of the Reformation movement in Scotland. The Protestants in the castle had become involved in controversy with the university; and John Rough, the castle chaplain, together with the patriot and poet Sir David Lyndsay, and others, becoming aware that a man of uncommon gifts had joined them, pressed upon Knox's soul and conscience the duty of taking up "the public office and charge of preaching." Knox's inclination was for the quiet of the study and the schoolroom, not for the responsibilities and perils of the life of a preacher of a proscribed and persecuted faith. He resisted the call with tears, and only after great hesitation was he persuaded to preach in the town of St. Andrews a sermon which convinced friend and foe alike that the great spokesman of Scottish Protestantism had been found. This was the turning point of Knox's life: from this time forward he regarded himself as called of God to the preaching office, and he was the more certain of the divine origin and compulsion of the call in that it ran counter to every inclination of his own.

At the end of June 1547 French assistance reached the governor of Scotland. The garrison of St. Andrews castle, bombarded from without and assailed by plague within, capitulated on terms which were not kept; and Knox and others were carried off to the miseries of slavery in the French galleys from which, 19 months later, English intervention secured his release, though with permanently broken health.

In England.—In England the Protestant government of Edward VI was endeavouring to hurry clergy and people into the Reformation faster, if anything, than most of them were willing to go. For this program preachers and propagandists were urgently

required; and since a return to Scotland was impossible for Knox at this time, the English government promptly made him one of a select corps of licensed preachers and sent him north to propagate the Reformation in the turbulent garrison town of Berwick-upon-Tweed. He reduced the town to order and established a congregation on Puritan lines, and there he met Marjorie Bowes who was to become his wife. Early in 1551 he was given a new assignment in Newcastle, and a little later was appointed to be one of the six royal chaplains whose duties included periodic residence at, and preaching before, the court, as well as itinerant evangelism in areas where the regular clergy were lacking in Protestant zeal. Northumberland's accession to power marked a governmental swing toward more extreme Protestantism; and Knox, now a leading figure in the Protestant camp, was pressed to accept the bishopric of Rochester. His refusal was motivated not by any doctrinaire objection to episcopacy but by his complete distrust of Northumberland's government and by a determination not to be bound to it by gifts or preferments. Later he refused the vicarage of Allhallows, London, mainly because it would have required his compliance with usages which he considered to be not yet sufficiently Reformed. He continued, under the patronage of the government, to exercise an itinerant ministry mainly, but not exclusively, in Buckinghamshire, Kent and London.

In three respects Knox left his mark on the Church of England. He took part in the shaping of its articles. He secured the insertion into the Book of Common Prayer of the so-called black rubric which explains that kneeling at communion implies no adoration of the elements. And he was one of the chief foster fathers of English Puritanism—though in this connection it should be noted that he regarded all sectarianism with horror. He could see no place for any religious body or sect apart from the national Protestant church, and throughout his life he used his considerable influence in England to persuade the Puritans to remain within the English church.

At Geneva.—On the accession of Mary Tudor in 1553 Knox was one of the last of the Protestant leaders to flee the country. He escaped to the continent with his mind distracted by the realization that the fate of "true religion" in England had turned on the religious opinions of one woman. He could see no security for the Reformation anywhere if the personal whim of a sovereign was permitted to settle the religion of a nation. Might it not be legitimate for Protestant subjects, in such circumstances, to resist—if necessary by force—the subversion of their religion by a Roman Catholic ruler? Knox laid this question before the Protestant leaders on the continent. John Calvin and Heinrich Bullinger were prepared to counsel only patience and prayer, certainly not armed resistance. From Theodore Beza, Knox may have received greater encouragement, for in this same year (1554) Beza wrote his *Traité de l'authorité du Magistrat* in which he developed ideas significantly similar to those of Knox—a fact which has not been sufficiently noted by Knox's biographers. Be that as it may, Knox formulated his fateful conclusion, later to be applied in Scotland, that godly magistrates and nobility have both the right and the duty to resist, if necessary by force, a ruler who threatens the safety of true religion. Also in 1554 Knox published his unfortunate *Faithful Admonition* to the faithful who remained in England. Its extremism and intemperate language served to increase the sufferings of those to whom it was addressed; and, coming as it did from one who was in comparative safety, it alienated many in England from him.

In the same year, on the insistence of Calvin, Knox became minister of a congregation of English refugees, mainly Puritan, in Frankfurt am Main. From this he was ejected by the machinations of the Prayer Book party in circumstances which reflected some credit on Knox and none on them. He now became minister of the growing congregation of English exiles in Geneva, a pastorate which lasted until his final return to Scotland in 1559, but was interrupted at the outset by a visit (1555–56) to Berwick and a nine-month sojourn in Scotland, in the course of which he married Marjorie Bowes. She died, having borne him two sons, in 1560.

In Edinburgh Knox was astounded by the progress made by the Reformed cause and by the eager reception given to him by all classes in the community. To the nobility, in visits to their country houses, he propounded his doctrine of "justifiable resistance" to Roman Catholic rulers who attacked the faith of Protestant subjects, and urged them to withdraw from all the rites and ceremonies of the Roman Church and to band themselves together for the defense of Protestantism in case that should prove necessary. A peremptory summons from his congregation called him back to Geneva; but he left to the faithful in Scotland an important *Letter of Wholesome Counsel* (1556) enjoining not only private family worship but weekly meetings of believers for corporate Bible study and discussion. From these weekly meetings Reformed congregations grew apace, and from the men who undertook their leadership came elders of the Reformed Church that was to be.

Geneva was to Knox a beloved city, "the most perfect school of Christ on earth since the days of the Apostles." There he spent the happiest years of his life, in peace, esteemed and among kindred souls. From this period dates his elaborate and rather tedious treatise on *Predestination;* since he held a practical doctrine of complete human freedom and responsibility along with an intellectual doctrine of absolute divine predestination, the treatise is more of an intellectual tour de force than a work of practical significance. From this time (1556–58) also dates his disastrous *First Blast of the Trumpet Against the Monstrous Regiment* (rule) *of Women* in which he states with intemperate vehemence the common belief of his day that the exercise of authority by women is contrary to both natural law and revealed religion. The pamphlet was aimed at the three women who were holding the reins of government in England, France and Scotland and were oppressing Protestantism; but publication unfortunately coincided with the accession in England of the Protestant Elizabeth I who indignantly and permanently debarred the rash author from her realm.

French Invasion of Scotland.—In Scotland matters reached a crisis in the spring of 1559 (*see* SCOTLAND: *History*). In 1557 the Protestant lords had signed a "band" or covenant, on Knox's advice, pledging themselves to foster and defend "the Congregation of the Lord" and its ministers (hence their name "lords of the congregation"). The queen regent, Mary of Guise, had deemed it politic to make concessions to them with a view to securing the crown matrimonial for her son-in-law the dauphin. But the peace of Câteau Çambrésis early in 1559, ending the hostilities between Spain and France, opened the possibility of stronger French intervention in Scotland, and the queen regent felt that the time had come to call a final halt to the expansion of Protestantism. To this end she summoned the Protestant preachers, as ringleaders of the growing Protestant insubordination, to appear before her on May 10, at Stirling. The Protestants replied by recalling Knox from Geneva, and the Protestant lords, lairds and commoners mustered at Dundee. On May 4 Knox joined them and they advanced to Perth, where, after a vehement sermon by Knox, the friaries were sacked. The townsfolk and the poor had bitter scores against the friars and seized the opportunity to repay them.

By the end of June Edinburgh was temporarily in Protestant hands and Knox was preaching in St. Giles'; but the triumph was illusory and Knox knew it. The voluntary army of Protestants could not keep the field for more than a few weeks; the mercenary army of the queen regent could keep the field indefinitely and strike a crushing blow as Protestant strength declined. At this juncture Henry II of France died and power fell into the hands of the Guises, the brothers of the queen regent and uncles of the young queen of France, Mary, queen of Scots. Strong French intervention in Scotland was now assured in furtherance of the Guise plan to displace Elizabeth and to unite France, Scotland and England under Francis II of France and Mary. Thus the religious issue in Scotland was crossed by a political one of critical international importance. A French victory in Scotland would place Elizabeth and England in grave peril. If not for religious, then for political reasons, it behoved England to make common cause with the Scottish Protestants. Knox lost no opportunity of driving this fact home to William Cecil (afterward Lord Burghley) and Elizabeth, though Cecil was already agonizingly aware of the peril and was held back only by the vacillation of his royal mistress. The autumn and winter of 1559 saw the Scottish Protestants in desperate plight.

Only Knox's superhuman exertions and indomitable spirit kept the cause in being. In the blackest hour his great sermon at Stirling put fresh heart into the despairing Protestant leaders and staved off irrevocable defeat. On Knox's resolution alone in these months hung the fate not only of Scottish Protestantism but of Elizabeth's England and perhaps of the Reformation throughout Europe.

The Scottish Reformation.—In the spring of 1560 Elizabeth at last consented to English action. In April 10,000 English troops joined the Scottish Protestants, the queen regent died in Edinburgh castle and the disheartened French gave up the struggle. By treaty, French and English troops were then withdrawn, leaving the victorious Scottish Protestants to set their own house in order. The chances were heavily against a satisfactory settlement, for there was no strong central authority to take control. The sovereign was a Roman Catholic and an absentee in France, and all her sympathies, religious and political, were with the defeated side. The estates (Scottish parliament) have never exercised much power; but now, meeting in August without royal authority, they proceeded to grapple with the religious issue. The Scots Confession (hurriedly prepared by Knox and three others), a document moderately Calvinist in tone but with a higher doctrine of the sacraments than Calvin's, was adopted as the faith of the nation, and remained so until superseded by the Westminster Confession a century later. Papal jurisdiction was abolished, and the saying of Mass prohibited with death as the penalty for a third offense (though it is fair to point out that there was perhaps only one instance in which this penalty was inflicted; for a variety of reasons the Scottish Reformation was much more moderate than is popularly supposed).

It remained to prescribe the polity and constitution of the Reformed Church (*see* PRESBYTERIANISM: *Scotland;* SCOTLAND, CHURCH OF). At this point insoluble problems arose, not so much over polity as finance. Knox, aided by a committee of distinguished churchmen, laid before the estates the First Book of Discipline containing proposals for the constitution and finance of the Reformed Church. Worship was to be regulated by the Book of Common Order (also called Knox's Liturgy), a revision of the order used by Knox in Geneva (*see* COMMON ORDER, BOOK OF). Congregations were to be governed by elders elected annually by the people, and the elders were to aid the minister to maintain firm moral discipline among the people. Ministers were to be elected by the people but to be appointed only after rigorous examination of life and doctrine by their ministerial brethren. The ablest ministers were to be appointed superintendents of areas roughly corresponding to the old dioceses, with pastoral oversight of ministers and congregations in the area, and were to be assisted by provincial synods of ministers and elders. It is not stated, but is clearly implied, that final authority is to lie with a general assembly of the church containing both elders and ministers. This polity is obviously not the "presbyterianism" of a later generation, and there is no reason to suppose that Knox foresaw that later development and designed the office of superintendent as a mere stopgap until full presbyterianism should arrive. Neither is the polity episcopacy, for the superintendents are not consecrated and do not constitute any kind of higher order, but are in all points subject to the general assembly. But in the high place given to the laity Knox's system contains the most essential element of later presbyterianism.

The Book of Discipline proceeds to outline a most elaborate educational scheme from parish school up to university, compulsory for all and free to the poor, with equal opportunity of advancement for the son of peasant and of peer in the service of the church and commonwealth. It also lays plans for a much-needed scheme of systematic aid of the poor, a project dear to Knox's heart. Finally it urges that the endowments of the old church should be made available for the financing of these admittedly very costly schemes of the new church.

The proposals thus outlined foundered on the rock of finance. The endowments of the old church were plunder in a poor land for the nobility, who had scant sympathy with Knox's "devout imaginings." The estates refused to accept the Book of Discipline and the church was left to organize itself to the best of its ability. The estates finally shelved the financial problem by life-renting benefice holders of the old church in their livings, with the obligation of supporting a Reformed ministry out of their revenues. Knox was deeply embittered by the enforced abandonment of his schemes for education and poor relief and by the scant provision for the Reformed Church. Thus the financial question drove a wedge between Knox and the nobles who had been his friends and supporters, and between the church and the government. The rift was widened when the return of Mary queen of Scots created a court party which resented the extremism of the ministers. Yet the poverty of the Reformed Church created a bond of sympathy between ministers and people, and governmental neglect or hostility compelled it to develop a sturdy autonomous life of its own which resisted later attempts to subject it to state control.

Mary arrived in Scotland in 1561 already persuaded that Knox was to be her archenemy and that the country could not hold them both. Knox, who hoped at first that the young queen would prove pliable in Protestant hands, soon reached a similar conviction. The first three of his celebrated audiences with Mary were polite skirmishes; in the fourth, battle was joined in grim earnest. Hearing that Mary was contemplating marriage with Don Carlos of Spain, a match which would have had fatal consequences for the Scottish Reformation and probably for England as well, Knox sounded the Protestant alarm with all the vehemence at his command. Mary, enraged at this intervention by a heretic preacher and commoner in affairs of state, summoned Knox, berated him with hysterical fury and charged him with treason; but the privy council refused to convict. Knox filled Mary's cup of bitterness in 1564 by marrying, without royal assent, Margaret Stewart, the 17-year-old daughter of the impoverished Lord Ochiltree, who was distantly related to the queen.

Last Years.—The hatred between Knox and Mary was now personal, deep and vindictive. But Mary's sun was setting. In 1564 she dismissed her Protestant advisers and undertook the mismanagement of her own affairs. For a time the Reformed Church was in real danger, but in 1567 came Mary's ruin and abdication (Knox would have preferred her execution) and Knox's old friend James Stewart, earl of Moray, became regent. In him the Reformed Church would have found a powerful patron; and Knox, believing that the long battle of the Reformation was ended, was contemplating a peaceful retirement to Geneva when Moray was murdered and the country plunged into a dreary struggle between the supporters of the queen and the regency. Knox was anxiously involved in the turmoil, but his strength was overtaxed and he suffered a paralytic stroke. When Edinburgh became a battleground between the factions in 1571 the leaders on both sides insisted on his removal to safety in St. Andrews. Thence he returned in 1572 to die. When the news of the massacre of St. Bartholomew's day reached Scotland Knox dragged himself to his pulpit in St. Giles', and in white heat drove home the lesson of that tragedy to his hearers. Once more he stood in the pulpit of St. Giles' to introduce his successor. On Monday, Nov. 24, 1572, he died in Edinburgh.

Knox was and is a controversial figure, and his work and influence will always be differently assessed by men of differing religious and political views. Certainly his conviction that the Reformation was God's cause and must triumph, a conviction which he had a remarkable power of impressing upon other minds, was the rock upon which the Reformed Church in Scotland was built. His power as a preacher, acknowledged by friend and foe, lay in his capacity to fuse reason with emotion and to be a passionate logician in the pulpit, convincing mind and heart with equal force. Intolerant he undoubtedly was, but not more so than most religious leaders of his day; and his Calvinism was a good deal more moderate than that of a later age. He may justly be blamed for his "rude vehemence," his acrid judgments and sometimes mischievous utterances; yet he was more temperate in action than in speech, and his private letters reveal an unexpected tenderness. His singleminded, lifelong and incorruptible devotion to what he believed to be his duty, in an age when such qualities were rare indeed, must command respect. The accusations of gross moral turpitude made against Knox by some later Roman Catholic writers are demon-

strably false at the few points where they can be historically tested, while there is ample historical testimony that his moral life was in keeping with his rigorous creed. Knox's most considerable literary work is his *History of the Reformation in Scotland.* For portrait *see* article PRESBYTERIANISM.

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KNOX, PHILANDER CHASE (1853–1921), U.S. lawyer, cabinet officer and senator, was born at Brownsville, Pa., on May 6, 1853. After graduating from Mount Union college, Alliance, O., in 1872, he studied law and was admitted to the bar in 1875. In 1877 he opened an office in Pittsburgh, Pa., where he practised law continuously until 1901 when he was appointed attorney general by Pres. William McKinley. While in this office he instituted many important suits, notably those against the "beef trust" and the Northern Securities company, which marked a new policy on the part of the government with regard to regulation of business. He resigned in 1904 when appointed to fill the unexpired term of Matthew S. Quay as U.S. senator from Pennsylvania. The following year he was elected for a full senate term. His service in the senate was interrupted in 1909 when Pres. William Howard Taft summoned him to become secretary of state, a position he filled until the end of the Taft administration in March 1913. Knox's attempt to use the influence of the department of state to encourage and extend U.S. financial and commercial interests, especially in Latin America, the near east and the far east, was criticized as "dollar diplomacy." In 1917 he was again returned to the senate. There he became one of the foremost opponents of the League of Nations. He died in Washington, D.C., Oct. 12, 1921.

KNOX, RONALD ARBUTHNOTT (1888–1957), English author, theologian and dignitary of the Roman Catholic Church, best known for his single-handed translation of the Bible, was born at Kibworth, Leicestershire, on Feb. 17, 1888, into a scholarly Anglican family. He was first scholar at Eton and subsequently at Balliol college, Oxford, from which he graduated in 1910. In the same year he became fellow of Trinity college, Oxford, and in 1912 chaplain. In 1917 he became a Roman Catholic and from 1926 to 1939 was Roman Catholic chaplain to the university.

Though the exploration of his theological and ecclesiastical perplexities between his graduation and entry to the Roman Church was marked by a gravity not unexpected from his family background, it was given characteristically witty expression in *Some Loose Stones* (1913) and *Reunion All Round* (1914). When the intellectual and spiritual struggle had been resolved it was chronicled in *A Spiritual Aeneid* (1918). The final objective expression of his position appeared in *The Belief of Catholics* (1927). Six volumes of Knox's sermons were published including the brilliant collections *Heaven and Charing Cross* (1935) and *Captive Flames* (1940), and a product of his experience as university chaplain was the witty *Let Dons Delight* (1939). He also wrote inventive and complex detective novels, probably the best of which was *Still Dead* (1934). Knox's New Testament appeared in 1945 and his Old Testament in 1949 and the penetrating examination of the problems of a translator, *On Englishing the Bible,* also appeared in that year (*see* BIBLE, TRANSLATIONS OF). This labour was rounded off by his *New Testament Commentaries* in 1953, 1954 and 1956. He died at Mells, Somerset, on Aug. 24, 1957.

See E. Waugh, *The Life of the Right Reverend Ronald Knox* (1959). (W. M. ME.)

KNOXVILLE, a city in eastern Tennessee, U.S., situated at the confluence of the French Broad and Holston rivers, which form the Tennessee. Pop. (1960) city, 111,827; standard metropolitan statistical area (Anderson, Blount and Knox counties, and including the cities of Maryville, Alcoa and Oak Ridge) 368,080. (For comparative population figures *see* table in TENNESSEE: *Population.*)

In 1761 the first Anglo-Americans on record visited the region. When a treaty of 1785 with the Cherokees opened the region to settlers, Capt. James White established the first permanent home; as headquarters of the Territory South of the Ohio, White's Fort was renamed Knoxville after Henry Knox, the secretary of war in George Washington's cabinet. During the American Civil War eastern Tennessee was torn by divided loyalties. Knoxville was occupied by Confederate troops, then Federal; during Nov. 1863 Confederates under Gen. James Longstreet unsuccessfully besieged Gen. Ambrose E. Burnside's Union army in the city's only major engagement. During Reconstruction, Knoxville grew rapidly. With a population of less than 3,000 in 1860 it grew to almost 10,000 by 1870. Two major events marked its history in the 20th century: creation of the Tennessee Valley authority (TVA) during the 1930s and establishment of Oak Ridge (*q.v.*), "the atomic city," 20 mi. W., during the 1940s. TVA headquarters are at Knoxville and 4 of its 25 dams are within 25 mi.; its electric power helped attract industry and its navigation program increased the city's transportation potential.

Area employment divides almost equally between industry and agriculture. Marble, tobacco, textiles, food, lumber, metals and chemicals are important to Knoxville's economy.

The University of Tennessee and Knoxville college influence the city's educational and cultural life, as do the Knoxville Symphony orchestra, the community-university Carrousel theatre and the Lawson McGhee library.

Knoxville is the western entrance to the Great Smoky Mountains National park (*q.v.*) and is at the heart of "the Great Lakes of the South," the TVA dam system. The city is well served by highways, railroads and airlines.

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KNUCKLE, the joint of a finger. The knuckle joint of an animal killed for eating is the tarsal or carpal joint of its leg. The word is used also in medical parlance to describe a loop of bowel within a hernial sac. "Knuckling" is used to describe a deformity of the leg of a horse (talipes) caused by a contraction of the posterior tendon of the fetlock. *See* JOINTS AND LIGAMENTS. (F. L. A.)

KNUCKLEBONES: *see* JACKSTONES.

KNUDSEN, WILLIAM S. (1879–1948), U.S. industrialist, noted for contributions to industrial production in World War II, was born in Copenhagen, Den., March 25, 1879, and christened Signius Wilhelm Paul Knudsen. He emigrated to the U.S. at the age of 20 and became a naturalized citizen in 1914. For several years he worked in various manufacturing plants, where he showed outstanding skill in production management. In 1913 he went to Detroit to work for the Ford Motor company, then pioneering quantity production of low-priced cars. He later transferred to the Chevrolet Motor company, rose to its presidency and in 1937 became president of General Motors corporation. When U.S. defense production got under way in the summer of 1940, Pres. Franklin D. Roosevelt appointed Knudsen a member of the advisory committee to the National Defense commission. In 1941 Knudsen became director general of the Office of Production Management. When the War Production board was created in Jan. 1942, Knudsen's position was abolished, but he was immediately commissioned a lieutenant general and became a roving production expediter for the war department. Resigning in July 1945, he returned to private business and died in Detroit on April 27, 1948. (H. C. T.)

KNUTSFORD, a market town and urban district of Cheshire, Eng., lies 25 mi. E.N.E. of Chester and is flanked by the landed estates of Booth, Tabley, Tatton and Toft. Pop. (1961) 9,389.

A charter of 1292 gave a market, free burgage and power to elect a mayor, and one of 1332 provided for fairs on certain festival days. Armorial bearings, granted in 1955, trace the town's history from King Canute, who is reputed to have forded the river Lily

which divided Over and Nether Knutsford. In Domesday Book Knutsford appears as Cunetesford. The principal shopping streets are King street and Princess street, each containing buildings of historical and architectural merit. The stone tower in King street is the town's memorial to Elizabeth Cleghorn Gaskell (*q.v.*), who took Knutsford as the original for her novel *Cranford*. The Sessions house, in Renaissance style, is in Toft road. Quarter sessions have been held in Knutsford since 1760. The Heath—about 30 ac. of common land—is the heritage of the townspeople and there the renowned May day festival (dating from 1874) is held annually. The town is predominantly residential. The limited amount of industry includes a paper works, sawmills and nuclear energy design laboratories. Manchester airport at Ringway is 5 mi. N.E.

(E. My.)

KOALA (*Phascolarctos cinereus*), an Australian marsupial well adapted to an arboreal existence. It is a robustly built animal, about two feet long, ashy gray to gray brown in colour, found in Victoria, New South Wales and Queensland and formerly also in the southeastern districts of South Australia. The koala lives among eucalyptus trees and subsists on a limited diet of the leaves and shoots, showing a preference for species of high oil content. Its intestine is modified for the digestion of two to three pounds of foliage daily by the presence of an enlarged "appendix"—a caecum, or extension, six to eight feet long. Koalas are said to mature at 4 years and to live for about 20, breeding every other year, gestation taking about 35 days.

BY COURTESY OF THE AUSTRALIAN NEWS & INFORMATION BUREAU

AUSTRALIAN KOALA (PHASCOLARCTOS CINEREUS)

Discovered soon after the arrival of Capt. James Cook at Botany bay in 1770, the koala is now protected by law. Prior to such protection, indiscriminate killing for the sake of its pelt, which makes an inexpensive fur, and the destruction of its habitat were leading to the extinction of the koala. *See* Marsupial.

(Jo. E. H.)

KŌBE, the first port in Japan in terms of value of trade, one of its largest cities and the capital of Hyōgo prefecture, is located at the head of Osaka bay to the east of the city of Ōsaka. Pop. (1940) 967,200; (1955) 979,305; (1960) 1,113,977. A long narrow coastal plain seldom more than one and one-quarter miles wide backed by the steep slope of the Rokkō mountains forced the city to spread along the sea. A few winding roads have been built up the front of the mountains to hotels and wealthy homes.

In early days the name Kōbe was applied to a small fishing village separated by the Minato river from the town of Hyōgo, the chief port of the area. Hyōgo, also known as Ōwada and Muko, was an important port for trade with China and Korea as early as the 8th century. For many centuries it continued to be Japan's chief port for foreign trade and the government maintained patrol boats there to control pirates in the Inland sea. For a brief period during the 12th century Taira Kiyomori made it the capital instead of Kyōto. During the Tokugawa period (1603–1868), Hyōgo served as the outer port of Ōsaka until in 1867 it was reopened to foreign trade. Soon it was outstripped and absorbed by Kōbe, which has a deeper harbour. The combined ports have been called the port of Kōbe since the establishment of the Kōbe customhouse in 1872. Hyōgo and Kōbe were incorporated as the city of Kōbe in 1889. The many foreigners who settled there in the 19th century gave it an international and cosmopolitan atmosphere. Absorption of adjacent communities continued: Minato in 1896, Suma in 1920, Nishigo in 1929, Tarumi in 1941, Arima in 1947, Mikage in 1950, Dōjō in 1951 and Nagao in 1955. During World War II, 60% of the city was destroyed and the population dropped to 380,000. The city and its harbour facilities were quickly rebuilt after the war. After Ōsaka, Kōbe is the most important industrial city of the broad industrial belt of western Japan. The chief products are ships, steel and rubber goods. Other industries produce sake, machinery, electrical equipment and machinery, books and textiles. (C. A. Mr.)

KOBLENZ: *see* Coblenz.

KOCH, FREDERICK HENRY (1877–1944), founder of the Carolina Playmakers at the University of North Carolina, is considered the father of American folk drama.

Born in Covington, Kentucky on Sept. 12, 1877, Koch received his B.A. degree from Ohio Wesleyan university, Delaware, Ohio, in 1900, his M.A. from Harvard in 1909. In 1905 he began teaching at the University of North Dakota, Grand Forks, forming the Dakota Playmakers in 1910. Called to the University of North Carolina, Chapel Hill, in 1918, he introduced his now famous course in playwriting and created the Playmakers whose theatre became the first state-subsidized playhouse in America. He died Aug. 16, 1944, at Miami Beach, Fla.

Koch's conviction that the roots of genuine American drama lay in "folk subject matter, with the legends, superstitions, customs, environmental differences and the vernacular of the common people" had far-reaching effect. Not only did his students, among them Thomas Wolfe, Maxwell Anderson and Paul Green testify to his influence, but the development of the little theatre movement, the rise of Negro drama, Mexican and Canadian folk drama and the exploitation of regional sources by playwrights Lynn Riggs, Hatcher Hughes, Lula Vollmer and Eugene O'Neill are generally credited to the persuasiveness of Koch's ideas.

Eleven volumes of folk plays appeared under Koch's editorship.

(E. B. P.)

KOCH, ROBERT (1843–1910), German physician, one of the founders of the science of bacteriology and winner of the 1905 Nobel prize for physiology and medicine for his work on tuberculosis, was born on Dec. 11, 1843, in Klausthal, near Hanover. He studied medicine at the University of Göttingen, where his teachers included F. Wöhler, the chemist, and F. G. J. Henle, the pathologist. In 1872 he settled in Wollstein, Posen, serving as district physician and in his spare time began his now-classic researches on the etiology of infectious diseases. In 1876 he proved experimentally that anthrax, a disease of sheep and cattle and occasionally of men, was caused by a specific bacterium. Koch devised technical methods of handling bacteria and of growing them in pure culture, publishing his results in 1877; most of his methods are still used.

In 1880 he was appointed to the imperial health office and to the medical school faculty in Berlin, where he assembled a brilliant group of assistants (G. Gaffky, F. Löffler, E. von Behring, P. Ehrlich, etc.). In 1882 Koch discovered and identified the germ of tuberculosis, and in 1883 he identified the cholera bacillus. His announcement in 1890 of the preparation of tuberculin raised hopes that he had discovered a cure for tuberculosis. Although these hopes were never realized, tuberculin proved to be a valuable aid in the diagnosis of tuberculosis. In 1891 Koch was made director of the new Institute for Infectious Diseases in Berlin, a position he held until 1904. To this institute came students from every part of the world to learn about the new science of bacteriology.

Every modern student of bacteriology learns Koch's postulates as part of his basic training in the subject. These postulates, briefly, are: (1) a specific organism must be seen in all cases of an infectious disease; (2) this organism must be obtained in pure culture; (3) organisms from pure cultures must reproduce the disease in experimental animals; (4) the organism must be recoverable from the experimental animals. These principles were first stated in 1840 by Henle. Koch's brilliant discoveries through the application of these dicta gave them experimental validity. Although these postulates have not been fulfilled exactly in all cases of infectious disease (leprosy is a notable example), they have been of enormous value as guides to the discovery of the etiologic agents in many of the most important diseases of men, animals and plants. Koch traveled extensively. He studied cholera in India and Egypt, plague in Bombay, rinderpest in South Africa, sleeping sickness in Uganda and malaria in Italy and on the shores of the Adriatic. He died on May 27, 1910, in Baden-Baden.

See also references under "Koch, Robert" in the Index.

BIBLIOGRAPHY.—Robert Koch, *The Etiology of Anthrax* (1877); *The Etiology of Tuberculosis* (1882); R. Bochalli, *Robert Koch* (1954); B. Heymann, *Robert Koch* (1932); B. Möllers, *Robert Koch* (1950); V. Robinson, "Robert Koch," *Pathfinders in Medicine,* 2nd ed. (1929). A bibliography of Koch's writings and the biographies of him appears in *Medical Classics,* vol. 12, pp. 714–880 (April 1938). (M. C. L.)

KOCH, an ethnic group akin to the Bodo (*q.v.*) tribes, dispersed over parts of Assam and Bengal. While their original language is a Tibeto-Burman dialect, large sections of the group in the 1960s spoke Bengali or other Aryan languages. In the 16th century a Koch chief established the state of Cooch-Behar (*q.v.*), and they now call themselves Rajbansi ("of royal blood"), resent being called by the old tribal name and follow Hindu customs. But their claim to the status of Kshatriya (*q.v.*) is not generally admitted, and many of the endogamous subdivisions rank very low in the Hindu caste hierarchy. The caste is mainly agricultural, but there are also Rajbansi carpenters, blacksmiths and traders. Some sections of the group are less Hinduized than others, and there are considerable variations in customs and status.

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KOCHER, EMIL THEODOR (1841–1917), Swiss surgeon, winner of the 1909 Nobel prize for medicine and a leader in the application of experimental and physiological principles to surgical problems, was born in Bern, Switz., on Aug. 25, 1841. After qualifying at Bern university in 1865 he studied in Berlin, London, Paris and Vienna, where he was a pupil of Theodor Billroth (*q.v.*). In 1872 he became professor of clinical surgery at Bern, remaining at the head of the surgical clinic for 45 years. After attending the International Congress of Medicine in London in 1881 Kocher became the chief advocate of Listerism in Switzerland, but his readiness to accept more advanced methods was outstanding, and he later adopted complete asepsis. His most famous work was that on the physiology, pathology and surgery of the thyroid gland, for which he was awarded the Nobel prize. By 1912 he had performed 5,000 operations for goitre, and had converted one of the most difficult surgical procedures into one practically without danger. His other contributions to surgery included his method for the reduction of dislocations of the shoulder, new methods or modifications of older methods for operation on the stomach, the lungs, the gall bladder, the tongue, the cranial nerves and for hernia. He devised many new techniques, instruments and appliances and the forceps and incision that bear his name remain in general use. His *Chirurgische Operationslehre* (1892) was issued in many editions and translations. Kocher died at Bern on July 27, 1917. (W. J. Bp.)

KŌCHI, the name of a Japanese prefecture and its capital city. The prefecture, in southern Shikoku, was formed from Tosa province after the Restoration of 1868, when feudalism was abolished. Area 2,743 sq.mi. Pop. (1965) 812,707. The population is concentrated on the Tosa plain, which is surrounded by mountains except on the south. Isolated by poor communications, the people have developed strong local pride. The chief products are agricultural machinery and implements, coral, processed sea food, dried bonito, paper and raw silk.

The city of Kōchi, commercial centre and capital of the prefecture, lies at the head of Urado bay. It was formerly the capital of Tosa province and in it was located the castle of the Yamanouchi family, of which the donjon survives. The city is noted for its marine products, especially dried bonito. Pop. (1965) 217,894. (C. A. Mr.)

KOCK, CHARLES PAUL DE (1793–1871), French novelist and dramatist whose work was long enjoyed at every level of society both in France and abroad, was born at Passy on May 21, 1793, the son of a refugee Dutch banker who died under the guillotine the following March. An avid reader and an inventive storyteller, Paul de Kock took a job as a bank clerk in 1808 but left it after the publication, at his own expense, of his first novel, *L'Enfant de ma femme* (1813). He established his reputation with *Georgette, ou la nièce du tabellion* (1820), *Gustave, ou le mauvais sujet* (1821) and *Mon voisin Raymond* (1823). His numerous novels and plays give a variegated picture of contemporary life, but his licentious works—which he defended as being playful rather than immoral—are no longer much read, though some titles, such as *Le Philosophe en voyage* (1821), *La Laitière de Montfermeil* (1827), *La Femme, le mari et l'amant* (1829; dramatized by Charles Dupeuty, 1830), *La Pucelle de Belleville* (1834), *La Famille Gogo* (1844) and *Cérisette* (1850), are still remembered. His books often gain by translation, which may eliminate faults and flatness of style objectionable in the original. Students of manners can find much curious information in *Le Barbier de Paris* (1826) and *La Grande Ville: nouveau tableau comique, critique et philosophique* (1842). He died in Paris on Aug. 27, 1871. His *Mémoires* were published in 1873. There is a collected edition of his works in 299 vol. (1902–05).

See C. Beuchat, *Histoire du naturalisme français,* 2 vol. (1949). (R. Dl.)

KODAIKANAL, a hill station of south India in the Madurai district of Madras. It is situated 7,375 ft. above sea level, 60 mi. by road from the nearest railway station of Kodaikanal Road (Ammayanaykkanur), which is itself 280 mi. S. of Madras and 25 mi. N. of Madurai. Pop. (1961) 12,860. Kodaikanal lies in picturesque hill country where many herbs grow wild. Citrus fruits and sago are cultivated. On the crest of the hills, at 7,700 ft., there is an upper air and solar observatory which was transferred from Madras in 1899. European missionaries spend the summer at the station and most foreign missions have their own permanent housing establishments there. Kodaikanal is noted for its schools, especially its boarding school for European children. At Shambaganur (6,000 ft.) is a well-known Jesuit seminary. (G. Kn.)

KODÁLY, ZOLTÁN (1882–1967), Hungarian composer and authority on Hungarian folk music, was born at Kecskemét on Dec. 16, 1882. He was a chorister in his youth at Nagyszombat (renamed Trnava), where he wrote his first compositions, and in 1902 he studied composition with Hans Koessler in Budapest. In 1905 he undertook his first folk song expedition. In the following year he met Béla Bartók and also graduated from Budapest university with a thesis on the structure of Hungarian folk song. After studying for a short time with Charles Widor in Paris he was appointed teacher of theory and later composition at the Budapest academy of music, a post he held from 1907 to 1941. Further researches on folk music were made until the outbreak of World War I; in 1923 he wrote his *Psalmus Hungaricus* to celebrate the 50th anniversary of the union of Buda and Pest. In 1926 he produced his comic opera *Háry János,* and his reputation was further established with his two sets of Hungarian dances for orchestra, *Marosszéki táncok* (1930) and *Galántai táncok* (1933). Other works include a *Te Deum* (1936), a concerto for orchestra (1941), *Missa brevis* (1942) and the opera *Czinka Panna* (1948). His Symphony was first performed in 1961. Kodály created an individual style derived from Hungarian folk music, contemporary French music and the religious music of the Italian Renaissance. With Bartók he published editions of folk songs (1906; 1921), and his folk song collection formed the basis of *Corpus Musicae Popularis Hungaricae* (established 1951). He died in Budapest on March 6, 1967.

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KODAMA GENTARŌ, Count (1852–1906), Japanese soldier and statesman of the Tokuyama clan, the guiding genius of the Manchurian campaign during the Russo-Japanese War, was born in Suwo province (now part of Yamaguchi prefecture), on March 15, 1852. In 1898 he became governor general of Formosa. In 1900–02 he was minister of the army and in 1903 held concurrently the portfolios of home and education. When the conflict with Russia became imminent in 1903, Kodama gave up his portfolios to become vice-chief of the general staff, and in 1904 was promoted to general. Throughout the Russo-Japanese War (1904–05) he served as chief of staff to Field Marshal Oyama Iwao, commander of the Japanese expeditionary forces in Manchuria. Kodama and Oyama's plans, carefully worked out in advance of

each engagement, left a minimum of initiative to local commanders, requiring the attainment of stipulated objectives regardless of cost in lives. But though Kodama was in his element on the battlefield, he was instrumental in bringing the war to a speedy conclusion. Realizing that Japanese resources were near exhaustion, he secretly hastened to Tokyo shortly after the victorious battle of Mukden (March 10, 1905) and urged Japanese leaders to make peace. Following the conflict Kodama became chief of the general staff, but the war had undermined his health and he died in Tokyo on Sept. 24, 1906. Posthumously, he was honoured with the title of count.

See Tatsuji Takeuchi, *War and Diplomacy in the Japanese Empire* (1935); Miwa Kai and P. B. Yampolsky (comp.), *Political Chronology of Japan, 1885–1957* (1957). (G. A. Ln.)

KOECHLIN, CHARLES (1867–1950), French composer and teacher of many of the younger composers of his time. Born in Paris on Nov. 27, 1867, of an Alsatian Protestant family, he did not take up music seriously until he was 22 after having studied at the École Polytechnique. Among his teachers at the Paris conservatoire were Antoine Taudou, Jules Massenet, André Gédalge and Gabriel Fauré. He later studied privately with Fauré and was to some extent influenced by him. He was a composer of originality and a pioneer in almost every branch of music, both practical and theoretical. As a teacher he had a great formative influence on composers of his own and younger generations, including the group known as "Les Six." He experimented in an individual manner with new techniques, polytonality, atonality and serialism. His works, many of which are still unpublished, range from songs, pianoforte music and every variety of chamber combinations to full-length symphonic and choral works, lyric dramas, ballets, music for films and educational exercises in polyphonic composition. Among the sources of his inspiration was Rudyard Kipling's *Jungle Book*, from which he set three poems for chorus and orchestra (1899–1910) as well as four symphonic poems based on episodes in the book (*e.g., La Course de Printemps* and *Les Bandar-Log*) written between 1925 and 1939. His bigger choral works include *La Fin de l'Homme*, on a text by Leconte de Lisle (1895); *L'Abbaye*, two parts (1899–1908); and the impressive *Chant funèbre à la mémoire de jeunes femmes défuntes* (1902–07). His interest in the cinema is shown in such works as *The Seven Stars Symphony* (1933), portraying Douglas Fairbanks, Lilian Harvey, Greta Garbo, Clara Bow, Marlene Dietrich, Emil Jannings and Charlie Chaplin, and *Danses pour Ginger* "in homage to Ginger Rogers" (1937).

Much of his music has a strong modal flavour, and his theoretical writings include treatises on modal polyphony, harmony and orchestration and an essay on polytonal and atonal music. He also wrote biographies of Debussy and Fauré and orchestrated Debussy's ballet *Khamma*, Chabrier's *Bourrée fantasque* and Fauré's incidental music for the London production (1898) of Maurice Maeterlinck's *Pelléas et Mélisande*. Koechlin was for many years president of the French section of the International Society for Contemporary Music, whose festivals he attended regularly. He died at his villa at Le Canadel (Var), on Dec. 31, 1950.

See M. D. Calvocoressi, "Charles Koechlin's Instrumental Works," in *Music and Letters* (Oct. 1924); W. H. Mellers, "A Plea for Koechlin," in *The Music Review* (Oct. 1942). (R. H. My.)

KOENIG, MARIE PIERRE JOSEPH FRANÇOIS (1898–), French army officer, was born at Caen on Oct. 10, 1898. He saw service first in World War I and later in the Rif campaign. In World War II he fought in Norway, then in France until he was evacuated to England, where he joined the Gaullist forces. In May–June 1942 Koenig achieved renown when, for 15 days, he and his Free French brigade held off Erwin Rommel's panzers at Bir Hacheim in Libya. Subsequently Koenig served as army assistant chief of staff, French delegate to Gen. Dwight D. Eisenhower's headquarters, commander of the French resistance forces, military governor of Paris after its liberation, commander of the French forces in Germany at the war's end, inspector general in north Africa in 1949 and finally as vice-president of the Conseil Supérieur de la Guerre in 1950. Retired soon after, he was elected to the national assembly and served briefly in 1954 and again in 1955 as minister of national defense. (M. V.)

KOFFKA, KURT (1886–1941), German-U.S. psychologist, one of the founders of Gestalt psychology, was born on March 18, 1886, in Berlin. He studied at the University of Berlin, receiving his doctor's degree in 1908. After holding assistantships at several universities he taught at Giessen from 1911 until 1924, when he first went to the United States. After teaching at Cornell university, Ithaca, N.Y., and the University of Wisconsin, Madison, he went to Smith college, Northampton, Mass., in 1927, as the first William Allan Neilson professor of psychology. He died on Nov. 22, 1941, in Northampton.

Koffka, together with Max Wertheimer and Wolfgang Köhler, was responsible for the development of the Gestalt theory, which began as a protest against the elementarism of the day. The movement is best known for its approach to problems of perception. It had an important influence on many aspects of psychology and often was in opposition to stimulus-response behaviourism. Koffka's first important publication was *Die Grundlagen der psychischen Entwicklung des Kindes*, an application of Gestalt principles to child psychology, which was published in English as *The Growth of the Mind* (1924) and later translated into Spanish, Russian, Japanese and Chinese. His *Principles of Gestalt Psychology* (1935) is outstanding as an attempt to treat a wide variety of psychological problems from a unified point of view. *See* also GESTALT PSYCHOLOGY. (Fz. H.)

KŌFU, commercial city and capital of Yamanashi *ken* (prefecture), Honshu, Japan, is located about 60 mi. W. of Tokyo, in the rich agricultural Kōfu basin. Between 1940 and 1958 the city increased in area from 16 sq.mi. (42 sq.km.) to 66 sq.mi. (171 sq.km.) and in population from 102,400 to 161,400. Pop. (1960) 160,963. Long a centre of sericulture, the city met the decline in silk demand by producing other textiles, by raising grapes and by expanding the tourist industry through the development of hot springs in the area. Locally mined rock crystal started the jewelry industry but most rock crystal now processed is imported. (C. A. Mr.)

KOGĂLNICEANU, MIHAIL (1817–1891), Rumanian writer and statesman, one of the founders of modern Rumanian historiography and one of the first prime ministers of the united principalities of Moldavia and Walachia, was born in Iași on Sept. 6, 1817. He was educated at Lunéville in France and at the University of Berlin, where he published the first attempt at a synthesis of Rumanian history, *Histoire de la Valachie, de la Moldavie et des Valaques transdanubiens* (1837), as well as a short survey of Rumanian language and literature, *Romänische oder wallachische Sprache und Literatur*.

Returning to Iași, Kogălniceanu in 1840 started publishing there a literary review, *Dacia literară*, and a scientific periodical devoted to history, *Arhiva românească*. From 1843 he lectured on national history at the Academia Mihăileană. He also edited the ancient Moldavian chronicles in the collection *Letopisetele Moldoviei*, three volumes (1845–52).

As his political activity aimed at progressive reforms, Kogălniceanu was exiled in 1846. After travels to France and Spain, he was back in Iași in 1848, devoting all his energies to propagating the idea of the union of Rumanian principalities but insisting at the same time on the necessity of social reforms, notably in his pamphlet on "The Wishes of the National Party in Moldavia" (1848). He founded a daily newspaper, *Steaua Dunării* (1855–59), in which he developed and defended his ideas.

After the union of Moldavia and Walachia under Prince Alexandru Cuza in 1859, Kogălniceanu became the prince's closest adviser. On Oct. 24, 1863, he was appointed prime minister and started a land reform and the secularization of monastic property, as well as administrative and educational reforms. The boyars' opposition, however, was strong, and he resigned on Feb. 6, 1865.

Minister of foreign affairs from 1876 to 1880, Kogălniceanu represented his country at the congress of Berlin (1878), where Rumanian independence was recognized. Shortly after his resignation he moved to Paris, where he died on July 1, 1891.

See N. Iorga, *Mihail Kogălniceanu, scriitorul, omul politic și Românul* (1920).

KOHAT, a municipality and district in Peshawar division, West Pakistan. The town stands on the left bank of the Kohat Toi, 37 mi. S. of Peshawar by the Kohat pass, along which a military road was opened in 1901. Pop. (1961) 49,854 including the cantonment with 13,838. It is built on undulating ground in an amphitheatre of hills, at some distance from the site of the 14th-century Bangash town, and is enclosed by a wall with 14 gates. The main bazaar runs east-west. Notable buildings are the fort, built by the British on the site of the old Sikh fort, the government college, town hall, Liaqat memorial hospital and municipal library. Northeast of the fort are several springs which supply water for irrigation. A railway runs from Jand on the main (Peshawar-Karachi) line to Kohat across the Indus, bridged at Kushalgarh, and beyond Kohat a narrow-gauge line goes to Thal. Kohat is noted for the production of lungis (cotton loincloths).

KOHAT DISTRICT (area 3,473 sq.mi.; pop. [1961] 627,795) consists chiefly of a bare and intricate hilly region west of the Indus, deeply scarred with river valleys and ravines, but enclosing a few patches of cultivated lowland. The eastern or Khattak country comprises a labyrinth of ranges. The Miranzai valley (inhabited by the Bangash tribes of Pathan origin) in the extreme west is comparatively rich and fertile. The Waziri hills on the south (under 4,000 ft.) extend like a wedge between Bannu and Kohat. Salt occurs in thick beds overlaid by beds of gypsum followed by nummulitic limestone. The salt is mined mainly at Jatta and Bahadur Khel. Wheat and bajra are the chief crops; camels are bred and large flocks of goats are kept.

Little is known of the district's early history. Tradition relates that in Buddhist times two rajas, Adh and Kohat, settled along its northern border. Kohat gave his name to Kohat town and Adh to the old fort of Adh-i-Samut, ruins of which are 4 mi. W. of Kohat. Kohat is first mentioned in the memoirs of the emperor Babur; the district appears to have been inhabited by the Bangash and Khattak tribes from the 14th and 15 centuries. After having been temporarily occupied by the Sikhs, it was annexed by the British with the rest of the Punjab in 1849. The Special (tribal) area attached to and administered by Kohat district had a population in 1961 of 190,083. (K. S. AD.)

KOH-I-NOR (*i.e.,* "mountain of light"), a famous diamond which became the property of the British crown in 1849. It was incorporated in the crown used by Queen Elizabeth, consort of George VI, at her coronation. It apparently formed part of the loot of Nadir Shah of Iran when he sacked Delhi in 1739. After his death it fell into the hands of his general Ahmad Shah, founder of the Durrani dynasty of Afghans. His descendant Shah Shuja, when a fugitive in India, was forced to surrender it to Ranjit Singh, the Sikh ruler. On the annexation of the Punjab in 1849 it was acquired by the British and was placed among the crown jewels of Queen Victoria.

Originally it weighed 191 carats, but when it was recut in 1852, at Garrards of London, its weight was reduced to 108 carats.

Its early history is controversial. Some writers have identified it with the diamond given to Babur's son Humayun by the raja of Gwalior after the battle of Panipat in 1526. Others have contended that it came originally from the Kollur mine on the Krishna river and was presented to Shah Jahan by Mir Jumla in 1656.

See J. B. Tavernier, *Travels in India,* ed. by W. Crooke, Eng. trans. by V. Ball, 2 vol., 2nd ed. (1925); H. Beveridge, "Babar's Diamond: Was It the Koh-i-Nur?" *Imperial and Asiatic Quarterly Review* (April 1899). (C. C. D.; X.)

KOHISTAN (Persian and Urdu, "country of the hills," "highlands"), the name of some mountainous or hilly tracts in West Pakistan and Afghanistan.

NORTHWEST FRONTIER KOHISTAN. The name Kohistan is specially applied to an area in the Peshawar division of West Pakistan, west of Chilas in Kashmir and the Kagan valley. The eastern part lies in Hazara district and is known as Indus Kohistan after the river that flows through it. It is inhabited mainly by the Allai, Samar, Jalkotie, Palasi and Harbani peoples. The western part, divided between Swat Kohistan (also known as Kalam) and Dir Kohistan, runs across the northern area of these two states. The Swat Kohistan is drained by the upper reaches of the Swat river and its affluents, and is inhabited by the Torwais and Garhwis. The mountains are snowbound, with rocky wastes down to about 12,000 ft. Below this the hills are covered with forests and grass down to 5,000–6,000 ft., and the valleys, especially near the Indus, are fertile and cultivated. The inhabitants, mainly of Turko-Iranian origin and Muslim, support themselves by agriculture and pasturing. Many have hazel or blue eyes and brown hair.

SIND KOHISTAN is a barren hilly tract in the west of Sind, consisting of the outlying spurs of the Kirthar range. It is quite wide between Karachi and Sehwan, beyond which it continues north as a narrow fringe along the skirts of the Kirthar range. Numerous hill streams or *nais* carry water only during the rains. Cultivation is possible where rainfall has been impounded or on the numerous watercourses. Cattle grazing is the main occupation.

AFGHAN KOHISTAN lies north-northeast of Kabul, the capital of Afghanistan, and extends to the Hindu Kush. Part of it is highly cultivated, with flourishing villages. (K. S. AD.)

KOHLER, KAUFMANN (1843–1926), Jewish theologian and leader in the Reform movement in Judaism, was born into a pious Jewish family at Fuerth, Bavaria, on May 10, 1843, and educated in talmudic schools and universities of Germany. His quest for reconciliation of traditional faith and modern knowledge is reflected in his doctoral dissertation, *Der Segen Jakobs* (1867). As its radicalism closed to him the Jewish pulpit in Germany, he emigrated to the United States. As rabbi of congregations in Detroit, Chicago and New York, and as president of the Hebrew Union college, Cincinnati (1903–22), Kohler was the foremost exponent of Reform thought for a generation. He convened the Pittsburgh rabbinical conference (1885), which adopted a platform, drafted by him, setting forth the essential principles of Reform in Judaism. He acted as a department editor of the *Jewish Encyclopedia* (1901–06) and contributed its principal theological articles. Kohler's chief works are *Jewish Theology, Systematically and Historically Considered* (1918) and *The Origins of the Synagogue and the Church* (1929). (S. S. C.)

KÖHLER, WOLFGANG (1887–1967), German-U.S. psychologist, originator of many aspects of Gestalt theory, was born at Reval (now Tallinn), Estonia, Jan. 21, 1887; he became a naturalized U.S. citizen in 1946. Köhler took his doctorate at Berlin in 1909, with an important investigation on hearing. From 1913 to 1920, as director of the Prussian Academy of Sciences Anthropoid Experiment station in the Canary Islands, he performed the famous experiments on problem solving by chimpanzees that led to radical revisions of learning theory, as well as other experiments on perception in apes and hens.

In 1921 he became professor of psychology at Göttingen and, a year later, director of the Psychological institute and professor of philosophy at Berlin. He directed there a series of notable investigations that explored many aspects of the comprehensive Gestalt theory, which Köhler, Max Wertheimer and Kurt Koffka (*qq.v.*) had earlier developed.

Köhler was unique among German scientists in his outspoken criticism of the Nazi regime; as a result he left Berlin in 1935 for Swarthmore college, Swarthmore, Pa. There he made important discoveries about figural aftereffects and about the electrical processes in the brain associated with visual perception. In 1955–56 he was a member of the Institute for Advanced Study at Princeton and in 1958 was appointed research professor of psychology at Dartmouth college. Köhler died in Enfield, N.H., on June 11, 1967. Among his important books are *Die Physischen Gestalten* (1920), *The Mentality of Apes* (1925), *Gestalt Psychology* (1929) and *The Place of Value in a World of Facts* (1938). *See* also GESTALT PSYCHOLOGY. (D. K. A.)

KOHLHASE, HANS (d. 1540), German brigand, the hero of Heinrich von Kleist's story *Michael Kohlhaas* (1810), was originally a merchant at Kölln in Brandenburg. While he was on his way to Leipzig fair in Oct. 1532, two of his horses were stolen by a Saxon nobleman, Günther von Zaschwitz. Unable to obtain redress in the courts of law, Kohlhase in March 1534 issued a *Fehdebrief,* or challenge, not only to his aggressor but to the whole

of Saxony. The elector of Saxony, John Frederick I, set a price upon his head. Kohlhase then collected a band and, despite the personal intervention of Martin Luther, spread terror throughout Saxony and, later, Brandenburg. In March 1540 he was seized, along with his principal associate Georg Nagelschmidt. The two were broken on the wheel in Berlin on March 22.

KOHLRABI: *see* CABBAGE.

KOHLRAUSCH, FRIEDRICH WILHELM GEORG (1840–1910), German physicist who made contributions in the fields of electricity and magnetism, was born on Oct. 14, 1840, at Rinteln on the Weser, the son of the physicist Rudolph Kohlrausch (1809–58). Kohlrausch held chairs at Göttingen (1866), at the School of Technology, Frankfurt am Main (1870), at Darmstadt (1871), at Würzburg (1875), at Strasbourg (1888), and at Berlin (1895). He died at Marburg on Jan. 17, 1910.

Kohlrausch devised a method of simultaneously determining the measurement of the horizontal component of the earth's magnetic field and an electric current. He carried out a series of important investigations on electrolytic conductivity, using an alternating current in conjunction with a bridge method, named after him, which reduced the polarization of the electrolyte. He investigated the variation of conductivity with dilution and showed that the ratio of the conductivity to the number of gram-equivalents of the salt per unit volume approached an upper limit for infinite dilution. He obtained a connection between this ratio and the sum of the velocities of the ions; this, with the determination of the ratio of the velocities made by J. W. Hittorf, enabled the absolute velocities of the ions to be found. His *Leitfaden der Praktischen Physik* (1870; many later editions) was widely read.

KO HUNG (PAO-P'U-TZU) (283?–343?), probably the best-known alchemist in the history of religious Taoism in China but also a Confucianist thinker, who tried to combine Confucian ethics with the occult doctrines found in Taoism. He was a native of Tan-yang in modern Anhwei Province, both his grandfather and father having served as officials at the court of the southern Kingdom of Wu. When he was born, however, China had already been briefly reunified under the Western Tsin Dynasty (265–317). In his youth he received an adequate Confucian education, but, having a broad intellectual interest, he came into touch with many other philosophical schools and eventually was captivated by the Taoist cult of physical immortality (*hsien; see* TAOISM). Religious Taoism offered its adherents immortality by such means as regulating the breath or by eating miraculous herbs or an elixir called gold cinnabar (*chin-tan*), a product of alchemy. In the hope of producing gold cinnabar, Ko Hung devoted himself wholeheartedly to alchemical studies.

As a thinker, however, Ko Hung was a Confucianist who stressed the importance of Confucian ethical principles for the regulation of proper human relations and severely criticized the unbounded hedonism that characterized the Taoist individualists of his day. His monumental work, *Pao-p'u-tzu* ("The Philosopher Who Embraces Simplicity"), by which name he himself is sometimes known, is divided into two parts: (1) the 20 Inner Chapters preach the gospel of individual salvation through the Taoist quest for immortality; (2) the 50 Outer Chapters reveal his orthodox Confucian attitude toward the problems that confronted Chinese society in the early 4th century.

Brief extracts from the *Pao-p'u-tzu* may be read in English in W. T. de Bary (ed.), *Sources of Chinese Tradition* (1960), in the "Introduction to Oriental Civilizations Series." For a complete English translation of the Inner Chapters, *see* James R. Ware, *Alchemy, Medicine, and Religion in the China of A.D. 320, The Nei P'ien of Ko Hung* (1967).

See also CHINESE PHILOSOPHY.

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KOHUT, father and son, leaders in Jewish scholarship.

ALEXANDER KOHUT (1842–1894), called the "Mighty Hammer" for his talmudic learning, and dedicated to Hungarian independence, Jewish emancipation, and rabbinic scholarship, was born on April 22, 1842, at Felegyhaza, Hung. At 15, he determined to produce a talmudic lexicon. He chose to revise the *Arukh* of Nathan ben Yehiel (*c.* 1100), a Hebrew and Aramaic dictionary, preparing a critical text and utilizing his knowledge of Persian. His labour of 25 years culminated in the *Arukh Completum.* A fervent supporter of Lajos (Louis) Kossuth (*q.v.*), Kohut excelled in Hungarian language and literature and was in 1867 appointed superintendent of the nation's schools, the first Jew to hold the position. Subsequently, he served in the Hungarian parliament. He emigrated to the United States in 1885 and became a leader of U.S. Judaism. He helped found the Jewish Theological Seminary of America in New York City (1886).

Kohut died in New York City on May 25, 1894. In his will, he requested that his children observe the anniversary of his death with good deeds, fulfilling the biblical teaching: "The memory of the righteous shall be for a blessing." This wish was honoured particularly by his wife, Rebekah, and his eldest son, GEORGE ALEXANDER KOHUT (1874–1933). The younger Kohut, who was born on Feb. 11, 1874, at Stuhlweissenburg, Hung., worked as educator and editor. Taught Judaica by his father, George Kohut studied at the College of the City of New York and at Columbia University. From 1920 he was principal and executive director of Columbia Grammar School. His extensive writings cover bibliography, literature, folklore, and Jewish history. He made possible the publication of many fundamental works of modern Jewish research through the Alexander Kohut Foundation. He died in New York City on Dec. 31, 1933. (M. Ds.)

KOJIKI, the "Records of Ancient Matters" of Japan. It was compiled in A.D. 712 by Hieda-no-Are, a professional transmitter and reciter in the imperial household. The *Kojiki* begins with the myths of creation and ends in A.D. 628. It consists of three parts: the first is called "Records of the Divine Age"; the middle and last parts include semimythical and semihistorical legends from the reigns of the 1st to the 33rd emperors. "Records of the Divine Age" is especially valuable for the study of primitive Shintō. It is composed of the creation myth; the celestial myth (*Takamano-hara*) centring around the sun-goddess (Amaterasu); the terrestrial myth (*Izumo*); the symbolic legends concerning the negotiation for Japanese sovereignty between the celestial (*Yamato*) clan and the *Izumo* clan; the descent to earth land of the children of the sun-goddess and the mythical legends of their offspring. It was written in quasi-Chinese, but largely phonetically, Chinese ideographs being used to represent the Japanese sounds. The religious and ethical values of the *Kojiki* were rediscovered and reevaluated by Motoori Norinaga, who wrote the complete "Annotation of the Kojiki" in 49 volumes. *See* SHINTŌ; JAPANESE MYTHOLOGY. (I. H.)

KOKAND, the capital of the Fergana *Oblast'* in the Uzbek Soviet Socialist Republic of the U.S.S.R., was the name of an independent khanate from 1798 to 1876. Pop. (1959) 105,082.

The city, which lies 40 mi. WNW of Fergana city, was mentioned by Arab chroniclers in the 10th century. Situated in the centre of the Fergana Valley on the Andizhan-Namangan-Leninabad Railway, Kokand is an important centre of the cotton industry, with metal-working, chemical, and other factories. There are more than 20 schools, as well as libraries and a theatre. Amid modern buildings are the remains of the palace of Khudayar Khan.

The khanate was formed by Alim Khan. About half the population were Uzbeks and Tadzhiks and the other half were seminomadic Kipchaks. The latter under their leader Khudayar Khan gained the ascendancy in 1840. For 1858 to 1866 the Kokand khanate came under the suzerainty of Bukhara. The Russian advance toward Kokand had begun in 1853 and the rivalry between the Bukhara and Kokand khanates prevented their uniting to resist the invaders. By 1866 the Russians had captured all the main cities of Kokand, including Tashkent. The khanate ceased to exist with the capture of Andizhan and Kokand by the Russians in 1876. The town of Kokand thereafter became the capital of the Russian *oblast* of Fergana. After the Revolution in 1917 a purely Muslim government was created in Kokand in opposition to the Russian colonist government of Tashkent. It was liquidated by Russian military force in January 1918. (G. E. WR.)

KOKCHETAV, an *oblast* and its capital town in the Kazakh Soviet Socialist Republic of the U.S.S.R. The *oblast,* formed on March 16, 1944, has an area of 30,502 sq.mi.; it is divided into 14 *raions* and has 3 towns and 4 "settlements of town type." It lies in a wooded steppe zone (Ishim steppe), which in the south rises into the picturesque hilly lake district of the Kokchetav upland (Kokchetavskaya Vozvyshennost), location of the Borovoye health resort. The highest point is Mt. Sinyukha (2,800 ft.). There are valuable deposits of iron, gold, coal and sodium chloride. The climate is continental. Precipitation is slightly more than 10 in. a year on the plains. The Ishim river flows through the western part of the *oblast* and there are many lakes. Black-earth soil, especially in the north, forms the basis for an essentially agricultural economy. As the result of the "Virgin Lands" campaign (1954–58) the cultivated area was increased to 11,830 sq.mi. Food grains (mainly wheat) predominate. There is important stockbreeding and dairy farming.

The population ([1959] 493,319) is 75% rural. Apart from Kazakhs there are large numbers of Russians, Ukrainians and other non-Asians. The *oblast* is traversed by the Middle Siberian and Trans-Kazakhstan railways and some new narrow-gauge and standard-gauge lines have been built in connection with the "Virgin Lands" campaign. There is an air service to Alma-Ata.

Kokchetav, the capital, is located on the south edge of the Ishim steppe, 280 mi. N.W. of Karaganda. Pop. (1959) 39,694. Founded as a Cossack village in the early 19th century, it is now an important railway junction with a number of light industries, mainly concerned with food processing. There is a medical training establishment and two museums. (G. E. WR.)

KOKOMO, an industrial city of Indiana, U.S., and county seat of Howard county, is 50 mi. N. of Indianapolis. In 1844 David Foster, a trader among the Miami Indians, laid out the village of Kokomo on part of the reservation once held by Chief Frances La Fontaine. The town was named for a relatively obscure Miami leader referred to in contemporary records as Koh-Koh-Mah. In 1844 also, it became the county seat and in 1865 it became a city. The modern city dates from 1886 when natural gas was discovered along nearby Wildcat creek. The subsequent ten-year gas boom attracted industries for the production of glass, rubber and tile products. Sudden exhaustion of the natural gas supply nearly halted the city's growth, but pioneer work in the design and manufacture of the "horseless carriage" by two local men, Elwood Haynes and Elmer Apperson, initiated a second industrial era centring around automobile production (the Haynes and Apperson models). A monument east of the city marks the place where one of the first automobiles in the U.S., invented by Haynes and built by Apperson, made its first road test on July 4, 1894. Metallurgical experiments of Haynes paved the way for other industries, including the manufacture of stainless steel and a durable cobalt-chromium-tungsten alloy known as Stellite. By the middle 1920s competitive assembly-line techniques had forced the abandonment of automobile manufacture by Haynes and Apperson, and the city was again faced with severe economic adjustments. Concerted efforts on the part of local citizens attracted new concerns, and by the outbreak of World War II Kokomo was again an important manufacturing centre.

The city has facilities for the production of automotive parts and accessories, steel and tool metals, pottery, plastics, opalescent glass, printed materials and canned goods.

For comparative population figures *see* table in INDIANA: *Population.* (V. M. B.)

KOKO NOR (CH'ING-HAI, Chinese for "Blue lake"), China's largest lake, at 10,515 ft. (3,205 m.) elevation in a basin about twice the lake's width (40 mi. [64 km.]) and three times its length (66 mi. [106 km.]) in the northeastern Tibetan highlands of the province of Tsinghai. Past the south of the lake runs the highway from Hsi-ning in east Tsinghai to the oil-rich Tsaidam basin west of Koko Nor. There are only a few small hamlets around the lake, but the surrounding rolling plateau valleys form rich grasslands for the flocks and herds of the thin nomad population. These include Mongols in the north and Tibetans in the south. Rainfall ranges from 7 in. in the southwest to about 16 in. around the east rim. From the Ta-t'ung mountains in the northwest flow two large streams to feed the lake, the Buka and the Bukayin. Lesser streams in the south flow from a long ridge leading to the Amne Machin range. (H. J. Ws.)

KOKOSCHKA, OSKAR (1886–), painter and poet of Austro-Czech origin, who became a British citizen in 1947, and one of the leading exponents of Austro-German Expressionism, was born on March 1, 1886, at Pöchlarn, Aus. While at the Vienna School of Arts and Crafts (1905–09), he was stimulated by *Jugendstil* painting (*art nouveau*). In about 1908 he found his own medium of expression in the psychological portrait, drawing rather than painting with his brush in a flowing linear style in which gesture and miming symbolized the mental attitudes of his models; *e.g.,* "Portrait of Auguste Forel" (1910). Simultaneously, he wrote dramas, prose and poetry, all important in literary history for the psychological problems they dealt with; *e.g., Mörder Hoffnung der Frauen* (1907) and *Der Gefesselte Kolumbus* (1913). He strove for an increase in the meaning of verbal expression by dissolving the syntax and isolating the single word. His writings are accompanied by striking illustrations. His second creative period began in 1917 at Dresden, where he was professor at the academy, 1919–24, and continued during travel in Europe, Africa and the middle east in 1924–31. He approached, temporarily, the contrasting and more lyrical style of the paintings of his north German contemporaries; landscapes and townscapes (Venice, London, Prague), mostly seen from tower-perspective, dominate this period.

During his stay in Prague (1934–38), and especially while in Great Britain (1938–53), he turned increasingly toward allegorical compositions which manifested his militant humanism, *e.g.,* "Prometheus-Saga" (1950). From 1953 Kokoschka undertook the conducting of annual courses in the International Summer Academy for the Study of Creative Arts at Salzburg. His paintings are exhibited in numerous art galleries, including the Neues Ealene, Munich, the Tate gallery, London, and the Museum of Modern Art, New York city. *See* also EXPRESSIONISM.

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KOKURA: *see* KITA-KYUSHU.

KOLABA, a district in Maharashtra, India. Area 2,723 sq.mi.; pop. (1961) 1,058,855, mainly Hindus. The former state of Janjira was merged in the district in 1948 and so were some parts of the former Bhor state. The district headquarters are at Alibag (pop. 9,909), a port 22 mi. S. of Bombay city. Kolaba takes its name from a little island off Alibag which was the stronghold of Angria, the 18th-century Maratha naval chief. The most interesting remains in the district are the Buddhists caves at Pal, Kol, Kuda, Kondane and Ambivli and the Brahmanical caves at Elephanta (*q.v.*). Matheran to the northeast is a popular hill station.

Kolaba is a rugged belt of country situated between the Western Ghats and the sea. The seacoast throughout the greater part of its length is fringed by a belt of coconut and betel-nut palms. Behind this is a stretch of flat country under rice, the staple crop of the district. Along the banks of the salt-water creeks are extensive tracts of salt marshes, and much salt is processed. Tidal inlets or creeks, of which the principal are Nagothna in the north, Roha or Chaul in the west and Bankot in the south, run inland for 25 or 30 mi., forming highways for a brisk trade in rice, salt, firewood, grass, timber, vegetables, fruits and dried fish. Within the district, on a peak of the Western Ghats, is the famous Raigarh fort where Shivaji built his capital and where he was crowned in 1674. There are extensive teak and blackwood forests. The Central railway (Bombay-Poona) crosses part of the district, and communication with Bombay is maintained by a steam ferry and by road. (M. R. P.)

KOLA NUT, a synonym for Colanut, the caffeine-containing nut of the trees *Cola acuminata* and *C. nitida* of tropical west Africa. It is an important article of diet for natives, and the dried nuts are exported for use in the manufacture of refreshing drinks. The trees, belonging to the cacao family (Sterculiaceae;

q.v.), are cultivated extensively in the American tropics.

KOLA PENINSULA (Kolski Poluostrov), of the U.S.S.R. lies in the north of European Russia, between the Barents and White seas. The base of the peninsula is marked by the Kola inlet in the north, the Kola river, Lakes Kola and Imandra and the Niva river, which enters the head of the Gulf of Kandalaksha. Almost 190 mi. from north to south and 250 from east to west, the area of approximately 50,000 sq.mi. forms the greater part of Murmansk (*q.v.*) *oblast* of the Russian Soviet Federated Socialist Republic.

Geologically the Kola peninsula, an extension of the Scandinavian peninsula, consists of a shield of very ancient, Pre-Cambrian crystalline rocks, mostly granites and gneisses, much fractured by faulting and rifting, giving a rectangular pattern of upland blocks and rift valleys, with associated intrusions of igneous rocks. Two such intrusions, laccoliths of nephelinite-syenite, form the highest parts of the peninsula, the isolated massifs of Khibiny and Lovozerskiye Tundry, which reach 4,068 and 3,694 ft. respectively. From these massifs the low Keivy ridge runs east-southeastward along the axis of the peninsula, gradually dropping in height toward the Gorlo (*i.e.*, "throat"), the narrow neck of the White sea. From this ridge a plateau slopes gently northward to the high, cliffed shore of the Barents sea, the so-called Murman coast (Murmanski Bereg). South of the ridge the land falls in a series of steps to the low, swampy coastal plain of the White sea, known as the Kandalaksha coast (Kandalakshski Bereg). This southern shore is lined by sand bars. The eastern shore, or Terski Bereg, overlooking the Gorlo, consists of low cliffs. The whole peninsula was greatly affected by the Ice Age (this being one of the last areas from which the ice retreated) and morainic deposits are frequent. There are numerous lakes, mostly occupying shallow depressions scoured out by the ice. The largest are Umbozero, between the two massifs, Lovozero, east of the massif of that name, and Yenozero near the Murman coast. The main rivers are the Ponoi, flowing across Kola peninsula parallel to, and south of, the Keivy ridge and into the Gorlo, the Iokanga draining to the Barents sea, and the Umba, Varzuga and Strelna, draining to the White sea. The granitic rocks so near the surface cause many rapids on all the rivers.

Almost all of the Kola peninsula lies north of the Arctic circle and the climate is severe. Precipitation is only about 16 in. a year, but much comes in the form of snow, which may lie all the year round on the higher parts of Khibiny. The January average temperatures in the interior are about −15° C. (5° F.), but on the Murman coast conditions are modified by the Barents sea which does not freeze. Summers are cool and cloudy, with average temperatures 12.8°–15° C. (55°–59° F.). All the north and east of the peninsula, together with Khibiny and Lovozerskiye Tundry, are in scanty tundra vegetation of mosses, lichens and dwarf Arctic birch, with very thin, poor soils. The southern part is covered by taiga forest, with birch and spruce dominant. Pines are found on sandy areas. Extensive sphagnum bogs occur everywhere.

The population is very thin and is chiefly concentrated along the coasts, where it engages in fishing. A few thousand reindeer-herding Lapps are found in the interior. Timber working is carried on in the south, but the main wealth of the Kola peninsula lies in the minerals of Khibiny, chiefly phosphorus-rich apatite, used for fertilizers, nephelinite, made into aluminum at Kandalaksha, zirconium and columbium. The mining centres are Kirovsk and Apatity. The largest town of the peninsula is the ice-free port of Murmansk on the eastern shore of the Kola inlet (pop. [1959] 221,874). Apart from the Kirov railway from Kandalaksha to Murmansk the peninsula is devoid of land communications other than winter trails. This railway branches farther south at Belomorsk, one line going to Leningrad, the other via Obozerskaya to either Archangel or Moscow. (R. A. F.)

KOLAR, a municipal town and a district in the Bangalore division of Mysore, India. The town, the district headquarters (pop. [1961] 32,587), lies 43 mi. E. of Bangalore and 21 mi. S. of Kolar Gold Fields by rail. Coarse cotton fabrics are woven on hand looms, and woolen blankets, leather goods and pencils are manufactured. There is an undergraduate college.

Kolar District (area 3,188 sq.mi.; pop. [1961] 1,290,144) is an undulating plateau, broken by isolated hills between the Western and Eastern Ghats. It is the dry zone of Mysore with scrub vegetation that is suitable for sheep rearing. Water from about 300 tanks (shallow depressions) is used for wet-crop cultivation, chiefly rice and sugar cane. The rearing of silkworms for raw silk, which is exported to Bangalore, is an important occupation of the people. Nandidrug hill (4,851 ft.), a health resort in the northwest, is the watershed of seven rivers which radiate in all directions. The central and eastern part of the district is drained by the Palar river. Chains of tanks are found along this basin and a large area is brought under wet cultivation. Raw sugar (jaggery), rice, tobacco and other garden crops are exported to Bangalore. (G. K. Gh.)

KOLAR GOLD FIELDS, a town in the southeast of the Kolar district in Mysore, India, lies 54 mi. N.E. of Bangalore and 10 mi. N. of Bangarapet (Bowringpet), a junction of the Southern railway on the Madras-Bangalore line. Pop. (1961) 146,811. The auriferous band of schists with an average width of 4 mi. runs north to south for a distance of about 40 mi.; in its southern portions are the productive fields of Kolar, about 4 mi. long. Effective extraction of gold was begun in 1881 and the four main reefs, Champion, Oorgaum, Nundydroog and Mysore, were opened up by 1883, the deepest being Oorgaum, 9,664 ft. below sea level. The average annual production is 21,000 oz., more than 95% of India's output. The extraction of gold is now a state undertaking. Although the population of the town is Telugu-speaking, it was not integrated into Andhra Pradesh at the reorganization of states in 1956. (G. Kn.)

KOLAROVGRAD (known as Shumen until 1950), a town and centre of Kolarovgrad province in northeastern Bulgaria, lies 80 km. (50 mi.) W. of Varna, in a valley in the eastern foothills of the Kolarovgrad limestone plateau. Pop. (1956) 41,546; (1961 est.) 58,039. It is named after Vassil Kolarov, a Bulgarian statesman who was born there. Founded in the middle ages, it was once a strong fortress. The Tombul mosque, the largest in Bulgaria, was built in 1774 during the Turkish occupation. Kolarovgrad is on the Sofia-Varna railway and a branch line connects it with Polyanovgrad in the south; it is also a road centre. Manufactures include flour, tobacco, dairy products, canning and brewing; there is also a modern factory producing automobile and tractor spare parts, the first of its kind in the country. Various crafts flourish there, as well as cattle breeding and vine growing. To the east of Kolarovgrad stand the ruins of Pliska, the ancient capital of the first Bulgarian kingdom (*c.* A.D. 680), and 13 km. (8 mi.) S.W. is Preslav, a 9th-century capital of the same kingdom, now a vine-growing centre. Turgovishte (pop. 15,373), 40 km. (25 mi.) W. of Kolarovgrad by road, is a 17th-century town, formerly Eski Dzhumaya, where a famous fair was held. It has light industries and a mineral spring. (An. Be.)

KOLBE, (ADOLF WILHELM) HERMANN (1818–1884), German chemist who accomplished the first generally accepted synthesis of an organic compound from inorganic materials, was born on Sept. 27, 1818, at Elliehausen, near Göttingen, where in 1838 he began to study chemistry under Friedrich Wöhler (*q.v.*). In 1842 he became assistant to Robert Wilhelm Bunsen (*q.v.*) at Marburg where he learned to analyze gases. Subsequently he assisted Lyon Playfair at London and from 1847 to 1851 he was engaged at Brunswick in editing Liebig and Wöhler's *Handwörterbuch der reinen und angewandten Chemie.* He then went to Marburg as Bunsen's successor and in 1865 was called to Leipzig where he died on Nov. 25, 1884.

Kolbe correctly considered organic compounds to be susceptible of derivation from inorganic ones, formed from the latter, directly or indirectly, by simple processes of substitution. The validity of this theory was proved when carbon disulfide prepared from the elements was successfully converted by chlorine into trichloroacetic acid and then into acetic acid by action of hydrogen. He also introduced a modified idea of the structural radicals, contributing in an important degree to the subsequent establishment of the structure theory, and predicted the existence of secondary

and tertiary alcohols. He is best known for his work on the electrolysis of salts of fatty and other acids, for his important preparation of salicylic acid from phenol and for his discovery of nitromethane. Together with Sir Edward Frankland he found that nitriles are converted into the corresponding acids on hydrolysis. From 1869 he edited the *Journal für praktische Chemie*.

His works include *Lehrbuch der organischen Chemie* (1854) and *Zur Entwickelungsgeschichte der theoretischen Chemie* (1881). For biographical details *see* G. Lockemann's essay in G. Bugge, *Buch der grossen Chemiker* (1929–30). (R. E. O.; X.)

KOLCHAK, ALEKSANDR VASILIEVICH (1873–1920), Russian naval officer, recognized in 1918–20 by the "Whites" as "supreme ruler" of Russia, was born in St. Petersburg, the son of an engineer. He graduated from the Naval academy in 1894 and at the outbreak of World War I was flag captain of the Baltic fleet. By Aug. 1916, as a rear admiral, he was commanding the fleet in the Black sea. In June 1917, after the March revolution, he resigned his post under pressure and went to the United States. Next he tried unsuccessfully to co-ordinate rival White Russian forces in Manchuria and then went to Omsk in Oct. 1918, where he became war minister in the "directory," then the legally constituted government of Russia in opposition to the Bolsheviks. On Nov. 18, 1918, a military *coup d'état* at Omsk, evidently planned with his connivance, brought him absolute power there. Though he was personally a humane man of democratic views, circumstances made Kolchak a ruthless dictator. He lacked political judgment and popular appeal; his administration was corrupt and perpetrated savage repressive measures against partisans and others suspected of opposition. Such actions lost him the sympathies of the Allies, particularly the Czech legionaries in Siberia, who afforded him vital military support. His armies, though at first successful, were forced back, and the retreat soon became a rout. When Omsk fell to the Red army on Nov. 14, 1919, Kolchak transferred his headquarters to Irkutsk, but an insurrection in the city brought a Socialist Revolutionary-Menshevik administration to power and he had to resign (Jan. 4, 1920). He placed himself under Allied protection, but on Jan. 15 was handed over by the Czechs to the Irkutsk authorities. The latter were soon swept away by the Bolsheviks, and on Feb. 7, 1920, Kolchak was summarily executed, his body being thrown into the Angara river.

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KÖLCSEY, FERENC (1790–1838), Hungarian poet, critic and orator, an able parliamentarian and an exceptionally intelligent and powerful writer, was born at Szödemeter on Aug. 8, 1790. During his childhood he lost both his parents and smallpox deprived him of one of his eyes. He studied law but his interest was focused on the literary movement started by Ferenc Kazinczy (*q.v.*). Kölcsey became the friend and admirer of Kazinczy, whom he supported vigorously in the discussions aroused by the language reforms. Kölcsey's moral rectitude and almost fanatical devotion to his country are reflected in his poems—one of which, the "Hymnus," included in a collection published in 1823, became the Hungarian national anthem—in his often severe but masterly literary criticism and in his funeral orations and parliamentary speeches. Between 1832 and 1834 he was a member of the diet and was an intelligent and dignified exponent of the liberal ideas which were then gaining support in the country. In his critical essays he laid the foundation of systematic literary criticism and aesthetics in Hungary. His work appeared mainly in periodicals; a collected edition was published in 1886–87; later collections appeared in 1941 and 1951. He died at Cseke, on Aug. 24, 1838. (Ds. Sr.)

KOLD, KRISTEN MIKKELSEN (1816–1870), Danish educator who established the basic pattern of the folk high school, was born in Jutland on March 29, 1816. A shoemaker's son, he was educated as a teacher but found himself unable to conform to the highly formal educational system. Inspired by Danish independence and by N. F. S. Grundtvig (*q.v.*), he founded a residential school in 1851 at Ryslinge to educate young adults "to love God, their neighbour and the country." In this school, and in others that he founded later, Kold lived frugally with his students, carried on most of his instruction orally, and was concerned more with moral than with intellectual teachings. His folk high schools and those modeled after them educated many leaders of the modern Danish state. The adaptations of these schools which eventually appeared throughout the world have usually reflected Kold's intensely personal approach to education. He died at Dalem on April 6, 1870. (C. O. H.)

KOLDING, a town of Denmark in the *amt* (county) of Vejle, on the east coast of Jutland, on the Koldingfjord, an inlet of the Little Belt, north of the German frontier. Pop. (1960) 35,101. The name of Kolding occurs in the 10th century, but its earliest known town rights date from 1321. In 1644 it was the scene of a Danish victory over the Swedes, and on April 22, 1849, of a Danish defeat by the troops of Schleswig-Holstein. It contains one of the oldest stone churches in Denmark, dating from the 13th century. To the northwest lie the ruins of the royal castle, Koldinghus, built in 1248, and partially destroyed by fire in 1808. The large square tower was built by Christian IV (1588–1648). It contains an antiquarian and historical museum (1892). A scenic view of the surrounding district is obtained from the Skamlingsbanken, 8½ mi. S.E. Kolding has good railway connections, and an excellent ice-free harbour, with a depth of more than 20 ft. It has large industrial concerns, and ordinarily exports about 170,000 head of cattle yearly.

KOLGUYEV (KOLGUEV), an island in Archangel *oblast*, U.S.S.R., is situated in the southeastern part of the Barents sea, 72 km. (45 mi.) off the mainland. It is roughly oval in form, has an area of about 1,300 sq.mi. and a maximum height of 540 ft. The sea around it is shallow and blocked by ice throughout winter and spring. Tundra and great bogs cover the greater part of the surface; there are several streams and many small lakes. The island is of recent geological formation and consists of sands and clays, which rise in the northwest to cliffs of 60 ft. A few boulders of sandstone and granite occur. Vegetation is sufficient to give pasture for a few herds of reindeer, owned by Nentsy (Samoyeds). There are bears, foxes and many birds.

See A. Trevor-Battye, *Ice-Bound on Kolguev* (1895), with full scientific appendices and history; and N. A. Solntsev, "Ostrov Kolguyev," *Uchenyye Zapiski Moskovskogo Universiteta*, 14, pp. 205–71 (1938). (T. E. A.)

KOLHAPUR, a city and district of Maharashtra, India. The city (pop. [1961] 187,442), formerly the capital of Kolhapur state and also the seat of the residency for Deccan states, is now the headquarters of the district. It is built on the slopes of the south bank of the Panchanganga river, 130 mi. S.S.E. of Poona at the terminus of a 30-mi. branch line from Miraj junction on the main Southern railway. Roads radiate in all directions, and the Poona-Bangalore road passes through the city.

Originally the city appears to have been an important religious centre, and numerous Buddhist remains have been discovered in the neighbourhood. In the town are many temples, several palaces, the Panchanganga ghat or bathing place, the town hall and a number of modern public buildings. There are colleges of arts and science, commerce and law, all affiliated to the new Shivaji university established in the city in 1963. The city is a market centre for jaggery, produced in quantity in the district; and there are a cotton mill and factories for pottery, paper and lace.

KOLHAPUR DISTRICT (area 3,141 sq.mi.; pop. [1961] 1,596,493) comprises most of the former princely state of the same name merged in Bombay state on March 1, 1949, together with parts of the former Kurundwad and Miraj Senior states and of Belgaum district. The district stretches from the heart of the Western Ghats eastward into the plain of the Deccan. Along the spur of the main chain of the Ghats lie wild and picturesque forest-clad hill slopes and valleys, producing timber. The central belt is crossed by several lines of low hills, and in the east the land presents the unpicturesque uniformity of a well-cultivated and treeless plain broken only by an occasional river. Among the western hills are the ancient Maratha strongholds of Panhala, Vishalgarh, Bavda and Rangna. The main products are jowar,

bajra (bajri) and sugar cane. Hardware, coarse cotton cloth, woolen cloth, perfumes, lace and glass ornaments are manufactured; there are cotton mills and ginning and pressing factories.

The maharajas of Kolhapur trace their descent from Rajaram, a younger son of Shivaji the Great, the founder of the Maratha power. The prevalence of piracy caused the British government to send expeditions against Kolhapur in 1765 and 1792 and in the early years of the 19th century. The misgovernment of the chief compelled the British to resort to military operations and ultimately to appoint an officer to manage the state. Besides Kolhapur city, the only town of consequence in the district is Ichalkaranji (27,423), which produces large quantities of saris.

(M. R. P.)

KOLLAR, JAN (1793–1852), Slovak poet who played an important part in the national and literary revival of the Slavs in the early 19th century. Born at Mosovce, Slovakia, on July 29, 1793, of a Protestant family, he was educated at Bratislava and at Jena university, where he fell in love with the "Mina" of his poems who became his wife, after long separation, in 1835. From 1819 to 1849 he was pastor to the Slovak community in Pest; the last three years of his life were spent in Vienna as professor of Slavonic archaeology. He died there on Jan. 24, 1852.

Kollar's enthusiasm for the history and destiny of the Slavs was kindled early by the fashionable antiquarian interest in the subject. Decisive, however, were his experiences at Jena, where he came to realize the extent of the German inroads on what had once been Slavonic territory and where he witnessed (notably at the Wartburg festival of 1817) the German endeavours to attain national unity and political freedom. The rest of his life was devoted to the encouragement of cultural unity among the Slavonic peoples, which he regarded as the tribes of a single great nation. These sentiments were expressed in the lyric-epic poem "Slávy dcera" ("The Daughter of Sláva"), a sonnet cycle preceded by a prologue in elegiacs: it portrays a pilgrimage through partly germanized Slavonic lands and into a pseudo-Dantesque Slavonic hell and heaven. In an influential essay of 1837 Kollar advocated literary co-operation among the Slavonic peoples.

See J. V. Ormis, *Bibliografia Jána Kollára* (1954). (R. Ay.)

KOLLATAJ, HUGO (1750–1812), Polish Roman Catholic priest prominent in the movement for national regeneration in the years following the partitions of Poland, was born on April 1, 1750, at Dederkaly Wielkie, in Volhynia, the son of a nobleman. He studied in Cracow and later in Vienna and in Rome. Returning home in 1775, he played a leading part in the work of the new Commission for National Education, especially in reforming the ancient university of Cracow, of which he became rector (1783–86). He was given an administrative post, but devoted his abilities to guiding the "Four Years' *sejm*" (1788–92) in its task of reconstructing social and political institutions. This was the main aim of his political agency, called by the conservatives "Kollataj's forge." The ideas that he put forward underlay the constitution of May 3, 1791, whereby the middle class was accorded a role in public affairs. He was then appointed vice-chancellor. After the defeat of the Poles by the Russians in 1792 he followed King Stanislaw II Poniatowski in joining the reactionary pro-Russian confederation of Targowica. Deprived of authority, he went into exile to Leipzig and Dresden, but returned to Poland to join Tadeusz Kosciuszko (*q.v.*) in 1794. Inspired by the French Revolution, he hoped to save his country's independence by introducing terror. When Kosciuszko's effort failed, Kollataj was imprisoned in Austria (1794–1802).

On his release Kollataj resumed his educational activities, founding the college of Krzemieniec in Volhynia in 1805. In 1807–08 he was imprisoned in Moscow. He welcomed the reforms associated with the introduction of the Code Napoléon and became the patron of the younger men who formed the radical opposition in the duchy of Warsaw. In a conservative community, he could persuade not only self-seekers and enemies but doctrinaire colleagues to swift action. He died in Warsaw on Feb. 28, 1812.

Kollataj published *Prawo polityczne narodu polskiego* ("Political Rights of the Polish Nation"; 1790), *O ustanowieniu i upadku konstytucji polskiej 3-go maja* ("On the Promulgation and Fall of the Polish Constitution of May 3"; 1793) and *Nil desperandum* (1808). His correspondence with Tadeusz Czacki appeared in 1844. *See* also POLAND: *History*.

See W. Tokarz, *Ostatnie lata Hugona Kołłątaja* (1905); M. Janik, *Hugo Kołłątaj* (1913). (ST. HE.)

KOLLER, CARL (1857–1944), Austrian-U.S. ophthalmologic surgeon, whose introduction of the use of cocaine (*q.v.*) as a surface anesthetic in eye surgery in 1884 inaugurated the modern era of local anesthesia. He was born in Schüttenhofen, Austria, on Dec. 3, 1857, and graduated from the University of Vienna in 1882. While serving as an intern and house surgeon at the general hospital in Vienna, he began to search for a local anesthetic that was suitable for eye surgery, which at that time was done either without an anesthetic, since no suitable local anesthetic was then known, or with general anesthesia, which was undesirable because of its side effects. While Koller was conducting this study, his colleague and friend, Sigmund Freud, asked him to help review and investigate the general physiological effects of cocaine; Freud was seeking to use cocaine to cure a friend of morphine addiction. The tongue-numbing effects of cocaine had been known since about 1860 and its use as an anesthetic had been suggested in 1879 (and again in 1884) by V. K. Anrep. Koller concluded that cocaine might be used as a local anesthetic on the eye and conducted laboratory investigations that supported his thesis. He came to the U.S. in 1888, became a naturalized U.S. citizen in 1902 and died in New York city on March 21, 1944.

KÖLLIKER, RUDOLF ALBERT VON (1817–1905), Swiss embryologist and histologist, one of the first to interpret tissue structure in terms of cellular elements, was born at Zürich on July 6, 1817. He studied under Lorenz Oken, F. G. J. Henle and Johannes Müller; his own students were later to include Ernst Heinrich Haeckel and Karl Gegenbaur. He became professor of physiology and comparative anatomy at Zürich in 1844; in 1847 he went to Würzburg as professor of the same subjects, and in 1849 he also took over the chair in anatomy. Through his leadership, together with that of Leydig, Virchow and Gegenbaur, Würzburg became one of the finest of German medical institutions.

His investigations covered such diverse subjects as development of cephalopods, structure of smooth muscle, development and differentiation of red blood cells and the significance of the germ layers in development. He described the spermatozoa as cellular in origin and nature, and contributed important evidence supporting the neuron doctrine. He considered Darwin's concept of evolution too teleological, and emphasized the significance of sudden as opposed to gradual changes in organisms. In addition he wrote two successful works (*Handbuch der Gewebelehre des Menschen,* 1852; *Entwicklungsgeschichte des Menschen und der höheren Tiere,* 1861) that set high standards for textbooks of histology and embryology. He was a co-founder (1848, with Karl von Siebold) and editor of the *Zeitschrift für wissenschaftliche Zoologie.* He died in Würzburg on Nov. 2, 1905.

See his *Erinnerungen aus meinem Leben* (1899). (J. M. O.)

KOLLONTAI, ALEKSANDRA MIKHAILOVNA (1872–1952), Soviet diplomat and the first woman to become an accredited minister to a foreign country, was born in St. Petersburg on April 1 (new style; March 20 old style), 1872, a daughter of a Russian general. She married an army officer, but was attracted to the Social-Democratic party. She lived abroad from 1908 to March 1917, when she returned to Petrograd and joined the Communist party, becoming soon after the November *coup d'état* commissar for public welfare. During this period an affair with the seaman Pavel Efimovich Dybenko might have ended in her execution for neglect of duty but for the intervention of Lenin. In 1920 she was a prominent advocate of the workers' opposition views. She joined the people's commissariat of foreign affairs in 1922 and served as minister to Norway (1923–25); after a short period as minister to Mexico, she was again appointed to Norway (1927–30); and she was minister to Sweden from 1930 to July 1945, with the rank of ambassador from 1943. In 1944 she conducted the Soviet-Finnish armistice negotiations. She died in Moscow on March 9, 1952.

KOLLWITZ, KÄTHE (née SCHMIDT) (1867–1945), German print maker and sculptress, an eloquent spokesman for the victims of social injustice, war and inhumanity, was born in Königsberg, East Prussia, on July 8, 1867, and studied art in Berlin and Munich. In 1891 she married Karl Kollwitz, a physician who chose to practise in a proletarian district of Berlin, and the impact of this milieu largely determined the course of her art. Her first set of prints (1894–98), inspired by Gerhart Hauptmann's provocative drama *The Weavers*, was exhibited in 1898. The following set, "Peasant War" (1902–08), was not equaled in emotional power by any of her later works. After World War I she became the first woman to be elected a member of the Prussian Academy of the Arts, from which she resigned in 1933 as a protest against the Hitler regime. In 1936 she was forbidden to exhibit. After her home in Berlin had been destroyed by bombs in World War II, she moved to the castle of Moritzburg near Dresden as a guest of the former royal Saxon family, and there she died on April 22, 1945.

Despite the stormy missionary trend of her art and the limitations it unavoidably imposed, her work derives vitality from a draftsmanship full of strength and character.

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KÖLN: *see* COLOGNE.

KOL NIDRE (Aramaic "all vows"), a prayer recited in the synagogue at the beginning of the service on the eve of the Day of Atonement (Yom Kippur). The name, derived from the opening words, is also used to designate the melody to which the prayer is traditionally chanted. Equally ancient versions in both Hebrew and Aramaic are extant, but the Aramaic version is generally used.

The prayer begins with an expression of repentance for all unfulfilled vows, oaths, promises made to God during the year. (According to some authorities, even fulfilled vows are included since the act of vowing, whether the vow is kept or not, is considered sinful.) The confession is followed by a general and comprehensive formula of absolution which concludes with Num. xv, 26, "And all the congregation of the people of Israel shall be forgiven. . . ."

Attempts have been made to trace the Kol Nidre to the rite of absolution of vows prevalent in the talmudic period, to those excommunicated because of their refusal to join in communal work during the early middle ages and to the persecution and forced conversion of the Jews to Christianity in 7th-century Spain. According to the latter theory, the converts who remained crypto-Jews recited the Kol Nidre to annul the oaths forcibly extracted from them by their persecutors. All that is known with certainty, however, is that the prayer was in use as early as the 8th century. Rabid anti-Semites in the middle ages, ignoring the repeated assertions of all rabbinic authorities that the absolution refers only to "matters between man and God," not to those "between man and his neighbour," used the prayer as a pretext to cast doubt upon the trustworthiness of an oath taken by a Jew in Christian courts.

The heads of the Babylonian academies (9th and 10th centuries) as well as leading rabbinic authorities throughout the ages, fearful that the Kol Nidre might be misinterpreted through ignorance or malice and even lead to laxity in the fulfillment of vows, strongly opposed its recitation. It was eliminated from the Reform Jewish liturgy in the 19th century but was reintroduced in revised form into the Reform prayer book in 1945. The appeal of the Kol Nidre is due in large measure to the plaintive and appealing melody associated with it. *See* also LITURGY, JEWISH.

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KOLOBRZEG (Ger. KOLBERG), a port and health resort in Koszalin *wojewodztwo* (province), Poland, is located on a coastal plain at the mouth of the Parseta (Prosnica) river, 40 km. (25 mi.) W. of Koszalin. Pop. (1960) 16,700. Almost completely destroyed in the fighting between the Germans and Russians in 1945, it has been rebuilt, including restoration of the 13th-century Gothic Collegiate church. Kolobrzeg is separated from the Baltic, where there is a fine beach, by a belt of sand dunes. It has 27 saline springs, and the health resort specializes in the treatment of children. The port is used mainly for fishing and the town's industry centres on fish products and the servicing of fishing vessels. The independent settlement on the site was incorporated into the Polish state in the 10th century. The first bishopric in the province was formed there in 1000. Early in the 14th century the town entered the Hanseatic league. Later, Kolobrzeg was included in the principality of Slupsk; along with that principality it was seized by Brandenburg in 1648 and its history is that of Brandenburg until its restoration to Poland following World War II. (T. K. W.)

KOLOKOTRONIS, THEODOROS (1770–1843), Greek patriot who took a leading part in the War of Greek Independence, was born on April 14, 1770, in Messenia. Self-styled *armatolos* of Leondari, he was driven by Veli, son of Ali Pasha to seek refuge in Zante in 1804. There, after the British occupation of the Ionian islands, he joined in 1810 the duke of York's Greek light infantry, commanded by Major (later Sir Richard) Church. In 1819 he was enrolled in the Greek revolutionary society Philiki Etaireia, and at the instance of Alexandros Ypsilantis returned in Jan. 1821 to the Morea, where he assembled forces. During the War of Independence he led Moreot bands, his most brilliant action being his part in the defeat of Mahmud Dramali's army in Aug. 1822. He constantly defied the central government, but in 1825 was defeated by Roumeliot troops and imprisoned on Ydra. Released to defend the Morea against the Egyptians, he maintained stout resistance. In 1825 he signed the Greek demand for British protection and invited Sir Richard Church to Greece. In 1828 he supported the president, Count I. A. Kapodistrias. After the president's assassination in 1831, he set up a rival administration to that which favoured Prince Otho for the throne. He later attempted to overthrow the Bavarian regency. For this he was condemned to death on June 7, 1834, but was later reprieved. He died in Athens on Feb. 15, 1843. (D. DN.)

KOLOMNA, a town of Moscow *oblast* in the Russian Soviet Federated Socialist Republic, U.S.S.R., lies 105 km. (67 mi.) S.E. of Moscow near the confluence of the Moskva and Oka rivers. Pop. (1959) 99,693. Kolomna stands on the Moscow-Ryazan railway and was one of the earliest steam locomotive building centres of Russia. Diesel engines are now produced. Other engineering products include heavy machine tools, especially for the textile industry. Synthetic rubber is also made. Kolomna was first mentioned in 1177. In 1305 it came under Moscow and formed a key stronghold of the southern frontier, being sacked four times by the Tatars. Only some ruins remain of its kremlin, completed in 1533. (R. A. F.)

KOLTSOV, ALEKSEI VASILEVICH (1809–1842), Russian poet whose works describe the peasant life in which he was brought up, was born on Oct. 14 (new style; 2, old style), 1809, in Voronezh. He was the son of a cattle dealer who treated him harshly and was unsympathetic to his interest in poetry, which he began writing from the age of 16. Owing to the patronage of Nikolai Stankevich his verse began to be published in 1835 and it attracted the attention of Vissarion Belinski (*q.v.*). Although much of his work is derivative, being modeled on that of Pushkin and others, he is noted for his success in introducing into Russian verse the authentic language of the Russian peasant. His themes are the sorrows and hardships of the peasant's life, which few other Russian poets knew as well at first hand as he. He died of tuberculosis in Voronezh on Oct. 31, 1842. (R. F. HI.)

KOLYMA, a river in northeastern Siberia, Russian Soviet Federated Socialist Republic, U.S.S.R., whose headwaters, the Ayan-Yuryakh and Kulu, rise in the Kolyma mountains (Khrebet Kolymski) north of the Sea of Okhotsk. It is 1,615 mi. long with a drainage basin of 248,689 sq.mi. In its upper course the river flows southeast and then northeast through the mountains, usually in narrow gorges with many rapids, notably the Great Kolyma

rapids. Emerging from the mountains, the valley gradually broadens, with a high right bank and low, flat left bank. The river becomes braided and its channels extend for six miles across the valley floor. Below Zyryanka the Kolyma enters the broad, flat and swampy Kolyma lowland (Kolymskaya Nizmennost) and flows northeastward along its eastern margin to discharge into the East Siberian sea by two main distributaries. This lower course has a steep right bank, forming the edge of the Yukagir plateau (Yukagirskoye Ploskogorye), and a width of 2,000–3,500 yd. The largest tributaries are the Ozhogina on the left and the Korkodon, Omolon and Anyui on the right. The Kolyma is navigable upstream to its confluence with the Bokhapcha, despite a bar at the river mouth, but the ice-free season is very short. In the lower course ice begins to form in late September and does not break up until early June. Upstream the open season is slightly longer. The breakup is accompanied by vast ice jams and widespread flooding. The average annual discharge is 134,196 cu.ft. per second, with almost half the annual flow coming in late spring and early summer. The Kolyma basin is covered by tundra or thin, stunted forest and is sparsely inhabited, largely by Yakuts and Eveny. There are important gold fields in the upper basin, served by road from Magadan, while a little lignite is mined at Zyryanka. The Kolyma mountains comprise a complex of ranges in northeastern Siberia, also known as Gydan, running northeast-southwest between the upper basin of the Kolyma river and Shelekhov gulf (Bukhta Shelekhova) of the Sea of Okhotsk. The range, which rises to 6,109 ft., is covered by mountain tundra vegetation, with poor forest on the lower slopes. Gold is found in some of the river valleys. (R. A. F.)

KOMARNO (Hung. KOMÁROM; Ger. KOMORN), an urban settlement lying across the frontier of Czechoslovakia and Hungary, is separated into two towns, Komarno (Czech.; pop. [1961] 24,975) and Komárom (Hung.; pop. [1960] 9,862). The original site of Komarno and the main settlement are at the eastern extremity of Great Schütt Island (Slovak Velky Ostrov Zitny; Hung. Csallóköz), enclosed by the two arms of the Danube below Bratislava. A north-bank tributary, the Vah, enters the Danube a few miles upstream from Komarno and the Nitra tributary flows in at the eastern end of the island, so that the site is marked by a confluence of strong watercourses. Through the centuries this provided a point of great defensive strength. The Romans recognized its value and fortified it. In Magyar history and in that of the Austro-Hungarian monarchy, Komarno became a noted strong point; there are records of vigorous building in the time of Matthias I Corvinus (1440–90), during the critical defense of German Europe from the Turks (1526–64), in the late 17th century and in the early 19th century. Between 1848 and 1849 Komarno was held by the Magyar nationalist forces, and it was the refuge for the Austrian National bank treasure in 1866 when Vienna was threatened by the Prussians. Komarno was also naturally a river port and this role supplemented and then superseded that of fortress; grain, wine, fish, coal and later petroleum became important freight commodities. But the growth of Komarno as a port was frustrated after the end of World War I by its frontier position and checked again by damage to the Danube navigation channel in World War II.

Before 1914, and within the old kingdom of Hungary, Komarno had spread to the south bank of the Danube and the railway station was built there on the line connecting Vienna with Budapest and with northern connections across the river. The south-bank extension was sometimes known as Komárom-Ujvaros (Ujvaros, "new town") and included Uj-Szony, formerly a separate village. Leather factories belonged to the north bank and later Komarno attracted refineries for Rumanian oil. The south-bank settlement drew on a fertile hinterland of wooded hill country, vineyard and grain growing and had textile and machine industries. There was also sturgeon fishing.

When, at the disruption of the Austro-Hungarian monarchy, the Danube became the frontier, the settlement was divided. Komarno, with about 18,000 people, became Slovak; Komárom, with about 6,000, remained Hungarian; and Komárom county in the Hungarian republic was merged with that of Esztergom. By the 1960s great strides had been made in the development of the south-bank town. Shipyards for river craft were constructed in Komarno and there was some export of these to the Soviet Union. The emergence of these twin towns was a good example of continued co-operation after the frontier revision. (H. G. S.)

KOMATI, a river of southern Africa, rises at about 5,700 ft. above sea level near Breyten in Ermelo district, southeast Transvaal, Republic of South Africa. It descends from the plateau near Carolina, cutting a valley 3,000 ft. deep in northern Swaziland before reaching the Lebombo range on the eastern Transvaal border. There it is joined from the north by the Crocodile river. Below the confluence the river cuts a *poort* (gap) through the Lebombo—the Komatipoort, a valley about 700 ft. deep. About 40 mi. above the frontier township of Komatipoort the river falls 53 ft. in about half a mile.

Below Komatipoort the river enters Mozambique where it is called the Incomati. It flows in a great loop northward, meandering through low, swampy country and spreading into Lake Chuali, reaching the sea about 15 mi. N.E. of Lourenço Marques. The Komati is a perennial river, its dry season flow at Komatipoort being about 1,000 cu.ft. per second. Its annual discharge averages approximately 400,000 ac.ft., of which about 75% occurs in the six months November–April. (J. H. WN.)

KOMI AUTONOMOUS SOVIET SOCIALIST REPUBLIC (KOMI AVTONOMNAYA SOVETSKAYA SOTSIALISTICHESKAYA RESPUBLIKA), of the Russian Soviet Federated Socialist Republic, lies in the northeast of the European part of the U.S.S.R., covering an area of 160,579 sq.mi. In the east the boundary is formed by the crest line of the Urals, rising to 6,214 ft. in Mt. Narodnaya. From northwest to southeast across the centre of the republic lie the low Timan hills (Timanski Kryazh), with a maximum elevation of 1,519 ft. Between the Timan hills and the Urals lies the broad basin of the Pechora, which is almost wholly within the republic. West of the Timan hills lie the upper parts of the Mezen and Vychegda basins. The whole area is covered by ground and terminal morainic material from the glacial period. Drainage is often indeterminate and there are extensive marshes and peat bogs, covering nearly 7,500,000 ac. In the extreme northeast there is tundra vegetation of mosses, lichens and dwarf shrubs, but this soon gives way southward to stunted trees and finally to the dense taiga forest, which covers most of the republic. Spruce, pine and birch make up nine-tenths of the forest, although fir is common locally and Siberian stone pine is found in the Urals. Soils are normally podsols of low fertility. Climate conditions are severe, with prolonged, cold winters and cool summers. Syktyvkar, the capital, has a January average of −15.6° C. (4° F.) and Vorkuta −20° (−4°), but extreme temperatures may fall as low as −45.6° (−50°). Respective July averages are 16.7° and 12.2° (62° and 54°). Precipitation ranges from 15 in. a year in the lower Pechora basin to 24 in. on the Urals. The Arctic circle crosses the north of the republic and, correspondingly, winter days are short and summer days long, but much of the summer insolation is lost because of high cloudiness.

The area was first penetrated by Russian fur hunters from Novgorod, who made use of the rivers and the low, easy portages from one basin to the next. There lay the earliest routes across the Urals into Siberia, but after easier, shorter routes were established farther south the Komi region became an unimportant, undeveloped backwater. Even its wealth of furs was greatly diminished by overhunting. Soon after the Revolution, in 1921, an autonomous *oblast* was established for the Komi people, to be raised later, in 1936, to the status of an autonomous republic, and the first steps were taken to develop the resources and economy of the area.

The 1959 census enumerated only 815,799 inhabitants, 5 persons per square mile; 59% (484,039) of the population are urban dwellers and 331,760 rural. There are 7 towns, and the 31 urban districts are indicative of a young and rapidly growing urban economy. The largest towns are Syktyvkar (64,461), the coal mining centre of Vorkuta (55,668) and the petroleum towns of Ukhta and Sosnogorsk. At least half the population are Russians, the Komi (formerly called Zyryam) and related Komi-Permyaki

numbered only 431,000 in the U.S.S.R. as a whole in 1959. The Komi belong to the Finno-Ugrian family of Permian peoples, as do the Nentsy (Samoyeds), of whom there are a few in the far north of the republic.

In the development of an industrial economy after the Revolution timber exploitation was given priority. This has expanded greatly throughout the republic. Logs are rafted down the Pechora, Mezen and Vychegda and their tributaries to sawmills located either on the Pechora railway or at the mouths of the rivers in Archangel *oblast*. The largest sawmilling centres are Syktyvkar, Mikun, Vozhayel, Ukhta and Pechora. The logging industry is encouraged by the very high proportion of mature and post-mature trees. Much timber working is carried on, with veneer making at Zheshart, prefabricated houses at Syktyvkar, Pechora and Ukhta and wooden barges and river craft at a number of riverside points. Nevertheless the bulk of the timber cut is either exported via Archangel, Mezen and Naryan-Mar, or sent by rail to other parts of the Soviet Union as pit props, sleepers, telegraph poles, saw timber and firewood. Mineral exploitation began especially after the construction of the Pechora railway from Kotlas to Vorkuta in the early 1940s. Mining is now the major branch of the economy. Around Vorkuta in the extreme northeast and extending southwestward to Inta are important deposits of good quality coal. A large proportion of the coal output is sent to Leningrad and its vicinity. There are also sizable petroleum deposits in the Pechora basin, near Ukhta and Troitsko-Pechorsk, which first began to be exploited in the early 1930s. There is a refinery at Ukhta. Natural gas is found in association with the petroleum and is piped to Perm in the Urals industrial area. On the upper Izhma asphaltite is obtained, used in insulating materials and paints. Alabaster and limestone are quarried. Agriculture is unimportant in the republic because of its northerly latitude and poor soils. Arable, hayland and pasture together constitute barely 1% of the area and of this only a small proportion is cropped. The arable, occurring in small patches along the rivers in the south, is mostly under rye and potatoes, with some oats and barley. More important is stock rearing, chiefly cattle and, in the northeast, reindeer. Fur trapping is common in the forests, especially squirrel and arctic fox. Apart from the many navigable rivers, which are closed by ice for 180 to 220 days a year, the only important line of communication is the Pechora railway, with a branch to Syktyvkar and a number of narrow-gauge feeders for timber exploitation.

Syktyvkar, at the confluence of the Vychegda and Sysola, is the administrative and cultural centre of the republic. There are a branch of the Academy of Sciences, a pedagogic institute and a research institute for the establishment of timber undertakings. The first documentary mention of the settlement dates from 1600 and it has been a town since 1780. (R. A. F.)

KOMI-PERMYAK NATIONAL OKRUG forms the northwest corner of Perm *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R. Pop. (1959) 235,674. The *okrug*, covering 12,664 sq.mi., is bisected by the Kama river and drained by its tributaries, chiefly the Veslyana, Kosa and Inva. The surface consists of the low, rolling, morainic hills of the Upper Kama upland, which reach a maximum height of 889 ft. Apart from flood-plain meadows along the rivers and swamp or peat bog in depressions, the whole *okrug* is in taiga forest of fir, pine, spruce and birch. Timber working is the only important activity of the inhabitants. Agriculture is confined to small patches of rye and oats, with some flax. A little wheat has been introduced. The only town is the administrative centre of Kudymkar on the Inva, with 20,000 people, engaged in furniture making and other timber working, and flax processing. The *okrug* is poorly served by communications other than the navigable Kama. Kudymkar has dirt roads to Usolye on the Perm reservoir and south to Mendeleyevo (100 km. [62 mi.]) on the Kirov-Perm railway. The Komi-Permyaks, for whom the *okrug* was established in 1925, are a branch of the Finno-Ugrian Komi people and were not separately enumerated in the 1959 census. (R. A. F.)

KOMOTINI (Komotine), a town of western Thrace, Greece, capital of the *nomos* (department) of Rhodope, stands on a river 13 mi. inland from the Aegean sea, south of the eastern extremity of the Rhodope mountains. Pop. (1961) 28,355. It is the seat of the metropolitan of Maronia and is connected by rail with the port of Alexandroupolis and with Salonika and Istanbul. Komotini is a market town for wheat, maize (corn), barley, cotton and tobacco. It was known in the Byzantine period as Koumoutzina or Komotine, and was called Gumuljina by the Turks. The treaty of London (1913) after the Balkan Wars allotted Komotini to Bulgaria; but the treaty of Sèvres (1920) after World War I granted it to Greece. It was occupied by Bulgarian troops from 1941 to 1944. (D. M. N.)

KOMSOMOLSK-ON-AMUR (Komsomolsk-na-Amure), a town of Khabarovsk *krai* in the Russian Soviet Federated Socialist Republic, U.S.S.R., stands on the left bank of the Amur, 400 km. (250 mi.) below Khabarovsk city. Pop. (1959) 177,278. Founded in 1932 on the site of the small village of Permskoye, the town was largely built and populated by members of the Komsomol (Young Communist league), from which it derives its name. Its growth has been remarkable and by the 1959 census it was the third largest city in the Soviet far east. It is now a major industrial centre and the Amurstal steelworks is the only such plant east of the Kuznetsk basin. With it are associated heavy engineering and machine building, including agricultural and casting machinery. The whole of the Amur is navigable from May to November and shipbuilding and repair are important. Oil from Sakhalin is brought to Komsomolsk by river and pipeline for refining. Fishing and timberworking are carried on and there are various industries producing foodstuffs, footwear and clothing. Just outside the town is a paper and pulp mill. There are rail connections with the Trans-Siberian railway near Khabarovsk, with Sovetskaya Gavan on the Tatar strait and with the timber town of Bolen. The town has pedagogic and polytechnic institutes and more than 50 schools. (R. A. F.)

KOMURA JUTARŌ, Marquis (1855–1911), Japanese statesman, was born in Hyuga. After extensive schooling in Japan he went to the United States where he studied law at Harvard university. Upon returning home he entered the foreign office in Tokyo. He served as chargé d'affaires in Peking, as Japanese minister in Seoul, in Washington, in St. Petersburg (Leningrad) and in Peking (during the Boxer uprising), earning a high reputation for diplomatic ability. In 1901 he received the portfolio of foreign affairs and held it throughout the course of the negotiations with Russia and the subsequent war (1904–05). He was appointed by his sovereign to meet the Russian plenipotentiaries at Portsmouth, N.H., and later the Chinese representatives in Peking, on which occasions the Portsmouth treaty of Sept. 1905 and the Peking treaty of November in the same year were concluded. For these services, and for negotiating the second Anglo-Japanese alliance in 1905, he received the Japanese title of count. He resigned his portfolio in 1906 and became privy councilor, from which post he was transferred to the embassy in London, but he returned to Tokyo in 1908 and resumed the portfolio of foreign affairs in the second Katsura cabinet. He was created marquis in 1911 and died at Hayama on Nov. 24 of the same year.

KONARAK (sometimes written Kanarak), a village in the Puri district of Orissa, India, famous for its medieval temple, and associated with the legend of Sāmba (son of Lord Krishna) being cured of leprosy by the blessings of the sun. The site is 18 mi. N.E. of Puri and about 20 mi. S.E. of Bhubaneswar, where the earlier development of the Orissan temple took place between the 9th and 12th centuries A.D. The Surya Deula (Temple of the Sun) at Konarak is the final masterpiece of the school. Built in the mid-13th century in the reign of Narasimha Deva I, it was never completed. It stands on the coast of the Bay of Bengal and was long known as the "Black Pagoda" (distinguishing it from a white pagoda at Puri); it formed a prominent landmark for East Indiamen steering for Calcutta.

The plan of the temple is typical of the Orissan school. The inner shrine (*garbha griha*) beneath the unfinished tower (*shikhara*) was connected to a massive assembly hall (*jagamohana*) in front of it. This was approached by a series of monumental stone stairs in front of which stood a dance pavilion (*nataman-*

dira). The temple was dedicated to the sun god Surya, whence the architect's conception of the whole shrine as the embodiment of his chariot. Around the basement platform on which the chariot stands are 12 great stone-carved wheels; the stairways are flanked by the 7 freestanding stone horses which drew the chariot. Over the centuries the unfinished structure fell into ruins, and even after extensive restoration it still gives only a shadowy picture of its final form. The assembly hall, 100 ft. on each side and 100 ft. high, is a great cube of red laterite masonry surmounted by a pyramidal roof in three tiers, crowned by a great stone *amalaka* or myrobalan fruit. The interior chamber is singularly plain but remarkable for its stone ceiling supported on wrought iron beams —a feature found only in the Orissan temples. The height of the completed tower would have been well over 200 ft.

The whole of the exterior is covered with sculptured decoration and has long been famous for its many erotic scenes. These are generally thought to have been associated with some form of Tantric rites, but their precise significance remains unknown. The principal carvings and icons are in a fine green chlorite stone.

(F. R. A.)

KONARSKI, STANISLAW (1700–1773), Polish Roman Catholic priest, political writer and reformer of education, was born at Zarczyce, near Kielce, on Sept. 30, 1700, of a noble family. He studied at the Piarist college at Piotrkow and entered the Order of the Piarist Fathers in Aug. 1715, changing his Christian name Hieronim to that of Stanislaw. He taught at the Piarist colleges of Podoliniec and Warsaw during 1719–25, then went to Rome to study at the Collegium Nazarenum, where he himself taught from 1727 to 1729. From Rome he went to Paris to study educational methods; and there he acquainted himself with the writings of John Locke, whose theory of education he adopted. Back in Poland in 1731, he collaborated with the Czartoryski family, rendering them services as a political writer. During the War of the Polish Succession he went back to Paris in 1734 as the secretary of the Polish legation on Stanislaw Leszczynski's behalf, but returned to Poland after the fall of Leszczynski's cause in 1736.

In 1741 Konarski became superior of the Polish province of his order and began his educational reform, organizing in Warsaw in the same year the Collegium Nobilium for young men from the ruling families in Poland. The reformed education, he hoped, would lead to the badly needed constitutional reform of the state. He extended his reform to all schools run by his order, in sharp competition with the Jesuits. Stressing the teaching of the Polish language, which was commonly neglected, he attributed a particular role to the school theatre; he even wrote two tragedies with a marked educational tendency. Patriotic education, care for the purity of the Polish language and emphasis on the progress of the natural sciences finally led even the Jesuits to accept the new achievements and to reform their own schools accordingly.

Konarski's patriotic attitude influenced also his historical and political writings. His collection of Polish laws, *Volumina Legum*, eight volumes (1732–68), is still a basic source. *O skutecznym rad sposobie* ("On the Means of Effective Councils," four volumes, 1760–63) was aimed against the principle of the *liberum veto*, which, by empowering any single deputy to break up a diet, made normal functioning of the state impossible and obstructed reform. Konarski died in Warsaw on Aug. 3, 1773.

See W. Konopczyński, *Stanisław Konarski* (1925); W. J. Rose, *Stanislas Konarski* (1929). (St. He.)

KONDYLIS, GEORGIOS (1879–1936), Greek army officer and statesman, a republican in 1923 and the restorer of the monarchy in 1935, was born at Proussos. He joined the army as a private at the age of 17, fought in the Cretan revolt of 1897 and left the army in 1905 to join the Greeks who were fighting in Turkish Macedonia. He became an officer in the Greek regular army in 1909 and served in both Balkan Wars of 1912–13, rising to the rank of colonel. He fought in World War I in Macedonia (1916–18) and took part in the Greek invasion of Anatolia. He resigned from the army in Dec. 1920 on the return of King Constantine and withdrew to Istanbul. After Constantine's abdication (Sept. 1922), Kondylis returned to Greece, was promoted general and took command of a division in Thrace. After crushing a royalist revolt in Oct. 1923, he resigned from the army and entered parliament as a republican. Appointed minister of war in March 1924, he formed a National Republican party of his own and became minister of the interior in October. Gen. Theodoros Pangalos, dictator from Jan. 1926, banished Kondylis for a time to Santorin; but on Aug. 22, 1926, Kondylis overthrew Pangalos by a *coup d'état*. As prime minister, Kondylis held a fair election in November, then dissolved his own party and withdrew from politics on Dec. 4, 1926. In 1930, however, he returned to politics and joined forces not with the Venizelist Liberals but with the conservatives of the Popular party. He was minister of war (1932–33 and 1933–35); in this capacity he smashed a Venizelist *coup d'état* in Salonika in March 1935. After the government had already decided, in Sept. 1935, to hold a plebiscite on its proposal to restore the monarchy, Kondylis himself became prime minister in October. It was then decided to restore the monarchy at once, but that the plebiscite should still be held to confirm this decision in November. Kondylis thus acted as regent until King George II returned to Greece. Still prime minister, he died in Athens of a heart attack on Jan. 31, 1936.

KONGO (Bakongo), a people dwelling along the Atlantic coast of Africa from Pointe Noire, Republic of Congo, in the north to Luanda, Angola, in the south. In the east their territory is limited by the Kwango river and in the northeast by Stanley pool. They live in the Republic of Congo (formerly French), the Democratic Republic of the Congo (formerly Belgian) and Angola, and numbered about 1,500,000 in the 1960s. Kongo is an ethnic name applied to a number of Bantu tribes related through language, history and customs. From the 15th to the 18th century the region was united in a kingdom with a capital at São Salvador, Angola.

The Kongo cultivate manioc, bananas, maize (corn), sweet potatoes, peanuts, beans and taro. Cash crops are coffee, cacao, urena, bananas and oil palms. Fishing and hunting are still practised by some of the tribes, but 350,000 Kongo live and work or trade in towns.

The Kongo are predominantly matrilineal and are grouped in segmentary lineages loosely tied by common clanships. The main characteristic of their social organization is fragmentation: nearly every village is independent of its neighbours and almost nothing remains of the ancient kingdom. Kongo religion centres around ancestor and fetish cults, operative also in social and political organization. Religious associations, formerly for witch finding and initiation, are also prominent and have merged with nativistic movements. A strong tradition of prophetism and messianism has given rise in the 20th century to nativistic, politico-religious movements, mostly xenophobic, such as Kimbanguism, Matswanism and other "ngunzisms." The artistic sense of the Kongo is expressed in sculpture, in a rich spoken literature and in an original music. *See* also Angola; Congo, Democratic Republic of the: *The People;* Congo (Republic); Africa: *Ethnography* (*Anthropology*): *West Central Africa.*

Bibliography.—M. Soret, *Les Kongo nord-occidentaux* (1959); K. E. Laman, *The Kongo,* 2 vol. (1953–57); J. van Wing, *Etudes Bakongo,* vol. i, *Histoire et sociologie* (1921), vol. ii, *Religion et magie* (1938). (J. M. J. V.)

KONIECPOLSKI, STANISLAW (1591–1646), leader of the Polish forces against the Turks, the Tatars and the Swedes, was born of an ancient Polish family. Educated at the University of Cracow, he learned the art of war under Jan Chodkiewicz (*q.v.*), whom he accompanied on his Muscovite campaigns, and under Stanislaw Zolkiewski, whose daughter Catherine he married. In 1619 he was appointed field commander of the Polish forces. In 1620 at Cecora (Ţeţora), on the Prut river, he was captured by the Turks and held prisoner in Constantinople for three years. For his victories over the Tatars at Martynow (1624) and elsewhere he received the thanks of the Polish diet and was made palatine of Sandomierz by King Sigismund III. In 1626 he was transferred to Prussia to check the Swedish king Gustavus Adolphus, against whom he won victories at Hamersztyn (Czarne) and Tczew in 1627 and—the most brilliant one—at Trzciana, on June 27, 1629. Appointed to the long-vacant post of commander

in chief of the Polish forces, in 1632, he became castellan of Cracow in 1633. He routed the Turks in 1633–34 and the Tatars in 1644; and he also subdued mutinous Cossacks, against whom he built the fortress of Kudak (on the site of the later Dnepropetrovsk), in 1635. Not very rich in his youth, he gathered a fortune in lands in the Ukraine: more than 100,000 people lived on his estates. He founded the market town of Brody, with a citadel and bastions, in 1633 and set up workshops producing Persian-type carpets there. He died in 1646 on the eve of an expedition against the Turks.

See S. Przylecki, *Pamietniki o Koniecpolskich* (1842). (St. He.)

KÖNIGGRÄTZ: *see* Hradec Kralove.

KÖNIGSBERG: *see* Kaliningrad.

KÖNIGSMARK, MARIA AURORA, Gräfin von (1662–1728), mistress of the elector Frederick Augustus I of Saxony (*see* Augustus II, king of Poland), was born of a German noble family in the Swedish service on May 8, 1662, at Stade in the archbishopric of Bremen, then a Swedish possession. On the sudden disappearance of her brother Philipp Christoph von Königsmark in 1694, she went to Dresden in Saxony to pursue inquiries about him. The elector of Saxony then made her his mistress; and in Oct. 1696 she gave birth to a son, Maurice, afterward the famous marshal de Saxe. The elector soon tired of her, and she was made coadjutor abbess and lady provost (*Pröpstin*) of Quedlinburg, but she lived mainly in Berlin, Dresden and Hamburg. In Oct. 1702 she went on an unsuccessful diplomatic errand to Charles XII of Sweden on behalf of the elector, now king of Poland, to beg for an end to the war between their two countries. The countess, described by Voltaire as "the most famous woman of two centuries," died at Quedlinburg on Feb. 16, 1728.

See O. J. B. von Corvin-Wiersbitzki, *Maria Aurora, Gräfin von Königsmark* (1902); P. Burg, *Die schöne Gräfin Königsmark* (1919).

KÖNIGSMARK, PHILIPP CHRISTOPH, Graf von (1665–1694), was the lover of Sophia Dorothea, consort of the electoral prince of Hanover, later George I of England. Born of a German noble family in the Swedish service on March 14, 1665, at Stade in the archbishopric of Bremen (then a Swedish possession), he traveled and campaigned in various parts of Europe before entering the service of Ernest Augustus, elector of Hanover, in 1689. There he made the acquaintance of Sophia Dorothea and assisted her in one or two futile attempts to escape from Hanover. He was seized at Hanover and disappeared from history, probably by assassination, on July 1, 1694. His correspondence with Sophia Dorothea has been published in *Der Königsmarck-Briefwechsel,* ed. by G. Schnath (1952).

See A. Köcher, "Die Prinzessin von Ahlden," in the *Historische Zeitschrift* (1882); W. H. Wilkins, *The Love of an Uncrowned Queen,* 2 vol. (1900).

KÖNIGSSEE (Lake of St. Bartholomew), in Upper Bavaria, Ger., lies about $2\frac{1}{2}$ mi. S. of Berchtesgaden, 1,975 ft. above sea level. It is 5 mi. long, 500 yd. to more than 1 mi. wide and its greatest depth is 617 ft. Königssee is the most beautiful lake in the German Alps, surrounded by limestone mountains (rising to 6,500 ft.) which descend precipitously to its green waters. (R. E. Di.)

KONINCK (Koning, Coningh), **PHILIPS DE** (1619–1688), Dutch painter most celebrated for his landscapes, was born in Amsterdam. He studied under his elder brother Jacob, a painter about whose work little is known. Philips appears to have lived and worked continuously in Amsterdam, where he died. The influence of Rembrandt is paramount in his art, and it has often been supposed, probably incorrectly, that Rembrandt was his master. However, Koninck was certainly a friend of Rembrandt and was associated with his artistic circle in Amsterdam. His works include portraits, biblical subjects and genre scenes, but his characteristic works depict wide panoramas of level countryside, with villages, trees and waterways, viewed from some slight eminence. Contrasting areas of cloud shadow and sunlit landscape give life and variety to the simple compositions. Though sufficiently similar to Rembrandt in style and handling to have often passed under his name, Koninck's landscapes show generally a blonder and greener colour range.

Examples can be seen in the National gallery, London, the Metropolitan Museum of Art, New York city, and the galleries at Amsterdam, Berlin and Copenhagen, while several remain in private Dutch and British collections. (R. E. W. J.)

KONKAN, an old name loosely applied to the maritime tract of western India, extends for about 360 mi. southward from a little north of Bombay city. It coincides approximately with the districts now in Maharashtra and Goa.

On the east Konkan is bounded by the Western Ghats, on the west by the Arabian sea. From the mountains at its eastern limits (in one place rising to 4,700 ft.) the land drops sharply but there is no continuous coastal plain as there is along the Malabar coast farther south. Instead spurs from the Ghats reach the shores of the Arabian sea and so interrupt communication that neither rail nor road can follow the coast. The coast has in general a straight outline; though it is much broken into small bays and by the mouths of the numerous small mountain streams from the Ghats which afford shelter for small vessels, only Bombay and Goa have harbours of sufficient extent for modern traffic. One of the most striking characteristics of the climate is the violence of the monsoon rains and the strength of the onshore winds, which have piled up sand dunes in many places. Its isolation and its numerous creeks and bays made Konkan a traditional haunt of pirates, who were not finally subdued until 1812. The southern Konkan has given its name to Konkani, a dialect of Marathi spoken mostly in Goa. (L. D. S.)

KONKOMBA, a people numbering about 78,000 (1960s) who live in the Northern region, Ghana, and the adjacent region of Togo, mainly in the Oti plain between the Kulaw river and the Togo hills. Some live in Dagomba (*q.v.*) and Gonja territory; others to the east are independent, grouped in parishes under the ritual leadership of an Earth priest. They speak a Gur language of the Gurma group, akin to Tobote (or Basare) and Kasele to the east. The Konkomba were formerly driven from the west of their present habitat by Dagomba and Gonja invaders, although some stayed and adopted the language of the conquerors.

The Oti plain is alternately a swamp and a dust bowl. Hamlets are built on ridges to avoid the annual floods. Sorghum and bulrush millet are grown in the farms surrounding the compounds, while rice, yams and peanuts are mainly grown at a distance. Some cattle, sheep, goats and fowl are kept. *See* also Togo, Republic of.

See M. Manoukian, "Tribes of the Northern Territories of the Gold Coast," *Ethnographic Survey of Africa, Western Africa* (1952); D. Tait, *The Konkomba of Northern Ghana* (1961). (Jo. R. G.)

KONRAD von Marburg (Conrad of Marburg) (*c.* 1180–1233), German inquisitor, was educated at the university of Bologna. It is not certain that he belonged to any order, although he has been claimed both by the Franciscans and the Dominicans. In 1214 he was commissioned by Innocent III to arouse interest in the proposed crusade, and during his mission of reforming convents he came to occupy, in 1226, a position of influence at the court of Louis IV, landgrave of Thuringia. He became confessor to the landgrave's wife, Elizabeth of Hungary (*see* Elizabeth, Saint), and exercised the landgrave's rights of clerical patronage during his absence on crusade. In 1231 Pope Gregory IX nominated him the first papal inquisitor in Germany, to extirpate heresy, to denounce the marriage of the clergy and to visit the monasteries. In 1233 he accused Henry II, count of Sayn, of heresy. An assembly at Mainz of bishops and princes declared Henry innocent, but Konrad demanded that this sentence be reversed. As he rode from Mainz he was murdered near Marburg on July 30, 1233. His *Epistola ad papam de miraculis Sanctae Elisabethae* was published at Cologne in 1653. Konrad is known to English readers through Charles Kingsley's drama *Saint's Tragedy* (1848).

Bibliography.—B. Kaltner, *Konrad von Marburg und die Inquisition in Deutschland* (1882); *Cambridge Medieval History* (1936); *Catholic Encyclopedia* (1908). (Wm. J. B.)

KONRAD von Würzburg (d. 1287) was one of the most important poets writing in Middle High German in the late 13th century. He was born in Würzburg between 1220 and 1230 and as a professional poet served a succession of patrons, first in

Strasbourg, then in Basel, where he eventually made his home and where he died, Aug. 31, 1287. Konrad was a prolific and versatile poet. His works range from full-scale epics, such as *Partonopier und Meliur* and *Der Trojanerkrieg,* to love lyrics and short didactic poems (*Sprüche*). His powers are best displayed in his shorter narrative poems, both the secular romances such as *Englehard, Das Herzmaere* and *Otte mit dem Barte* and the religious legends of *Silvester, Alexius* and *Pantaleon.*

Konrad lived at a time when court life and its chivalric ideals were declining, but before the rising towns had acquired a sufficiently distinct entity to provide creative artists with identifiable means of self-expression. Although himself of humble origin, he sought to preserve the decaying values of courtly life and to invest them with new poetic qualities. His originality is thus of form, not of content, and lies in an ingenuity of poetic diction, an exuberant exploitation of linguistic and narrative skills. He took Gottfried von Strassburg as his model, developing, often to the point of exaggeration, his already stylized techniques of language and versification. If Gottfried may be called the "classical" artist of the 13th century Konrad is the poet of "baroque." The subtlety of his artistry, coupled with the explicitly didactic purpose of both his epic and lyric poetry, earned the esteem of his contemporaries and his subsequent elevation to the ranks of the "12 old masters" honoured by the Meistersingers.

See A. Moret, *Un artiste méconnu, Conrad de Wurzbourg* (1932); G. Ehrismann, *Geschichte der deutschen Literatur bis zum Ausgang des Mittelalters,* 2nd ed., pp. 35–54 (1935), which gives a full bibliography. (Rd. J. T.)

KONSTANZ: *see* Constance.

KONTAKION, the name given to the Byzantine metrical sermon. It consists of a number of stanzas (*oikoi*), metrically identical, which end in the same refrain. The stanzas, the first letters of which generally form an acrostic in which the name of the poet is included, are preceded by a prelude (*koukoulion*) in a different metre. The *kontakia* were accompanied by music, none of which has survived, and were probably chanted in a kind of recitative resembling an oratorio, the congregation joining in the refrain. The metres of the fully developed *kontakia* are extremely elaborate, and are governed by the number of syllables and the position of accents in each line, as well as by regular sense pauses.

In character the *kontakion* is nothing more than a poetical homily, akin to the rhythmical prose sermons of the early Christian church, preached after the lesson. The word *kontakion* appears to be derived from the *kontos,* the staff on which the parchment was rolled, but other terms were also used to designate this kind of poetry, for instance *hymnos, epos, poiema, ode, psalmos* or *ainos.* Certain of the elements of the *kontakion,* such as the acrostic and the refrain, can be found in the Greek literary tradition of the 4th and 5th centuries A.D., but its true character, that of a metrical sermon, and the strophic element are certainly due to the influence of Syrian literature. Syrian elements were blended with the artifices and elaborate adornments of late Hellenistic rhetoric. Unfortunately, it is not possible to follow the early development of the *kontakion,* as nearly all the early examples are lost. It is known mainly from its fully developed form, especially as it appears in the 6th century in the hands of Romanos the Melodos (*see* Romanos, Saint), its greatest master. The Christmas hymn of Romanos and the celebrated *Akathistos,* a hymn of disputed authorship and date, are perhaps the two most famous surviving *kontakia.* The *kontakion* declined in the 9th and the 10th centuries. It gave way to a more elaborate form of religious poetry, the *kanon* (*q.v.*), in which music and not the words is perhaps the most important element.

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KONYA (ancient Iconium), a city and capital of the *il* (province) of Konya, Turk. The city stands on the edge of the semi-desert plateau of Lycaonia, backed on the west by the Pisidian mountains, 145 mi. S. of Ankara. Pop. (1960) 119,841. The town grew rapidly after it was reached by the railway in 1896, and particularly after 1907, when a German company began a project for draining and irrigating the plains of the lower Carsamba valley. Konya stands in a rich agricultural region, with extensive fruit orchards and fields of grain, sugar beets and flax. However, after 1923 most of the traffic to southern Turkey followed the northern railway line through Ankara, and Konya did not develop as much as other towns of the Turkish interior. The southwestern part of the city has been redesigned, and a wide avenue leads through the western suburbs to the railway station, but the old city still survives to the east of the acropolis. The town is linked by rail and road with Istanbul and with Baghdad and Basra in Iraq.

Konya's ancient name was popularly derived from the *eikon,* or image, of the gorgon's head, with the aid of which Perseus vanquished the native local population before founding the Greek city; or, according to another tradition, from the effigies (*eikones*) of mud with which Prometheus and Athena repeopled the world after the flood. The indigenous inhabitants were Phrygian in speech and culture, their presiding deity being the goddess Cybele, worshiped in the form of the Zizimmene Mother. With the extension of Hellenic civilization in the time of the Seleucids, the place acquired importance as a link with the newly opened Great Eastern Trade route. As a result, it was gradually hellenized from the 3rd century B.C. and became a self-governing city, largely Greek in language, education and culture. However, a section of the population obstinately retained its own character and traditions, and it appears from inscriptions that the Phrygian language was still alive there in the second half of the 3rd century A.D. It was probably among this Phrygian section that the Jewish community stirred up opposition to Paul on his first visit of A.D. 47 or 48. He returned in 50 and 53, and Iconium is the setting of the tale of Paul and Thecla (*see* Thecla, Saint).

Both Cicero and Strabo count Iconium as a city of Lycaonia, to which it may be said to have belonged geographically, although it was ethnically Phrygian. From 25 B.C. to the end of the 3rd century A.D. it was included in the Roman province of Galatia. In about A.D. 297 it was probably taken as the capital of the province of Pisidia, and on the division of that province in about A.D. 371–372 it became the capital of the province of Lycaonia. The emperor Claudius I granted it the title of Claudiconium, and some time soon after A.D. 130 Hadrian raised it to the status of a colony. In later Byzantine times Iconium was the headquarters of the Anatolic *theme* (province) and, being so near the frontier, suffered harshly from Arab raids. It was conquered by the Seljuk Turks about A.D. 1072, and in 1099 they chose it as the capital of their sultanate (the sultanate of Rum). The city was extensively rebuilt, though many inscriptions, etc., were incorporated conspicuously into the perimeter walls which are two to three miles round and buttressed by square massive towers. The palace of the Seljuk sultans of Rum stands on the acropolis mound, and nearby are the mosque and tomb of Ala ud-Din. Farther south is the tekke, or monastery, which was the headquarters of the Mevlevi (Mawlawi, Maulawi) order of dancing dervishes, whose founder Jalal-ud-din Rumi, lies buried there. In addition to the old church of St. Amphilochius inside Konya, there are other early Christian shrines nearby under the hill of St. Philip (Takali Dag).

Konya Il has an area of 17,792 sq.mi., the largest in Turkey. Pop. (1961) 982,422. It includes much of the central Taurus range which, with its outliers Kara Dag on the southeast and Karaca Dag to the east, provides the most extensive remaining grazing grounds for the nomadic tribes of Turkey. The plains just below the Taurus range, with their numerous oases from Aksehir to Eregli, are the most prosperous part of the province, and five new barrages were expected to extend the cultivated area there. Beyond, to the north, the bare Anatolian steppe is of little use except for spring pasture. The population is for the most part agricultural and pastoral. Opium is the chief crop; carpet weaving and the manufacture of cotton and silk goods are the main industries. Lead is mined in the Bulgar Dag at Bulgar Maden. The principal exports are salt, minerals, opium, cotton, cereals, wool and livestock. (Wm. C. B.)

KOOK (KUK), **ABRAHAM ISAAC** (1864–1935), rabbi and talmudic scholar, first chief rabbi of Palestine under the British mandate, was born in Grieva, Latvia, the son of Shlomo Zalman ha-Cohen. He served as rabbi in the towns of Zimel and Boisk, and in 1904 became the rabbi of Jaffa, Israel. In 1914 he was stranded in Europe by the outbreak of World War I and in 1916 accepted the call of congregation Machzike Hadath in London to become their rabbi. In 1919 he returned to Palestine as the rabbi of Jerusalem, and in 1921, when the position was created, he was elected chief rabbi of Palestine, a position he held until his death on Sept. 1, 1935.

Kook's literary activity began with articles in Hebrew periodicals on the inseparability of Jewish nationalism from the Jewish religion. He maintained the essential unity of the halakic and philosophic teachings, which were generally regarded as separate domains, embodying this view in the curriculum of the *Yeshiba* he established, first in Jaffa and later in Jerusalem, known as Merkaz Harab. A mystic by nature, Kook viewed Jewish national revival as the process through which the divine plan for strengthening faith against the rising tide of heresy in modern times is carried out. This philosophy, which he preached during his lifetime, he expounded in a stream of cryptic essays, most of which were published posthumously under the title *Oroth Hakodesh*.

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KOOTENAY (KOOTENAI), a river in western North America, once called the Flat Bow and also MacGillivray, has its headwaters in the Rocky mountains to the west of Banff, Alberta. It flows southward in a broad U-shaped valley through scenic Kootenay National park in British Columbia and breaks out of the Rockies at Canal Flat to become a southward-flowing river in the Rocky mountain trench. It swings in a broad U southward into Montana and then northward into Idaho before broadening out into long, narrow Kootenay lake in British Columbia; from the western arm of the lake it flows into the Columbia river. About 130 mi. of the total 407 mi. of the river are in the United States. There is a wide variation in the seasonal flow of the river as measured at Wardner, B.C. The average late spring runoff of 67,000 cu.ft. per second is more than 100 times the winter minimum of 600 cu.ft. per second.

The Kootenay river falls 365 ft. in the 25 mi. between Kootenay lake and the Columbia river. In this section five dams were constructed, the first two built early in the 20th century. They have a total hydroelectric generating capacity in excess of 300,000 h.p. used chiefly to supply power to the large base-metal smelter and refinery at Trail, B.C. (J. L. R.)

KOPEISK (KOPEYSK; formerly KOPI, Russian for "mines"), a town of Chelyabinsk *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., lies 7 mi. E.S.E. of Chelyabinsk, with which it is linked by a branch railway and a tramline. Pop. (1959) 160,713. At the time of the Revolution it was a small mining settlement of only 9,000 inhabitants and has grown to a large town on the basis of its lignite mining. There are 26 seams, totaling 85 ft. in thickness. The main consumer of the lignite is the thermal power station in Chelyabinsk. Kopeisk has a large-scale plant, which produces coal-mining machinery. (R. A. F.)

KOPER (CAPODISTRIA), a seaport and *srez* (district) of the People's Republic of Slovénia, Yugos., lies 24 km. (15 mi.) S.W. of Trst (Trieste). Formerly an island, it was connected to the mainland in 1825 by a causeway half a mile long. The town of Koper (pop. [1961] 7,960) is of Mediterranean character. Noteworthy buildings are the cathedral and the palace of the local authority in the principal square. There are extensive saltworks in the vicinity. Koper is usually identified with the town of Aegida, which in the 6th century A.D. received the name of Justinopolis from Justin II. When Istria fell to the patriarchs of Aquileia in the 13th century they made Justinopolis the capital of Istria (whence the name Capodistria). It was captured by the Venetians in 1278. Under Austria from 1813 to 1918, Koper was then occupied by Italy. In 1954, when the Free Territory of Trieste was partitioned, it became part of Yugoslavia. (V. DE.)

KOPISCH, AUGUST (1799–1853), German painter and poet, was born at Breslau on May 26, 1799. Inspired by folk material, he wrote poetry based on legends and fairy tales, with a simplicity and appeal which gave it wide popularity (*Gedichte*, 1836; *Allerlei Geister*, 1848). Kopisch studied painting and archaeology in Italy (1823–28) and discovered, with Ernst Fries, the Blue grotto at Capri (1826). An injury to his hand ended his career as a painter and in 1847 he was given a court position at Potsdam, where he produced a history of the royal gardens (1854). He also translated parts of Dante's *Divine Comedy* (1842). He died in Berlin on Feb. 3, 1853. His collected works appeared in five volumes (1856). (W. D. WI.)

KOPPARBERG, a *län* (county) in Sweden in the southern part of the region of Norrland, is centred on Lake Siljan. Pop. (1960) 285,862. Area 30,365 sq.km. (11,724 sq.mi.). The *län* approximates to the former *landskap* (province) of Dalarna and extends almost from the Gulf of Bothnia to the Norwegian frontier. The hilltop height falls from 3,950 ft. in Storväteshågna to less than 1,000 ft. in the southeast. The upper territory is barren *fjäll* (upland) but the Dal tributaries cut deep and, although not providing through routeways, allow access to the west. Near Siljan a ring of Silurian sedimentary rocks has the best soils, agriculture and settlement of upper Dalarna (*q.v.*). In this region some traditional costumes and customs remain and it is an important tourist area. The Bergslagen region in the south, extending into adjacent counties, is a district of leptites set in gneiss and contains veins of gold, silver, lead, copper, iron and other ores. The deeply incised Dal river has rapids and many sites for power production. Railways have allowed modern industries to thrive in the sector southeast from Borlänge.

Falun (pop. [1960] 18,818), headquarters town of Kopparberg *län*, is 153 mi. N.W. of Stockholm by rail, in difficult country near the northern shore of Lake Runn. Its famous copper mines have been worked since the 13th century, but after the 17th century output declined and now the copper is unimportant, though various secondary products are still obtained. The mines belong to the Kopparberg Mining company, probably the oldest industrial corporation in the world, having been established before 1347. Falun has museums of mineralogy and geology and a school of mining. (A. C. O'D.)

KÖPPEN, WLADIMIR PETER (1846–1940), German meteorologist and climatologist, best known for his classification of climates. He was born (of German ancestry) in St. Petersburg, now Leningrad, Russia, on Sept. 25, 1846. After study at Heidelberg and Leipzig, he was employed (1872–73) in the Russian meteorological service. In 1875 he became chief of a new division of the Deutsche Seewarte, Hamburg, charged with the initiation of weather forecasting for northwestern Germany and the adjacent seas. From 1879 he was able to devote himself to fundamental scientific work. His most influential accomplishments were comprehensive studies of the weather and climate of the oceans, investigations of the upper air by means of kites and sounding balloons and a systematic study of climate that culminated in his widely used classification of climates (1918). Besides hundreds of articles and shorter works, his most important writings are *Grundriss der Klimakunde* (1931) and, with Alfred Wegener, *Die Klimate der geologischen Vorzeit* (1924). In 1927 he undertook, with Rudolf Geiger, the editorship of a five-volume *Handbuch der Klimatologie*, which was not completed, but of which a number of parts, three by Köppen himself, appeared between 1930 and 1940. He died in Graz, Aus., on June 22, 1940.

See Else Wegener-Köppen, *Wladimir Köppen, ein Gelehrtenleben* (1955). (J. B. L.)

KOPRULU (KUPRILI), the name of a Turkish family, five members of which became grand viziers between 1656 and 1710:

MOHAMMED KOPRULU (1575?–1661), founder of the Koprulu family, was born in Rudnik, Albania. He took his surname, Koprulu, from Vezirkopru, a town in Anatolia where he settled and married. He was brought to the palace when young, was educated there and employed in work of minor importance. He was then sent on military service to Anatolia. From 1648 onward he served successively as the governor of Konya, Trabzon (Trebi-

zond) and Damascus. In 1656 he was offered the grand vizierate which he accepted on condition that the sultan, Mohammed IV, then a minor acting through his mother Turhan Sultan, should not oppose any of his decrees. The sultan was to refuse to listen to any calumny or abuse directed against him as grand vizier.

At that time, the authority of the sultan was undermined by palace intrigues, by the insubordination of the army in Istanbul, by revolts in the provinces and by attacks of the Venetians on the coasts of Anatolia and even on the Dardanelles. Once grand vizier, Koprulu undertook to restore order. He exiled the untrustworthy ulemas (scholars trained in Muslim religion and law) from Istanbul and put to death 4,000 insubordinate soldiers and the Greek patriarch accused of treachery. After that he attacked the Venetians. He defeated and expelled their fleet from the Dardanelles and captured Lemnos and Tenedos (1657). This success gave him the opportunity to break off the Turkish alliance with France, which had secretly aided the Venetians. In 1657 Koprulu deposed George Rakoczy II, prince of Transylvania, on the ground that by invading Poland he had broken his agreement with the sultan. On Rakoczy's refusal to submit Koprulu invaded Transylvania (1658) and compelled him to flee to Austria. Koprulu dealt, also, with the pacification of Anatolia, Syria and Egypt, where about 20 viziers and former viziers were in rebellion against the sultan. Koprulu died at Adrianople (Edirne) on Oct. 31, 1661, having recommended the appointment of his son as his successor. He was a man of strong will who refused to capitulate or recognize failure.

Koprulu Fazil Ahmed Pasha (1635–1676), the eldest son of Mohammed Koprulu, was born at Vezirkopru, Anatolia, in 1635. He came to Istanbul at the age of seven. He was educated at the madrasah (Muslim college) and by his father, who gave him an insight into the methods of government and administration. He became a professor at the age of 22 but after a time left the madrasah and was appointed governor successively of Erzurum, Damascus and Aleppo. He became grand vizier, after his father's death, on Oct. 31, 1661.

Although his main object in foreign politics was peace, circumstances compelled Ahmed to make war. In 1663 he led his army against Austria, which was anxious to re-establish its authority over Hungary and Transylvania. He invaded Hungary and took Neuhäusel but was routed by the Austrian general, Count Raimund Montecuccoli, at St. Gotthard on the Raab river, on Aug. 1, 1664. In spite of this defeat, by the treaty of Vasvar Ahmed kept his recent conquests and obliged Austria to recognize Michael Apaffy as the prince of Transylvania and to pay 200,000 florins tribute. In 1666, he led an expedition to Candia, Crete, and in 1669 compelled the Venetian commander to capitulate, thus establishing Turkish authority over Crete. In 1672 he turned his arms against Poland in response to an appeal for help from the Cossacks of the Ukraine. The Polish king Michael, who put up little resistance, was forced to sign the treaty of Buczacz by which he surrendered Podolia and the Ukraine to Turkey. As the treaty was repudiated by the Polish diet, Ahmed undertook a new expedition against Poland. This achieved no conclusive result and he returned to Istanbul, leaving the direction of the war to his viziers. He died at the age of 41, near Adrianople, on Nov. 3, 1676. He was a brave leader, determined and generous.

Koprulu Fazil Mustafa Pasha (1637–1691), second son of Mohammed Koprulu, was also born at Vezirkopru, Anatolia. He received a theological education. At first he spent most of his time on military service with his brother Ahmed Koprulu and in 1680 he was appointed a vizier. In 1687 he took part in the mutiny that resulted in the abdication of Mohammed IV. In 1689 he was appointed grand vizier by the sultan Suleiman II and ordered to stop the advance of the armies of the Holy league (Austria, Poland and Venice). He first reorganized the administration and the army and then attacked the Austrians. He captured Vidin, Nis and Belgrade (1690), and invaded Hungary (1691), but was defeated and slain at Slankamen (Aug. 19, 1691). He was a brave man and of a kindly and tolerant disposition.

Kopruluzade Huseyin Pasha (1644–1702), surnamed Amujazade ("nephew"), was the son of Hasan, a younger brother of Mohammed Koprulu. Details of his early life are not known. He took part in the expedition led by Kara Mustafa against Vienna (1683). After serving as governor of a series of cities, he was appointed Kapudan Pasha (grand admiral) of the Turkish fleet and recovered Chios from the Venetians (1696). In 1697 he was governor of Belgrade, but after the defeat of the Turkish army at Zenta that year he was appointed grand vizier. Realizing the weakness of his resources he concluded the treaty of Karlovci with the Holy league in 1699. The Eastern Question (*q.v.*) may be said to have begun with the partition of Ottoman territories in Europe resulting from this treaty. Huseyin Pasha was dismissed by the sultan on Sept. 4, 1702, and died the same month. He lacked the skill of the previous Koprulus.

Kopruluzade Numan Pasha (1670?–1719) was born in Istanbul, the eldest son of Fazil Mustafa. He received a good education. In 1696 he took part in the expedition against the Austrians and was promoted to the rank of vizier. In 1710 he married Aisha Sultan, daughter of Mustafa II, and was then appointed grand vizier. His refusal to break the peace treaty with Russia led to his dismissal, after only nine weeks in office. He nevertheless served as a provincial governor for many years. He died on Feb. 6, 1719. *See* also Turkey: *History*. (E. Z. K.)

KOPRULU, MEHMED FUAD (1890–1966), Turkish scholar, historian and statesman, who made a valuable contribution to the modern study of Turkish literary history. Born in Istanbul in 1890, the descendant of viziers famous in the 17th century, he early abandoned the writing of poetry and literary criticism and under the influence of the Turkish nationalist Ziya Gokalp turned to the study of Turkish literature. He became professor of this subject at Istanbul university (1913) and founded the Institute of Turcology. Turning to politics he became a member of parliament (1936), a founder member of the Democratic party and foreign minister (1950–57). After the publication (1919) of his work on the early Turkish mystics (*Türk Edebiyatinda ilk Mutasavviflar*) he studied the beginnings of Ottoman Turkish history and literature, greatly elucidating this little-known period in his publications "Ottoman Turkish Literature" in the *Encyclopaedia of Islam,* iv (1931), and *Les Origines de l'empire ottoman* (1935). He died in Istanbul on June 28, 1966. (F. I.)

KORAIS, ADAMANTIOS (1748–1833), Greek humanist distinguished for his classical learning, for his patriotic activity and for his influence on his country's modern literary language, was born at Izmir (Smyrna) in Turkey on April 27, 1748. Having gone to France to study medicine at Montpellier, he moved to Paris in 1788 and turned to literature. After work on the ancient medical writers, he made his name with editions of the *Characters* of Theophrastus, of some Hippocratic writings and of the novelists Longus and Heliodorus; but his major literary work was the *Library of Greek Literature,* 17 volumes (1805–26), which was soon accompanied by *Parerga,* 9 volumes (1809–27). These collections included historical, political, philosophical and scientific works by ancient writers, but no poetry, since Korais, inspired by patriotic motives, thought the ancient poetry less relevant to contemporary Greek problems. He did, however, edit books i–iv of the *Iliad.* He also translated Herodotus into modern Greek. Many textual emendations proposed by him have been proved right.

In his enthusiasm for the cause of Greek national liberation Korais issued pamphlets, polemical verse and other political writings; helped to found the Paris Philhellenic committee (1825) for the financing of his country's struggle against the Turks; and tried to improve educational facilities for young Greeks. To rid the Greek clergy of prejudice and superstition, he took to working on theological subjects. His effort to simplify the literary Greek of his day by assimilating it to the currently spoken idiom resulted in his *Atakta,* five volumes (1828–35), the first serious study of modern Greek and also the first dictionary of modern Greek. Of his vast correspondence, more than 5,000 letters are extant. An unassuming man, Korais refused all honours offered by French academic bodies. He died in Paris on April 6, 1833.

See D. Thereianos, *Adamantios Korais,* 3 vol. (1889–90); K. Amantos, *Adamantios Korais* (1952); K. Demaras, *Koraes Kai He Epoche Tou* ("Korais and His Times") (1953). (Ce. A. T.)

KORAN (a spelling fairly well established in English toward the end of the 19th century but now beginning to give way to the more correct form QUR'AN), the sacred scripture of the religion of Islam. This article will deal with four aspects: (1) descriptive, of the Koran as it now exists; (2) religious, of its role in the Islamic system and its significance for Muslims; (3) historical-genetic, of the process by which it came into being; and (4) historical, of its treatment over the centuries.

Description.—The Koran is a book in the Arabic language, about 80,000 words in length (somewhat less than the size of the New Testament). It is composed of 114 *suras,* or chapters, of varying size, from scores of pages down to about a dozen words. The *suras*, numbered serially, have each a name (in a few cases, with variants), and each is divided into numbered verses like the Bible. The first *sura,* entitled "The Opening," is in the form of a short devotional prayer; it is constantly so used, ceremonially and otherwise, and by comparativists has been called "the Lord's Prayer of the Muslims." It is addressed to God. The remainder of the Koran is in the form of an address *from* God, he either speaking himself, sometimes in the first person, or else, through the imperative *Qul,* "Say!" which introduces many verses and passages and some *suras,* ordering that the words that follow be proclaimed. Much of it is addressed to men in general, or to men of (the) faith, or to the unconvinced, all in the second person plural, or in the second person singular to Mohammed, who is mentioned by name four times and by implication constantly.

Except for "The Opening," which is brief, the *suras* at the beginning are the longest and the subsequent ones are on the whole successively shorter. In most copies of the Koran each *sura* bears, along with its title, the word *Madaniyah* or *Makkiyah* ("of Madinah [Medina]" or "of Makkah [Mecca]"), indicating that according to tradition it was revealed to Mohammed in the period of his life when he was preaching in the one or the other of these two Arabian cities (*see* MOHAMMED); in some cases an intermixture of verses is similarly designated. Each *sura* (except the ninth) opens with the formula "In the name of God, the Merciful and Compassionate."

The Koran is in prose, much of it of a highly intense, even rhapsodic quality, and much of it rhymed. The shorter *suras* tend to be ejaculatory, other parts are more narrative. The subject matter is varied: passages of one or several verses, or of an entire *sura,* deal in diverse ways with many topics, some of them several times repeated—topics ranging from stories of previous "prophets" to an extremely vivid eschatology, stressing judgment; from divorcées to the oneness and omniscience and supreme majesty of God; from the defeat and forthcoming victory of the Romans (Byzantines) to kindness to orphans. The style, at times fiery, is powerful, the general tone deeply moralist and theocentric; the whole reverberates with a passionate demand for obedience to the will of a transcendent but near and mightily active God.

Religious Significance.—In the faith of Muslims, and according to the theory propounded in the book itself, the Koran is the revealed word of God. This postulates God, and indeed the kind of God who has something to say to us and who takes the initiative in saying it. Religion in this view is not a human searching after God: it is God who acts, and is known because and insofar as, and only as, he chooses to disclose himself. More precisely, he chooses the manner and the moment of his disclosures—for example, choosing Mohammed in 7th-century Arabia to transmit the Koran—but fundamentally it is not a matter of choice. Rather it is of the inherent nature of God from all eternity that he speaks to men. And what he says to man is also not quite a matter of choice, but an inherent and timeless (pre-existent) quality of the divine. It might be argued that he does not disclose himself (as, in some Christian theology, he does in Christ) but discloses rather what he wants man to know; so that the Koran might be said to be a revelation *from* God rather than a revelation *of* God. However, this distinction cannot be pressed far, for it is a revelation of God's will, and the theologians refused to dichotomize between God's attributes and his essence.

In the Muslim view (elaborated from the Koran), God created the universe, ordaining its processes and controlling them: he prescribed a pattern or order, which nature must obey. For man also he ordained a pattern of behaviour; but unlike the rest of the natural world, man was made conscious and free, to choose whether or not he will conform to God's decrees. There is for mankind a right way to live; it is the Koran that makes this known. It had been disclosed before: so soon as man was created, he was informed of what is right and wrong—in Islamic terms, Adam was the first "prophet," and there have been many others since, including Noah, Abraham, Moses, Jesus. The message that they brought from God, however, is believed by Muslims to have been later distorted or forgotten, so that the Koran sent to Mohammed confirms or corrects and in any case supersedes them all.

For Muslims the Koran is the *ipsissima verba* of God himself. It is God speaking to man not merely in 7th-century Arabia to Mohammed but from all eternity to every man throughout the world—including the individual Muslim as he reads it or devoutly holds it. It is the eternal breaking through into time, the unknowable disclosed, the transcendent entering history and remaining here, available to mortals to handle and to appropriate, the divine become apparent. To memorize it, as many Muslims have ceremonially done, and perhaps even to quote from it, as every Muslim does daily in his formal prayers and otherwise, is to enter into some sort of communion with ultimate reality. Certainly, to obey it is to leave the purely natural and to enter upon that realm where the mundane and the transcendent meet. On the one hand physical copies have been treated always with formal reverence; on the other hand the content of the book is ideally the source not only of the religion of Islam in general and of every part of it in particular but also of the whole life of the community in motion. There are many written commentaries on the text (see *History,* below). In a wider sense, the life of Mohammed is regarded as essentially a commentary on and exposition of the Koran; moreover, the whole of Islamic history might in some ways be regarded as, at least ideally, an elaborating and implementing of its meaning. Between these extremes, Islamic law (*q.v.*) is thought of as implicit within the Koran, educed from it formally; to say nothing of lesser things like Arabic grammar, based squarely upon it. In recent times even modern science has by a few speculative minds been seen as a kind of commentary on particular parts of the Koran.

The outsider who would understand the religion of Islam must bear constantly in mind that Muslims do not read the Koran and conclude that it is divine; they believe it to be divine, and then they read it.

Genesis.—Scholars who are not Muslims—that is, who do not believe the Koran to have originated directly with God—look for its origin on earth, and find it in the mind and personality of Mohammed and in the environment into which he came. In contrast with earlier centuries, when outsiders resolutely regarded him as a mischievous impostor, it is now agreed that he sincerely believed that the koranic verses were coming to him from God, through the intermediary of an angel. He apparently saw visions, and more often heard voices, which modern religious psychology recognizes as exemplifying a known pattern, instanced in many parts of the world (*cf.* Joan of Arc).

The form of his early utterances is seen as closely parallel to that of the Arabian soothsayers (singular, *kahin*) of the time, later enunciations, more sophisticated, as more parallel to biblical traditions. In content, also, scholars find echoes of Arabian notions first informed, then gradually overlaid or replaced, by those of Christian and especially Jewish lore largely in apocryphal versions current in the milieu. Much academic work has been and continues to be done in identifying sources of particular details and of general religious and moral ideas and orientation. Endeavours to reconstruct the chronological order of the parts of the Koran lead to careful studies of the development of Mohammed's personality and activities and a tracing of the dialectic between his revelations and his career.

Whether believing Muslims or not, historians have the problem of the process by which the pronouncements of revelations were subsequently constituted into the Koran as a compiled text: the transformation of piecemeal utterances over about 20 years into a written book—the first in Arabic. Up to the time of the redaction

of the Koran, Arabic writing was but a mnemonic device; it was used on bits of materials by various converts to facilitate recitation of some of the prophetic pronouncements. These, after the death of Mohammed (which meant also the cessation of his living authority), were presently gathered together to form the basis of a complete "recitation" (which is what the word *qur'an* means). Over against alternative versions, an authoritative one was organized and officially promulgated by the caliph Othman about 20 years after Mohammed's death (in the early 650s A.D.); this was technically improved by the Iraq governor al-Hajjaj about 30 years later and was gradually accepted throughout the Islamic community as normative. It was several centuries, however, before the Arabic script was gradually elaborated to its present precision; alternative "readings" have been recognized as legitimate, and also minor standard textual variations are preserved in the various manuscript traditions. The general acceptance throughout the Muslim world of the beautiful and precise printed edition published in Cairo under royal patronage in 1919, and many times reissued, seems to be giving this the status of an agreed official text.

History.—Wherever the faith of Islam has spread, the Koran has been copied, studied, interpreted and sometimes translated; and in addition western scholarship has in modern times devoted to the book investigations now of quite major consequence, chiefly exact studies of historical reconstruction. Among Muslims, the chief Koran science has been exegetical commentary, phrase by phrase. The first great exponent of this art was al-Tabari (*q.v.; c.* 838–923), whose voluminous exposition set the pattern which has never since basically altered. Of his many hundreds of successors, the most eminent and influential have been al-Zamakhshari (1075–1144), al-Razi (1149–1209) and especially al-Baydawi (d. *c.* 1300). The latter two represent a position successively closer to the growing orthodoxy than Zamakhshari, although they are less scholarly and less complete. Modern commentaries mostly follow traditional lines, although in a few instances partially modernist positions are set forth in this form, notably by Mohammed 'Abduh (1849?–1905) of Egypt and Abu-l-Kalam Azad (1888–1959) of India.

A more comprehensive inquiry into Koran problems reached its zenith in the brilliant work (*al-Itqan*) of al-Suyuti (1445–1505), but this has not been followed up. In addition to these specific studies, every Muslim theologian, jurist, mystic and heresiarch has incorporated the Koran or (more usually) individual parts of it into his system, sometimes in a distinctive way.

Early Muslim versions of the Koran in Persian (10th century) and Turkish (perhaps 11th?) were later mostly neglected, and translating the scripture was rejected in principle by orthodoxy. In Christendom, there is reference to a Syriac translation of the 9th century; in the 12th, Robert of Ketton (or Chester) made an important Latin version. This was printed in 1543 and done into Italian (1547), thence into German (1623) and thence into Dutch (1641). In the middle ages translations from the Arabic were made also into Hebrew, and from the 14th century into Spanish vernaculars. In early modern times an important version appeared in French (1647, Du Ryer); this was translated into English (1649), Dutch (1658), Russian (1716). In 1734 a direct version in English was published (Sale; very influential), and in the 19th century translations appeared in all the chief languages of Europe, including Polish, Greek and Portuguese. In several western languages there are now many translations, including some made by Muslims, missionaries and others.

Within the Muslim community modern translations have appeared, chiefly in interlinear form with Arabic; first in India with Persian (18th century) and a half-dozen of the provincial languages (19th); in the 20th century translation activity has been brisk throughout the Muslim world, from Hausa to Indonesian (though Arabs still object). The printing of the Arabic Koran began in Europe: *c.* 1530, destroyed by the church; Hamburg, 1694; Padua, 1698; etc. In Islam it was at first resisted as heretical but presently appeared and has now been fully accepted: an imperial edition from St. Petersburg, 1787, was on Muslim initiative (Mulay Usman); Teheran, in lithograph, 1828; India, prolifically from 1831, also lithograph; Istanbul, by photocopy process, from 1871; and the official Cairo edition (1919) mentioned above. *See* also references under "Koran" in the Index.

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KORAPUT, a town and district of Orissa, India. The town, the district headquarters, lies at an altitude of over 3,000 ft. and has a population (1961) of 7,461.

KORAPUT DISTRICT was included in the new Orissa province in 1936. With an area of 9,864 sq.mi., it is the largest district in Orissa. Pop. (1961) 1,498,271, more than 80% of whom are of tribal communities. The district is divided into three natural divisions: (1) the valleys of the Vansadhara and Nagavali rivers, almost parallel to one another; (2) the plateau land, stretching from the border of Kalahandi district (north) to that of Andhra Pradesh (southeast), and rising to 3,000 ft., comprises the Nowrangpur and Jeypore talukas and extends toward Bastar and Raipur districts of Madhya Pradesh (west); and (3) the dense forest of Malkangiri taluka, famous for bamboo and teak. Koraput is rich in minerals, including manganese, bauxite, limestone and dolomite. The Machkund project, undertaken jointly by Andhra Pradesh and Orissa, provides hydroelectric power to much of the district. Jeypore (pop. [1961] 25,291) contains the Vikram Dev college affiliated to Utkal university and there is a sugar factory at Raigada. The Raipur-Vizianagram railway line passes through the eastern part of the district. The Dandakaranya Development authority (1958) resettled many refugees from East Pakistan on reclaimed land in the districts of Koraput, Kalahandi and Bastar (the last-named in Madhya Pradesh). (MA. M.; N. K. S.)

KORAT: *see* NAKHORNRATCHSIMA.

KÖRBER, ERNST VON (1850–1919), Austrian statesman who was prime minister from 1900 to 1904 and again in 1916, was born at Trento in South Tirol on Nov. 6, 1850. Educated as a lawyer, he went to work in the ministry of commerce in 1874, rose steadily in the administrative service and was minister of commerce in 1897–98, under Paul von Gautsch. At this time there was strong parliamentary opposition to proposals for solving the language question between the various nationalities of the Habsburg monarchy. This situation caused the emperor Francis Joseph to turn to cabinets of officials who, relying on paragraph 14 of the constitution, would govern by means of emergency decree whenever they could not secure a favourable majority in the *Reichsrat.* Minister of the interior under Manfred von Clary-Aldringen (1899), Körber himself became prime minister, as well as minister of the interior, in Jan. 1900. He appealed to public opinion through the press rather than through the *Reichsrat,* but he failed to reconcile the Germans and the Czechs over the language question and had to dissolve the *Reichsrat* on its rejection of his proposals. The new *Reichsrat* (1901) approved his ambitious proposals for economic development and his social legislation; and his budget of 1902 was the first for four years to be passed in the normal way. Obstruction, however, continued over the language question, difficulties arose also over Hungarian affairs, and Körber resigned in Dec. 1904. During World War I he was appointed finance minister for Austria-Hungary in Feb. 1915 and prime minister of Austria in Oct. 1916, after the murder of Karl von Stürgkh. His resignation, however, was announced on Dec. 24, 1916. Körber died at Baden-bei-Wien on March 5, 1919.

KORCE (Slavonic KORITZA), a town of southern Albania and capital of the *rreth* (district) of that name. Pop. (1960) 39,400, part Orthodox and part Muslim; there is also a Vllach element in the town and *rreth.* The town stands about 2,800 ft. above sea level in a fertile plain, which slopes northward down to the former swamp of Maliq, drained after World War II and cultivated. The plain is one of the chief wheat-growing areas of Albania, and sugar-beet cultivation has been added. There are sugar refineries at Korce and Maliq and a brewery at Korce. The town is tree-shaded and has a modern appearance, with largely straight streets. It has no long history, the ruined town of Voskopoje, 9 mi. to the west, having been the former commercial centre of the area. Occupied by the Greeks in 1912, Korce was awarded to Albania by

the International Boundary commission. The French, from the Salonika front, occupied it during World War I and founded a *lycée* which had a high reputation. Occupied by the Greeks in 1940–41, Korce was restored to Albania by the German occupation of the Balkans. (D. R. O.-H.)

KORCULA (CURZOLA), an island and a commune in the Adriatic off the Dalmatian coast, forms part of Croatia, Yugos. It lies 3.2 km. (2 mi.) W. of the Peljesac (Sabbioncello) peninsula between Split and Dubrovnik. Pop. (1961) 10,223. Area 272.6 sq.km. (105 sq.mi.). The island, 48 km. (30 mi.) long and about 8 km. (5 mi.) broad, has a hilly interior rising to 1,863 ft. with prehistoric grave mounds. Phoenicians may have colonized the island and the Greeks did so in the 4th century B.C.; the Greek name Kerkyra (Lat. Corcyra) Melaina may have referred to the dark pines which still grow there. Among the rulers of Korcula were the Romans, Goths, Slavs, Byzantines, Genoese, the kings of Hungary and Croatia and the Bosnian dukes, the city-republic of Dubrovnik, the Russians, French, British and Austrians. It passed to Yugoslavia after World War I. Marco Polo was taken prisoner by the Genoese in a sea fight off the island in 1298.

The people are mainly sailors, fishermen and farmers. Vines and olives are grown, and marble and stone are quarried. There exists a modern shipyard. The capital, Korcula, stands on a rocky foreland near the eastern end. It contains the loggia (council chambers) and palace of the Venetian governors, a fine Gothic cloister in a 15th-century Franciscan friary, walls and towers of the citadel (1420) on the hilltop and a 13th-century Gothic church, formerly a cathedral.

In World War II it was occupied by the Italians and in 1943 by the Germans; Yugoslav partisans attacked it several times with heavy losses on both sides. (V. DE.)

KORDOFAN (KURDUFAN), a province in the Republic of the Sudan, lies between latitude 9° and 17° N. and longitude 26½° and 32½° E. Pop. (1955–56 census) 1,761,968. Area 146,929 sq.mi. It is composed mainly of Archean crystalline rocks, covered locally by the Nubian sandstone, and is a plateau averaging about 1,500 ft. in altitude but diversified by many small uplands, often rugged and scarped. Those to the south, rising within Archean outcrops, are known as the Nuba mountains (Jibal an Nubah; from the peoples living upon them) and include Jabal ad Dayr (4,593 ft.) and Jabal Temading (4,790 ft.). To the north are Jabal Umm Durag (3,343 ft.) and Jabal Harazah (3,698 ft.). Extensive deposits of wind-blown sand, fixed by vegetation, extend across the centre and southwest and are known as the *qawz* ("dunes"). There are alluvial clays and silts on lower ground within and around the Nuba mountains.

The tropical continental climate prevails, and most of the year is dry. Rainfall, between June and October, diminishes from 30–35 in. in the south to almost nothing along the northern border. No perennial streams exist, and indeed over much of the *qawz* there is no surface drainage at all. To the north wadies such as the Al Malik (El Milk) and (in the extreme northeast) the Muqaddam flow occasionally after rainstorms and join the Nile. The runoff from the Nuba uplands is gathered by the *khawr* ("watercourse") Abu Habl (to the north), the *khawr* Al Ghallah (to the west) and the Shelengo (Al Azraq) wadi and others (to the south).

Vegetation is fairly thick to the south and on the clay plains near the Nuba mountains. Semideciduous thickets and palms grow in a savanna with grass between two and four feet high. In central Kordofan there is acacia scrub with grass one to two feet high, which thins out northward and merges into desert along the northern border. The *tebeldi* tree (baobab) is common on the *qawz* and often grows to imposing size. The natural vegetation has been much degraded on the Nuba mountains and the *qawz* by shifting cultivation and grazing. Plants browsed by camels, sheep and goats are also disappearing in the semidesert fringe. The natural fauna includes buffalo, giraffe, lion, leopard, cheetah, roan antelope, wart hog, hare, quail, partridge, jungle fowl, bustard and guinea fowl. Ostriches also are found in the north. Most of these animals are now rare because of the extension of grazing and cultivation.

Arabic is the principal language, spoken in the home by about 70% of the population. About 25% speak Nuba tongues, 32,000 Dinka and 48,000 west African languages. About 1,000,000 of the people belong to Arab tribes, including the mainly sedentary Gawama'a (Al Jawami'ah)-Bedeiriya (Al Budayriyah) and Hamid. More than 100,000 nomads (mainly Al Kababish) in the north belong to the Siad al Ibil, or camel owners, while about 25,000 in the southwest, together with smaller numbers in other central and southern areas, are Baqqarah, or cattle owners. The chief towns are El Obeid (Al Ubayyid; 52,372), An Nuhud (En Nahud; 16,500), Ar Rahad (6,000), Dilling (5,600), Barah (4,900) and Kaduqli (Kadugli; 4,700).

Administratively, Kordofan is divided into districts, namely: Dar Bedeiria (with headquarters at El Obeid), Eastern Kordofan (Umm Ruwabah), Northern Jabals (Dilling), Southern Jabals (Kaduqli), Dar Kababish (Sodiri), Dar Hamid (Barah) and Tegali (Rashad).

The railway from Kusti (Kosti) on the Nile to El Obeid, built 1908–11, encouraged economic development that was further fostered after 1925 by truck transport on tracks through the scrub. Shortage of water was formerly acute and has not been wholly remedied. Pools that linger after rain, often artificially enlarged, and the hollowed trunks of *tebeldi* trees are still important sources, as are deep wells sunk by native methods. The government has bored more than 200 wells, and after 1945 used modern excavators to dig reservoirs (*hawafir*) which are filled by runoff in clay areas. Thereby more land has been brought under cultivation, and the population has become more settled. Millets are the staple crop, and both *Sorghum vulgare* and the bulrush millet (*Pennisetum typhoideum*) are grown. Peanuts and sesame are grown on the *qawz* with a surplus for sale. Short-staple cotton is grown on suitable silty land adjoining the southern Nuba mountains under government supervision. After ginning, it is sent by truck to Semeih, on the railway. Gum arabic is collected, and there is regular sale of camels, cattle, sheep and goats, especially in El Obeid.

The railway was extended during 1955–59 from Ar Rahad to Abu Zabad and to Nyala (in southeastern Darfur), thus stimulating the production of millet and peanuts along its route, as well as the cattle trade. Aircraft flying regular services between Khartoum and places in Darfur call at El Obeid. (J. H. G. L.)

Kordofan was originally inhabited by brown-skinned Nubian-speaking peoples and the name may be derived from a Nubian word *kurta* meaning "men." Red-brick ruins at Abu Sufyan and at Zankor in the northwest were outposts of the Christian kingdom of Nubia before the 13th century A.D. A Nubian graffito at Awdun shows that the old name of the Meroïtic kingdom, Cush, was still used in northern Kordofan in the Christian period, and the name of the Kaja of that area preserves a form of the name Cush. In the 13th century the trade route passing through the north to Egypt was controlled for a time by Kanem, and in 1286 Sultan Kala'un of Egypt sent a messenger to several princelets of the Sudan, including Barah and Anaj, perhaps in northern Kordofan. In the 14th century nomad Arabs from Egypt had spread all over Kordofan, amalgamating with some of the aborigines and driving the remnant into the hills. In the 17th century Tunsam, being defeated in a civil war with Suliman Solong, the founder of the Keira dynasty of Darfur, fled to Kordofan and set up the kingdom of the Musaba'at (*i.e.*; "those who went east") there. In the 18th century both the Fung sultans of Sennar and the sultans of Darfur claimed to control Kordofan, but without permanent effect. Although the Fung army under Abu al-Kaylak defeated the Musaba'at in 1748, the Musaba'ati sultan Hashim had recovered much of Kordofan and re-established himself at El Obeid before al-Kaylak's death (1772).

In 1784 war broke out between Hashim and Teirab, sultan of Darfur; after a preliminary victory, Teirab died, and only about the end of the century was Hashim overthrown. Darfur then controlled Kordofan until 1821, when Mohammed Bey Defterdar defeated the Fur governor Magdum Musallem near Barah and conquered Kordofan for Egypt. The Nuba mountains area was raided for slaves but never properly administered by the Egyptians. Kordofan remained under Egyptian rule until 1882 when Moham-

med Ahmed, the Mahdi, raised the country to revolt. It was at Kashgil (Kazgeil) in Kordofan that Hicks Pasha (Col. William Hicks) and his Egyptian troops, sent to crush the revolt, were annihilated (Nov. 1883). In 1899, a year after the battle of Omdurman, the Mahdi's successor met his death and the country passed to the Anglo-Egyptian condominium, which became the independent Republic of the Sudan in 1956. (A. J. AL.)

KOREA (CHOSON or TAE HAN). Located in the heart of the far east, the peninsula of Korea is of great strategic importance. Extending southward from Manchuria and the U.S.S.R., it is 525 mi. long and from 125 to 200 mi. wide and is bounded on the north by the Yalu and Tumen rivers, on the south by the Straits of Korea, on the west by the Yellow sea and on the east by the Sea of Japan. There are about 3,500 islands along the 5,400 mi. coast line. The area is 85,543 sq.mi.

The name by which it is best known to its own people is Choson, which may be translated as "land of the morning calm." This was the name used by the Yi dynasty (1392–1910); when the Japanese annexed Korea in 1910, they used the Japanese romanization, Chosen. The western name, Korea, was derived from the name of the Koryo (Korai) dynasty (A.D. 935 to 1392). Koryo may be translated as "land of high mountains and sparkling streams," an apt description of the peninsula.

The post-World War II division of the land at an artificial barrier, the 38th parallel, resulted in the formation of the Republic of Korea (South Korea), area 38,004 sq.mi., pop. (1960) 24,994,117, in the zone occupied by the U.S. at the end of the war, and the Democratic People's Republic of Korea (North Korea), area 46,539 sq.mi., pop. (1960 est.) 8,250,000, in the zone occupied by the U.S.S.R. The Republic of Korea uses within Korea the name Tae Han (previously used for a short period—1897–1910); the Communist regime continues to use the name Choson. In June 1950 aggression from the north brought on the Korean War with resultant devastation to much of the peninsula. Since the truce of 1953, reconstruction has progressed rapidly in both north and south; the peninsula is still divided by an uneasy truce line.

(S. McC.)

PHYSICAL GEOGRAPHY

Geology.—Korea is a mountainous land of diverse geology. The northern interior forms a broad continental base; it is similar geologically to the adjacent areas of Manchuria. The drainage divide of central Korea lies in the eastern part of the peninsula, a high, mountainous terrain composed chiefly of Archeozoic (Early Pre-Cambrian) rocks—granite, gneiss, mica schist and other metamorphics. Geosynclinal deposits ranging up to Triassic in age flank these ancient rocks on the west. The southeastern part of the peninsula, of considerably less relief, is composed largely of Cretaceous and Tertiary sedimentary rocks interspersed by Late Tertiary granitic intrusions. The latest major mountain making in Korea appears to have occurred during Jurassic time, all older rocks undergoing the deformation. The latest uplifts have determined the orientation of the peninsula.

Although volcanism is recorded in the dike rocks and lava flows associated with both the geosynclinal sedimentaries and the later Mesozoic deposits, it has not been pronounced in more recent geologic time. Paek-san, or Long White mountain, on the northern border, is a volcanic *caldera* with a crater lake. Some of the higher elevations are capped by lava flows from Paek-san and other volcanoes. Ullung Island in the Sea of Japan and Cheju (Quelpart) Island off the southwest coast are both volcanic in origin. Hallasan on Cheju was last active in A.D. 1007. Korea has no active volcanoes and very rare earthquake shocks, a striking contrast with nearby Japan.

Mineral resources include titaniferous magnetites and hematites of various ages from Archeozoic to Paleozoic. Copper is reported to occur in veins and as contact metamorphic and metasomatic deposits, chiefly in Paleozoic limestones. Gold, in vein quartz and in auriferous sulfides, is widely distributed in Archeozoic rocks. Some Cretaceous coal beds are anthracitic, but the largest coal deposits are of Permian Age. (J. H. Bz.; S. McC.)

Physiography.—The Tumen and Yalu rivers which form the country's northern border originate on the slopes of Paek-san. Extending southward from the mountainous northern interior, close to the eastern coast, a major mountain chain throws off spurs to the west and south. Thus, mountains are found in profusion throughout the peninsula; some of the earliest western travelers likened the land to "a sea in a heavy gale." The eastern coast is rugged and has tides that rise only two or three feet. The western coast is a network of estuaries and tidal flats where the tides rise from 20 to 30 ft., making navigation difficult. The main rivers drain to the west and south. Some of these are navigable in their lower courses for small boats. Notable are the Naktong in the southeast, the Han in the centre, the Taedong in the north and the Yalu. The southwestern coast is a maze of islands and peninsulas. Cheju, offshore about 50 mi., is Korea's largest island. The most important ports are Pusan in the southeast (the major connecting point with Japan); Wonsan, Ch'ongjin, Najin and Unggi along the northeast coast; Mokp'o and Kunsan in the southwest; Chemulpo (Inch'on); and Chinnamp'o, the port of the northern metropolis, P'yongyang. Sinuiju, on the Yalu river, serves as an entry point into Manchuria.

Korea has no wide alluvial plain, and only one-fifth of the land is arable. Most of this agricultural land is along the coastal margins and in the river basins. The south has more extensive plains and is favoured by a mild winter, so that two crops may be grown in a year. Though many of Korea's hills have been denuded of their trees, there are still extensive coniferous and mixed forests, especially in the north and in the more rugged mountain areas, in which also are the main mineral and hydroelectric resources.

The division of the land at the 38th parallel accentuated these latent geographic differences between the northern and southern parts of the peninsula.

Climate.—The climate of Korea is humid and continental, similar in many respects to the region between Georgia and Maine in the United States. Korea, however, has a pronounced rainy season in the summer and relatively dry winters. The yearly rainfall varies from about 60 in. along the shores of southern Korea to 25 in. in the northern interior. The summers are hot throughout Korea, with average August temperatures for most of the peninsula above 24° C. (75° F.). The hot, moist summers are well suited for growing rice, the desired crop of the Korean farmer. Winters in the north are dry and cold, with temperatures well below freezing; P'yongyang has an average January temperature of −8° C. (18° F.). In the south the winters are relatively mild; average January temperatures along the southern coast are above 0° C. (32° F.). (S. McC.)

Vegetation.—More than 3,400 species and varieties and 880 genera of vascular plants are known from Korea. Larch, spruce, fir and birch dominate the northern regions bordering China. Rhododendron and pines appear above the timber line. In the Yalu valley and middle Korea the prevailing features are *Pinus koraiensis* and deciduous hardwoods such as maple, basswood, birch, poplar, oak, *Maackia, Phellodendron,* ash, hornbeam, elm, chestnut, hackberry and, infrequently, magnolia and Japanese yew. Wild peonies and lilies beautify the countryside. The flora of the southern coastal areas and Cheju Island includes many southern forms such as evergreen oak, trees of the laurel family (*Cinnamomum, Machilus, Actinodaphne*), bamboo and camellia.

(W.)

Animal Life.—The native animal life of Korea is in general strikingly similar to that of Europe. Among mammals there are in addition such notable forms as the tiger, snow leopard and musk deer. The larger mammals include wolf and bear, wild boar, red deer, roe deer and the goral, a goat antelope. The ring-necked pheasant is native instead of introduced. The common toad and various frogs are directly related to those of north China and thus to those of Europe as well. The salamanders include the peculiarly Asiatic *Hynobius*. There are a few lizards and several species of snakes, which include two small venomous species, a pit viper and the common viper.

THE PEOPLE

Ethnology.—Archaeological, linguistic and legendary sources

support the view that the Korean peninsula was settled by tribes, Tungusic in origin, who migrated in waves from Manchuria and Siberia from the 3rd millennium B.C. They settled along the coasts and moved up the river valleys. Until the introduction of metal culture toward the end of the 5th century B.C. these varied tribes practised a simple hunting and fishing economy. These people, who in southern Korea were known as the Han, formed the dominant racial stock of the Korean people and were the originators of the Korean language.

Basically the Koreans have the same Mongoloid background as the Chinese and the Japanese, although the Koreans have distinguishing characteristics: dark, straight hair, high cheekbones, and a somewhat protruding jaw. They tend to be taller than the Japanese and shorter than the northern Chinese.

The Puyo and Koguryo peoples were the last of the Tungusic migrants who settled in adjoining Manchuria and across the Yalu river in northern Korea from 400 B.C. on. Other tribes—the Okcho along the northeastern coast and the related Ye and Meak peoples in the rest of northern Korea—separated them from the Mahan, Chinhan and Pyonhan tribes in southern Korea. Chinese influence was strong in the north and weak to the south. From 108 B.C. Chinese colonies, notably the Lolang, centred near the present city of P'yongyang in northwestern Korea, flourished as enclaves in the Korean peninsula. Though the Koguryo people in the north maintained their hunting economy and tribal organization, the Han people in the south, with the introduction of rice and other cereals, became agricultural during the Lolang period. Settled in villages, the three Han groups were divided and politically weak. It was the aggressive Koguryo which eventually overthrew the Lolang colony in A.D. 313.

Language.—The Korean language belongs to the Ural-Altaic group, as do the Turkic, Mongol and Japanese (but not the Chinese) tongues. The Korean spoken tongue and the native vocabulary are dissimilar to the other languages in the group. The Chinese cultural influence is obvious in the written language; Chinese was the classical language for many centuries just as Latin and Greek were used in European nations. The Koreans developed a written language—the *Idu*—by adapting the meaning of the Chinese characters to their own spoken language. This was superseded by a native alphabet, the *hangul* or *onmun*, invented in the 15th century, which standardized the spoken sounds. (*See* also JAPAN: *The People;* JAPANESE LANGUAGE.) (S. McC.)

Religion.—Indigenous religions included shamanism (or Sinkyo) and Chondokyo (Tonghak, or Society of the Heavenly Way). Confucianism and Buddhism came in with the Chinese influence, Shintō and various sects of Buddhism with the Japanese and Christianity with missionaries from many western countries.

Shamanism (*q.v.*) was the earliest indigenous religion and continued to play an important role in the culture of the Koreans, having been part of the mores of the people since prehistoric times. It is a form of animistic nature worship. The practice of shamanism in Korea in modern times is almost identical with its practice by tribes in central Asia and Siberia.

Confucianism ranks next to shamanism in its influence on Korean religious life. It was introduced from China during the 1st century B.C. and as a state religion vied with Buddhism for dominance until its final triumph over Buddhism in 1392.

Buddhism entered Korea in the 4th century A.D. It was accepted with much enthusiasm, reaching its high point from the 12th to the 14th centuries. Buddhism continued to exercise an influence, gaining some strength with the Japanese annexation. After 1945 Buddhism had some growth with control centred in liberal Buddhist monasteries.

Korea had its first contact with Christianity at the end of the 16th century as a result of the invasion of Japanese forces, some of whom were Christians. Foreign Roman Catholic priests, believed to be Chinese, entered Korea in 1686. The first western missionaries to arrive in Korea were three French Roman Catholic priests who entered in the 1830s, only to be killed during anti-Christian persecutions. Such persecutions continued until 1881. Protestant missionaries entered as permanent residents three years later. Before World War II there were reported to be about 500,000 Christians in Korea, more than half of whom were Protestants. With the freeing of Korea after the war, Christianity rapidly increased in prestige and numbers of adherents in South Korea. There were by the 1960s an estimated 2,000,000 Korean Christians.

Chondokyo, originally called Tonghak or Eastern Sect and opposed to all foreign influences, was started in 1859 by a man named Ch'oe. This religion is basically eclectic, adopting various features of shamanism, Confucianism, Buddhism and Christianity. Estimates of the number of followers of Chondokyo ranged from 2,000,000 in 1930 to about 80,000 before World War II and 73,000 in South Korea alone after the war. Shintō, introduced by the Japanese, made some converts among the Koreans during the occupation but virtually disappeared after 1945.

(S. NR.; S. McC.)

HISTORY

Legends and Early History.—The long history of Korea goes back into a legendary past. One of the important legends is that of a founder of "divine origin" who is reported to have become the first king of Korea in 2333 B.C. (The Republic of Korea officially starts its calendar with this date; 2333 is added to the year of the western calendar to designate the year of the Korean calendar.) According to the legend, Hwanung, son of the Creator, came to earth in a pine forest, found a beautiful young woman (who had just been transformed from a bear into a human being) and breathed on her; she gave birth to Tangun, who became the first king. The bear and forest motif of the legend has significance in showing the northern Asiatic origin of the Korean people. Another significant legend relates the story of Kija, a Chinese sage who was reported to have emigrated to Korea in 1122 B.C. with 5,000 followers and brought Chinese culture to the peninsula.

Firm historical evidence substantiates the theme of the Kija legend—the influence of Chinese civilization on the Korean people—although at a later date. In 108 B.C. the Chinese established four colonies in northwestern Korea. Lolang, with its capital at P'yongyang, was the most flourishing of the four. In its later years it was virtually an independent state.

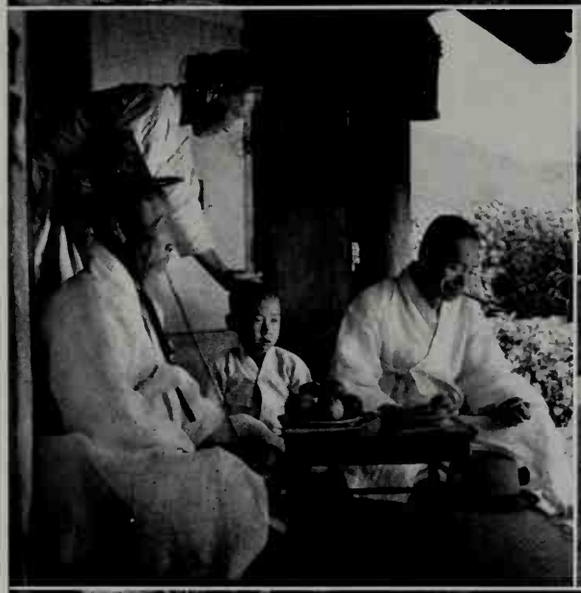
Southern Korea, where the Han peoples lived, stayed outside Chinese control, although it was strongly influenced by Chinese culture. The three Han tribes or peoples were the Mahan, Chinhan and Pyonhan. Each of the three was a federation of many clans.

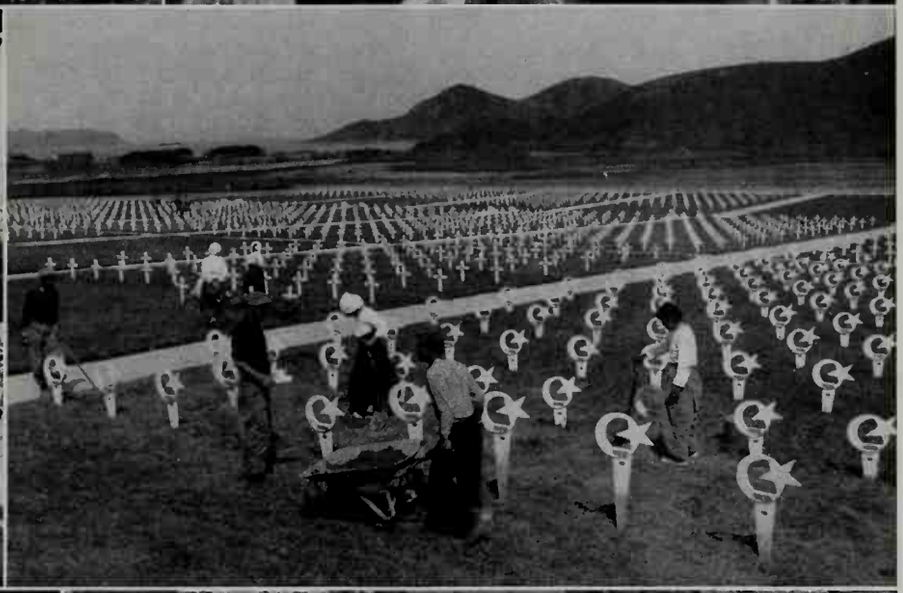
Period of the Three Kingdoms.—The first period in the recorded history of Korea is called the Period of the Three Kingdoms. The year 57 B.C. is generally given as the beginning of the period, since in that year the kingdom of Silla was founded out of the area of Chinhan in southeast Korea. In 37 B.C. Pyonhan became a part of Silla. The kingdom of Koguryo was founded in 37 B.C. in northern Korea in the area formerly under Chinese control. Lolang was the last Chinese colony to be incorporated in Koguryo in about A.D. 300. The third kingdom was Paekche, in southwest Korea, which was established between 15 and 20 B.C. out of the area of Mahan. A fourth state, Karak, existed from A.D. 42 to 562 in the southern tip of Korea around the modern city of Pusan. It is believed to have been under Japanese control, at least for a time, and was finally absorbed by Silla.

The three kingdoms waged war on each other sporadically over a period of 700 years. Silla was also attacked numerous times in this period by Japan. In A.D. 660 Paekche, and in 668 Koguryo, passed under the control of Silla, which had been given considerable aid by China in its wars against the other two kingdoms.

The unification of the peninsula under Silla lasted until 935. During this period Chinese culture, including Buddhism, was dominant. Literature, art and science made rapid progress. The language of the peninsula became almost completely homogeneous.

Koryo. About 900 Kungye, a local chief in an area north of Silla, established the rival state of Later Koguryo in north-central Korea. Wang Kon, one of his officers, succeeded him in 918 and made his capital at what is now Kaesong. Wang Kon strengthened his state and in 935 the last king of Silla abdicated; Wang Kon established the kingdom of Koryo, which lasted until 1392. Under the Wang dynasty Koryo was dominated by Buddhism.





PHOTOGRAPHS, (TOP LEFT) FRITZ HENLE, (TOP RIGHT, BOTTOM LEFT, BOTTOM RIGHT) HORACE BRISTOL FROM THREE LIONS, (CENTRE LEFT, CENTRE RIGHT) HORACE BRISTOL FROM PHOTO-REPRESENTATIVES

VIEWS OF THE REPUBLIC OF KOREA

Top left: A temple near Seoul

Top right: View of the harbour at Pusan, a principal port of the republic

Centre left: A Buddhist family of rural Korea. The grandfather wears the tall black hat and trims his beard in the traditional manner of older Koreans

Centre right: Gravetenders at the United Nations cemetery at Pusan. In the foreground are the graves of Turkish soldiers who fell in the Korean war

Bottom left: Woman praying at a Buddhist shrine

Bottom right: Aerial view of some of the government buildings of Seoul, capital of the republic

KOREA

PHOTOGRAPHS (TOP LEFT, CENTRE LEFT, BOTTOM LEFT) HORACE BRISTOL FROM THREE LIONS, (TOP CENTRE) EVANS FROM THREE LIONS, (TOP RIGHT, CENTRE RIGHT) BOB LAUBACH FROM BLACK STAR, (BOTTOM RIGHT) G. BORLAND FROM BLACK STAR

THE PEOPLE OF KOREA

Top left: Reeling thread from silkworm cocoons in a Korean silk manufacturing plant

Top centre: A Korean farmer, wearing the traditional white cotton work clothes

Top right: Farmer leveling his rice field near Chungju

Centre left: An archery shoot. The sport is pooular with Korean men

Centre right: Woman (left) learning to read from a primer. After the Korean war the republic increased its efforts to combat illiteracy and to re-educate those citizens who knew only Japanese script, the language taught during the Japanese occupation, 1910 to World War II

Bottom left: Korean schoolgirls at play. One girl bounces another into the air while a third steadies the jumping board

Bottom right: Korean woman displaying her basket woven of wire scraps

Confucian ideas, including the examination system for civil administrators, however, had an increasingly strong role. Koryo generally enjoyed good relations with China and envoys were exchanged at times, particularly when new rulers succeeded to the throne. Internally, the peninsula was divided into provinces, though the central administration appointed the governors. The tribes on the northeast frontier were often troublesome and Japanese pirates harassed the south and east coasts. However, the Chitan (Khitan) after they arose to power in Manchuria were more formidable threats to the security of the Koryo dynasty. After they established the Liao dynasty in China they made demands for overlordship and the Korean court was not strong enough to repel them. They invaded the peninsula in A.D. 1011 and burned the capital city. After the Koreans built better defenses and after the power of the Chitan began to crumble, Koryo was freed. This respite was short lived for in 1231 the Mongols from the plains of Manchuria and central Asia, overran the peninsula. The Koryo king was forced to submit; his successors took Mongol princesses for their wives and Korean court life followed the Mongol pattern. In 1274 and again in 1279, Kublai Khan ordered invasions of Japan launched from Korea. Despite these tumultuous times Korean culture survived and in the realms of letters, Buddhist-inspired art and pottery had a high development. Finally in 1364 a young Korean general, Yi Songgye, was able to defeat the Mongol forces which were weakened by their warfare against the Ming dynasty in China proper.

Choson.—General Yi deposed the last ruler of the decadent and weakened Wang dynasty in 1392 and established his own dynasty. This remained in power until the Japanese annexation of Korea in 1910. The Ming emperor of China recognized the new Yi dynasty and allowed it to adopt an old name for Korea: Choson, or Chaohsien in Chinese. Hanyang, the present city of Seoul, was made the capital. Buddhism, which in the last decades of the Koryo dynasty had become politically powerful and corrupt, was curbed and the Confucian ethical system governed the mores of the court and upper civil service. Under the Yi dynasty Korea flourished intellectually and culturally. In 1403, about 50 years before Johann Gutenberg, Chinese characters were printed in movable type. In 1420 a royal college of literature was established. In 1443 *onmun,* the phonetic alphabet, was developed. During the first 150 years of the dynasty scholarship was widespread in medicine, astronomy, geology, history and agriculture.

At the end of the 16th century Korea suffered from the first of two invasions that took place in a 50-year period. In 1592 Toyotomi Hideyoshi, shogun of Japan, invaded Korea. After seven years of conflict and occupation the Japanese troops were withdrawn. During this period the Koreans, led by Adm. Yi Sunsin, won a famous naval victory over the Japanese in Chinhae bay, aided by an ironclad ship built in the shape of a tortoise.

In 1627 the Manchus, who were threatening the power of the Ming dynasty in China, invaded and occupied Korea and forced the ruler to admit the sovereignty of the Manchus before withdrawing. The Manchu Ch'ing dynasty established itself in China in 1644. Korea maintained a tributary status with Manchu China by which China's suzerainty was recognized; in practice, however, this did not interfere with Korea's independence. The Korean court sought to maintain a "younger brother" relation to the "older brother," China, in the Confucian tradition. Internally, however, in part because of the devastating invasions, the Yi dynasty lost much of its vigour. In 1650 a party system within the court developed which weakened the central government. For decades this party struggle, based not on principles but on trifles and involving family jealousies, continued to be a dominant factor in Korean court life. Political intrigue supplanted political leadership in the scholar-landlord-civil servant class. Gradually this group became estranged from the common people. Thus the Korean government was weak and venal when the western world began to take an interest in the peninsula.

Contact With the West.—Korea maintained a policy of isolation until the 1880s. One of the first contacts with the western world occurred in 1653 when a Dutch ship was wrecked on Cheju Island and the 36 survivors were brought to Seoul. Although forbidden to leave the country, eight of the Dutch sailors escaped after 13 years. The narrative written by one of them provided the western world with an early eyewitness account of Korea.

From time to time thereafter contacts were made by European vessels. In the 1830s three French priests entered the country, but they were soon killed. Contacts were more numerous after 1865, with ships of many nations attempting to "open up" Korea. At various times French, U.S. and Japanese naval parties came into conflict with Koreans. In 1876 the Japanese forced the Koreans to conclude a treaty which began diplomatic relations between the two countries. In 1882 the U.S. became the first western nation to conclude a treaty with Korea. This was followed by similar treaties with other western countries, and by 1886 diplomatic relations had been established with all nations having interests in northeastern Asia.

Growth of Japanese Influence.—The progressive elements in Korea looked upon Japan as an example of how Korea might also benefit from western civilization. The progressives were opposed by conservative elements, centred about the court, who did not want Korea to adapt itself to the western world. The progressives, aided by the Japanese, led revolts against the court in 1882 and again in 1884.

During the 1884 revolt the court appealed to the Chinese government, through the latter's resident minister in Seoul, Yuan Shih-k'ai, for aid, and the Chinese sent troops. The Japanese in Seoul were forced to flee. The Chinese and Japanese governments resolved their difficulties in Korea temporarily under the Tientsin agreement of 1885. China and Japan agreed to withdraw their troops from Korea, the Korean government was to organize its own army without Japanese or Chinese participation, and if because of a serious disturbance it became necessary for either government to send troops into Korea the occupying government would notify the other in writing as to its intentions and withdraw the troops as soon as the matter had been settled.

The Tientsin agreement lasted for nine years. However, taking advantage of a local crisis within Korea occasioned by an uprising of the Tonghaks, a nationalistic religious group, the Japanese sought to force reforms and increase their power in Korea. In this they were opposed by the court and the Chinese. For this and other reasons in 1894 Japan brought troops into Korea and declared war on China (*see* CHINESE-JAPANESE WAR).

The Chinese-Japanese War was short lived. The new Korean government set up by the Japanese asked Japan's help to drive the Chinese from Korea, and in return Japan promised to maintain the independence of Korea. Chinese troops and naval units were easily defeated, and under the treaty of Shimonoseki of April 17, 1895, China recognized Korea's full independence and autonomy.

The Japanese ignored their guarantee of Korea's independence and through their ministry in Korea made many demands on the government, all with the avowed purpose of "reform." On Oct. 8, 1895, they seized King Kojong and forced upon him a cabinet of Koreans who favoured the Japanese. On Feb. 11, 1896, the king fled with his loyal ministers to the Russian legation and resumed his rule over the country. He dismissed the Japanese officials and replaced some with Russians, including Russian military instructors to train the Korean army.

Japan and Russia attemped to reach an agreement on their positions in Korea. On April 25, 1898, the Nishi-Rosen protocol was signed, by the terms of which both countries recognized the sovereignty and independence of Korea and agreed not to interfere directly in the affairs of the country. Russia recognized Japan's interest in the development of commercial and industrial relationships between Japan and Korea. The agreement meant different things to each party and soon became meaningless. Russia would not consent to Japan's having a free hand in Korea even in return for Russia's being given the same status in Manchuria.

When war between Japan and Russia became imminent, the emperor of Korea (in 1897 the king of Korea proclaimed himself emperor to assume the same status as the neighbouring emperors of China, Japan and Russia and named his land Tae Han) proclaimed Korea's neutrality. This was ineffective in view of Japan's power. The Russo-Japanese War (*q.v.*) began in Feb. 1904, and

the Japanese invaded Korea. Within two weeks the Korean emperor was forced to sign a treaty of alliance with Japan. Under the treaty, Japan "guaranteed" Korea's independence and territorial integrity in return for permission to use Korea as a base of military operations against Russia. Before the war was over Japan forced the Korean government to accept Japanese advisers on foreign, financial, police, judicial and military matters and Japan took over the Korean postal, telegraph and telephone services.

In the treaty of Portsmouth in Sept. 1905 Russia recognized Japan's paramount position in Korea. The United States and the United Kingdom likewise recognized Japan's rights in Korea.

When the Korean emperor first refused to sign the treaty offered by Japan in Nov. 1905, Japanese soldiers surrounded the palace and the treaty was signed. Under the treaty Japan handled all of Korea's foreign affairs, and Japan had a resident general in Seoul and residents throughout the country. Prince Itō Hirobumi became the first resident general in Feb. 1906.

In 1907 the emperor was forced to abdicate in favour of his son. The Japanese controlled the Korean government by placing a vice-minister in each department. The Korean army was disbanded and the police, judicial systems and prisons were taken over by the Japanese. Annexation was all that was left to effect complete control over Korea.

Period of Japanese Annexation.—In 1910 the last Korean ruler signed the treaty that annexed Korea to Japan. The Korean emperor became prince of the Shotoku palace with the title of imperial highness. Annual grants were made to the former emperor and members of the court. Former Korean ministers of state were made peers.

The head of the new regime was the governor general, who was appointed by the Japanese emperor and responsible to him through the Japanese overseas ministry. (In 1942 Korea became an integral part of Japan, and jurisdiction for its affairs was transferred to the home ministry.) The governor general appointed all officers of the government, issued decrees and imposed fines or prison sentences. Virtually all higher posts and even posts of district magistrate and village head were held by Japanese, while Koreans were appointed to clerical and minor posts. The governor general had an advisory body, the *chusuin* or central council, consisting of 65 native Koreans from the wealthy aristocracy and business class. On the relatively few occasions that the *chusuin* was consulted, the questions on which it was asked to give advice were innocuous. The chief administrative assistant of the governor general was the civil administrator who was appointed by the Japanese prime minister. The civil administrator supervised the government bureaus.

The Japanese controlled Korea largely by force, exercised by the police and the Japanese army. The police operated throughout the country in every community. In 1941 there was one policeman to every 400 persons. Economic control, though indirect, was very strong.

Nationalism.—The Japanese continually faced resistance from the Korean people, first armed resistance and, after World War I, passive resistance. The Japanese ruthlessly attempted to suppress Korean nationalism whenever it appeared, and thousands were killed or imprisoned. In the first three years after annexation there were 70 separate encounters between Korean insurgents and Japanese authorities.

The nationalism of colonial peoples that followed World War I had its influence in Korea. On March 1, 1919, a proclamation of independence was issued by 33 prominent Koreans. About 500,000 Koreans took part in peaceful demonstrations wherever the proclamation was read. The movement for independence went on for about two months until it was suppressed by the Japanese. According to reports of the Japanese government, 553 Koreans were killed, 1,409 wounded and 19,054 imprisoned; 11,831 were still in prisons awaiting trial nearly two years after their arrest. The Japanese recalled Gen. Yoshimichi Hasegawa, governor general, and appointed Adm. Makoto Saito as his successor. Saito promised a number of reforms, including freedom of speech and nondiscrimination of power, very few of which were actually carried out.

Meanwhile outside Korea, Korean patriots in Siberia, Manchuria, China and the United States were agitating for Korean independence. After the March 1 movement in Korea some of these groups joined forces and set up a Korean provisional government with headquarters in Shanghai. Among those involved was Syngman Rhee, a former student at Princeton when Woodrow Wilson was president of that university. Strenuous efforts made by this group to gain recognition at the Paris peace conference, at the Washington disarmament conference and at the League of Nations failed.

The Korean nationalists continued their activities up to World War II. Many were forced to flee the country, chiefly to the U.S., China, Manchuria and Siberia. They were also active in other countries, including Japan, where in 1932 an unsuccessful attack was made on the life of the Japanese emperor. A permanent Korean commission was established in Washington, D.C., with Rhee at its head.

End of Japanese Rule.—World War II brought an end to Japanese rule of Korea. In Dec. 1943 the Cairo declaration issued by China, the United Kingdom and the U.S. promised Korea its independence in "due course." A provisional Korean government was formed in Chungking in 1944 with Kim Koo as president, Kim Kiusic as vice-president and Gen. Kim Yaksan as war minister. A small Korean force, led by Gen. Li Chungchun, fought under the Chinese against Japan during the war.

At the Potsdam conference in July 1945 the Allies declared that "the terms of the Cairo Declaration shall be carried out." The U.S.S.R. committed itself to support the independence of Korea when it entered the war against Japan on Aug. 8, 1945. Soviet troops entered Korea from the north on Aug. 12 and U.S. troops entered from the south on Sept. 8. For purposes of military operations in carrying out the Japanese surrender, Korea was divided into Soviet and U.S. areas at the 38th parallel.

Postwar Partition.—With the end of Japanese rule a political vacuum existed in both the Soviet and U.S. zones. In South Korea two separate political forces presented themselves to the U.S. occupation authorities. The first, the Korean People's Republic, was proclaimed on Sept. 6, 1945. Communist-influenced and in opposition to the U.S. military government, it was headed by Lyuh Woonhyung (Yo Unhyong), who had organized a small underground party in Korea during the war. The other was the exiled Korean provisional government, headed by Syngman Rhee and Kim Koo, which returned to Korea from the United States and China after the Japanese surrender. U.S. authorities were neutral and maintained that military government was the only government in South Korea. In Feb. 1946 the U.S. military government created the Representative Democratic council, an all-Korean body that was to act in an advisory capacity to the commanding general. Syngman Rhee was made chairman. The council was replaced in Oct. 1946 by the interim legislative assembly, created to give the Koreans control of their government but with the U.S. retaining the power to dissolve the assembly and to appoint half the members.

In the Soviet zone an Executive Committee of the Korean People was organized by the Soviet command in Aug. 1945 to take over some of the Japanese governmental powers. A hierarchy of people's committees was established throughout North Korea. In Feb. 1946 a Provisional People's Committee for North Korea was established to replace the Executive committee. Kim Il Sung, a Korean Communist who had been in the Soviet Union for years, became the head of the North Korean government.

The first effort to unify Korea came at the Moscow conference of Dec. 1945 at which the U.S., the U.K. and the U.S.S.R. (with China adhering) agreed that the U.S. and Soviet commands in Korea were to form a joint commission which, in consultation with Korean democratic parties, was to make recommendations to the four powers regarding the organization of a provisional Korean democratic government. The joint commission met from March to May 1946 but was unable to reach agreement when the Soviet command attempted to prevent certain Korean groups from participating. The joint commission reconvened a year later on the understanding that the Soviet Union would modify its position. The discussions were stalemated, however, when the U.S.S.R. reverted to its original position. Other efforts to secure an agree-

ment between the U.S. and the U.S.S.R. on the unification of Korea failed.

The U.S. referred the question of Korean unification to the United Nations. On Nov. 14, 1947, the general assembly adopted a resolution calling for elections throughout Korea under the observation of the UN Temporary Commission on Korea. The elections were to select a national assembly to draft a democratic constitution and establish a national government. The Soviet command denied the UN commission permission to enter its zone.

Elections were held in South Korea on May 10, 1948, under the supervision of the UN commission. The national assembly met for the first time on May 31, 1948, and elected Syngman Rhee chairman. A constitution for the Republic of Korea was adopted and promulgated in July 1948 and Syngman Rhee was elected president on July 20. The Republic of Korea was inaugurated on Aug. 15, 1948, and on the same day the U.S. military government ended. On Dec. 12 the UN general assembly recognized the new government as the only lawful government in Korea and recommended that the occupying powers withdraw their forces from Korea as early as practicable. The U.S. completed the withdrawal of its military forces on June 29, 1949, leaving behind about 500 men who constituted the U.S. military advisory group.

The North Korean People's committee adopted a draft constitution on July 10, 1948, and on Aug. 25 elections with single slates were held for members of the supreme people's assembly of Korea. The assembly adopted the constitution on Sept. 8 and proclaimed the establishment of the Democratic People's Republic of Korea the following day. Kim Il Sung became premier of the North Korean government. On Dec. 25, 1948, the U.S.S.R. announced complete withdrawal of its occupation forces from North Korea, a claim that the UN commission was not permitted to verify.

The Korean War.—North Korean raids across the 38th parallel occurred with increasing frequency and seriousness in 1949 and 1950 and protests were made by South Korea to the UN. Then on June 25, 1950, North Korean troops invaded South Korea in force, marking the start of the Korean War. UN forces came to the support of South Korea. The war lasted more than three years. More than 1,000,000 persons were killed; 2,500,000 were left homeless; and cities, industrial installations and communications and transport facilities were devastated. Property damage was estimated at more than $1,000,000,000. Hostilities did not end until July 27, 1953, after two years of truce negotiations, with an armistice agreement between the commander in chief, UN command, and the commanders of the Korean People's army and the Chinese People's Volunteer army. (For details of the history, participants, and actions of the war *see* KOREAN WAR. *See* also FAR EAST: RELATIONS WITH THE WEST; ARMISTICE.)

A political conference to negotiate the peaceful unification of Korea was recommended in the armistice agreement and on Aug. 28, the United Nations general assembly adopted a resolution recommending arrangements for such a conference.

The ensuing discussions on Korea, begun at Geneva on April 26, 1954, were fruitless, and on June 15 the 16 Allied delegations issued a statement which noted that the Communist delegations had rejected every effort made to obtain agreement for a peaceful settlement in Korea and concluded that there was no purpose to be served in further discussions until the Communists accepted two basic principles: (1) that the UN had the authority under its charter to take collective action to repel aggression, to restore peace and security and to extend its good offices to seeking a peaceful settlement in Korea; and (2) that genuinely free elections should be held in Korea under UN supervision in order to establish a unified, independent and democratic Korea. The Allies reported the failure of the conference to the UN, and on Dec. 11, 1954, the UN general assembly approved the report, reaffirmed that the objectives of the UN remained the "achievement by peaceful means of a unified, independent and democratic Korea under a representative form of government and the full restoration of international peace and security in the area," and expressed the hope that progress would soon be made toward these objectives. At subsequent UN general assembly meetings similar resolutions were passed.

The Communist command violated various provisions of the armistice agreement, especially those relating to the introduction of new jet planes and armament. The Neutral Nations Supervisory commission (NNSC) was not able to function effectively in either North or South Korea and eventually was restricted to a very limited role. The Military Armistice commission continued to hold meetings at Panmunjom and hear complainants from both sides. Little action took place to reach a true and lasting armistice. At the UN general assembly and through notes exchanged via London and Peking, some diplomatic maneuvers were attempted but with little success. The UN commission for the unification and rehabilitation of Korea continued to operate in South Korea watching the political developments there, but it was not allowed in North Korea and was generally restricted to making annual reports to the UN general assembly.

In the meantime, on June 6, 1953, prior to the signing of the Korean armistice, Pres. Dwight D. Eisenhower pledged the United States, subject to congressional approval, to enter into a mutual defense treaty with the Republic of Korea and to continue economic assistance, and a mutual defense treaty was entered into force on Nov. 17, 1954. The treaty pledged each country to act to "meet the common danger in accordance with its constitutional processes." The U.S. senate's consent to the ratification was subject to the understanding that the treaty did not require the U.S. to assist the Republic of Korea except in the event of an armed attack against territory recognized by the U.S. as lawfully under the control of the Republic of Korea.

In order to aid the economy of the Republic of Korea economic aid programs were carried on after 1950 by the UN Korean Reconstruction agency (UNKRA), by the U.S. and by other means. The UNKRA program came formally to an end on July 1, 1958. Contributions totaling $148,500,000 were made by 34 UN member states and 5 nonmember states. In addition the UN Emergency Relief program contributed $474,400,000 and international voluntary agencies contributed $85,000,000. Most of the money was contributed by the U.S.; in addition, the U.S. from 1953 to 1958 contributed $1,300,000,000 in economic aid and even larger amounts of direct military aid. With the closing of UNKRA in 1958 most of the economic aid received by Korea came directly from the U.S. (S. McC.)

South Korea.—Syngman Rhee, who in 1948 became the first president of the republic, was re-elected to a second term in Aug. 1952. Before the election there had been a dispute between Rhee and the national assembly, which had the power to elect the president, over whether the constitution should be amended, as suggested by Rhee, to provide for the popular election of the president. President Rhee won this struggle for power and the constitution was changed. The internal political scene was marked by intrigue and shifting coalitions of groups. A few key figures were assassinated, and attempts were made on the lives of others. The leader of the Progressive party was executed for treason. John Myun Chang, former Korean ambassador to the U.S., was appointed to succeed Lee Bum Suk as prime minister in Nov. 1950, but the prime ministership was abolished in 1952. Chang appeared on the scene again, running successfully for the vice-presidency on the opposition Democratic party ticket in the elections of May 1956. In these elections, President Rhee, running as the Liberal party candidate, was again re-elected and the Liberal party held a majority in the national assembly.

Rhee's re-election for the fourth time in March 1960 was preceded by a period of tension and violence, followed by student-led demonstrations resulting in many casualties, charges of election rigging and demands for his resignation, supported by the unanimous vote of the assembly. Rhee resigned under pressure April 27 and fled to exile in Hawaii, and a caretaker government under Huh Chung took over.

The second Korean republic was established on June 15 with the passage of a law providing for a parliamentary system in place of the presidential, with a figurehead president elected by both houses of the legislature, and on Aug. 12 Posun Yun was chosen president. John Myun Chang became prime minister.

A military junta took over the government on May 16, 1961;

the Chang cabinet was arrested, the assembly was dissolved and further political activity was banned. Pres. Posun Yun proclaimed martial law throughout the country and appointed Lieut. Gen. Chang Do Young, titular head of the revolutionary committee, as prime minister. By July 3 an inside coup reconstructed the junta itself and Maj. Gen. Pak Chung Hi (Park Chung Hee) emerged as chairman of the supreme council of national reconstruction, with Kim Chong Pil, head of the South Korean Central Intelligence agency (C.I.A.), apparently ranking second in the regime.

On March 21, 1962, Pres. Posun Yun resigned, reportedly protesting the exclusion of the politicians and ranking officials of the previous regimes from political life, and on March 24 General Pak took over as acting president. He promised constitutional reform, the restoration of civilian rule and general elections. Martial law was terminated in Dec. 1962 and a new constitution drawn up by the junta was approved by a national referendum. It provided for a strong president and a weak unicameral national assembly, and abolished the office of vice-president. Early in 1963 Kim resigned from the junta and from the C.I.A. to organize the Democratic Republican party in preparation for the postponed elections. In March 1963, however, Pak proposed a referendum to approve the continuation of junta rule for four more years, with the banning of political activity during that time. However, he again changed his mind and on May 11 announced that elections would be held in the fall of 1963, with political campaigning to be allowed in the interim. Pak resigned from the army and became the candidate of the Democratic Republicans, Kim having retired from politics. The election took place on Oct. 15, with Pak defeating Posun Yun, candidate of the newly formed Civil Rule party, by a narrow margin.

North Korea.—Kim Il Sung continued as premier after 1948 and political power remained in the hands of the central committee of the Korean Workers' (Communist) party, also headed by Kim; he claimed 100% turnout of voters in the Oct. 1962 elections. Within the party there was a struggle for power between those Korean Communists trained in the Soviet Union and those trained in China. One group of the latter (a so-called Yenan group) were purged in 1954. North Korea attempted to support Communist China while avoiding any serious break with the U.S.S.R. but by late 1962 and 1963 was openly on the Chinese side in the dispute over co-existence.

A three-year plan for 1953–56 was reported to have been successfully completed to prepare the way for the adoption by the supreme people's assembly of Korea's first five-year plan in June 1958 to cover the period 1957–61. A seven-year plan adopted in September 1961 included pledges to abolish taxes by 1967 and establishment of nine-year compulsory schooling.

North Korea continued to reject the UN unification plan and proposals for elections under UN supervision. A bid at the UN in 1962 to seat both Korean governments failed when North Korea declined to recognize UN competence to deal with the Korean problem. (S. Nr.; S. McC.)

POPULATION

Historic Demographic Patterns (1580–1910).—The broad trends in the development of population over four centuries, as it has reacted to distinctive foreign and domestic forces shaping Korea's experience, seem clear in spite of sometimes conflicting and incomplete data. It is estimated that Koreans numbered about 5,500,000 in 1580. At that time the country had not entirely lost the creative surge generated in the magnificent early Yi reigns of the preceding century, nor had it suffered the intensified raids of Japan-based freebooters or the devastations of Hideyoshi (1592–98) and of the Manchus (1627 and 1636–37). By 1637, at the end of the "bloody half-century" and the beginning of two and one-half centuries of isolation, two determinant facts emerge. First, the land in cultivation, and therefore the supply of food and of materials for craft production, had dropped off severely since 1580 and was not again to reach that year's level before 1910. Second, the population had apparently fallen off during these same 50 years by almost 1,000,000 to something over 4,500,000, as a result of direct wartime decimation and of a decline in birth rate.

Republic of Korea: Area and Population

Political subdivisions	Area (sq.mi.)	Population 1960 census*	Density per sq.mi.
Independent city			
Seoul	237	2,444,883	10,316.0
Provinces			
Cheju (Cheju)	692	281,720	407.1
Kangwon (Chunchon)	6,416	1,636,726	255.1
Kyonggi (Seoul)	4,231	2,758,027	651.9
North Cholla (Chonju)	3,102	2,395,023	772.1
North Ch'ungchong (Chongju)	2,870	1,369,313	477.1
North Kyongsang (Taegu)	7,706	3,850,102	499.6
Pusan (city)	139	1,162,614	8,364.1
South Cholla (Kwangju)	4,636	3,553,475	766.5
South Ch'ungchong (Taejon)	3,363	2,525,646	751.0
South Kyongsang (Pusan)	4,612	3,016,588	654.7
Total	38,004	24,994,117	657.7

*Preliminary

The census of 1789 recorded the precise figure of 7,403,606, roughly 3,000,000 more than in 1637. Figures conflict for 1876, when the Japanese treaty forced Korea out of its seclusion, but the best balanced estimate seems to be 10,500,000 or two and one-third times the figure for the beginning of the "hermit" period 239 years earlier. Somewhat more rapid growth was achieved in the next 34 years; the official Japanese report for 1910 showed a total peninsular population of 13,128,780.

The Japanese and Post-War Periods.—Those who deny that Japan's rule in Korea was extremely harsh take great comfort in the fact that the population was reported as 24,000,000 in the census of 1940 and that there is wide agreement on a figure close to 27,000,000—more than double the population at annexation in 1910—for the end of World War II in 1945. An even faster rate of growth prevailed after 1945. The over-all percentage growth in South Korea, where population density had reached 657 per square mile by 1960, has been far greater than that in North Korea because of the several million refugees moving southward since 1945 (in excess of those moving northward). The best estimates for that year show approximately 16,500,000 for the south and 10,500,000 for the north. Corresponding figures for 1960 are 24,994,117 and 8,250,000, respectively. The natural increase is now assumed to be about the same north and south; since 1955 this excess of births over deaths has apparently averaged at least 3% per year. This increase, which goes on in the face of massive unemployment, underemployment and critical economic issues, is especially ominous for South Koreans, whose population density now exceeds that of the Japanese.

It is a striking fact that during its 239 years of isolation the population increased by about 6,000,000 (from about 4,500,000 in 1637 to 10,500,000 in 1876), representing an average annual addition of slightly more than 25,000 or 0.56%. During the 87 years from 1876 to 1963, on the other hand, there was an increase from about 10,500,000 to about 38,750,000, which is equivalent to a growth of 3.1% per annum.

Despite all of the suffering and uncertainty of decades of exposure to the whirlpool of modern world forces, Koreans have increased their numbers almost six times as fast since 1876 as they had for centuries before that date.

The table above gives area and population figures for South Korea; comparable data for North Korea are not available.

ADMINISTRATION AND SOCIAL CONDITIONS

Government

Korea's Political Heritage.—Political authority during much of Korea's prehistory seems to have been attributed to the single God and Creator Hwanung and his representatives, but in that period and in the early historical centuries control was in fact exercised by tribal organizations, evolving into centralized monarchies between the 1st and 4th centuries A.D. For 1,000 years (*c.* 400–1400), while rival kingdoms achieved an invigorating resurgence after each destructive invasion, Korea was the scene of an almost continuous contest for political and social mastery between Buddhism, with its metaphysically oriented individualism, and Confucianism, with its humanistic but exacting collectivism always idealizing the Chinese imperial model. Even when the highest offices in Silla or Koryo were held by Confucian literati, it was the appealing cosmogony, the impressive ceremonials and the per-

suasive monks of Mahayana Buddhism that usually captured the imagination of royal families and of the people until after the rise of the Yi dynasty in 1392. When Buddhist political power had been crushed in early Choson (1392–1910), government became the preserve of the Confucian scholar-officials. Once these bureaucrats, who were also the great landlords, had abandoned their early spirit of service and pursuit of enlightenment and had become factious and self-seeking, government tended to become predatory and to be identified by the people with corruption and tyranny rather than with justice. The gulf separating the rulers from the ruled became wider during Choson's long isolation, from 1637 (the Manchu peace) to 1876 (the enforced treaty with Japan). In the three and one-half decades (1876–1910) which remained before annexation by Japan, the people were helpless in the face of strange world forces, not only because they were poorly informed, hard-pressed and still preoccupied with eluding the long arm of an often vicious government, but also because the dominant conservative politicians lacked both the vision and the inclination to undertake the fundamental regeneration which was urgently needed. Japan's 35-year regime (1910–45) had the possible virtues of decisiveness and consistency, but it treated Koreans as second-class citizens in their own land, denied them any significant training in self-rule, and deepened their habitual distrust of the whole institution of government.

South Korea.—The United States army military government in Korea (USAMGIK) was a major element of the over-all U.S. command (United States Army Forces in Korea, or USAFIK) from Sept. 1945 to Aug. 1948. Both in its efforts to prepare Koreans for western-style democracy and in its other culture-wide activities, military government was handicapped by the lack of personnel familiar with the country, by the lack of an over-all program, and by serious initial misconceptions of both Koreans and Americans. Dedicated and capable people of both nationalities, however, did important work in many fields, including that of government in its broadest sense. Under the South Korean interim government, sponsored by and within USAMGIK beginning in the fall of 1946, several hundred Korean leaders had an unprecedented opportunity to gain useful experience (1) by serving as members of the Korean interim legislative assembly and (2) by taking over from their U.S. counterparts the title and much of the executive responsibility of civil administrator, department and bureau directors, provincial governors and subordinate provincial officials.

On May 10, 1948, elections were held in South Korea under the supervision of the UN Temporary Commission on Korea (see *History: Postwar Partition,* above). National assemblymen thus elected approved in July 1948 a constitution that provided for (1) a unicameral national assembly, to be elected quadrennially by universal suffrage; (2) a powerful president and a vice-president to be elected for four years by each incoming assembly; (3) a prime minister to be appointed by the president with the assembly's approval; (4) a cabinet to be appointed by the president without legislative approval; (5) a veto by the president over legislation, with the assembly having power to override vetoes; (6) emergency powers in the hands of the president; (7) a supreme court, with power to determine the constitutionality of laws and regulations, and lower courts; and (8) guarantees of civil liberties, the right to equal opportunities for education and the right of collective bargaining. With Syngman Rhee chosen as first president, the Republic of Korea was established and USAFIK's authority transferred to it on Aug. 15, 1948.

Proposing for the first time in Korean history to take orders exclusively from the "sovereign people," the republic faced enormous difficulties. Among them were the suspicion of all public authority, which had been intensified by such features of the three-year American regime as a continued slowness of economic recovery, extreme shortage of employment opportunities in the cities and the still present issue of "profiteers" and "collaborators," often expressed in the arbitrary actions of the national police under the influence of suddenly powerful Korean personnel trained and long used in subordinate police posts by the former Japanese police-state regime. Adding to the difficulties were the tendency of both the people and the so-called political parties to think in terms of regional loyalties, personalities and the personal following of individual leaders rather than principles or even the long-run goals of interest groups; and an overwhelming feeling of the ordinary citizen's helplessness in the face of enormous domestic and international issues, made more ominous by economic, social and moral uprooting and by Korea's obvious role as a pawn in the deadlocked American-Soviet power conflict, together with the constant and sometimes ingenious propaganda and organizational activity of Communist and Communist-inclined groups in the south.

In 1952, preceding the elections, the constitution was amended at Rhee's insistence to provide for the direct popular election of the president and vice-president and, at the assembly's, for a new upper chamber, the house of councilors.

From 1948 through 1957 work was proceeding on a new and considerably liberalized civil code to replace the one (copied after European models) that Japan had imposed in 1912. The new code, passed by the national assembly in December 1957, became effective Jan. 1, 1960, and has been recognized by the successor regimes as the prevailing codification in the civil field.

After Rhee's resignation April 27, 1960, the interim government from April to August 1960 provided an orderly setting in which constitutional revisions could be drafted and approved by the assembly, new elections held and the "second republic" set in motion. Amendments provided that the president's position as chief of state should be largely ceremonial, but that he should be free to follow the order of his choice in submitting the names of candidates for prime minister to the national assembly for its confirmation, or election; that the prime minister and his cabinet were responsible to the assembly; and that that body should consist of the house of representatives and the house of councilors which Rhee had originally approved in the compromise of 1952 but had refused to activate.

The military junta which executed a successful coup on May 16, 1961, constituted itself the supreme council for national reconstruction. Civilian officials were removed from office, with the important exception of the president, the symbol of continuity, who finally resigned in March 1962. Such constitutional organs as the house of councilors, the house of representatives and the prime ministry were suspended and their authority transferred to the supreme council.

A new constitution approved by national referendum late in 1962 and promulgated early in 1963 as the basis for the proposed third republic was less liberal in certain respects than the constitution of 1948 but conspicuously similar to that document in its strong presidency and its unicameral legislature. It returned to the system of universal adult suffrage and appropriated such virtues as there are in the U.S. principle of the separation of executive, legislative and judicial powers.

Seoul is the capital of South Korea; for list of provinces, see *Population,* above.

North Korea.—The Communist-led provisional government established by the U.S.S.R. in 1945 evolved into the supreme people's assembly, which in turn adopted a constitution based on the Soviet model and proclaimed the Democratic People's Republic of Korea in 1948. Government is by a coalition dominated by the central committee of the Korean Workers' (Communist) party, with a premier and a president. The capital is P'yongyang, an independent city with a population (1960 est.) of 653,100. The Kaesong-Chigu district which includes the city of Kaesong is also classified as an independent city. The provinces set up by the republic are Chagang; North Hamgyong; South Hamgyong; North Hwanghae; South Hwanghae; Kangwon; North P'yongan; South P'yongan; and Yanggang. (C. N. W.)

Education

Until the annexation of Korea by Japan in 1910 education was basically a function of the family, with the more literate members of poorer families taking charge of learning in the home. Among the wealthier class a teacher was often hired by a group of families who also provided a schoolroom. Children were taught Chinese ideographs as well as the Korean phonetic script called *onmun* or *hangul.* The goal of many students was to take the examinations

for government positions.

Under Japanese rule education in Korea advanced significantly in terms of the number of schools and of students. The content of education, however, was rigorously controlled with a view to assimilating the Korean people. In 1939 there were 1,200,000 Korean students in primary school—1 out of every 3 Korean children—and 93,000 Japanese children—practically every Japanese child. High schools, professional schools, colleges and the Seoul Imperial university had a combined enrollment of 34,000 Japanese and 62,000 Koreans, with the latter figure including a sizable attendance in agricultural training schools. Japanese and Korean students generally attended segregated primary and secondary schools.

Apart from the public-school system there were many private schools run by missionary groups. One-fourth of all the high-school students in Korea attended these private schools, as did 15% of professional-school students and 57% of college students. These schools were of special significance for Korean girls, who were generally not able to go beyond public primary school. The private schools were subject to restrictions by the Japanese authorities in an effort to limit their importance.

With the end of Japanese rule over Korea in 1945, the educational system of South Korea underwent a complete reorganization. Korean educators were given much responsibility in educational reform. The curriculum of all schools was revised along democratic lines. Textbooks were rewritten in Korean. The U.S. military government distributed 15,000,000 elementary-school textbooks written in the *onmun* alphabet. Special attention was given to scientific and technical training in order to train Koreans to take the place of Japanese technicians who were repatriated to Japan at the end of the war. In 1948 the literacy rate for the native Korean *onmun* script was reported to be about 70% to 80% as a result of an intensive campaign to eradicate illiteracy; for Chinese ideographs it was substantially lower.

Compulsory education on the elementary level was established in the Republic of Korea in June 1950, although the outbreak of the Korean War in the same month prevented its full implementation. Twelve years of elementary and secondary education were offered, with entrance to secondary education based on competitive examinations.

By the 1960s the 5,000 elementary schools had 4,000,000 students; 1,000 middle (junior high) schools, 500,000; and 600 high schools and vocational high schools, 300,000. The more than 60 colleges and universities had about 150,000 students and another 150,000 attended civic (adult education), civic-high and other schools. Teachers training institutions were graduating more than 5,000 teachers a year. Korea university, at Seoul, was founded in 1905. National universities, all founded after 1946, included Chonnam, Chungnam, Chunpuk, Kyungpuk, Pusan and Seoul.

In North Korea the seven-year plan adopted in 1961 pledged the establishment of nine years of compulsory schooling. When the plan was adopted there were about 7,000 schools of general education with more than 2,000,000 students; about 1,000 technical and middle schools with 100,000 students; and 40 institutes of higher learning with 100,000 students. Communist sources reported an increase of 96% in the total number of students in all schools between 1946 and 1960. Kim Il Sung university, P'yongyang, was founded in 1946.

ECONOMIC CONDITIONS

Agriculture, Forestry and Fishing.—Korea has always been a predominantly agricultural country. Agriculture traditionally suffered from relatively low soil fertility, periods of flood and then of drought and an overcrowding of the land. North Korean agriculture, more diversified than that of southern Korea, emphasized grains other than rice to a greater extent. Fruit and vegetable production was also larger in the north.

Under Japanese rule, northern Korean chemical plants provided the synthetic fertilizer needed in the country; 70% of the fertilizer output was consumed in southern Korea. Korea was used by Japan as a source of rice to help make up Japan's food deficits. The Japanese government spent large sums of money for irrigation and for clearing of land to increase yields and the area under cultivation. Korea became an exporter of rice for Japan, and at the same time Korea had to import lower grades of rice and other grains to make up its own food deficit.

After the end of World War II, South Korean agriculture suffered from shortages of fertilizer and after 1950 from the ravages of war. After the truce considerable improvement was made. Approximately 5,000,000 ac. were under cultivation in the 1960s, more than half in paddy fields. The average land area for a farm household was slightly over two acres. One-third of the farm families farmed one acre or less.

Rice is South Korea's principal crop, with barley and wheat next in importance, followed by rye and other grains, soybeans and other pulses. Tobacco and cotton are also important. Livestock include pigs, poultry, rabbits and some goats. Cattle are used for draft; horses number fewer than 20,000.

In North Korea corn (maize), potatoes and wheat are the ranking crops, along with hardy cereals such as millet, barley and grain sorghum. North Korean sources reported that, taking 1946 as 100, total agricultural production had reached 224 by 1960, with the farming sector increasing from 100 to 205 and the livestock sector from 100 to 301. The same sources reported that, with 1949 as 100, the total area of cultivated land reached 332 by 1961; the area of rice paddies (included in the total area of cultivated land) reached 313. Much progress was reported in the mechanization of agriculture, rural electrification and the organization of agricultural co-operatives. The announced target of the seven-year plan (1961) was 5,000,000 tons of grain in 1962. Claimed output in the year the plan was announced was 4,830,000 tons: this report was adjusted by the U.S. state department to 3,378,000 tons.

From 1943 to 1953 timber reserves were reduced by more than 50% through war devastation, indiscriminate cutting and poor management. In South Korea about 15,000,000 ac. are classified as forest land, of which about one-fifth are national forest.

Fish and marine life is abundant off the Korean coast. The fishing industry involves more than 1,000,000 persons, with more than 500,000 Koreans engaged in actual fishing operations. Sea food rather than meat provides most of the animal protein in the Korean diet. At the end of World War II marine landings decreased to about 200,000 metric tons a year, about half the average of the war years. This decrease was the result largely of the deterioration of the fishing fleet and the withdrawal of large Japanese-owned boats operated under the supervision of Japanese technicians. The beginning of the Korean War in 1950 wiped out the gains in fishing that had been made gradually since 1945. Marine landings by the 1960s were up to more than 400,000 metric tons in South Korea and 500,000 metric tons reported by North Korea.

Manufacture and Mining.—During most of the Japanese occupation of Korea, the development of manufacturing industries was restricted, since the Japanese looked to Korea as a source of raw materials and a market for Japanese manufactures. Household manufacturing industries, food processing and some textile manufacturing on the factory level represented the major industrial segments of the Korean economy until the 1930s. At that time the Japanese undertook the development of certain industries in Korea, especially heavy industries in northern Korea, in order to complement the Japanese industrial structure. The major industries developed were chemicals, cement, iron and steel, electric power and machinery in northern Korea and textiles and food processing in southern Korea.

With the end of World War II, the industrial capacity of North Korea was damaged by departing Japanese technicians and reduced by some removals of equipment by Soviet forces. South Korea was cut off from the more heavily industrialized northern part of the country. The output of South Korea's light industries was inadequate to meet local requirements. About 60% to 70% of South Korea's electric power was furnished by plants in North Korea until May 1948, when the power supply was cut off by North Korea. The loss of this power was largely restored later by power barges furnished by the United States and by development of South Korean thermal and hydroelectric facilities with expansion called for in the five-year development program adopted in 1961.

The textile industry has been South Korea's most important manufacturing industry, with cotton textiles accounting for about 90% of total textile output. Cotton and woolen yarn, raw silk and woolen, rayon and nylon fabrics also are produced. Other manufactures include shoes, bicycle tires, paper and cement.

The major mineral resources are found in North Korea. Iron ore, copper, lead, zinc, pyrites, tungsten, graphite, coal and magnesite comprise the important deposits. South Korea produces iron ore, coal, tungsten, copper, lead, graphite and kaolin. Though peat and lignite coal have been mined, the principal production both for domestic use and for export is anthracite coal.

In North Korea industrial development and expansion was emphasized by the Communist regime, which claimed substantial increases in coal, iron ore and nonferrous metal mining and in iron and steel and other manufacturing production. Industrial production in 1961 was reported to have reached 71% of the gross industrial and agricultural output.

Commerce.—Most of Korea's foreign trade was with Japan during the period of its occupation by that country. In 1939 exports to the Japanese empire represented 97% of the total, and Korea's imports from that empire represented 89% of the total. Korea's major export commodities were rice, marine products, minerals and lumber. Its imports were chiefly consumers' goods, coal and machinery. In 1939 Korea's imports were 39% larger than its exports, the deficit being met by gold shipments and by Japanese capital investments.

After the end of World War II, North Korea's trade was largely with the U.S.S.R., Communist China and Communist countries of eastern Europe. South Korea depended upon U.S.-financed imports from the U.S. or from other Asian countries, especially Japan. By the 1960s South Korea's chief exports were rice, cotton fabrics, tungsten ore, silk, coal and iron ore; chief imports were foodstuffs, textiles, fertilizer and feed, chemicals, raw materials, machinery and mineral fuels. Major recipients of exports were Asia (Japan, Hong Kong), Europe (U.K.) and the U.S. while major sources of imports were Asia (Japan, Thailand), Europe (West Germany, Italy) and the U.S.

North Korea's foreign trade continued to be chiefly with the U.S.S.R. and Communist China and some trade agreements were made with European Communist-bloc countries.

Transportation and Communications.—During the period of Japanese annexation the Japanese, for military and economic reasons, built an extensive rail network. The main line connected Pusan at the southeast tip of Korea with Sinuiju at the Manchurian border. From Seoul a branch line extended to the northeast coast and another line went to the southwest; thus the rail network was in the shape of an offset X. Numerous branch and connecting lines were later constructed. About 3,500 mi. of railway were built under the Japanese administration, using the standard gauge of 4 ft. 8½ in. The railways were neglected during World War II and efforts were made to rehabilitate them in the postwar period. The Korean War, however, not only stopped the rehabilitation but caused great damage to the existing facilities. In South Korea most of the system was operated during the war by UN forces; it was returned to Korean control in June 1955. About 1,800 mi. are in operation in South Korea.

At the end of World War II, Korea had an average of only 1.17 mi. of highways and roads per square mile, as compared with 4.5 in Japan. The principal highways paralleled and acted as feeders to the main railroad lines and were almost entirely of dirt and gravel. In 1952 the only surfaced highway in South Korea was a 20-mi. asphalt section from Inch'on (Chemulpo) to Seoul, built in 1946, and streets were paved only in Pusan and Seoul. By the 1960s there were about 3,500 mi. of national highway (400 paved) and 13,500 mi. of provincial, city and local highway.

The Japanese encouraged air transportation in Korea through subsidies as early as 1929. All air companies that operated there before 1945 were Japanese firms. After World War II private commercial airlines provided domestic and international passenger and cargo service.

Shipping by water is important in Korean transportation. Contributing factors include the mountainous terrain of the interior, the lack of east-west highways and railways and the growth of important population centres on the coast. Under Japanese control, practically all Korea's shipping requirements were met by Japanese shipping firms. At the end of World War II these Japanese vessels, except for a few old ships, were withdrawn from Korean waters. By the 1960s South Korea had a fleet (including fishing vessels) of more than 10,000. Marked increases in railway, motor vehicle and sea and river transport were reported for North Korea.

The telephone service and post and telegraph offices are government owned and operated in the Republic of Korea. The Republic of Korea took over the international communications services of the Radio Corporation of America in Dec. 1949 and was admitted into the International Tele-communication union on Jan. 11, 1952. Television was introduced in 1956.

Finance.—Despite the industrialization of North Korea, the Korean banking system was much more developed in South Korea, where commerce was centred and where 80% of the total loans and cash holdings in Korea were located. With the end of World War II those branches of the central bank (which had been under the direct control of the Japanese minister of finance) located in South Korea operated as the Bank of Chosen until 1950, when it was reorganized as the Bank of Korea. The North Korean branches became the North Korean Central bank.

Inflation remained the basic element in the financial picture of South Korea after the end of World War II. The Korean War, of course, contributed to the inflationary situation. In spite of strenuous efforts on the part of the government to check inflation, to reduce imports and to increase exports, South Korea continued to be dependent on foreign aid (see *History*, above).

North Korea, also reliant on foreign aid, claimed to have completed the socialization of agriculture, home industry and the capitalistic structure of industry. More than 95% of revenue in the annual budget was attributed to income from the "socialist account" and the abolition of taxes was promised in the seven-year plan announced in 1961 (see *History*, above).

See also references under "Korea" in the Index.

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For current history and statistics *see* the *Britannica Book of the Year.*

(S. NR.; S. MCC.; X.)

KOREAN LANGUAGE. Spoken by approximately 30,000,000 persons, Korean is probably related to Japanese, which has a remarkably similar grammar (*see* JAPANESE LANGUAGE). Both languages are perhaps related to the Altaic group (the Tungus-Manchu, Mongolian and Turkic families) but not to Chinese, from which they have borrowed many words.

There are seven vowels in the speech of Seoul: *i, e, ä* (as in English "pit," "pet," "pat") *ï, ë, a* ("put," "putt," "pa"); *u, o* ("rue," "row"). Standard Korean distinguishes an eighth vowel, *ö* (like German *böse*). Some dialects do not distinguish *ä* from *e* or *ï* from *ë*. In addition to *m, n, ng, h, y* and *w,* there are three sets of consonants: lax *p, t, c(h), k* (sounding like *b, d, j, g* between voiced sounds) and *s;* tense *pp, tt, cc(h), kk, ss;* and breathy *ph, th, ch(h), kh.* At the beginning of a syllable, Korean *l* sounds like a Japanese *r.* Some dialects have a word accent involving pitch and/or length.

The official script, called *hankïl* or *ënmun,* is a simple alphabet that was invented in 1443. The symbols are arranged in syllable-like blocks not unlike the Chinese characters which are still widely used to write words of Chinese origin. Considerations of word structure and grammar complicate the standard spelling, and the system of sound changes requires considerable study.

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(S. E. MN.)

KOREAN LITERATURE has maintained an unbroken tradition for about 2,000 years, and it is distinctly different in both form and content from the literature of China and Japan. This is especially remarkable in view of the close contacts with China and the use of Chinese script until the invention of the Korean alphabet (1443). While Chinese is a monosyllabic tone language, Korean is polysyllabic, abounding in onomatopoeic expressions and graceful turns of phrase. Chinese script, therefore, could not adequately express the Korean sensibility until it was adapted for phonetic purposes. Such a method of transcription was devised and used from the 7th century, chiefly to preserve the texts of native poetry.

Poetry.—Korean literature encompasses as wide a variety of genres as may be found in any other literature, but the Koreans have been happiest in their poetry, which has always been an essential part of their culture. The earliest poetry was composed mainly of sacred hymns originating in religious and agricultural festivals. The oldest extant poem is the "Song of Yellow Birds" by King Nuri (19 B.C.–A.D. 18). It was, however, in the kingdom of Silla that the first vernacular genre of poetry flourished. While the kingdoms of Paekche and Koguryŏ were harassed by continual foreign invasions or internal disturbances, Silla was able to develop its indigenous culture in relative peace in an isolated corner of the peninsula.

Buddhism, which was made the state religion in 527, flourished, and a chivalrous institution, the *hwarang,* played an important role in the development of the first polished verse form, the *Saenaennorae.* The *Saenaennorae* means "poems of the east," namely Korea—its own native songs in contrast to foreign songs—and it covers in particular the 14 poems in the *Remains of the Three Kingdoms* (*c.* 1285) and the 11 devotional poems in the *Life of the Great Master Kyunyŏ* (1075). These Old Korean poems were written in three forms, of which the last, the most perfected, has two stanzas of four lines plus a stanza of two lines. Seventeen of the 25 extant poems, written between the 7th and 10th centuries, are Buddhist in inspiration and theme.

The form of poetry characteristic of the Koryŏ period is the *changga* or long poem, so called because of the refrain recurring at intervals, generally at the end of each stanza. Historical sources record 60 titles of Koryŏ poems, 20 with texts and 40 without. Authors of the *changga* characteristic of this period were all ordinary people. The *kisaeng,* Korean female entertainers comparable to the Greek hetaerae, played an important role in the literary world and left four poems of high literary merit. Love, the eternal theme in world literature, was the main subject. These poems were usually sung to the accompaniment of a musical instrument.

The Yi dynasty, founded in 1392, was a period of inventions and compilations, advancement and enlightenment. The period saw the invention of movable type and, most significant, of a purely phonetic alphabet (1443), which was promulgated in 1446. Great literary works began to be published; literature and the arts flourished. Eulogies praising the foundation of the dynasty appeared, culminating (1445–47) in the great eulogy cycle the *Hymns to Flying Dragons in Heaven,* consisting of 125 cantos. New literary genres also rose, among them the popular *sijo,* which came into being toward the beginning of the 14th century.

The *sijo* is a short polished poem, ending with a graceful, profound and witty turn of thought; yet its soul is not wit but sensibility. The *sijo* was an art for the many, and many *sijo* were composed extempore, to be sung to a lute accompaniment. The norm consists of a stanza of three lines with 14 to 16 syllables in a line, the total number of syllables never more than 45. That is, it is a poem of a three-line stanza, four feet in a line, and three to four syllables in a foot. Thus the basic form is as follows:

1st line	3	4	4	4/3
2nd line	3	4	4	4/3
3rd line	3	5	4	3

The 16th century produced not only a host of scholar-poets but also the greatest woman poet of Korea, Hwang Chin-i (fl. 1506–44), a master technician whose favourite theme was mutability. The master of the *sijo* form in the 17th century was Yun Sŏn-do (1587–1671), perhaps the most versatile and inventive of all Korean poets, 75 of whose poems survive. The introductory poem to his immortal *Songs of Five Friends* (1642) goes:

> How many friends have I? Count them:
> Water and stone, pine and bamboo—
> The rising moon on the east mountain,
> Welcome, it too is my friend.
> What need is there, I say,
> To have more friends than five?

His masterpiece is *The Angler's Calendar* (1651), a cycle of 40 poems covering the four seasons of the year. From the 18th century on, writers from the middle and lower classes emerged, also composing *sijo* extempore, in a tone often hedonistic and rich in realism and humour. The *sijo* remains the favourite classical form of verse in Korea.

The *kasa* or discursive poetry, one of the new genres of the Yi dynasty, first appeared toward the middle of the 15th century. It is regarded as a modified form of the long poem in Koryŏ, but what differentiates it from the *changga* is that it has no stanzaic division, continuing on like a chain, and has a tendency toward description and exposition rather than subjective lyricism. However, it uses accentuation and rhythm, caesura and balanced parallel phrases. Its norm is a group of two four-syllable words (or alternation of four and three or three and four) which forms a single unit and is repeated in parallel form. The *kasa* poem varies in length from one longer than the *changga* of Koryŏ to several thousand lines. The earliest extant *kasa* poem is the "Hymn to the Spring" by Chŏng Kŭg-in (1401–81). Chŏng Ch'ŏl (1536–93; author of the *Pine River Anthology*), Hŏ Nansŏrhŏn (1563–89) and Pak In-no (1561–1643) produced some of the finest examples in this form. From the 18th century on, however, the *kasa* became predominantly a popular form of verse among women and common folk. The new *kasa* poets relied solely on colloquial diction and conversational rhythm for effect and welded written and spoken language into one. The "Song of the Lantern Feast" (*c.* 1725) is a good example of this type.

Novel.—The novel in the modern sense appeared only in the second quarter of the 17th century, although legends, narratives and tales existed from earlier times. The *Life of Hong Kiltong* by Hŏ Kyun (1569–1618) and *The Cloud Dream of the Nine* by Kim Man-jung (1637–92) are two landmarks before the appearance of *Spring Fragrance,* the most popular novel in Korea. Written anonymously in the 18th century, the novel was expanded with new parts added during the course of reprintings. The story is a romance between the son of an upper-class family and the daughter of a socially despised *kisaeng.* The novel contains brilliant characters, who live in every reader's memory, and abounds in human and humorous action.

Drama.—Drama had its origin in the agricultural festivals of the primitive era, during which dances were performed to the rhythmic accompaniment of chorus or drums and other musical instruments. The earliest record of the performance of "a hundred shows" by mimes, acrobats, jugglers, singers and dancers occurs in A.D. 32. The most famous dances in Silla, however, were sword and Ch'ŏyong dances.

The mask and puppet plays are of folk origin and closely associated with the popular religions, shamanism and Buddhism. The most famous mask play is the *Sandae,* which originated toward the end of the 14th century and was developed in the 15th. It was performed on stage by masked actors following a script which presented a story with spoken lines and intermittent dances and songs. The representative puppet play is the *Kkoktukaksi,* consisting of eight acts, each independent of the others. The texts of these plays have little literary merit. In another form of popular entertainment, the *p'ansori,* in the later Yi dynasty, the singers, like the minstrels in medieval Europe, re-created, dramatized and sang known tales and narratives with gestures and the accompaniment of a drum. It flourished in the 18th and 19th centuries, chiefly in the southeast.

Modern Period.—Modern literature represents a total break with the Korean past. As in China and Japan, a specifically mod-

ern type of expression developed much later than it did in the west, and when it appeared it tended to imitate foreign examples. The pioneering period, which followed the introduction of western learning and the translation of European literature, produced two great men of letters, Ch'oe Nam-sŏn (1890–1957) and Yi Kwang-su (1892–). The former founded the *Sonyŏn* or *Children,* the first literary monthly, in which he published first examples of Korean free verse. Yi, on the other hand, produced the first novels of modern consciousness. Three poets stand out: Kim So-wŏl (1903–34), Kim Ki-rim (1909–) and Chŏng Chi-yong (1903–). The first was a poet of nature and folk tradition, whose works are rich in local colour. The second, head of the "Intellectualist" school, first practised Imagist poetry and later, advocating the depersonalization of poetry, wrote satirical verse. The third, the best modern poet, wrote pure poetry, marked by a flawless diction and freshness of imagery.

The political confusion, and war, after 1945 disrupted creative activities. Increasing opportunities, however, are offered to writers by new literary journals, and new names appear every year. The period of experimentation seems to be over, and a literature which faithfully continues the Korean tradition may be seen in the making.

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KOREAN WAR, a conflict precipitated in June 1950 when the Soviet-supported Democratic People's Republic of Korea (North Korea) invaded the Republic of Korea (South Korea). The United Nations denounced the invasion as aggression and, with the United States as principal participant, immediately came to the aid of South Korea. The People's Republic of China joined North Korea in Nov. 1950. After exceptional vicissitudes of combat, the war ended inconclusively in July 1953.

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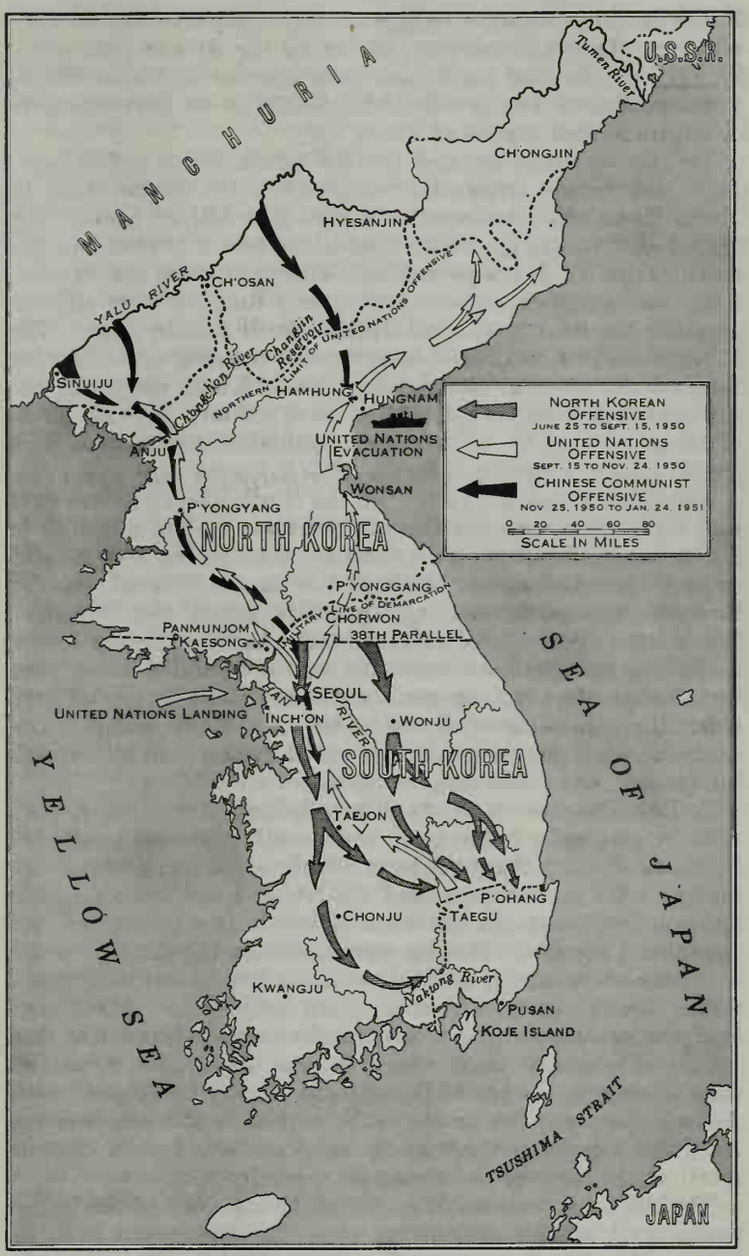
I. BACKGROUND

The causes of the Korean War can be traced to Japanese victories in the Chinese–Japanese War (1894–95) and the Russo–Japanese War (1904–05), and the ensuing Japanese annexation of Korea. By World War II Korea still belonged to Japan and at the Cairo conference on Dec. 1, 1943, Britain, China and the United States announced that in due course after the defeat of Japan, Korea should become free and independent. These same Allies reaffirmed the principles of the Cairo declaration in the Potsdam proclamation, July 26, 1945. The Soviet Union, hitherto neutral



OFFENSIVES AND COUNTEROFFENSIVES OF THE KOREAN WAR

in the war against Japan, formally adhered to both the Cairo declaration and the Potsdam proclamation when it declared war against Japan, Aug. 8, 1945. A week later, in establishing terms and procedures for the Japanese surrender, the Allies agreed that Soviet troops would accept the surrender of Japanese forces in Korea north of the 38th degree of latitude while U.S. troops would accept the surrender south of that line. (*See* WORLD WAR II CONFERENCES, ALLIED.)

1. Divided Korea.—The Soviets respected the surrender line and the Allied occupation of the country took place with a minimum of friction. It soon became apparent, however, that the 38th parallel—intended only as a temporary military demarcation line—was considered by the Soviets to be a political boundary. Contrary to American intentions or expectations, the country was divided into two rigidly separated occupation zones between which all communications were severed. After two years of unsuccessful efforts to reach agreement with the Soviet Union on ways and means of carrying out the promise of the Cairo declaration, the U.S. government referred the Korean problem to the United Nations. A United Nations Temporary Commission on Korea was established in 1947 to supervise free, nationwide elections, and to establish an independent Korean government. Since the U.S.S.R. refused to co-operate and would not allow any UN representatives to enter North Korea, the commission limited its activities to the American zone. Elections were held there in May 1948 and on Aug. 15 the United Nations officially established the Republic of

Korea (R.O.K.), which it recognized as the only true Korean government. The first president, chosen by the Korean general assembly, was the aged patriot and anti-Japanese resistance leader, Syngman Rhee. The new republic established its government at Seoul, traditional capital of Korea.

The Soviet Union declared the UN action illegal and in Sept. 1948 gave formal diplomatic recognition to its puppet state in North Korea: the Democratic People's Republic of Korea, with capital at P'yongyang. In December the Soviet government announced that all its troops had been withdrawn from the country. There was evidence, however, that many Russians were still supervising the training of a substantial North Korean army. The U.S. government, which had been steadily reducing its occupation forces in the newly established Republic of Korea, completed the withdrawal in June 1949, leaving a small military advisory group of about 500 men to assist in the organization and training of a hastily created Republic of Korea (R.O.K.) army.

Throughout 1949 and early 1950 the North Korean government took all possible measures short of overt war to create trouble in South Korea. There were frequent raids across the 38th parallel while Communist agents south of the border fostered disorder through propaganda, sabotage, guerrilla action and terrorism. When these efforts failed to cause the collapse of South Korea, Stalin and the Chinese Communist leader, Mao Tse-Tung (who was visiting Moscow), apparently planned direct action to bring about the unification of Korea under Communist control. Undoubtedly their primary objective was to reduce U.S. influence in the far east, and particularly in Japan.

2. The Theatre of War.—The principal feature of Korea's military geography is the great north-south mountain range that forms a wall down the entire length of the eastern side of the peninsula. This central spine, and the lateral spurs extending west and southwest into the flat country beside the Yellow sea, are rugged and desolate. Flowing westward from the main range are a number of broad rivers which, with the lateral mountain spurs, create serious obstacles to north-south movement. These, however, are less discouraging to communications and movement than the formidable east coast where, in most places, the mountains drop abruptly to the Sea of Japan. The country's only good roads and railroads are concentrated in the west, with only one road and a railroad running part way along the east coast. Lateral communications between the two coasts are generally poor.

The climate is comparable to that of the east coast of the United States north of the Carolinas, but somewhat more severe in its extremes; the winters are particularly bitter in the north and northeast. The monsoon rains last for about three months during the summer, when most of the flat regions are flooded. Few of the roads are surfaced, and during the rainy season most of the remaining dirt tracks are impassable for ordinary motor transport.

There are three principal seaports. Wonsan on the northeast coast has one of the finest harbours in the far east. Pusan on the south coast was the terminus of the main railroad connecting Manchuria with Japan and had been developed into an important commercial port during the Japanese occupation. Inch'on (Chemulpo) on the west coast is smaller and is hampered by 30-ft. tides; its importance lies in its proximity to Seoul, capital of Korea.

3. The Opposing Forces.—After 1945 the U.S.S.R. had built a substantial, well-trained, well-equipped military force in North Korea. Its hard core consisted of approximately 25,000 seasoned veterans who had fought with the Chinese Communists in Manchuria. In June 1950 there were about 130,000 men under arms, organized in ten divisions averaging about 10,000 men each, plus a tank brigade and supporting troops. They were amply equipped with modern Soviet weapons, including artillery and approximately 150 T-34 medium tanks. In addition there were nearly 100,000 trained reserves, organized in reserve divisions, each with a small active cadre. Supporting the army was an air force equipped with approximately 180 Soviet combat planes of World War II vintage. There was, in addition, an insignificant navy consisting of a few coastal craft.

The R.O.K. army in South Korea numbered about 100,000 men, organized into eight divisions ranging in strength from 7,000 to 9,500 men each, plus supporting troops. This army had been in existence only slightly over a year and was in no sense combat-ready. Six of the divisions were supported by one battalion each of light 105-mm. howitzers; the other two had no artillery. There was no medium or heavy artillery; there were no tanks; there were no combat aircraft; there were no reserves. Four of the R.O.K. divisions were deployed along the 38th parallel; the other four were for the most part engaged in suppressing Communist guerrillas in the wild, mountainous interior. There was a small navy consisting of a few patrol-type coast guard vessels.

II. NORTH KOREAN INVASION, 1950

At dawn, June 25, 1950 (far eastern time), Marshal Choe Yong Gun, commanding the North Korean army, unleashed a carefully planned attack across the 38th parallel. The bulk of the invading army drove southward from the vicinity of Yonchon in two columns, converging on Seoul. Smaller forces struck along both coasts. The four defending R.O.K. divisions were thrown back in great confusion by this vigorous surprise attack.

The United Nations Security council met in emergency session on June 25 and passed a resolution noting "with grave concern the armed attack upon the Republic of Korea by forces from North Korea." The resolution called for the immediate cessation of hostilities and the withdrawal of North Korean forces to the 38th parallel, and at the same time requested UN members to assist in execution of the resolution. The Soviet Union, which had been boycotting UN Security council meetings since January, was not represented; thus there was no Soviet veto.

The North Koreans ignored the UN resolution and pressed on with their attack. On June 27 the president of the United States, Harry S. Truman, announced that, in consonance with the resolution, he had ordered U.S. air and sea forces to give the R.O.K. army support and cover. Later that same day the UN Security council went even further, recommending that member nations "furnish such assistance to the Republic of Korea as may be necessary to repel the armed attack and to restore international peace and security in the area."

In response to this resolution several member nations promptly sent small air and naval contingents to assist United States forces. To co-ordinate the international contingents operating in and around Korea, the UN Security council on July 7 passed a resolution providing for unified command and requesting that an American be designated as commander in chief of UN forces. President Truman immediately appointed General of the Army Douglas MacArthur, then commander of U.S. forces in the far east, to this post.

Meanwhile, on June 28, MacArthur had personally visited the fighting front in Korea and had observed the North Koreans capture Seoul. He reported that the R.O.K. army was too demoralized to stop the invaders, even with U.S. air support. On June 30, therefore, President Truman authorized MacArthur to use U.S. ground forces to assist in halting the North Korean aggression. At this time U.S. ground occupation forces in Japan consisted only of four divisions, seriously understrength in men, weapons and equipment. These divisions were composed mainly of young, incompletely trained recruits, with relatively few veterans among the platoon leaders and noncommissioned officers.

1. Arrival of the 24th Division.—On receipt of the president's order, MacArthur immediately directed the 24th infantry division to move to Korea from Japan. Two more divisions were to follow as soon as possible. Maj. Gen. William F. Dean, commanding the 24th division, promptly began a piecemeal movement. Most units prepared to cross the Strait of Shimonoseki on a few hastily assembled vessels while others began to move by air. The first of these to reach the front was Task Force "Smith"—an understrength infantry battalion plus an artillery battery—which joined the R.O.K. army near Osan on July 4. Next morning the Americans were struck by an entire North Korean division, supported by about 30 tanks. The demoralized R.O.K. troops disappeared, but the handful of Americans, completely surrounded, held out for seven hours against continuous attack, until all ammunition was exhausted. Then, abandoning their heavy equipment, the survivors fought their way south.

Meanwhile, General Dean hurried north with the first regiment to arrive from Japan. Covered by the heroic delay of Task Force "Smith," Dean put the regiment in position a few miles south of Osan. The following two weeks—July 6–21—were a nightmare for Dean and his gathering 24th division. The inexperienced officers and men of the division soon responded to Dean's inspired, professional leadership to fight a grim delaying action from P'yongt'aeng-ni to Taejon. The culmination was a bitter, five-day battle at the crucial road and railroad junction of Taejon, in which Dean's skilful direction of the fight was fully as memorable as his heroic personal participation with pistol and bazooka. Finally on July 20, as North Korean columns lapped around his overextended flanks, and as other Communists—often disguised as refugees—began to penetrate his main battle positions, Dean gave the order to withdraw from Taejon. Personally commanding the rear guard, Dean was the last American to leave the town. He was cut off by a North Korean roadblock and captured soon afterward.

In a classic example of a delaying action, Dean had accomplished his mission of gaining time to permit the landing of two more divisions from Japan. Had he failed, the North Koreans would have overrun the entire peninsula, and the Korean War would have ended in mid-July 1950. As it was, the 25th infantry division had been able to disembark at Pusan, while the 1st cavalry division (actually organized to fight as infantry) was landed on the east coast, over the beaches near P'ohang-dong, to avoid further overcrowding of Pusan's limited port facilities. By July 28 the cavalrymen had relieved the battered and exhausted 24th division east of Taejon. Lieut. Gen. Walton H. Walker, commanding the 8th army, organized his forces for the defense and counteroffensive that General MacArthur had ordered.

2. The Naktong River Line.—In the face of this increased American resistance, the North Koreans began to fan out, overrunning the southwestern portion of the peninsula, then turning eastward in a wide envelopment to rush directly for Pusan. General Walker rapidly shifted his forces, throwing what was left of the 24th division back into action By July 27 the threat had been contained, with thin covering forces delaying the North Korean push toward Pusan. The Americans fell back to the Naktong river, where the thinly spread defenders could piece together a more or less continuous line, stretching north from Tsushima strait for about 90 mi., thence east another 60 mi. to the Sea of Japan. The Communists had now overrun all of South Korea save for this small beachhead covering the approaches to Pusan.

Air and naval assistance had been invaluable in helping the 8th army to stabilize the situation, at least temporarily, along the Naktong river line. By early August the Far East Air forces had flown approximately 10,000 combat sorties, seriously hurting the attacking troops, as well as interfering with the arrival of reinforcements and supplies from North Korea. This constant pummeling prevented the Communists from mounting a full-scale coordinated offensive against the Naktong line until late August. On the other hand, the fact that the North Koreans were able to carry out incessant local attacks all along the front clearly demonstrated the limitations of air operations against a determined, resourceful ground army.

The flanks of the 8th army were protected by the U.S. 7th fleet, which included several warships of other UN members. The entire Korean peninsula was sealed by blockade, while coastal areas were harassed by naval gunfire and carrier-based planes. In addition U.S. navy pilots contributed greatly to air force operations in support of ground forces, and in interdiction of Communist supply lines. Above all, navy command of the sea assured the subsequent arrival of reinforcements and the provision of unlimited logistical support from the United States and Japan.

By mid-August the 2nd infantry division, the 1st marine provisional brigade and two infantry regimental combat teams had arrived from the United States, Okinawa and Hawaii to bolster the 8th army. General Walker had been able to reorganize and reequip five R.O.K. divisions, but these had not yet recovered from the shock of the initial disaster and were unreliable in the face of North Korean attacks. Had it not been for the reinforcements, the 8th army would probably have been unable to stop the intensified and more thoroughly co-ordinated Communist attacks that began on Aug. 26. The Communists made a number of penetrations across the Naktong river on the west and rolled the 8th army line back more than 20 miles in the north. By Sept. 10, however, judicious use of mobile reserves, combined with intensified air support, halted the Communist advance.

Bitter fighting continued all along the front, but Communist attacks again became local and unco-ordinated, while the Communists prepared for another full-scale effort. The United Kingdom 27th brigade had arrived during the height of the Communist assault. But at about the same time the marine brigade was withdrawn, and it was with slightly reduced strength that the 8th army prepared to launch a counteroffensive on Sept. 16. This began on schedule, despite a furious North Korean assault on the 15th. That same day the whole picture of the war had been suddenly altered by action elsewhere.

III. INCH'ON LANDING AND ADVANCE TO THE YALU

At dawn, Sept. 15, U.S. marines made an amphibious landing on tiny Wolmi Island, which dominates Inch'on harbour. Later that day additional marine units landed along Inch'on's water front; by the following afternoon they had captured the city and were pressing rapidly inland toward Seoul. These troops were part of the 1st marine division, which included the brigade recently withdrawn from Pusan. The division was part of the newly created X corps, commanded by Maj. Gen. Edward M. Almond. Also included in the corps was the 7th infantry division, the fourth of General MacArthur's occupation divisions, which had been brought up to strength for this operation by the attachment of about 5,000 R.O.K. troops.

The entire world, including the American public, had been shocked by the fact that the North Koreans had appeared to be on the verge of driving U.S. troops into the sea near Pusan. Even greater, however, was the amazement created by the sudden appearance of the X corps at Inch'on. Military critics are unanimous in crediting General MacArthur for this dramatic reversal of the tide of war. On Aug. 12 MacArthur had ordered his staff to prepare for an amphibious landing at Inch'on on Sept. 15, the earliest date that tides would be suitable. Planning and preparation for a major amphibious operation usually take five or six months; MacArthur was allowing only one. But he was determined to restore America's damaged prestige as soon as possible.

The joint chiefs of staff (JCS) in Washington were at first opposed to such a landing. They feared that because of the grave situation in the Pusan perimeter, MacArthur would not be able to hold out enough units to fight elsewhere and might be defeated in both places. They did not think the plans could be ready in time. Finally, they doubted that Inch'on was the right place for a landing, for the beachline there had every possible disadvantage for an amphibious operation.

MacArthur agreed that the tidal variation at Inch'on was approximately 30 ft., permitting use of the beaches for only 6 hours of each 24. He knew that the only approach was through a narrow, tortuous channel, blocked by Wolmi Island, and that the port facilities of Inch'on were inadequate to support a major operation. On the other hand, the North Koreans had committed practically their entire army to the assaults on Pusan. The Inch'on-Seoul area was weakly held, and nowhere else were the North Korean lines of communication so vulnerable or accessible. Furthermore, Seoul, as Korea's capital, was psychologically important. No other, more cautious, plan could achieve such surprise or yield such benefits. MacArthur insisted that there would be no danger to the Pusan perimeter if he could be provided with a marine division as the spearhead for the amphibious assault. The plans, he said, would be ready in time.

Somewhat reluctantly, the JCS approved the operation and rushed the marines to him. The results were exactly as MacArthur had predicted. On Sept. 18 the 7th division came ashore, fanning out quickly to the southward, while the marines continued to drive toward Seoul. On the 26th, the day Seoul fell, an armoured spearhead dashing north from the Pusan perimeter met the 7th division near Osan. The North Korean army, completely shattered, had

ceased to exist as a cohesive force. Many of the demoralized survivors were able to escape northward through the wild, rugged country in the central and eastern portion of the peninsula, but more than 125,000 prisoners fell into Allied hands. In its conception, its execution and its results, the Inch'on landing takes its place beside the great battles of history.

1. The Advance to the Yalu.—Against negligible opposition, UN forces swept northward toward the 38th parallel. Then, in order to make a landing on the east coast of North Korea, on Oct. 7 the X corps was withdrawn from the Seoul area. This resulted in a brief lull in the pursuit, as the 8th army undertook the administrative and logistical measures necessary to permit a continuation of the advance.

Many observers at the time speculated that the delay might be due to indecision as to whether UN forces should cross the 38th parallel into North Korea. In fact on Sept. 27 MacArthur had been ordered by the JCS "to destroy the North Korean armed forces." Authority to advance into North Korea was also personally sent to MacArthur by President Truman on the 29th. In addition on Oct. 6 the UN general assembly approved an advance into North Korea.

R.O.K. units had already crossed the 38th parallel on Oct. 1, and 8th army troops followed on Oct. 9. On Oct. 20, P'yongyang, the North Korean capital, was captured by a combined air-borne landing and overland advance. At the same time the advance of the R.O.K. I corps up the east coast had been so rapid that Wonsan was captured on Oct. 10, eight days before the amphibious armada of the X corps arrived off the port to make its planned assault. After clearing the Communist mines—of the latest Soviet type, laid under Soviet supervision—blocking the harbour, X corps began to land on Oct. 26, immediately moving north to join the continuing R.O.K. advance.

2. The Chinese Communist Mystery.—That same day, on the western side of Korea's mountain spine, another R.O.K. unit reached the Yalu river, and the Manchurian border, at Ch'osan. Then, suddenly, a new element entered the picture. Substantial Chinese Communist forces began to ambush and counterattack the scattered R.O.K. units moving toward the Yalu. And on Nov. 1 a night attack by Chinese troops severely mauled an American regiment at Unsan. General Walker called back his leading units to the vicinity of the Ch'ongch'on river to consolidate, meanwhile attempting to evaluate the new situation.

The Chinese Communists had apparently sent units south of the Yalu immediately after the Inch'on landing, but it seems probable that they would have accepted UN occupation of most of North Korea if a substantial buffer zone had been left south of the Yalu. An approach to that river, however, was apparently considered an unacceptable threat to Manchuria. It is clear that the Soviet Union approved the Chinese decision to intervene and promised to provide supplies and modern equipment.

When MacArthur was authorized to cross the 38th parallel, he was specifically directed that no United Nations aircraft, under any circumstances, were to fly north of the Yalu river. Despite increasingly strident threats of intervention by the Peking government, aerial reconnaissance of southern Manchuria was prohibited. Thus there was no way of keeping tabs on the numbers or locations of Chinese forces or logistical bases north of the Yalu, or on the size and flow of troop or supply movements. The number of Chinese troops actually south of the river at the beginning of November was unknown, save that it was substantial. All movements took place at night, and all concentrations were thoroughly camouflaged by day.

MacArthur did not believe that the Chinese Communists would actively enter the war unless Manchuria was invaded. He thought the threats of intervention were pure bluff and he so informed President Truman at an unusual conference at Wake Island on Oct. 15. MacArthur's opinions were substantiated by the evaluations of the U.S. central intelligence agency (CIA). Yet the presence of large Chinese Communist forces in North Korea was undeniable. The problem facing MacArthur, therefore, was how best to bring the war to a conclusion without having any inkling as to the intentions of the Chinese Communists.

While MacArthur and his staff were studying this enigma, the 8th army was consolidating its position astride the Ch'ongch'on river and improving its logistical situation for possible further advance. On the other side of Korea's rocky spine, General Almond's X corps, including the R.O.K. units on the east coast, was still moving northward toward the Manchurian and Soviet borders. There was some contact with Chinese Communist forces, but these were brushed aside by the marine division and the 7th division. On Nov. 21 the 7th division reached the Yalu river at Hyesanjin.

By this time MacArthur had decided to advance boldly to the border to fulfill his mission of destroying all North Korean forces and to end the war. He realized that this would risk danger to his overextended units if the Chinese Communists should attack suddenly in great strength. On the other hand, he felt that, without long-range air reconnaissance, this was the only way to clarify an obscure situation. If the Chinese should attack, he expected to be able to smash them and their bases with his superior air forces. He had considered establishing a defensive position across the narrow "waist" of Korea, between Sinanju and Hungnam, a distance of about 100 mi., which could have been held easily by the forces at his disposal. He rejected this idea, however, and the JCS approved his decision to advance to the Yalu. Under the circumstances of the time it is doubtful that the American public would have approved a course of apparent timidity in the face of Chinese Communist threats. The 8th army advance began on Nov. 24.

IV. CHINESE COMMUNIST INTERVENTION

The following night—Nov. 25–26—18 Chinese Communist divisions unexpectedly struck UN forces west of the mountains. The main effort of this 180,000-man offensive was directed at the 8th army's right flank, pouring through the gap between that army and the X corps. Most of the UN units were able to hold their positions against the savage blows, but the three right-flank R.O.K. divisions were smashed. The Chinese swept over them, threatening to encircle the entire army. Walker threw in his reserves to hold off the onrushing Chinese and ordered a withdrawal behind the Ch'ongch'on river. Despite heavy pressure all along the line, and amidst some initial confusion, the army pulled back from the trap with light losses, save in the embattled units covering the right flank. As additional Chinese troops continued south through the mountains, seeking another envelopment, the 8th army—now in relatively good order—was forced to fall back farther.

Meanwhile, on Nov. 27, the storm struck the X corps, to the east. Approximately 120,000 Chinese Communist troops drove southward through the mountains, east and west of the Changjin (Chosin) reservoir, driving back elements of the 3rd and 7th divisions, and completely isolating the 1st marine division. It was now apparent to General MacArthur that he had suffered a serious defeat. The advance to the Yalu was forgotten; all efforts were now bent to save UN forces from threatening disaster.

1. Criticism of MacArthur.—MacArthur was criticized for the inadequate security that permitted the surprise Chinese attacks to have their initial, stunning effect. His supporters claimed that, lacking air reconnaissance north of the Yalu, the only way he could determine the intentions or strength of the Chinese Communists was to advance as he did. This seems reasonable, but in the light of the contacts with Chinese units that had been made for the preceding month, it is hard to understand the relative lack of alertness that existed in the front-line units. Walker and MacArthur must share the blame.

MacArthur has also been criticized for maintaining two separate, independent field commands in Korea, each equally subordinate to himself. East-west communications across the central mountain spine, however, were so difficult that the 8th army could not have exercised any more effective control over X corps than was possible from Tokyo. And apparently MacArthur felt it was wiser to keep over-all control of the land operations in his own hands rather than entrust this responsibility to Walker by placing the X corps under the 8th army. The division of command does not seem to have adversely affected UN forces. On the other

hand, the simultaneous advance of these two independent commands on a broad front was unnecessarily bold under the obscure circumstances existing. In retrospect it would seem that one of these should have been held back as a strategic reserve. It appears, however, that MacArthur expected that in the event of Chinese intervention, the prohibition against air operations north of the Yalu would be canceled. He also felt that there would be less chance of Chinese intervention if the war in Korea were brought to the earliest possible conclusion, and so he risked the advance along the entire front.

It is probable that air attacks against their bases and communications in Manchuria would have so crippled the Chinese as to prevent them from operating effectively any great distance south of the Yalu. As it was, a bitter MacArthur was denied permission to make such attacks against the area he called the Manchurian "sanctuary." Catastrophe was prevented, but at the cost of a severe defeat and a humiliating retreat from North Korea. In a remarkable demonstration of skill and determination at all levels of command, the 8th army was extricated from apparent disaster with exceptionally light losses in men and material. By Dec. 15 General Walker had consolidated his army on a line north of Seoul, generally along the 38th parallel.

2. Evacuation of X Corps.—In the X corps zone the situation had at first appeared even more serious. Chinese columns had broken through the left flank of the 7th division, east of Changjin reservoir, and had cut off the 1st marine division to the west. Other columns were advancing through the mountains, around the left flank of the 3rd division, to threaten Wonsan, which was practically undefended. With the X corps split into three or more segments, and in grave danger of piecemeal destruction, MacArthur ordered evacuation of the corps by sea by way of Hungnam and Wonsan.

Most X corps units were able to withdraw easily, under effective air cover. The 1st marine division, however, was completely surrounded. But its commander, Maj. Gen. Oliver Smith, had kept his division well in hand. Repulsing the attacks of eight Communist divisions surrounding his force, Smith consolidated south of the reservoir. Then, spurning the idea of withdrawal or retreat, he faced his division southward toward Hungnam to begin "attacking in another direction." The Chinese, suffering as much as the Americans from sub-zero cold, were unable to halt Smith's steady advance. For a while it looked as though the marines would be forced to abandon all of their heavy equipment, the Chinese having destroyed a bridge across a gorge otherwise impassable for the division's tanks and trucks. At this critical juncture the air force, which had been supplying the division by air drop, delivered bridging equipment by parachute. On Dec. 9 the marines were met by a relief column of the 3rd division. The remainder of the withdrawal was relatively uneventful, and the marines were completely loaded on their waiting transports at Hungnam by Dec. 15. All UN forces in Wonsan had already been evacuated.

The Chinese made repeated efforts to break through the contracting perimeter at Hungnam but were driven off with staggering losses. The combination of air force and navy carrier air support, and of gunfire from navy warships, provided cover for the ground defenders as the 7th and 3rd divisions embarked. When the evacuation was completed, on Dec. 24, a total of 105,000 R.O.K. and U.S. soldiers and marines had been transported by the navy from Wonsan and Hungnam, plus 98,000 civilian refugees. The vessels also loaded 17,500 vehicles and 350,000 tons of other cargo. The air force evacuated 3,600 troops, 200 vehicles and 1,300 tons of cargo. Although the entire evacuation operation was as effective a co-ordination of land, sea and air effort as has ever been undertaken in warfare, it did little to wipe away the grim taste of defeat.

3. Lessons.—The UN command learned—or relearned—a number of tactical lessons from the defeat. First, and perhaps most important, was the fact that western troops—particularly the Americans—had become too dependent upon what might be termed the laboursaving devices of modern warfare. Because of their automotive transportation, and the diversity, volume and accuracy of their firepower, they had neglected the movement aspect of the tactical fundamentals of fire and movement. The road-bound U.S. infantry had come to rely too much upon supporting tanks, artillery or aircraft to overcome an enemy on their front.

The Chinese, on the other hand, recognized the superiority of U.S. firepower and avoided it whenever possible. Mountainous Korea offered excellent opportunities to minimize this UN advantage. The steep, forested slopes provided concealment and protection from artillery and air attack. Lack of roads made it impossible for U.S. tanks to be employed effectively. By moving as much as possible in the rugged regions where Americans were not likely to go, the lightly equipped Chinese found that they could easily get behind the UN positions, frequently without being detected. Night attacks, in particular, seemed to bother the Americans. The principal means used by the Chinese to reduce their firepower inferiority were surprise, movement and concealment—and they were masters of camouflage.

There was nothing new in these lessons, and it is easy to exaggerate the significance of the tactical differences between the United Nations and Communist forces. The principal Communist advantage was numerical superiority—approximately 400,000 ground combat troops against less than 200,000. This superiority combined with willingness to suffer great losses and the advantage derived from surprise seizure of the initiative were the main reasons for early Chinese successes. And it should also be realized that, despite the initial shock, surprise and confusion created by the Chinese attacks, the United Nations forces showed remarkable steadiness and skill in extricating themselves from their exposed positions—and inflicted much heavier losses on the attackers than they suffered themselves. American tactical principles of fire and movement were proven sound and were soon used effectively; they merely required a bit of dusting off when taken down from the shelf.

On Dec. 23, General Walker was killed in an automobile accident. He was replaced by Lieut. Gen. Matthew B. Ridgway. With the 8th army holding the general line of the 38th parallel, and the X corps disembarking at Pusan to form a strategic reserve far in the rear, there was no longer any reason for the separation of the two commands. Consequently the X corps became a part of the 8th army, consolidating the responsibility for all ground action in Korea in the hands of General Ridgway. Over-all command of land, sea and air forces was retained by MacArthur.

V. THE FIRST SIX MONTHS OF 1951

On Dec. 31, 1950, the Communists began the second invasion of South Korea. About 400,000 Chinese fighting men advanced across the 38th parallel, accompanied by approximately 100,000 men of the revitalized North Korean army. To oppose them Ridgway had nearly 200,000 combat troops; approximately 100,000 of this total were supplied by the United States and an equal number by South Korea, with additional small contingents from 13 UN members. As in June, the Communist main effort was north and northeast of Seoul. The 8th army, still dispirited by its recent defeat, fell back in the face of the massive onslaught, nonetheless inflicting severe losses on the attackers. Seoul was evacuated on Jan. 4, and the defenders' problems were greatly increased by hordes of refugees—including some concealed Communists—streaming down their lines of communications. When UN resistance stiffened south of Seoul, the Communists shifted their main effort farther east, near the centre of the peninsula. There they made a major break-through, for a time cutting off part of the 2nd division near Wonju. But Ridgway promptly shifted units from each flank and threw in his reserves to plug the gap. With air force assistance he had stabilized the line by mid-January. The invaders' lengthening lines of communications offered remunerative targets for air attacks. As a result the attackers, pounded from ground and sky, lacked the logistical support necessary to continue the attack.

On the diplomatic level, meanwhile, the People's Republic of China was denying any official participation in the Korean War. Though obviously making a major national war effort, Peking blandly insisted that its troops fighting in Korea were "volun-

teers," and disavowed responsibility for their actions. The UN general assembly was not convinced, however, and on Feb. 1, 1951, voted to brand Communist China an aggressor.

1. United Nations Counteroffensive.—With the Communist offensive halted, the 8th army probed cautiously northward and encountered only light resistance. Ridgway therefore ordered a general advance in a series of carefully prepared, limited-objective attacks, beginning Jan. 25. Progress was slow but steady against increasingly fierce opposition. By Feb. 10, UN troops had advanced 20 to 40 mi. On the central front on Feb. 11 a violent Communist counterattack thrust back the advancing UN troops. Fighting was particularly intense near Chipyong and Wonju. By Feb. 19, however, UN troops had regained the initiative; by the end of the month the 8th army had reached the outskirts of Seoul.

The effects of this UN counteroffensive were far-reaching. In the first place the success had restored the 8th army's confidence in itself and in its combat doctrine. UN troops had improved their foot mobility and had become less concerned by threats to their communications resulting from Chinese encircling tactics. They had discovered that they could hold out easily against all-round attack with the aid of air supply and air support, while the Communists could not provide their troops with sufficient logistic support to maintain the momentum of an attack for more than a few days. Meanwhile, taking relatively few casualties themselves, they were inflicting terrible losses on the Communists. As usual the Chinese had made their first penetration through R.O.K. units, over whom they had maintained a constant moral superiority. But though three R.O.K. divisions had been badly mauled—one completely disintegrating—still another R.O.K. division fought as effectively as the nearby Allied units and played a major part in stopping the attack.

Encouraged by these results, Ridgway soon resumed the advance. Operation "Ripper" began on March 7. The primary objective was to inflict casualties; the secondary aim was to seize ground, particularly to force the Communists out of Seoul and out of the large supply base they had built up at Ch'unch'on. At first, resistance was stubborn, but a successful crossing of the Han river, east of Seoul, forced the Communists to evacuate the city during the night of March 14–15. An effort was made to trap the retreating Communists by dropping a reinforced air-borne regiment at Munsan on March 23, but most of the lightly equipped Chinese and North Koreans got away. By March 31 the UN front line was again along the 38th parallel, almost exactly where it had been three months earlier.

UN intelligence estimated that the Communist withdrawal had been made to permit reorganization and massing of forces north of the parallel, in preparation for another major offensive. MacArthur and Ridgway decided to recross the 38th parallel for the dual purposes of keeping the Communists off balance and to provide more space for a flexible defense against the expected attack. As before, the advance was slow and unspectacular, but considerable punishment was inflicted upon an enemy that became increasingly reluctant to give ground. By April 19, having seized the towns of Yonchon and Hwachon, the 8th army sent strong probes north toward the so-called "iron triangle," marked by the towns of Chorwon, Kumhwa and P'yonggang. This had become a major Communist assembly and supply area, as well as an important link in the communications system connecting Communist forces on each side of the peninsula.

2. Relief of General MacArthur.—Just before this time there had been a dramatic change in the command of the United Nations forces. On April 11, President Truman relieved General MacArthur as UN commander and as the commander of U.S. forces in Japan and the far east. General Ridgway was appointed to take MacArthur's place and Lieut. Gen. James A. Van Fleet was sent from the United States to take command of the 8th army.

General MacArthur had made no secret of his belief that the prohibition against attack on bases in Manchuria had been primarily responsible for the extent of the UN defeat in November and December. He felt that by limiting his freedom of action the government had failed to back up its original decision and was trying to shift to his shoulders the onus for a defeat which was due as much to Washington's miscalculation of Chinese Communist intentions as to his own. Not only did he believe that restrictions should be lifted against attack on bases in the Manchurian "sanctuary" but he also felt that Communist China should be forced to reduce the scale of its effort in Korea. He urged that the Chinese coast be blockaded, Chinese economic centres be bombed, greater assistance be given to Chiang Kai-shek and Chinese Nationalist troops be permitted to join the UN forces in Korea. MacArthur felt also that the prestige and honour of the United States demanded immediate action to redeem the Yalu defeat and to carry out the previously avowed mission of uniting Korea. This meant that reinforcements should be sent to Korea, to permit a major offensive. He believed that the Soviet Union could not afford to risk a war by coming to the aid of China, but that if the U.S.S.R. did make such a mistake, there could be no better time for the United States to face a showdown with Moscow.

President Truman and his advisers undoubtedly were as keenly anxious to repair damaged U.S. prestige as was MacArthur. But they feared that the actions that MacArthur advocated might result in an enlarged and protracted war, and they were more worried about possible Soviet reaction than he was. They feared that the Kremlin might not be able to stand by while China was defeated for fear of repercussions in the entire Communist bloc. Furthermore, America's European allies were strongly opposed to risking the danger of World War III by expanding the war in the far east. The Europeans felt that they would become increasingly vulnerable to Soviet attack if more U.S. military strength were committed in Asia. The U.S. government, therefore, somewhat reluctantly modified its objectives in Korea. The concept of uniting Korea by force was abandoned; the United States would be satisfied if the aggressors were punished and ejected from South Korea.

MacArthur was openly dissatisfied with this obvious, though unannounced, government decision. He had been directed by the JCS not to make policy statements without specific governmental approval. But on March 20 the general reiterated his opinions in a letter to Representative Joseph Martin, which Martin promptly made public. Five days later MacArthur, on the basis of his authority as UN commander, and without consulting Washington, called upon the Chinese Communists in Korea to surrender. He hinted that air and naval attacks against Communist China would be the probable consequence if it continued the war. He offered the Chinese commander an opportunity to meet him for a discussion in the field.

President Truman considered that the letter to Martin and the demand for Chinese surrender were both violations of the order that MacArthur should clear policy statements with the government. The president was convinced that the general was defying the government's decisions and its authority. It would seem that MacArthur did in fact intend to present the government with a clear-cut choice: either it could change what he considered to be a disastrously mistaken policy, or else it could relieve him of his command under circumstances that would permit him to take the issue to the country. It is certain that he did not consider his actions as defiance; he considered them, rather, as a means of bringing about an essential policy showdown. Regardless of the issues involved, and whether or not the general was deliberately insubordinate, as Truman believed, the president as commander in chief was fully justified in relieving a general who thus challenged his authority. Truman has been criticized, however, for the manner in which MacArthur was relieved: the general first learned of his recall through a news broadcast rather than in an official communication from the government. As to the policy issues, these were thoroughly aired, after MacArthur's return to the United States, in a senate investigation in May–June, 1951. The results were inconclusive.

3. Communist Spring Offensives.—On April 22 the Communists launched their expected spring offensive. They endeavoured to drive through to Seoul in the heaviest concentration of troops yet encountered in Korea. Secondary attacks were made in the general direction of Inje, farther east. The well-prepared defenders had little trouble repulsing the attacks along most of

the line, but an R.O.K. division near Hwachon was smashed, and the Communists made a deep penetration before the hole could be plugged. General Van Fleet decided to pull the left flank back a bit to straighten out the line. While this was being done, in the face of heavy Communist pressure, units of the British 29th brigade were exposed by the more hasty withdrawal of a nearby R.O.K. division. A battalion of the Gloucestershire regiment was cut off, and efforts to relieve it failed. After a magnificent defensive stand worthy of the best traditions of the British army, the battalion was overwhelmed and only 40 men were able to fight their way back to UN lines.

Aside from this disaster, the UN withdrawal was orderly and profitable. As the Chinese pressed forward they were mowed down by co-ordinated infantry and artillery fire and were incessantly attacked from the air. By the time the 8th army had withdrawn to previously prepared positions 4 mi. N. of Seoul, they had sustained about 7,000 casualties, while the Communists had lost more than 70,000.

The Communists, as in the past, could not maintain a sustained offensive. For the next two weeks they regrouped in preparation for renewing the attack, while 8th army troops kept them off balance by a series of limited-objective counterattacks. Then on May 15 the second phase of the Communist offensive began. This time the main effort was against R.O.K. forces on the eastern side of the peninsula. The Chinese drove through Inje, the R.O.K. III corps being completely smashed. The Communists now tried to sweep around the right flank of X corps. The 1st marine division and the 2nd army division, on the west flank of the gap, promptly faced to the right and counterattacked, while the 3rd division and the 187th air-borne regiment were rushed up from reserve. These American units joined the left flank of the R.O.K. I corps on May 20, plugging the gap north of Soksa. Meanwhile the I and IX corps had easily repulsed secondary attacks north of Seoul. By May 22 the exhausted Communists had been completely stopped, after suffering about 90,000 casualties in seven days.

4. Resumption of UN Offensive.—Without a pause the 8th army counterattacked on May 23. As before, the primary objective was to inflict as many casualties as possible; the secondary objective was to seize important roads and key communications centres. By the end of the month UN forces had recovered almost all the territory held before the Communist spring offensives. The R.O.K. advance along the east coast, supported by naval gunfire, had been particularly rapid, reaching Kansong, 35 mi. N. of the 38th parallel, by May 30.

The pace was slower in early June. This was partially due to some stiffening of Communist resistance, particularly in front of the "iron triangle." In addition, the onset of the monsoon rains had turned the dirt roads into quagmires, and ammunition shortages were plaguing the 8th army. Most important, however, was the fact that the U.S. government, considering the world-wide "cold war" situation, refused to make any substantial increases in the military resources already in Korea. Ridgway and Van Fleet were ordered to abandon their plans for a major offensive into North Korea. Van Fleet was confident that the badly beaten Communists were on the verge of collapse, but he now had no choice but to limit his objectives.

By June 12 UN troops had captured Chorwon and Kumhwa, on the southern side of the "iron triangle," and there Van Fleet established his line. By holding the bottom third of the triangle, the 8th army effectively denied its use to the Communists. Meanwhile, near the east coast, X corps units had seized the southern edge of a strongly fortified mountain-rimmed depression called the "punch bowl."

The ammunition shortage had continued to be bothersome. U.S. consumption of artillery and mortar ammunition during the first ten months of the war had greatly exceeded World War II rates and were thus far beyond planned production and distribution schedules. A system of rationing was imposed by Van Fleet which, while delaying UN advances in some cases, nonetheless assured adequate stocks to meet Communist attacks. Production and distribution soon caught up, but rationing remained in force on the front.

VI. TRUCE TALKS AND INTERMITTENT WAR, 1951–53

The extent to which the Communists had been hurt by the punishing advances of the 8th army was now clearly revealed. On June 23, 1951, Jacob A. Malik, Soviet United Nations representative, proposed that cease-fire negotiations be undertaken between the participants. As a result, truce talks began on July 10 at Kaesong. From the outset it was obvious that the Communist objectives in the talks were quite different from those of the United Nations. In the first place, the Communists were confident that UN forces would mount no major offensives while the talks were in progress. Thus a badly needed respite was assured the battered Communist troops. Secondly, they hoped by intransigence and procrastination to obtain results they had been unable to achieve on the battlefield. Finally, they used the truce talks as a medium for violent propaganda attacks against the Allies, and particularly against the United States. Since Kaesong was inside their lines, the Communists tried various ways to humiliate the UN negotiators and to make it appear that they were suing for peace.

While this wrangling took place in July and August, the 8th army undertook a number of successful, limited-objective attacks. When the negotiations broke down completely late in August, Van Fleet enlarged the objectives. By the end of October, despite vigorous opposition, the UN line had been straightened out and the "punch bowl" captured—and the Communists had again become interested in negotiations. With the talks resumed—this time at Panmunjom, in a neutral area between the two lines—Ridgway on Nov. 12 ordered Van Fleet to cease offensive operations. From that time on the 8th army was limited to an active defense. In May 1952, Gen. Mark W. Clark became UN commander in place of General Ridgway, who was assigned to command NATO forces in Europe.

During 1952 there were no important developments in the ground warfare. While the negotiators argued intermittently at Panmunjom, both armies limited themselves to constant patrolling and occasional small, violent clashes along the opposing outpost lines. The Communists, however, utilized this relatively quiet period to build up their combat strength in Korea and to improve their tactical and technical procedures. By the end of the year it is estimated that they had more than 800,000 ground combat troops—three-fourths Chinese—in Korea, while the United Nations command—two-thirds R.O.K.—comprised less than 300,000 combat soldiers. The Communists had earlier been greatly inferior to the UN forces in artillery. Now they received large numbers of the latest Soviet artillery weapons, and by constant practice and imitation of UN procedures greatly improved their previously primitive methods. They also brought in numerous excellent antiaircraft guns, which somewhat reduced the effectiveness of UN air attacks against ground installations.

It was, however, due largely to continued UN command of the air that the enlarged and improved Communist army was kept thoroughly neutralized. In Aug. 1951 UN air forces began a major campaign of interdiction, known as Operation "Strangle." This forced the Communists to devote a disproportionate effort to the difficult task of maintaining an adequate flow of food and other supplies to their vast army, and severely limited their daytime movements away from their deep, concealed earthworks and their underground installations in the rear areas. To maintain a degree of operational effectiveness, the Communists were forced to pay a very heavy toll in transport vehicles and equipment destroyed.

1. Air Warfare.—In response to this punishment the Communists made an intensive effort to seize control of the air from the UN. The first MIG-15s—the latest Soviet jet fighters—had appeared over North Korea late in 1950 and were seen in increasing numbers through 1951. The performance characteristics of the MIG-15 were substantially superior to the U.S. F-84, and slightly superior in some respects to the F-86. Nonetheless, the much higher competence of UN pilots—mostly American—enabled them to maintain air superiority without difficulty. UN pilots were never permitted to undertake "hot pursuit" of fleeing MIG

aircraft north of the Yalu, or in any other way to violate the Manchurian "sanctuary." The Communists endeavoured to establish air bases south of the Yalu, but these were kept under constant UN air attack and were never used.

The degree of UN superiority in the air is demonstrated by the loss figures: in air-to-air combat, UN aircraft destroyed 1,108 Communist planes (including 838 MIG-15s), probably destroyed an additional 177 and damaged another 1,027, against a total UN loss of 114 aircraft. By the end of the war U.S. F-86 jets were destroying MIG-15s at the rate of 13 confirmed Communist losses to every F-86 shot down. An additional 1,213 UN aircraft were lost to Communist antiaircraft fire, almost all of these while giving close support to ground troops.

The U.S. navy, too, contributed to the pressures that neutralized the Communist ground forces. The blockade of North Korea was maintained effectively and naval gunfire provided valuable support near the coast, as well as blasting coastal railroads, highways and ports in North Korea. At the same time navy and marine corps air units gave close support to ground units all along the line and contributed to the air force interdiction program.

2. Germ Warfare Charges.—Early in 1952 the Communists charged the UN with using germ warfare. This charge was intended to shift to the UN responsibility for disease epidemics sweeping through the civilian and military populations of North Korea. Accusing the UN of starting this bacteriological campaign in Nov. 1951, the Communists used every conceivable method of getting captured pilots to admit guilt. In May 1952, after four months of intensive physical and psychological torture, two American pilots "confessed." About 78 pilots in all were subjected to such pressure, and a total of 38 succumbed, while 40 steadfastly resisted all forms of threats and torture. The utter falsity of these charges was later proved in the United Nations. When repatriated after the war, all of the pilots repudiated their "confessions."

3. Prisoners of War and Armistice Negotiations.—During the war the Communists captured about 92,000 prisoners of war, of whom about 80,000 were South Koreans, about 10,000 were Americans and approximately 2,500 were from other UN forces. The figures can never be definite because it is not known exactly how many died of mistreatment or starvation, how many missing men were held unreported and never returned, or how many South Koreans were forcibly drafted into the North Korean army. Early in 1951 the Communists boasted that they had more than 65,000 UN prisoners. But when the matter of repatriation of prisoners became a negotiating issue at Panmunjom, they changed their story, admitting only 11,500. Perhaps 50,000 South Koreans were drafted into the North Korean army, and probably more than 20,000 were killed or died in prison. The Communists never responded satisfactorily to UN inquiries on this subject, or any other of the many discrepancies in their figures. Later evidence supplied by returned prisoners revealed that almost two-thirds of U.S. prisoners died or were killed in the prisoner of war camps.

United Nations forces captured 171,000 Communist prisoners, of whom slightly more than 20,000 were Chinese, the remainder North Koreans. It soon became evident that more than half the Korean prisoners, and two-thirds of the Chinese, were violently opposed to the idea of returning to their Communist homelands. Approximately 38,000 proved to have been South Koreans impressed into the North Korean army, and these were released before the war ended. Although the UN command would have preferred to agree to repatriate all of the remainder, to expedite agreement at Panmunjom, humanitarian considerations forbade forcing more than 50,000 unwilling men to return to Communist control. The Communists insisted that those who refused repatriation had been coerced or terrorized.

While negotiations stalled on this point for months, the Communists made strenuous efforts to change the attitudes of the anti-Communist prisoners in UN hands. They planted organizers among prisoners captured at the front, and these soon built up a very effective control organization within the various prisoner compounds in South Korea, particularly on Koje Island, near Pusan. Several violent riots took place on Koje in early 1952. In May the U.S. commander of the Koje camps was actually captured and held prisoner for three days in a pro-Communist compound. By June, however, the UN command had restored order and firm control. After careful screening it was discovered that there had been no significant change in the numbers or attitudes of the anti-Communist prisoners.

During the summer and fall of 1952 the Korean War became a major issue in the U.S. presidential election campaign between Gen. Dwight D. Eisenhower and Gov. Adlai E. Stevenson. Though a majority of the American people undoubtedly wanted a clear-cut victory in Korea, they were also getting very tired of the drawn out struggle and its small but constant casualty lists. Thus Eisenhower's assurance that if elected he would act to end the war as soon as possible may have contributed to the extent of his victory over Stevenson. In December, as he had promised, he visited the front in Korea.

Meanwhile, in October, the Panmunjom negotiations had foundered completely on the prisoner of war issue. But in Feb. 1953, shortly after President Eisenhower's inauguration, General Clark suggested to the Communist command that there be an exchange of sick and wounded prisoners. The Communists agreed, and Operation "Little Switch" took place at Panmunjom in April, about 6,000 Communists being exchanged for approximately 600 UN prisoners, of whom 149 were Americans. Meanwhile, in February, Lieut. Gen. Maxwell D. Taylor replaced General Van Fleet as commander of the 8th army.

4. Syngman Rhee's Objection.—Following this move the armistice negotiations were resumed, and by early June final agreement seemed close. At this point the president of the Republic of Korea, Syngman Rhee, flatly refused to be a party to any agreement that perpetuated the division of his country and that permitted the Communists to try to woo back anti-Communist North Korean prisoners. He demanded that the military offensive be resumed and the Chinese Communists driven from North Korea. He spurned President Eisenhower's request that he accept the truce terms. On June 18 he ordered the release of approximately 27,000 North Korean anti-Communist prisoners held under R.O.K. guard. At Panmunjom the Communists accused the startled UN negotiators of bad faith and again broke off negotiations.

At this juncture both the Communists and the United Nations command brought pressure on Rhee. The Communists launched their largest attacks since the spring of 1951, mainly against R.O.K. units. They made some small gains and inflicted substantial losses on the R.O.K.s, but at the terrible cost of 70,000 Communist casualties. Though the UN promptly counterattacked, General Clark made it clear to Rhee that the continued existence of South Korea was dependent upon the support of the UN, and particularly of the United States, and that both of them were determined to seek an honourable armistice.

VII. ARMISTICE AND REPATRIATION OF PRISONERS

Rhee finally agreed to co-operate, though he refused to sign an armistice. On July 20, 1953, negotiations were resumed at Panmunjom, and on the 27th an armistice was signed and became effective. The battle lines became the *de facto* boundary between North and South Korea. Repatriation of prisoners who wanted to return home followed soon after. The UN command sent back 77,000 while the Communists released 12,700 of whom 3,597 were Americans and 945 Britons. General Dean was returned on Sept. 4.

In the United States, and to a lesser extent in Britain, there was one disturbing note when the prisoners got home from their ordeals in the Communist prison camps. It was soon learned that a substantial proportion—perhaps 15% among Americans—had actively collaborated with the enemy, and that only a few—about 5%—had steadfastly resisted all Communist efforts to indoctrinate them, or to use them for propaganda purposes. The remainder, generally apathetic, had not been collaborators but had apparently given in to some degree to Communist pressures. One reason for this apparently poor showing was the inhuman treatment given to all prisoners by the Communists in order to break their spirits, make them confess falsely to crimes or otherwise

serve Communist propaganda ends. Though realizing that every man has his breaking point, beyond which he cannot withstand physical and psychological torture, and that nearly 60% of the prisoners had died from torture or neglect, Americans and Britons nevertheless feared that their men had been inadequately prepared to meet the ruthless treatment.

While these matters were beginning to weigh on British and American consciences, the final act of the repatriation drama was taking place at Panmunjom. From September to December, in accordance with the armistice terms, nearly 23,000 anti-Communist prisoners were exposed to threats and blandishments of Communist "explainers," under the supervision of a Neutral Nations Repatriation commission composed of representatives of India, Sweden, Switzerland, Poland and Czechoslovakia. Despite the intensive "explanations," only about 700 prisoners—mostly planted Communist agents—agreed to go home. The remainder were later released by the UN command, nearly 15,000 Chinese going to Formosa and almost 8,000 North Koreans remaining in South Korea.

At the same time 359 Communist-held prisoners—including 23 Americans and one Englishman—were given an opportunity to change their decisions not to go home. Despite clear warnings to the Americans that if they decided to return they would be liable to prosecution for collaborating with the enemy, and for possible crimes against fellow prisoners, two finally decided to take the risk and return home. The remaining 357 were steadfast in their refusal of repatriation.

Conclusion.—The Korean War was a major conflict. This fact is clearly demonstrated by the following table of UN casualty figures:

Armed Forces	Killed*	Wounded	Captured*	Totals
United States	33,729	103,284	10,218	140,806
Other UN forces	4,786	11,297	2,769	17,190
South Korean	70,000	150,000	80,000	280,000
Totals	118,515	264,581	92,987	437,996

*Note that prisoners of war who were killed or died while in enemy hands are included under both the killed and captured figures but have been counted only once in the totals. South Korean casualty figures are approximations only.

It is estimated that there were about 1,600,000 Communist battle casualties, of whom nearly 60% were Chinese. In addition, the Communist armies suffered approximately 400,000 nonbattle deaths from disease, bringing total war casualties to about 2,000,000. It is also estimated that approximately 3,000,000 North Korean civilians died from disease or other causes directly attributable to the war. Close to 500,000 South Koreans were killed or died from war causes.

One of the most significant aspects of the war was the participation of so many United Nations members. Britain and Turkey each supplied the equivalent of two regimental combat teams of ground troops; Canada, the Philippines and Thailand contributed one regimental combat team each; New Zealand furnished an artillery regiment; Australia sent two infantry battalions; one infantry battalion each represented Belgium, Colombia, Ethiopia, France, Greece and the Netherlands; Luxembourg sent an infantry company. One or more warships were contributed by Australia, Britain, Canada, Colombia, France, the Netherlands, New Zealand and Thailand. Air units were supplied by Australia, Canada, Greece, Thailand and the Union of South Africa. These were, for the most part, only token forces, but they fought bravely, took heavy casualties and made a substantial contribution to the UN success in defeating aggression. In addition, Denmark, India, Italy, Norway and Sweden supplied noncombat medical units.

The Korean War was a frustrating experience to the entire non-Communist world but particularly to professional American military men. They could not understand why their nation, the most powerful in the world, should accept an unsatisfactory conclusion of a war they were convinced could have been won easily and conclusively and without serious danger of Soviet intervention. Perhaps a majority of the American public agreed, yet they were tired of the war and tired of the debate over how the war should be fought, so they philosophically accepted the decision of their government.

The principal concern of the U.S. government—under President Eisenhower as much as under President Truman—had been to prevent an expansion of the limited Korean conflict into a world-wide nuclear war. The United States was willing to accept a peace that was less than a victory for a number of reasons. As far as Korea was concerned, aggression had been thwarted and had been punished rather severely; the Communists had been driven out of the Republic of Korea, which had actually gained a little territory. In a broader context, the Soviet Union and the People's Republic of China had been taught a lesson about the steadfastness of the United States in supporting its allies against aggression. That lesson had not been wasted on the European allies, who might have wavered if the United States had deliberately risked expanding the war in the far east. If, in retrospect, it appears that the United States may have been overly cautious in dealing with both friends and enemies, and that American prestige in the far east may have suffered in consequence, it must be remembered that this was the first major war of the nuclear age. The U.S. government was acutely aware that it carried an unprecedented and staggering responsibility for the preservation of world civilization.

See FAR EAST: RELATIONS WITH THE WEST; *see* also references under "Korean War" in the Index.

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KORFANTY, WOJCIECH (1873–1939), Polish political leader who played a major part in the national reawakening of the Poles in Upper Silesia, was born at Siemianowice, near Katowice, on April 20, 1873. After failing to complete his university studies in Breslau (Wroclaw), he became a journalist on the *Gornoslazak* newspaper in Katowice in 1901. Already a member of the secret nationalist society known as "Z," he wrote and spoke against the attempt to germanize the Silesian Poles. He thus aroused the opposition of the Prussian administration, landlords, industrialists and the Roman Catholic clergy. Even so, he was elected to the *Reichstag* in 1903, the first Polish member for Upper Silesia. He was re-elected in 1907 and 1918 and was also a member of the Prussian *Landtag* from 1904 to 1918.

Korfanty's greatest hour came when, as head of the Polish commissariat for Upper Silesia, he led the Polish campaign for a plebiscite and obtained a majority in the southeastern industrial part of Upper Silesia on March 20, 1921. Because of British and Italian opposition he ordered an armed rising on May 3, 1921, to seize the area where voting had revealed a Polish majority. The final partition did not satisfy the Polish claim but was much better than the one initially intended by the Allied commission.

In restored Poland, Korfanty was a member of the constituent *sejm* (1919–22) and of the two successive ordinary *sejmy* (1922–30). Jozef Pilsudski, then head of state, refused to appoint him prime minister in the summer of 1922, but Korfanty was deputy prime minister (Oct.–Dec. 1923) under Wincenty Witos. He became leader of the Christian Democratic party and, after Pilsudski's *coup d'état* in May 1926, was one of the bitterest critics of Pilsudski's dictatorial methods. Imprisoned in Sept. 1930, with other democratic leaders, in the Brzesc fortress, he was released after the elections of Nov. 1930, when he was elected to the senate. He lived in Czechoslovakia after 1935 but returned to Poland on April 29, 1939, when he was arrested for his allegedly subversive activities abroad. Released because of his poor health on July 20, he died in Warsaw on Aug. 17, 1939. *See* also POLAND: *History.*

(K. SM.)

KŌRIYAMA, an industrial and communication centre in Fukushima prefecture, Japan, about 140 mi. north and slightly

east of Tokyo. Kōriyama is supplied with coal from the nearby Jō coal field and electric power generated from the rivers of the surrounding mountains and from Lake Inawashiro. The power is used in the expanding textile mills and chemical and machine factories. Pop. (1960) 102,636; (1965) 223,182. (C. A. Mr.)

KORKU, a tribal people of middle India numbering about 200,000 (1960s) and concentrated in the Amravati (*q.v.*) district of Maharashtra state and in the Betul (*q.v.*) district of Madhya Pradesh. Many Korku also live along the Satpura and Mahadeo hills in Indore, Hoshangabad and Chhindwara. Generally plow agriculturists, many have substantial farms in the Satpuras and several have been landlords with extensive acreage. Others shifted as recently as the late 19th century from slash-and-burn jungle cultivation to forestry and field labour. Korku live in villages of thatched houses commonly arranged in parallel. Administration is by hereditary headmen; patrilineal clans bear such names as those of plants and animals. Marriage is prohibited among first cousins as in northern India while exchange marriages are permitted, typical of southern India generally.

Korku identify themselves as Hindus, worshiping sun, moon, Mahadeva (Shiva) and the smallpox goddess Sitala; they also recognize distinctive gods in such forms as hill, tiger and pig. Their ceremonies resemble those of the low castes in that they employ their own priests and mediums instead of Brahmans. The Korku dietary relies mainly on millets; fish and fungi are favoured. They hunt rats and monkeys in some areas, and are said to have eaten beef in the past; these foods now are avoided by even the lowest castes. Nevertheless Korku regard themselves as ranking above the Gond, Bhil (*q.v.*) and untouchable castes. The Korku language, still widely spoken, is the westernmost member of the Munda linguistic family. That family includes the languages of the Korwa, Kharia, Juang, Munda, Ho and Santal tribes on the east, and those of the Saora, Gadaba and Bondo tribes far to the southeast. *See* Munda Languages.

See R. V. Russell and Hira Lal, *The Tribes and Castes of the Central Provinces of India,* vol. 3 (1916). (M. Ma.)

KORNBERG, ARTHUR (1918–), U.S. physician and biochemist, co-winner with Severo Ochoa of the 1959 Nobel prize for medicine, was born in Brooklyn, N.Y., on March 3, 1918. He received a B.S. degree from the City College of New York in 1937 and an M.D. degree from the University of Rochester in 1941, and then interned at the Strong Memorial hospital in Rochester. He worked in biochemistry at the National Institutes of Health, Md., from 1942 to 1953, heading the enzyme and metabolic section from 1947 to 1953. In 1953 he became professor and head of the department of microbiology at Washington university, St. Louis, leaving in 1959 to become chairman of the department of biochemistry of the school of medicine, Stanford university, Calif.

Kornberg's scientific work was concerned with the elucidation of the biosynthesis of the nucleotides and of the coenzymes built up from these compounds. In 1956 he and his co-workers discovered the pathway for the biosynthesis of deoxyribonucleic acid (DNA), and for this work Kornberg was given a share of the 1959 Nobel award. The DNA polymers, composed of a varying number of nucleotides, are presumed to be the central constituents of the chromosomes, which carry and transmit the genetic information necessary for the orderly synthesis of specific cell constituents. Kornberg's work clarified the manner by which specific DNA chains are built up in the cell. This discovery is of basic importance to genetics, to the study of viruses, to cell and tissue differentiation and to the understanding of the synthesis of specific proteins. (R. Le.)

KORNILOV, LAVR GEORGIEVICH (1870–1918), Russian army officer, remembered for his part in the civil strife of 1917–18, was born on July 30 (new style; 18, old style), 1870, at Ust-Kamenogorsk in Siberia, the son of a Cossack officer. He was an intelligence officer during the Russo-Japanese War and attaché in Peking from 1907 to 1911. In World War I he commanded a division, was captured by the Austrians at Przemysl in March 1915, escaped in 1916 and received the command of an army corps. After the democratic revolution of March 1917, he was given charge of the vital military district of Petrograd, but his stern conception of discipline was little suited to a revolutionary epoch, and he soon resigned. Returning to the front he distinguished himself in the abortive July offensive in Galicia.

On Aug. 1 (N.S.) Kornilov was appointed commander in chief by the new socialist prime minister, A. F. Kerenski (*q.v.*). The two men differed radically in background, temperament and outlook and regarded each other with unconcealed suspicion. In Kornilov's view the dissolution of the army was largely the fault of the provisional government, which he considered excessively dependent on the Petrograd soviet. He desired to establish "firm authority"—a vague formula by which he understood a personal dictatorship by himself, but with Kerenski remaining in the government. Kornilov took a lamentably naïve view of political problems and placed undue trust in advisers of doubtful capability and integrity. When Kerenski refused to sanction the drastic disciplinary measures advocated by army leaders, Kornilov, succumbing to his advisers' influence, sought to coerce the government by sending troops to Petrograd to suppress the soviet. Kerenski mistakenly concluded that Kornilov intended to overthrow the government by force and peremptorily dismissed him from his post (Sept. 9, N.S.). Kornilov refused to obey and issued a counterdeclaration protesting his innocence and denouncing Kerenski as a puppet of the soviet. Kornilov's troops were speedily halted and disarmed. The government turned for aid to the soviet, whose power now increased appreciably.

The Kornilov affair discredited the provisional government and facilitated its overthrow by the Bolsheviks. When this occurred Kornilov escaped from detention at Bykhov to the Don, where with generals M. V. Alekseev (*q.v.*) and A. M. Kaledin he organized the anti-Bolshevik volunteer army. On April 13 (N.S.), 1918, he was killed by a chance shell outside Ekaterinodar (Krasnodar). (J. L. H. K.)

KOROLENKO, VLADIMIR GALAKTIONOVICH (1853–1921), Russian novelist, best known for his short stories, was born in Zhitomir, Ukraine, on July 27, 1853. His father, a Cossack, occupied the post of district judge. Educated in the secondary schools of Zhitomir and Rovno, Korolenko entered the Petersburg technological college in 1871 and the Moscow College of Agriculture and Forestry in 1874. In March 1876, he was expelled for taking part in the revolutionary activities of the students of the Moscow colleges and he suffered the same fate when a student of the Petersburg Mining college. In 1879 he was arrested and sent to Siberia where he spent five years in exile. His first stories were published in 1879 and, on his return from Siberia, in 1884. His story *Son Makara* (Eng. trans., *Makar's Dream,* 1891), written in Siberia, but only published in 1885, made him famous throughout Russia. His other famous stories, written after he had settled in Nizhni Novgorod, include *Slepoi Muzykant* (1886; Eng. trans., *The Blind Musician,* 1886–98), *V durnom obshchestve* (1885; Eng. trans., *In Bad Company,* 1916), *Les shumit* (1886; Eng. trans., *The Murmuring Forest,* 1916), *Za ikonoi* ("At the Icon"), *Reka igraet* (1892; "The River Sparkles"), *Bez Yazyka* (1895; "Without a Language"), written after his visit to the Chicago exhibition in 1893 and describing the distressing adventures of a Ukrainian peasant in the U.S., *Mgnovenie* (1900; "A Moment") and his autobiographical *Istoria moego sovremennika* (1905–21; "The History of My Contemporary"). Korolenko died on Dec. 25, 1921, in Poltava. (D. Mk.)

KORTRIJK: *see* Courtrai.

KORYAK are a Mongoloid people from the northeastern part of Siberia, living entirely in the U.S.S.R. and numbering about 6,300 in the 1960s. This is a 15% decrease compared with their population of 7,434 in 1927. With the neighbouring Chukchi and Kamchadal (*qq.v.*) peoples they form the Chukchian language family, perhaps related to the Eskimo-Aleut. (*See* Paleo-Asiatic Languages.) Their settlements are scattered in harsh Arctic tundra and taiga in the northern part of the Kamchatka and the southern Chukchi peninsulas on both the Pacific and Okhotsk coasts as well as inland. First European contacts date from the 17th century. The coastal dwellers fish and hunt sea mammals, primarily seal. Inland Koryak breed reindeer for transport, meat and milk; reindeer pelts provide clothing and cover for wood-frame tents.

The coastal Koryak dwelling is either of earth or wood, the earthen type being below ground or semisubterranean, an archaic Arctic style. Transport on water is by kayak; herdsmen also harness dog teams or reindeer in pairs to sledges.

Koryak society has no ranks or classes; nor do they have their own centralized authority. Traditionally they lived either in small, fixed fishing villages or in nomadic tent-dwelling bands as reindeer herdsmen and were divided into as many as nine distinct subgroups. The small nuclear family and the village were the foci of social life. The family remains the chief economic unit and descent is reckoned in the male line. Small numbers of both coastal and reindeer-breeding families joined in cooperative ownership of herds in nomadic camps or hunted seal together.

Koryak practise shamanism (*q.v.*); in addition, they have animistic beliefs, holding that the present world and the next are populated with spirits. Despite the construction of Soviet schools and efforts to settle them in collective farms the Koryak have tended to retain their traditional culture. *See* also KAMCHATKA.

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KORYAK NATIONAL OKRUG, established in 1930, forms the northern part of Kamchatka *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R. Its area of 116,409 sq.mi. covers the northern half of the Kamchatka peninsula and, on the mainland, the southern end of the Koryak range (Koryakski Khrebet) and the Penzhina basin. The relief is rugged and the climate severe, with summer averages not over 12° C (53° F) and January averages about −18° C (0° F). Vegetation consists of tundra or thin forest of stone birch, with some larch in the Penzhina basin. The population numbers 27,525 (1959), only 0.2 persons per square mile. The Koryaks are a Paleo-Asiatic group, related to the Eskimos, and are declining in number, from 7,018 within the *okrug* in 1926 to 5,100 in 1959. There are also small numbers of the related Itelmeny and Chukchi and some Eveny. The chief occupation is fishing, especially for crab, from the small settlements round the coasts, while inland fur hunting and reindeer herding are important. Near Korf a little open-cast coal is mined and in the Penzhina basin small quantities of timber are felled. There are no towns, the administrative centre being the village of Palana (pop. 1,000) on the west coast. The three urban districts of Ilpyrski, Korf and Ossora on the east coast total 6,000 inhabitants. (R. A. F.)

KORZYBSKI, ALFRED HABDANK SKARBEK (1879–1950), Polish-U.S. scientist and philosopher, the founder of general semantics, was born July 3, 1879, in Warsaw, and educated as an engineer. During World War I he served in the intelligence department of the Russian army general staff and was wounded in battle. In 1915 he went on a military mission to Canada and the United States. With the collapse of the tsarist regime in 1917, he remained in the United States to serve as secretary of the French-Polish military mission. Later he became a U.S. citizen.

Korzybski held that man was unique among living creatures in possessing the ability to transmit ideas and information from generation to generation. This he called man's "time-binding capacity." He called for a new ethics based on the recognition of time-binding as a central value, on which all uniquely human achievements are based. In the sciences, in which progress is steady and cumulative, Korzybski felt that human time-binding capacities were to be seen "at their best."

His best-known book, *Science and Sanity: an Introduction to Non-Aristotelian Systems and General Semantics* (1933), in which he presented a critique of traditional assumptions about language and a comparative study of sane and unsane ways of using and reacting to language. These he embodied in a system of linguistic retraining which he called general semantics (*see* SEMANTICS, GENERAL). Training in general semantics, he stated, would release men's time-binding capacities—their intellectual potential—now often crippled by pathological linguistic habits. Korzybski taught his system in Chicago (1938–46) and at Lakeville, Conn. He died at Sharon, Conn., on March 1, 1950. (S. I. H.)

KOS: *see* Cos.

KOSALA, a large kingdom of ancient India roughly corresponding to the historic region of Oudh (*q.v.*), extending across both banks of the Sarayu river (modern Ghaghra) and north into the present Nepal. It was ruled, according to the *Ramayana,* by kings descended through Ikshvaku from the sun, notably by Rama, whose capital was Ayodhya near modern Faizabad. It rose in political importance early in the 6th century B.C. to be one of the 16 nations dominant in northern India. It annexed the powerful kingdom of Kasi (capital Varanasi); and during the lifetime of Gautama Buddha (*c.* 563–483 B.C.), under King Prasenajit (Pasenadi), it was regarded as one, perhaps the dominant, of the four powers of the north: Kosala, Magadha, Vatsa and Avanti. At that time Kosala could command the trade routes of the Ganges basin. The Buddha, who was born in the Sakya (Sakiya) tribe of northern Kosala, often preached at the capital Sravasti (Savatthi), where he passed the rainy season during the last 25 years of his life. There had been a matrimonial alliance between Kosala and Magadha, but about 490 B.C. war broke out between them, as a result of which it appears Kosala was weakened and never regained its position of control. By the time of the rise of the Mauryan dynasty (*c.* 321 B.C.), Magadha had finally subjugated Kosala. In later times this Kosala was usually known as Northern Kosala, as distinct from Kosala, Southern Kosala or Great Kosala, a large kingdom on the upper Mahanadi river, founded, according to the *Ramayana,* by Rama's son Kusa, which flourished until the 12th century A.D. (*see* INDIA-PAKISTAN, SUBCONTINENT OF: *History*). (R. TH.)

KOSCIUSKO, MOUNT: *see* AUSTRALIAN ALPS.

KOSCIUSZKO, TADEUSZ ANDRZEJ BONAWENTURA (1746–1817), Polish army officer and statesman, famous both for his role in the American Revolution and for his leadership of the Polish national insurrection of 1794, was born on Feb. 4, 1746, at Mereczowszczyzna in Belorussia, of a small landowner's family. On entering the corps of cadets in Warsaw he attracted the notice of King Stanislaw II Poniatowski, and in 1769 he was sent abroad at the expense of the state to complete his education. In France he studied the art of fortification and painting. Returning to Poland in 1774, he was engaged to teach drawing and mathematics to the daughters of the hetman Jozef Sosnowski, but fell in love with the youngest of them, Ludwika, and planned to elope with her. This led to his being wounded by the hetman's retainers and dismissed.

In the summer of 1776 Kosciuszko entered the American continental army as a volunteer and brilliantly distinguished himself in the Revolutionary War. For fortifying Philadelphia he obtained the rank of colonel of engineers (1776); and his services at Ticonderoga in 1777 contributed to the defeat of Gen. John Burgoyne at Saratoga. In 1778–79 he planned and built the fortress of West

BY COURTESY OF THE ALLEN ART MUSEUM, OBERLIN, OHIO

KOSCIUSZKO, PORTRAIT PAINTED BY BENJAMIN WEST IN 1797, DURING THE GENERAL'S BRIEF STAY IN LONDON

Point; in 1780 he was chief engineer of the Southern army; and in 1781–82 he took part in the sieges of Ninety-Six and of Charleston. In 1783 Kosciuszko was rewarded with the thanks of congress, the privilege of U.S. citizenship, a considerable annual pension, lands and the rank of brigadier general.

Returning to Poland toward the end of 1784, Kosciuszko lived in the country. He was commissioned a major general in 1789 when the Polish army was being rebuilt. In the war following the proclamation of the constitution of May 3, 1791 (*see* POLAND: *History*), he took a leading part, distinguishing himself as divisional commander at Dubienka (July 18, 1792). The French Constituent Assembly then conferred honorary citizenship on him. When King Stanislaw acceded to the pro-Russian confederation of Targowica, Kosciuszko with many other officers resigned his commission and retired to Leipzig in Saxony. It was foreseen that he would be commander in chief of the Polish army, and he visited Paris in Jan. 1793 to attempt to win revolutionary France for the cause of Poland. He proclaimed his intention of effecting radical reforms, both social and constitutional, but received only evasive replies from Girondins and Jacobins alike.

On his return to Leipzig, Kosciuszko was invited by the Polish insurgents to take command of the national armies, with dictatorial power. He hesitated at first, but when he heard that the insurrection had already begun and that the Russian armies were concentrating to crush it, he hastened to Cracow. On March 24, 1794, his arms were consecrated according to an ancient custom at the church of the Capuchins, thus giving the insurrection a religious sanction. The same day, amid a vast concourse of people in the market place, Kosciuszko took an oath of fidelity to the Polish nation and swore to wage war against the enemies of his country, declaring at the same time that he would fight only for the independence and territorial integrity of Poland. He remained in Cracow until April 1, organizing his forces: as rifles were in short supply, he recruited peasants armed with pikes and scythes. He hoped that lack of equipment and training would be compensated by strength of numbers.

On April 4, 1794, Kosciuszko defeated a Russian force at Raclawice; but at the battle of Szczekociny (June 6) a Prussian army appeared unexpectedly, and the Poles were unsuccessful. On June 8 another Polish division was beaten at Chelm by new Russian troops. On June 15 the Prussians occupied Cracow, and Kosciuszko retreated toward Warsaw. Meanwhile the mob of the capital broke open the jails and murdered the political prisoners. Kosciuszko subdued the capital and punished those responsible for the massacre. At this very time, however, he had to use all his ability and resource to meet the external enemies of Poland. Superior Russian and Prussian forces of 40,000 men invested Warsaw on July 13. Kosciuszko, now reconciled with the radicals, conducted the defense of the city with brilliance and success, though he had only 20,000 soldiers and 18,000 armed civilians at his disposal. The besiegers withdrew from Warsaw on Sept. 6, but elsewhere Kosciuszko's generals were defeated one by one by Gen. Aleksandr V. Suvorov. On Oct. 10 Kosciuszko attacked the Russians at Maciejowice, but the support on which he had relied failed to arrive: the Polish army of 7,000 was almost annihilated by the 14,000 Russians, and Kosciuszko, seriously wounded and unconscious, was taken prisoner on the field of battle.

Kosciuszko was conveyed to St. Petersburg where, on Dec. 10, 1794, he was imprisoned in the Peter-and-Paul fortress. Released on Nov. 26, 1796, after the emperor Paul I's accession, he went via Finland and Sweden to England, reaching London on May 30, 1797. He was received there with respect, but left two weeks later for the United States. He collected his accumulated pension ($18,940) and asked Thomas Jefferson to sell his land. He bought Negroes with the money thus obtained and set them free.

In July 1798 Kosciuszko arrived in Paris. Distrusting Napoleon, he soon retired to the country house of his friend Pierre Zeltner, the Swiss envoy, at Berville, near Versailles. In 1806 Napoleon tried to gain his collaboration, but was refused. After the first downfall of Napoleon, the Russian emperor Alexander I visited Kosciuszko at Berville in April 1814; but at the congress of Vienna Kosciuszko's importunities on behalf of Poland wearied Alexander, who preferred the advice of Prince Adam Czartoryski. Kosciuszko then retired to Solothurn in Switzerland, where he lived with François Zeltner, Pierre's brother. On April 2, 1817, he emancipated the peasants on his estates in Poland.

Kosciuszko died at Solothurn on Oct. 15, 1817. His remains were carried to Cracow and buried in the cathedral, while the people, reviving an ancient custom, raised a huge mound to his memory near the city.

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KOSEM SULTAN (1589?–1651), Ottoman sultana, said to be of Greek origin, exercised a strong influence on Turkish politics for half a century, first as the wife of Ahmed I, then as mother of Murad IV and Ibrahim I and grandmother of Mohammed IV. She allowed the janizaries to commit abuses and crimes and even to dethrone her son Ibrahim. In 1651 she attempted to kill Mohammed IV, but was strangled by men in the entourage of her daughter-in-law, Turhan Sultan. Kosem was ambitious, unscrupulous and beautiful when young. *See* also TURKEY: *History*. (E. Z. K.)

KOSHER, in Jewish religious practice, means "fit" or "proper" and is derived from Esth. 8:5, the only biblical instance of the adjective kosher (Ashkenazic form, with accent shifted colloquially, common in northern Europe) or kasher (Sephardic form, common in southern Europe and the East). Kosher is chiefly used in connection with the dietary laws and implies: (1) that the food is not derived from the animals, birds, or fish prohibited in Lev. 11 or Deut. 14; (2) that the animals or birds have been slaughtered by ritual method of *shehita* (*see* below); (3) that the meat has been salted to remove the blood (Deut. 12:16, 23–25 and elsewhere) after the carcass has been critically examined for physical blemishes and that the ischiatic nerve has been removed (porged) from hindquarters (Gen. 32:32); and (4) that meat and milk have not been cooked together (Ex. 23:19) and that separate utensils have been employed. In consequence of (2) the term *terefa* (that which has been torn by beasts, Gen. 31:39) is extended to all food violating the law, even, incorrectly, to admixtures of leaven on Passover, though *Kosher la-Pesach,* "fit for Passover," is fairly correct. So-called kosher wine is prepared under observation, to prevent libations to idols and, by talmudic extension, to avoid handling by non-Jews. This last regulation is presently observed only by the ultra-Orthodox; a relic of Roman days, it once was common to both Judaism and early Christianity. "Kosher" is often used generally of other matters, sometimes as opposed to pasul ("unfit"); *e.g.,* of a scroll of the Law.

The special method of slaughtering animals, called *shehita,* consists of an incision made across the neck of the animal or fowl by a qualified person especially trained for ritual slaughter, with a special knife that is razor sharp and has a smooth edge with absolutely no nicks. The cutting must be made by moving the knife in a single swift and uninterrupted sweep, and not by pressure or by stabbing. The cut severs the main arteries, rendering the animal unconscious and permitting the blood to drain from the body. The slaughterer (shohet) recites a prayer before the act of *shehita.*

Objection has sometimes been raised to this method of slaughter on grounds of cruelty. The sight of the struggling animal aroused the concern of humane societies, and in some European countries this resulted in legislation forbidding *shehita.* Scientific opinion indicates, however, that severance of the carotid arteries and the jugular vein by one swift movement results in almost immediate loss of consciousness, and the afterstruggle is reflex muscular action.

In Orthodox Judaism, the dietary laws are considered implications of the divine command to "be holy" (Lev. 19:2), but in Reform Judaism their observance has been declared to be unnecessary to the life of piety.

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KOSI, a river of Nepal and northern India. With its seven tributaries it drains the eastern third of Nepal including the country around Mt. Everest. Some of the headstreams rise beyond the Nepalese border in Tibet. About 30 mi. N. of the Indian-Nepalese frontier the united stream passes through the Chatra gorge where the valley is only 3 to 5 mi. wide. Below this gorge and where it emerges on the great plain of northern India on its way to join the Ganges, the Kosi has long been notorious for its sudden and devastating floods, with rises of 30 ft. and more in 24 hours. Floodwaters from about 24,000 sq.mi. of its mountain basin tear through the fertile plain, following such an irregular course that the river has no permanent channel. After independence in 1947 the Indian government reached agreement with Nepal to build a main dam at the Chatra gorge to control the flooding and provide power and irrigation water for that part of Bihar state lying north of the Ganges. (L. D. S.)

KOSICE (Hung. KASSA; Ger. KASCHAU), the most important town of eastern Slovakia and chief city of Vychodoslovensky *kraj* (region), Czechoslovakia, lies in the valley of the Hornad 306 km. (190 mi.) E.N.E. of Bratislava. Pop. (1960) 87,526. The neighbourhood is known as the Kosice basin, a north-south tectonic depression between the crystalline and limestone highlands of the west and the volcanic hill country to the east. Penetration northward from Kosice to the Carpathians is easy, and there is evidence of it in medieval road and modern rail routes northward to the town of Presov and the Carpathian pass known as the Poloniae Porta. Kosice in the late middle ages was one of the 24 Spis (Zips) towns of the Polish-Slovak frontier of which Levoca (Leutschau) was the capital and in which immigrant German merchants were conspicuous. Their commercial law was known as the Magdeburger Recht. The long narrow medieval square of Hlavna ulica is still the centre of the town. In it stand the beautiful cathedral of St. Elizabeth, the easternmost of the great Gothic churches of Europe; St. Michael's chapel and the Franciscan church of the German period; and Levoca house, the warehouse of the Spis merchants. In the mid-17th century Benedict Kischdy, the bishop of Eger, founded a university in which the law library became noted. The solid 17th-century fortifications against the Turks later hampered the commercial growth of the town.

The sheltered Kosice basin favours farming and the town is an established market for many agricultural products, especially fruit, wine, tobacco, grain and sugar beets. Kosice also attracted textile and furniture industries. In the late 19th century the railway was built mainly to link the Slovak iron field with Silesia by the upper Vah valley and the Jablunkov pass; its southern terminus at Kosice supported a limited growth of heavy industry there.

Close to Kosice are the spas of Bankov Kupele, 5 km. (3 mi.) W., and Herl'any, 19 km. (12 mi.) N.E. The buildings of the medieval Premonstratensian monastery of Jasov are 32 km. (20 mi.) W.; the huge stalactite caverns nearby were used sporadically for refuge.

In 1945 Kosice was the first seat of the Czechoslovak government after the German withdrawal and much vigorous industry has since developed there, including the East Slovak ironworks and cement, printing and food-processing factories. The city has a modern airport and a north-south arterial road runs through it. The Safarik university, named after the mid-19th-century Slovak scholar, maintains the old academic character of the town, and a technical college is linked to the growth of heavy industry. (H. G. S.)

KÖSLIN: *see* KOSZALIN.

KOSOVO-METOHIJA (KOSMET), an autonomous region of Serbia, Yugos. Area 10,887 sq.km. (4,203 sq.mi.); pop. (1961) 963,988, of whom the majority are Albanian-speaking Shqipetars. Kosovo is a plain 97 km. (60 mi.) long, surrounded by mountains, rich in lead and silver. The Romans worked silver mines there. In the middle ages the Serbian kings developed the mines and the town of Novo Brdo flourished, with 40,000 inhabitants in the 15th century and an important trade. Kosovo is potentially a central region for Balkan communication. The main town is Pristina (*q.v.;* pop. [1961] 38,593). Nearby are the Serbian monastery of Gracanica, with frescoes from the early 14th century, and the battleground of Kosovo Polje, where the Turks in 1389 defeated the Serbian army of Tsar Lazar and in 1448 the Hungarian force of Hunyadi. Metohija is west of Kosovo; its main town is Pec (*q.v.;* 28,351). The best-known monasteries are St. Patrijarsija, the residence of the Serbian patriarchs from 1346, and Decani with frescoes from the 13th century. Kosovo and Metohija are among the most fertile parts of the Balkans. The main occupations of the people are agriculture and mining. (V. DE.)

KOSSEL, ALBRECHT (1853–1927), German biochemist and Nobel prize winner for physiology and medicine (1910), was born on Sept. 16, 1853, at Rostock. He was educated at the *Gymnasium* of his native city and at the University of Strasbourg, where he was a pupil of Felix Hoppe-Seyler, one of the pioneers of modern biochemistry. After graduating M.D. in 1878 he worked first under Hoppe-Seyler and then under E. Du Bois Reymond at the Physiological Institute in Berlin. In 1895 he became professor of physiology and director of the Physiological Institute at Marburg and he held this post until 1901, when he accepted a call to the corresponding chair at Heidelberg. At the time of his death on July 5, 1927, he was emeritus professor of physiology at the University of Heidelberg and director of the Heidelberg Institute for Protein Investigation. Kossel was one of the first to apply the exact methods of organic chemistry to the elucidation of problems in the chemistry of living tissues. His researches were mainly on the nucleic acids, substances which are concerned in the formation of proteins in the body. In 1910 he was awarded the Nobel prize "in recognition of the contributions to the chemistry of the cell made through his work on proteins, including the nucleic substances." (W. J. BP.)

KOSSUTH, LAJOS (1802–1894), Hungarian patriot, the foremost leader of the revolution of 1848–49, was born at Monok in Zemplén County on Sept. 19, 1802. His father's family, although titularly "noble," was poor, and his father earned a living as agent for a local magnate, Count Vecsey; his mother was of mixed German and Slovak origin. The Kossuths were Lutherans. Young Kossuth studied at the famous Protestant school of Sárospatak. Having qualified as an advocate but failed to obtain a post in the civil service, he returned to his native county and found employment as agent for the widow of a local landed magnate. His life during this period was wild and irregular. He attended the diets of 1825–27 and 1832–36 as representative *in absentia* of certain magnates or their widows, a position which allowed him to sit in the lower house, but not to speak. In the excited atmosphere of the "long diet" Kossuth developed his social and political philosophy, which was one of extreme nationalism combined with advanced radicalism. There was no liberal innovation of the age which he did not wish to see implanted in Hungary, and he favoured all the specific reforms such as taxation of the nobles and the complete emancipation of the peasants, then being advocated for Hungary's particular ills. He also took the popular view, combated by Count István Széchényi, that the root of his country's ills lay in its subordination to "Vienna" and that no thorough social or economic reform was possible until political emancipation had been achieved. Sanguine and hot-headed, he was completely blind to the danger involved by too strong a challenge to Vienna, and he treated objections from the Croats or the non-Magyars of Hungary as either negligible or treasonable.

BY COURTESY OF THE CHICAGO HISTORICAL SOCIETY

KOSSUTH, DAGUERREOTYPE MADE BY EDWARD ANTHONY, *c.* 1851–52

The proceedings of the diet were at that time not published, and Kossuth hit on the idea of circulating letters describing them. The reports were not verbatim records but highly coloured im-

pressions, barely distinguishable from political pamphlets. They were first copied by hand, then lithographed, by the enthusiastic young *jurati* who by custom attended the diet, and circulated throughout Hungary. They were brilliantly written, for Kossuth proved a master of the pen; and when the diet adjourned he was invited to carry on with a similar series on the proceedings of the Pest county assembly. Now, however, he came into conflict with the police and was arrested (May 4, 1837); after 22 months' detention he was sentenced to three years' imprisonment.

Released under an amnesty in 1840, Kossuth found himself a popular hero. The proprietor of a biweekly journal, the *Pesti Hirlap*, made him its editor. His leading articles, written in an extraordinarily fluent and beguiling style, gained him innumerable adherents but alarmed the moderate reformers, the conservatives and the authorities. In 1844 he lost his position with the *Pesti Hirlap* and was refused permission to start a journal of his own. Metternich, indeed, offered him work for the government, but this he refused. His next enterprise was to found a society for promoting Hungarian industry; this proved, economically, somewhat futile, but afforded him a further platform for agitation.

In 1847 the county of Pest sent Kossuth to the diet at Pozsony (Bratislava). He at once assumed leadership of the Reform party and had succeeded in bringing the political issue to a head, when the outbreak of revolution in France in Feb. 1848 gave him his chance. On March 3, in a speech of extraordinary power—for his tongue had, if possible, even more magic than his pen—he demanded the removal of the "dead hand" of Vienna as the only way to safeguard the liberties of Hungary and of all the peoples of the monarchy. When the news of the Vienna revolution of March 13 reached Pozsony, he persuaded the Hungarian parliament to accept a program including the appointment of a responsible ministry for Hungary, all the social reforms favoured by the Liberals and also constitutional institutions for Austria. As a member of the deputation that carried the address setting out these demands to Vienna, he saw it accepted by a panic-stricken court.

Count Lajos Batthyány, the new Hungarian prime minister, allotted Kossuth the portfolio of finance in his ministry—a dangerous assignment, as the ultimate control of finance, with that of the defense services, was precisely the chief point still at issue between Vienna and Hungary. Kossuth soon provoked a crisis by forbidding the exportation of the crown revenues derived from Hungary. But he also made himself the life and soul of the whole radical and extreme nationalist movement in Hungary. It was he who, insofar as any Hungarian did so, provoked the final conflict with Vienna by persuading the diet to refuse, except on absurd political conditions, the dispatch of 20,000 Hungarian troops to Italy. Instead, he called for a national force of 200,000 men and a credit of 42,000,000 florins to meet the danger threatening Hungary from the Croats and Serbs. No cash resources being available, he began to issue assignats.

When Josip Jelačić invaded Hungary and the government resigned (Sept. 11), Kossuth became *de facto* dictator of Hungary, as president of the committee of national defense to which, in the absence of a regular government, the diet entrusted the conduct of affairs. The next months brought out all his greatness and his weaknesses, his magnetism and his courage, his intolerance and his lack of realism, his wanton provocation of insuperable difficulties and his genius to accomplish the impossible. No one but he could have given the Hungarian people the heart to face the overwhelming odds against them; but he also increased those odds by his intransigence and aggravated Hungary's own difficulties by his jealousy and suspicion of his best general, Arthur Görgey, and his meddling in military affairs. The refusal of the Hungarian diet to recognize the abdication of the Austrian emperor Ferdinand (Dec. 2) was his work, as was the declaration of April 14, 1849, proclaiming the dethronement of the Habsburg dynasty. The diet then elected Kossuth himself governor of Hungary. When, with the arrival of the Russian armies, even he was forced to recognize the position to be hopeless; he resigned this post in favour of Görgey (Aug. 11) and escaped to Turkey.

Kossuth spent two years interned in Turkey, then was allowed to go to the United States, spending on the way three weeks in England, where he was received with unexampled popular enthusiasm. His reception in the United States was equally brilliant, but in neither country could he obtain official support for Hungary. He returned to London and spent the next years seeking opportunities to turn the international situation to Hungary's advantage, but always unsuccessfully; his plans for creating a Danubian federation were equally barren, though in them he renounced much of his early chauvinism. He kept in touch with the national movement in Hungary and bitterly denounced the Compromise of 1867. He spent his last years at Turin in Italy, where he died on March 20, 1894. The government allowed his body to be brought back to Hungary and buried at Pest.

In 1841 Kossuth had married Terézia Meszlányi. His son Ferenc Kossuth (1841–1914) was for a time the somewhat ineffectual president of the Hungarian Party of Independence.

A new edition of Kossuth's complete works in three volumes appeared in Budapest in 1948–51. His *Memoirs of My Life* were published in English in 1880.

See O. Zarek, *Kossuth* (1937); D. Kosáry, *Kossuth Lajos* (1946).
(C. A. M.)

KOSTROMA, an *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., formed in 1944 from Yaroslavl *oblast*, covers 23,243 sq.mi. (60,199 sq.km.) in the middle Volga basin. The Volga itself crosses the southwestern corner of the *oblast*. The surface, a rolling, morainic plain, slopes from the Volga to the Galich-Chukhloma upland in the west and the Northern Uvals (Severnye Uvaly) in the north. There are a number of lakes, the largest being Galich (Ozero Galichskoye) and Chukhloma (Ozero Chukhlomskoye). In valleys and depressions, flood-plain meadows and sphagnum bogs are extensive, but most of the rest of the *oblast* is in taiga forest, dominated by spruce, pine and birch, with fir in the northeast. Soils are usually podsols of low fertility and less than 15% of the area is under the plow.

The population of the *oblast* at the 1959 census totaled 919,999 persons. Apart from the administrative centre of Kostroma (171,720), towns are all small. The more important towns are Bui, Sharya, Galich and Nerekhta. The forests are exploited and most towns have sawmilling and timber-working industries. Most of the rivers are utilized for rafting timber to the Volga. The sphagnum bogs are used for peat-cutting. Grain, chiefly rye and oats, takes up half the arable land, with fodder crops and flax occupying most of the rest. Flax processing and linen manufacture are widespread. Despite abundant natural pasture, the number of livestock (chiefly cattle and pigs) is relatively low. The *oblast* is poorly served by communications; the Vologda-Kirov railway crosses it from east to west and is linked to the Volga at Kostroma by a branch from Galich. (R. A. F.)

KOSTROMA, a town and *oblast* centre of the Russian Soviet Federated Socialist Republic, U.S.S.R., stands on the left bank of the middle Volga about 190 mi. N.E. of Moscow. Pop. (1959) 171,720. The first documentary mention of the town dates from 1213, but it is believed to have been founded in 1152 by Yuri Dolgoruki. Its key position on the Volga trade route made it the object of bitter struggles between Novgorod, Tver and Moscow; it was annexed by Moscow in 1329. The fort of Kostroma was often the refuge of the princes of Moscow during war. The cathedral, dating from 1239 and rebuilt in 1773, is situated in the *kreml*, or citadel, and is a fine example of old Russian architecture. In the centre of the town is a monument to the peasant Ivan Susanin, who saved the life of Michael (*q.v.*) Fedorovich, tsar of Russia from 1613 to 1645. Kostroma's trading and manufacturing importance grew steadily and the town became the seat of a *guberniya* (pre-Revolution province). In the 19th century it became a major textile town. The largest flax-processing combine in the U.S.S.R., linen mills, a textile machinery plant, a textile institute and a research institute of cotton thread are there. Other industries include the building of excavators and river craft, and lumber and food processing. (R. A. F.)

KOSYGIN, ALEKSEI NIKOLAEVICH (1904–), Soviet statesman, head of the government of the U.S.S.R. from 1964, was born on Feb. 20, 1904, in St. Petersburg (later Leningrad). He volunteered for the Red Army in 1919, during the Civil

War, after which he attended a vocational school in Leningrad (1921–24). He joined the Communist Party in 1927. A graduate (1935) of the Leningrad Textile Institute, he was appointed director of a Leningrad textile plant in 1937. He became mayor of Leningrad in 1938.

Having been people's commissar for the textile industry (1939–40), Kosygin was a deputy chairman of the Council of People's Commissars from 1940 to 1946 and of its succeeding body, the Council of Ministers, from 1946 to March 1953, when Stalin died; he was also minister of finance in 1948 and then minister for light industry (1948–53). Within the Communist Party, meanwhile, he had been elected to the Central Committee in 1939, to candidate membership of the Politburo in 1946, and to full membership of the Politburo in 1948; but in 1952, when the Politburo was renamed the Presidium of the Central Committee, he was demoted to candidate membership, which moreover he lost in March 1953.

Kosygin was minister for manufactured consumer goods from September 1953 to March 1954 and a deputy chairman of the Council of Ministers from December 1953. As N. S. Khrushchev consolidated his power, Kosygin was readmitted to candidate membership of the Party Presidium in July 1957 and to full membership in May 1960, when he also became one of the two first deputy chairmen of the Council of Ministers.

In October 1964 Kosygin took Khrushchev's place as chairman of the Council of Ministers (prime minister), but his personal role in engineering Khrushchev's downfall is obscure. To show that the U.S.S.R. was not abandoning the Far East, he visited China, North Vietnam, and North Korea in February 1965; but in Peking he had only a cool reception. In December he accused the United States of arming West Germany against the U.S.S.R. and said that he could not meet Pres. Lyndon B. Johnson so long as the war in Vietnam continued.

At the Communist Party's 23rd Congress (March–April 1966), when he was reelected to the renamed Politburo, Kosygin described Khrushchev's approach to the problems of national economy as "subjective," "dilettante," and "anti-Leninist." On Aug. 3, on being reappointed chairman of the Council of Ministers by the Supreme Soviet, he declared that, while resistance to aggression would still be a central element in foreign policy, his government would not be provoked by those who would like to pluck chestnuts out of the fire of international tension and war. (K. Sm.)

KOSZALIN (Ger. Köslin), a town of Poland and capital of the *wojewodztwo* (province) of the same name, is situated on the Dersecina river near the Baltic coast, 85 mi. (137 km.) N.E. of Szczecin. Pop. (1960) 44,410. Industries include agricultural machinery, forest products, food processing and some light manufacturing. Koszalin was granted town rights in 1266. Situated within the principality of Slupsk (*q.v.*), it was the residence of the bishops of Kamien from 1556 and of the dukes of Pomerania from 1574 to 1622. In 1648 it was seized by Brandenburg. In World War II it was about half destroyed. Following the war it became part of Poland.

Koszalin Wojewodztwo, formerly in Prussian Pomerania, became part of Poland in 1945. Area 6,940 sq.mi. (17,974 sq.km.); pop. (1960) 687,915. It consists of lake-studded moraine highlands and a low coastal plain along the Baltic, where action of the sea has formed coastal lakes. Despite poor soil, Koszalin is chiefly agricultural, with grain and potatoes as the principal crops. There is also a timber industry. Food processing is also being developed. Principal towns, besides Koszalin, are Slupsk, Szczecinek, Kolobrzeg and Walcz. (T. K. W.)

KOSZTOLÁNYI, DEZSÖ (1885–1936), the greatest impressionist in Hungarian literature, was born on March 29, 1885, at Szabadka, the son of a headmaster. He studied at the University of Budapest, intending to teach, but became a journalist, joined the circle of the literary magazine *Nyugat* and published his first volume of poetry in 1907. He won general recognition in 1910 with the publication of a cycle of poems, *A szegény kisgyermek panaszai,* a small boy's subtle and moving impressions of his surroundings. He died in Budapest on Nov. 3, 1936.

Kosztolányi's sensitivity to experience and mastery of expression enabled him to write poetry of great lucidity and deceptive simplicity. A sympathetic observer of human frailty, with a gentle humour and a penchant for the macabre, he was an accomplished short-story writer, Kosztolányi also wrote several novels: the story of a servant girl, *Édes Anna* (1926?; Eng. trans., *Wonder Maid,* 1947) is perhaps the best. As a translator of poetry he was outstanding. In his later years, he paid much attention to the preservation of the purity of Hungarian. Kosztolányi showed little interest in what others considered the major problems of his time: for him the poet was the "soldier of castles in Spain," the guardian of beauty, civilization and humanity. (Ds. Sr.)

KOTA, one of the indigenous, Dravidian-speaking peoples of the Nilgiri hills in the south of India. They live in seven villages totaling about 1,100 inhabitants during the 1960s; these were interspersed among settlements of the other Nilgiri peoples, Badagas and Todas. A village has two or three streets, each inhabited by the members of a single patrilineal clan. Most adult Kotas also speak Tamil, another Dravidian tongue.

They were traditionally artisans and musicians. Each Kota family was associated with a number of Badaga and Toda families for whom they provided metal tools, wooden implements and pots. They also furnished the music necessary for the ceremonies of their neighbours. From its associated families the Kota family received a share of grain from the Badaga harvest and some dairy products from the Todas. Kotas also co-operated with the jungle-dwelling Kurumbas, who provided jungle products and magical protection.

Because Kotas handled animal carcasses and had other menial occupations, their neighbours considered them to be of inferior rank. But the Kotas were not oppressed by this opinion. If they felt aggrieved in their relations with the others, they would boycott them. Kotas could do without Badaga grain for a time because they had land and farmed it, but the other groups felt the need of Kota tools and music. A compromise usually was effected in such cases, and the normal intergroup relations resumed.

Aboriginal Kota religion entails a family trinity of two brother deities and the goddess-wife of the elder. Each deity has a priest and a diviner in every village. The diviner becomes possessed on appropriate occasions and speaks with the voice of the god.

After 1930 the traditional interdependence among the Nilgiri groups was abandoned and only a few Kota families continue to supply tools and music. Kota livelihood is mainly from the cultivation of grain and potatoes.

See M. B. Emeneau, *Kota Texts* (1944–46); D. G. Mandelbaum, "The World and the World View of the Kota," *Village India,* ed. by M. Marriott (1955). (D. G. M.)

KOTAH, a town and district of Rajasthan, India. The town lies on the right bank of the Chambal river, 120 mi. S. of Jaipur and 250 mi. S.S.W. of Delhi. Pop. (1961) 120,345. It is a walled town with lakeside gardens, a fine old palace, a new palace called Umid Bhawan, the royal cenotaphs, the Chambal dam and a game sanctuary. There are a number of modern schools and hospitals. The town has an airport.

Kotah District (area 4,794 sq.mi.; pop. [1961] 848,389) slopes gently northward from the high tableland of Malwa (*q.v.*), and is drained by the Chambal river and its tributaries, all flowing in a northerly or northeasterly direction. The Mokandarra range (1,200–1,600 ft.) runs from southeast to northwest. The Mokandarra pass through these hills in the neighbourhood of the highest peak (1,671 ft.) was made memorable by the passage of Col. William Monson's army on its disastrous retreat before the Maratha leader Holkar in 1804. There are extensive game preserves, chiefly covered with grass. Grain is exported; salt, cotton and woolen cloth are imported.

The former state of Kotah, corresponding to the present district, was separated from Bundi state in 1625 and its first chief, Madho Singh, assumed the title of raja. In 1708 Raja Bhim Singh obtained the title of maharao from the rana of Mewar, which was later confirmed by the Mogul emperor. Zalim Singh, the regent of Kotah for more than 50 years, founded the *chhaoni* (cantonment) near Gurgaon, afterward known as Jhalrapatan. He was one of the first—in 1817—to enter into a treaty with the British. (S. M. T. R.)

KÖTHEN, a city of Germany which after partition of the na-

tion following World War II became a regional capital in the *Bezirk* (district) of Halle in the German Democratic Republic, is about 50 km. (31 mi.) N. of Halle and 60 km. (37 mi.) S.S.E. of Magdeburg. Pop. (1964 est.) 38,205. It is a railway junction on the main line between Halle and Magdeburg. There are heavy engineering, boiler and apparatus factories, and the fertile surroundings are a part of the largest sugar beet area in the German Democratic Republic. A chemical training school and a teacher training institute are in Köthen.

Köthen was mentioned in the chronicles for the first time in 1115. The well-planned market settlement was granted a municipal charter in 1200.

KOTKA, a town of Finland in Kymen *lääni* (Kymi county), lies at the mouth of the Kymi river on two small islands, Hovinsaari and Kotkansaari, 70 mi. E.N.E. of Helsinki. Pop. (1960) 30,293. It is the major seaport for eastern Finland and an important export harbour for timber. Industrial enterprises include sawmills and paper mills, and prefabricated houses, cellulose and phosphates are also manufactured. Kotkansaari was fortified by the Russians between 1790 and 1800 and its main fort was bombarded and virtually destroyed by the British fleet in 1855. Town rights were granted in 1878. The Kymenlaakso museum is situated in Kotka and there is also a municipal theatre. (E.-S. Ku.)

KOTLAS, a town of Arkhangelsk *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., stands at the confluence of the Northern Dvina and the Vychegda. Pop. (1959) 39,162. It is a major communications centre of northern European Russia, the focus of the Northern Dvina navigation system and a most important rail junction, where a line from Kirov meets the Konosha-Vorkuta railway. The main cargoes transshipped are coal from Vorkuta from rail to barge, and rafted timber to rail. Its nodal position has led to the development of large sawmilling and timber-working industries, producing paper, pulp and prefabricated houses. Shipbuilding is carried on in its suburb of Limenda, 5 km. (3 mi.) away on Mikheikov, an island in the Northern Dvina. (R. A. F.)

KOTOR (It. Cattaro), a seaport in the Bokokotorski *srez* (district) of Montenegro, Yugos., 40 km. (25 mi.) W. of Titograd. It is situated on the Boka Kotorska (Bocche di Cattaro), a beautiful deep inlet of the Yugoslav Adriatic coast, which forms one of the finest natural harbours in the world. Pop. (1961) 8,572. The town and harbour lie at the foot of Mt. Lovcen (5,738 ft.). The town has a quiet charm, with paved streets and old buildings, and its centre is free from through traffic. Hercegnovi (Castelnuovo) guards the main entrance to the Boka. Founded in 1382, it was occupied by Turks, Venetians, Spaniards, Russians, French, English and Austrians. Nearby is the Orthodox monastery, Savina, with medieval documents. On the landward side long walls run from the town to a castle far above. There are a Roman Catholic cathedral (11th-century or earlier, restored), a Serbian Orthodox church of St. Luke (1195) and monasteries. The people of Kotor were noted builders in the middle ages and excellent seamen. Peter the Great sent his seamen to learn their trade in Kotor.

Illyrians were the earliest inhabitants. In their time the main town was Rhyzon, now Risan, which submitted to Rome in 168 B.C. The place was later under Venice until 1185 and then until 1370 in the Serbian kingdom. In Kotor the golden sovereigns of the Serbian tsar Stephen Dushan were minted. After the downfall of Serbia in 1389, it was seized and abandoned by Venice and Hungary in turn and then passed under Venetian rule in 1420. In 1814 it was restored by the congress of Vienna to Austria under whom it remained until 1918. The Slav sailors in the Austro-Hungarian navy there mutinied in 1918 and many of them were shot. After World War I Kotor became part of Yugoslavia. (V. De.)

KOTRI, a town of Dadu district, Hyderabad division, West Pakistan, is an important rail centre on the right bank of the Indus, connected by a railway bridge with Hyderabad on the opposite bank. Pop. (1961) 20,262. The Ghulam Mohammed barrage (1955) on the Indus, 4½ mi. above Kotri, was designed to control the Indus floods, to generate hydroelectricity and to irrigate about 2,800,000 ac. in Hyderabad, Tatta and Dadu districts of which 1,700,000 ac. are virgin land. A 20-ft.-wide road with a footpath on either side was constructed over the barrage; the Sui (*q.v.*) gas pipeline to Karachi also passes over it. The project also involved the formation of the Kalri lake (41 sq.mi.), 7 mi. N. of Tatta, providing water for Karachi and fisheries. (K. S. Ad.)

KOTTAYAM, a town and district in Kerala, India. The town (pop. [1961] 52,685), headquarters of the district, lies on the banks of a great lagoon called the Vembanad "lake" at the mouth of the Minachil river, 45 mi. S.S.E. of Ernakulam. It is the centre of the Syrian Christian community, which is made up of Roman Catholics and non-Catholics. The latter have three subsects: the Jacobites, the Mar Thomites and the Church of South India. The Syriac Church traces its origin to the apostle St. Thomas, who is believed to have visited Kerala in A.D. 53 and established seven churches on the Malabar coast, one being at Kottayam. (*See* also Kerala: *Population.*) There are three Christian colleges affiliated to Kerala university, two for women and a third which is the oldest institution for imparting English education on the west coast. The town is an educational and cultural centre with a number of schools, newspapers, etc. Since the opening up of the Anaimalai mountains in the early 20th century for tea and rubber plantations, Kottayam has become a market centre trading in these products. There is a cement factory using lime shell as raw material.

Kottayam District (area 2,326 sq.mi.; pop. [1961] 1,732,880), comprising ten talukas, extends from the coast to the Cardamom hills. It has the highest percentage of Christians in India. (G. Kn.)

KOTTE, a town in the Western province of Ceylon, lies 5 mi. S.E. of Colombo. Pop. (1953) 54,381. It is governed by an urban council and functions essentially as a suburb of Colombo, though it still has paddy fields, coconut plantations and gardens within its boundaries.

Kotte is still almost surrounded by lagoons, rivers and swamps, but in earlier times, when water encompassed it even more completely, it must have been a splendid defensive site. It was no doubt mainly for this reason that during the troubled times from 1415 until 1565 it was the seat of the Sinhalese kings. The site of their palace can still be seen and they are known to have supplemented the natural defenses by means of moats, ramparts and watchtowers. When Portuguese envoys were taken to Kotte from Colombo in 1505 they had a circuitous journey lasting three days to deceive them about the location of the capital; "to go to Kotte" has thus passed into Sinhalese as a synonym for a roundabout route. (B. H. F.)

KOTZEBUE, AUGUST FRIEDRICH FERDINAND VON (1761–1819), German dramatist, whose plays enjoyed remarkable popularity all over Europe and whose assassination caused equally violent enthusiasm for and revulsion against its radical origins, was born in Weimar on May 3, 1761. He wrote his first comedy while a law student in Jena and when he returned to Weimar he had the entrée into court literary circles. But in 1781 something—perhaps an indiscretion of his satirical pen—made it prudent for him to leave Weimar. His chosen exile was Russia, where after two years he entered government service. In 1785 he became president of the magistracy of the province of Estonia and was ennobled. Some of his greatest successes (*e.g., Adelheid von Wulfingen*, 1788, Eng. trans., 1798; *Menschenhass und Reue*, 1789–90, Eng. trans., *The Stranger*, 1798; *Die Indianer in England*, 1790, Eng. trans., *The Indian Exiles*, 1801) were written in Reval. After some time abroad (1798–1800) traveling in France, writing for the Vienna *Burgtheater* and visiting Weimar, he was returning to St. Petersburg when he was inexplicably arrested at the frontier, apparently on the emperor Paul I's orders, and transported to Siberia. Fortunately, however, the emperor, capricious alike in his enthusiasms and his aversions, chanced after a few months on a trivial piece of Kotzebue's in which Paul's father was presented in a favourable light. Kotzebue was immediately recalled, given an estate in Livonia and made director of the German theatre in St. Petersburg.

In 1801 he returned to Weimar, but he was not on good terms with Goethe (who, however, recognized his dramatic talent) or

with the romantics and, after a period in Berlin, he went back to Russia in 1806. In 1817 he was sent abroad once more by the emperor Alexander to report on current ideas in France and Germany on politics, finance, education, etc. Though execrated by the radicals as a spy in the pay of a reactionary power, Kotzebue declared that his actions, being without concealment, could not be described as espionage. The paper he published, however, the *Literarisches Wochenblatt,* became a centre of attack and on March 23, 1819, in Mannheim he was stabbed by Karl Sand, a member of a radical student association. Sand was executed and the universities placed under strict control as a result.

As a dramatist Kotzebue was prolific (he wrote more than 200 plays), facile, but dramatically adroit. He is at his best in such comedies as *Der Wildfang* (1798) and *Die deutschen Kleinstädter* (1803), which contain admirable genre pictures of German life. He also wrote some novels as well as historical and autobiographical works.

BIBLIOGRAPHY.—Two collections of Kotzebue's plays were published during his lifetime: *Schauspiele,* 5 vol. (1797) and *Neue Schauspiele,* 23 vol. (1798–1820). His *Sämtliche dramatische Werke* appeared in 44 vol. (1827–29) and again, under the title *Theater,* in 40 vol. (1840–41). *See* also C. Rabany, *Kotzebue, sa vie et son temps* (1893); L. T. Thompson, *A. Kotzebue, A Survey of His Progress in France and England* (1929); A. W. Holzmann, *Family Relationships in the Dramas of August von Kotzebue* (1936).

KOTZEBUE, OTTO VON (1787–1846), Russian navigator, who commanded two voyages of circumnavigation, was born at Reval (Tallin) on Dec. 30, 1787, the second son of August von Kotzebue (*q.v.*). He accompanied Adam Ivan Krusenstern (*q.v.*) on his voyage of 1803–06. From 1815 to 1818 Kotzebue led an expedition in the brig "Rurik." Entering the Pacific at Cape Horn he visited Easter Island and the Tuomotu archipelago, where a number of islands were discovered, charted a large part of the coast of Alaska and discovered the sound that now bears his name; then finding he could not return to the Atlantic through the Arctic, he visited the Marshall Islands on his way back to Europe. He brought home a large collection of previously unknown plants and much new ethnological information. The physicist H. F. E. Lenz accompanied him on his second voyage that was commissioned by Alexander I in 1823–26 and carried out valuable oceanographic researches. His most important discoveries were several islands in the Society and Marshall groups. Kotzebue died at Reval on Feb. 15, 1846.

There are English translations of both Kotzebue's narratives: *A Voyage of Discovery into the South Sea and Bering's Straits for the purpose of exploring a North-East Passage . . . 1815–1818,* three volumes (1821), and *A New Voyage Round the World . . . 1823–1826* (1830). (A. M. F.)

KOUMOUNDOUROS, ALEXANDROS (1814–1883), Greek statesman, nine times prime minister between 1865 and 1882, was born at Selitsa, in the Peloponnese. He took part in the Cretan insurrection of 1841 and was elected to the Greek chamber of deputies in 1851, of which he became president in 1854. He served as minister of finance in 1856, 1857 and 1859. He adhered to the moderate wing of the Liberal party until the revolution of 1862 and the dethronement of King Otho. Having been twice minister of the interior (1864 and 1864–65), he was prime minister from March to June 1865 and from Nov. 1865 to Oct. 1866. He became prime minister again in Jan. 1867, but was dismissed by King George I in Jan. 1868, for making warlike preparations against Turkey during the new Cretan insurrection. He presided over three more cabinets between 1870 and 1877. Appointed prime minister for the seventh time in Jan. 1878, he sent troops to help the insurgents of Thessaly against the Turks. He was succeeded on Nov. 1, 1878, by Kharilaos Trikoupis, but ten days later was premier once more. In March 1880 Trikoupis returned to power, but in the following October Koumoundouros formed his ninth and last ministry. He resigned on March 15, 1882, being opposed by the new Thessalian deputies. He died in Athens on March 8, 1883.

KOUSSEVITZKY, SERGE (SERGEI ALEXANDROVITCH KUSSEVITSKY) (1874–1951), Russian-U.S. (naturalized, 1941) conductor and publisher, champion of modern music who commissioned and performed many important new works, was born in Vyshni Volochek (Tver) on July 26, 1874. He studied the double bass in Moscow and rapidly became a virtuoso on this instrument, giving recitals in Russia, Germany and England at which he played compositions of his own; his double bass concerto (1905) became a repertory piece. He first appeared as a conductor in Berlin (1908). In 1909 he established his own orchestra in Moscow and founded a publishing firm for Russian music; works by Scriabin, Rachmaninoff, Stravinsky, Prokofiev and others were included in its catalogue. Between 1910 and 1914 he took his orchestra along the Volga, visiting towns that had not previously heard orchestra music on this scale. After the Russian revolution, Koussevitzky was musical director of the State Symphony orchestra in Petrograd until 1920, when he left Russia. In 1921 he organized annual concerts in Paris, at which he conducted many new works by Russian and French composers.

In 1924 he was engaged as conductor of the Boston Symphony orchestra, remaining at this post until 1949; he gave first performances of works by Aaron Copland, Roy Harris, Walter Piston and other U.S. composers. Stravinsky's *Symphony of Psalms* and works by Prokofiev, Ravel and others were commissioned for the 50th anniversary of the Boston Symphony orchestra in 1931. In the summer of 1937 he inaugurated the annual Berkshire festivals with the Boston Symphony orchestra at Tanglewood, Mass.; in 1940 he established there the Berkshire Music centre, at which courses were given each summer by outstanding American and European musicians. In 1942 he organized the Koussevitzky foundation to commission and perform new works.

Koussevitzky's conducting was highly individual; his interpretations of Tchaikovsky, Sibelius and other romantic composers were marked by rhapsodic animation; he imparted a similar quality to compositions of the modern school. He died in Boston on June 4, 1951. (N. Sy.)

KOVALEVSKI, ALEKSANDR ONUFRIEVICH (1840–1901), Russian zoologist, founder of comparative embryology and experimental histology, was born on Nov. 19 (new style; Nov. 7, old style), 1840, at Shustyanka, near Dvinsk (now Daugavpils, Latvia). He studied at the University of St. Petersburg, taking the doctor of science degree in 1867. Kovalevski's scientific activities alternated between teaching—as professor of zoology in the universities of St. Petersburg (1867, 1891–93), Kazan (1868–69), Kiev (1869–74) and Odessa (1874–90)—and prolonged expeditions to the Mediterranean coasts and the Red sea. Kovalevski established for the first time the existence of a common pattern in the development of all multicellular animals, thereby providing important evidence of the evolution of living organisms, as shown in his works on the *Development of Amphioxus lanceolatus* (1865) and *Anatomy and Development of Phoronis* (1887). He also demonstrated the homology of their embryonic layers. His most important work on this subject was *Embryological Investigations on Worms and Arthropods* (1871). In a series of investigations on the development of flies (1886–87) Kovalevski demonstrated the role played by phagocytes in the histolysis taking place in the course of their metamorphosis.

Kovalevski's achievements were recognized by his election to the Russian Academy of Sciences (1890). He died on Nov. 22 (N.S.; Nov. 9, O.S.), 1901, in St. Petersburg. The mathematician Sonya Kovalevski (*q.v.*) was his sister-in-law.

See (both in Russian) V. A. Dogiel, "A. O. Kovalevski and His Significance in World Science," *Vestnik Akad. Nauk S.S.S.R.,* 11, p. 57 (1956); B. N. Mazurmovich and I. K. Shulga, *Eminent Russian Zoologists* (1955). (C. A. He.)

KOVALEVSKI, SONYA (SOPHIE) (1850–1891), Russian mathematician and novelist, was born at Moscow on Jan. 15, 1850, the daughter of a general of artillery, Korvina-Krukovsky. In 1868 she married a young paleontologist, Vladimir Kovalevski, and the two went to Germany to continue their studies. In 1869 she went to Heidelberg where she studied under Helmholtz and others; and in the period 1871–74 she read privately with Karl Weierstrass at Berlin, as the public lectures were then not open to women. In 1874 the University of Göttingen granted her a degree *in absentia* for a thesis on partial differential equa-

tions, one of her most remarkable works. She returned to Russia and later accepted an invitation to become lecturer at the University of Stockholm, where in 1889 she was appointed professor, at the instance of M. G. Mittag-Leffler, also a pupil of Weierstrass. In 1888 she achieved her greatest scientific success by being awarded the Prix Borodin of the French Academy for a paper on the rotation of a solid body round a fixed point. So remarkable was this work that the value of the prize was doubled. She died in Stockholm, Feb. 10, 1891, at the height of her fame, shortly after her election to the St. Petersburg Academy of Science. Madame Kovalevski also gained a considerable reputation as a writer; best known are her novels *The Sisters Rajevski* and *Vera Vorontzoff*, depicting life in Russia.

BIBLIOGRAPHY.—Her scientific works were published by the Akad. Nauk S.S.S.R. (1948). *See* also *Sonja Kovalevsky, Her Recollections of Childhood*, Eng. trans. by I. F. Hapgood, with a biography by Anna Leffler (1895); G. von Hoyer, *Sonja Kowaleswki, Leben und Liebe einer gelehrten Frau* (1950). (O. OE.)

KOVROV, a town of Vladimir *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., stands on the high right bank of the Klyazma, just above its confluence with the Uvod 40 mi. E.S.E. of Vladimir city. Pop. (1959) 98,563. The town has been a centre of the textile industry since the 18th century (the name comes from the Russian *kover*, "carpet"), specializing in cotton cloth, but the most important industry now is heavy engineering. Excavators, motor cycles, milling machinery and weighing machines are made. Kovrov stands on the main Moscow-Gorki railway at the junction with a line to Murom, which is on the line from Moscow to Kazan. (R. A. F.)

KOXINGA (CHENG CH'ENG-KUNG) (1624–1662), Chinese general, was born in 1624 in Hirado, Jap., the son of a Chinese father and a Japanese mother. His father, a Fukienese, had gained great wealth from commerce and piracy. In 1645, following the Manchu capture of Nanking, a Ming dynasty pretender, the prince of T'ang, established his court in Fukien. Because of Cheng's support of the pretender, the Ming imperial surname was conferred on him. Popularly, he was called Kuo-hsing-yeh, "Lord of the Imperial Surname," from which the Dutch derived "Koxinga." Cheng continued to profess pro-Ming sympathies throughout his life, although his actions were undoubtedly largely motivated by personal ambition. Holding a portion of Fukien throughout the 1650s, he continuously fought the Manchus, and refused their generous surrender offers. In 1661 Cheng invaded Taiwan (Formosa) and eventually expelled the Dutch. Beset by personal and political difficulties, he died June 23, 1662, apparently a suicide. (JA. B. P.)

KOZELUCH (KOŽELUH), **LEOPOLD** (1752–1818), Bohemian composer, was born at Velvary on Dec. 9, 1752. In 1765 he went to Prague where he studied composition with his uncle, Johann Kozeluch, and pianoforte playing with F. X. Dušek. Kozeluch first became known as a composer of ballets, a large number of which were performed at the National theatre, Prague, during 1771–78. In 1778 he went to Vienna where he became a fashionable piano teacher. He succeeded Mozart as court composer at Vienna in 1792 and held the office until his death there on May 7, 1818.

An able composer, Kozeluch wrote ballets, operas, symphonies, pianoforte concertos and sonatas and arranged Scottish songs for the Edinburgh publisher G. Thomson.

His uncle JOHANN ANTON KOZELUCH (1738–1814) was also a prolific composer, but less well known than Leopold. (Cs. CH.)

KOZHIKODE (formerly CALICUT), headquarters of Kozhikode district in Kerala state, India, lies on the Malabar coast 414 mi. W.S.W. of Madras by rail. Pop. (1961 census) 192,521. Calicut's historic fame for cotton weaving is reflected in the name calico. The place was an early focus of Arab traders, who first settled there in the 7th century. Their descendants together with numerous local converts to Islam constitute the Moplahs. The Portuguese explorer Vasco da Gama reached Kozhikode in 1498, but the first Portuguese attempts to found a trading post were thwarted by the Moplahs and the zamorin, or local chief. In 1511 peace was concluded and a fortified post was built, which the Portuguese abandoned in 1525. An English expedition visited Kozhikode in 1615, but not until 1664 did the East India company found a trading establishment there. The French followed suit in 1698 and the Danes in 1752. Haidar Ali (*q.v.*) captured the town in 1765 and destroyed it. In 1782 his troops were driven out, but it was reconquered in 1788 by his son Tippu, who brutally deported the inhabitants to Beypore, 6 mi. S. In 1790 the British occupied Kozhikode and it passed into their hands by treaty in 1792, when the inhabitants returned and rebuilt the city.

The port has poor facilities and it is practically closed during the monsoon; ships must lie 3 mi. offshore at other seasons. Nevertheless, at the mouth of the Kallayi river, just south of the town, is located one of the largest timber depots in India. Besides coconut products, Kozhikode exports pepper, ginger, coffee, tea and other crops. Its industries include sawmills, tile manufacturing, coffee curing and hosiery works, the last established by the interdenominational Basel Mission society, whose activities there ceased on the outbreak of World War I. An important educational centre, Kozhikode has three arts and science colleges (one exclusively for women), a medical and a teacher-training college and a marine biological research institute.

KOZHIKODE DISTRICT, pop. (1961) 2,617,189, area 2,042 sq.mi., was formed in 1956 from the Malabar district of Madras and consists of the *talukas* of Badagara, Ernad, Kozhikode, Quilandy, South Wynad and Tirur. The chief occupations are the cultivation of rice and the processing of coconut and forest products. (G. KN.)

KPE (BAKWERI, BAKWIRI), a Cameroon people numbering about 16,000 in 1953, who live on the lower slopes of volcanic Cameroon mountain. They are one of the extreme northwestern Bantu-speaking peoples, and form a linguistic group with the neighbouring Mboko, Isuwu and Wovea. Although these peoples were not attested by name until the early 19th century, a little-known Dutch vocabulary (1665) relates to them, thus dating the Bantu linguistic border in this area earlier than this. The largest political unit among the Kpe was the village, with a chief selected by lineage heads from among the descendants of the village founder. The Kpe have localized exogamous patrilineages governing succession to office, and dispersed exogamous matrilineages with fertility functions. Inheritance is patrilineal in theory, but other forms occur in the 1960s. Males are circumcised, but there is no clitoridectomy.

The tarolike *Xanthosoma* cocoyam, now the staple crop (introduced in the 19th century), is planted by women; plantain, the former staple, is cultivated by men, who also clear the farms. Dwarf cattle and other livestock are kept. Crafts, always scanty, are in decline; iron working has disappeared. The Kpe believe in a High God (Ovase, Lova), but there are no priests or shrines. Approach to the supernatural is through diviners and doctors, although libations may be poured to ancestors; witchcraft beliefs flourish. Christianity and formal education have been widely accepted and Kpe led the early British Cameroons political movement. Although of small population, they are of much scientific interest because of social problems arising from the establishment of plantations on their soil in the 1890s. They show unusually low fertility and have almost certainly declined in numbers during the 20th century. *See* also CAMEROON, REPUBLIC OF.

BIBLIOGRAPHY.—E. Ardener, "Coastal Bantu of the Cameroons," *Ethnogr. Surv. Afr., Western Africa* (1956), *Divorce and Fertility: an African Study* (1962); E. Ardener *et al., Plantation and Village in the Cameroons* (1960). (E. W. A.)

KPELLE, a Negro tribe numbering approximately 400,000 in the 1960s, occupying much of central Liberia on both sides of the St. Paul river from about 30 mi. inland and extending northeast into Guinea. Kpelle speak a southwestern Mande language that is most closely related to Mende, Gbandi and Toma; parts of the New Testament have been translated in Kpelle and a monthly news sheet in the language is read by about 2,000 people. The economy is basically one of agricultural subsistence; rice is the major crop, and comprises the standard diet along with palm oil. Cassava, bananas and other foods are used in small quantities; meat, either domestic or wild, is scarce. Land must lie fallow for several years after a crop is grown and is assigned to each family annually by

the clan chief, whose domain is a group of villages.

The clan chief is assisted by a council of elders and, although superior to the village chief, is subordinate to the paramount chief whose authority extends over several clans. Tribal customs and loyalty are also ensured by the initiation of adolescents into their status as responsible adults. Other rites, involving snakes, departed spirits, witches, sympathetic magic and other secrets, are perpetuated by initiation on a voluntary basis.

Young children are generally cared for by members of the mother's family, but they are later supported by the father and his brothers, who also inherit the father's property if he dies. Marriage is secured by payments to the bride's maternal uncle; since the payment is rarely complete, the bride's family usually retains partial claim to her and her belongings. Polygamy is common, particularly among chiefs. *See* MANDINGO.

(W. E. WE.)

KRAEPELIN, EMIL (1856–1926), German psychiatrist, originator of a classification system of psychopathology on which all subsequent classifications have been based, was born at Neustrelitz, Mecklenburg, on Feb. 15, 1856, and studied at Würzburg, Munich and Leipzig. He held teaching positions in Dorpat and Heidelberg and finally at Munich, where he founded a research institute in 1917. The successive editions of his *Textbook of Psychiatry* (first published in 1883; 8th ed., 1915), which includes his description of psychiatric entities and the course of their development, also present a history of psychiatry. Kraepelin interested himself in a wide variety of problems: he helped devise a series of tests by which he attempted to separate psychological activities into four components: perception, memory, association and motor functions; comparative psychiatry came under his scrutiny as a result of world travel; his work in criminology formed the basis for many modern conceptions concerning the relation of criminality to psychiatric disorder.

Throughout his career Kraepelin investigated the manic-depressive psychosis. He originally differentiated six states of depression: melancholia simplex, stupour, melancholia gravis, paranoid melancholia, fantastic melancholia and delirious melancholia. In addition he recognized four mixed states: depressed mania, agitated depression, depression with flight of ideas and partial inhibition. He finally concluded that these all belonged to a single manic-depressive entity. He died Oct. 7, 1926, at Munich.

(R. M. D.)

KRAFFT-EBING, RICHARD, BARON VON (1840–1902), German neuropsychiatrist, best known for his work in sexual psychopathology, was born Aug. 14, 1840, at Mannheim and was educated in Germany and Switzerland. Although he was a student of psychology, the direction of his interests was primarily in the field of medicine and psychiatry. At the age of 32 he was appointed professor of psychiatry at Strasbourg, and subsequently he occupied similar positions at Graz and Vienna (1889). His interests, like those of many other German scientists, were broad: his clinical observations in psychiatry are noteworthy; he was interested in the genetic functions in insanity and in sexual deviation; he investigated epilepsy, paralysis agitans and hemicrania; he established the relationship between syphilis and general paralysis; and he performed experiments in hypnosis.

Krafft-Ebing's books on criminal psychology, psychiatry and forensic psychopathology went through numerous editions, and a number have been translated into English. Best-known of his works are *Uber gesunde und kranke Nerven* (1903), *Psychopathia Sexualis* (1886) and *Lehrbuch der Psychiatrie auf klinischer Grundlage* (1879).

He died on Dec. 22, 1902, near Graz. (R. M. D.)

KRAFT (KRAFFT), **ADAM** (*c.* 1455–1509), German sculptor of the Nürnberg school, was born about the middle of the 15th century, probably at Nürnberg, and died at Schwabach in 1509. He seems to have emerged as sculptor about 1490, the date of the seven reliefs of scenes from the life of Christ which, like almost every other specimen of his work, are at Nürnberg. The date of his last work, an Entombment, with life-size figures, in the Holzschuher chapel of St. John's cemetery, is 1507. Besides these, Kraft produced the great Schreyer monument (1492) for St. Sebald's at Nürnberg, a skilful though mannered piece of sculpture opposite the Rathaus, with realistic figures in the costume of the time; Christ bearing the Cross, above the altar of the same church; and various works made for public and private buildings, as the relief over the door of the Wagehaus, a St. George and the Dragon, several Madonnas and some purely decorative pieces, as coats of arms. His masterpiece is perhaps the magnificent tabernacle, 62 ft. high, in the church of St. Laurence (1493–1500).

KRAGUJEVAC, a town and *srez* (district) of Serbia, Yugos., is situated on the Lepenica, one of the left-bank tributaries of the Morava, 123 km. (76 mi.) S. of Belgrade by road. Pop. (1961) 52,792. Kragujevac is the chief town of the Sumadija, in which at the beginning of the 19th century Karageorge led the first uprising of the Serbian peasants against the Turks. For a time it was the capital of Serbia under Prince Milosh (1818–39), and in that period a high school was established as well as a theatre, a printing press and a military school. The first newspaper in Serbia, *Srbske novine*, was published there. Pupils from all parts of the Sumadija go to the schools in Kragujevac. During World War II, on Oct. 21, 1941, the Germans shot 5,000 men between the ages of 14 and 70 in the town. A monument has been built to their memory.

Kragujevac is linked with Belgrade and with the south by road and by a branch line to the Belgrade-Salonika railway. It lies in a fertile country which produces grain, fruit and cattle. The food industry is developed. The first Serbian arsenal was built in Kragujevac in the 19th century. The town has one of the largest automobile-assembly plants in Yugoslavia. (V. DE.)

KRAIT, a Hindu name for dangerously venomous snakes of the genus *Bungarus*, found in southeast Asia from India to Malaya. Although allied to the cobras, they bite less readily. *See* SNAKE.

(L. M. KR.)

KRAKATAU (KRAKATOA), a volcanic islet situated in the Sunda strait, between Java and Sumatra, Indonesia. The volcano is one of more than 100 active and recently active volcanoes that dot the Indonesian islands and comprise the greatest concentration of volcanic activity in the world. Its catastrophic eruption in 1883 was one of the greatest witnessed by man.

During late geological time, probably within the last 1,000,000 years, the volcano built a cone-shaped mountain composed of alternating layers of andesite lava flows and cinder and ash thrown up by moderate explosions. From its base, 1,000 ft. below sea level, the cone projected about 6,000 ft. above the sea. Then, still in prehistoric times, the top of the mountain was destroyed to form a crater four miles across, technically known as a *caldera*. Most of the *caldera* was beneath water level, but higher portions of the rim projected as four small islands: Verlaten (Sertung) on the northwest, Lang and the Polish Hat on the northeast, and Rakata on the south-southeast.

Following the formation of the *caldera*, moderate volcanic activity resumed and a small cone of basalt was built partly overlapping Rakata Island. Next two andesite cones were built along a line that extended north-northwestward from Rakata Island across the *caldera*. These cones, Danan in the middle and Perbuwatan at the north, merged with the Rakata cone to form a single island, Krakatau, that extended almost completely across the *caldera*. The Rakata cone was the highest, rising 2,623 ft. above sea level. Previous to 1883, the only eruption within historic time occurred in 1680, when moderate explosions and a flow of andesitic glass (pitchstone) issued from Perbuwatan.

On May 20, 1883, the Perbuwatan vent again became active. The eruption was not particularly violent, though ash-laden steam clouds reached a height of 6 mi., and the sound of the explosions could be heard at Batavia (Jakarta), 100 mi. away. About the end of May the activity died down, but it resumed on June 19 and a few days later was joined by eruption from Danan. By early August a third vent had opened but the activity continued mild.

On Aug. 26 the character of the eruption began to change and rapidly became paroxysmal. At 1 P.M. the first of a series of increasingly violent explosions occurred, and at 2 P.M. a black cloud of ash rose 17 mi. above Krakatau. The explosions became more and more violent. At Batavia during the night the noise sounded like heavy artillery fire, and the concussions caused the houses to

tremble and plaster to fall. The climax was reached at 10 A.M. on Aug. 27, with catastrophic explosions that propelled ash to a height of 50 mi., and were heard 2,200 mi. to the southeast in Australia, and at Rodriguez Island, nearly 3,000 mi. to the southwest. The pressure waves in the atmosphere were recorded all the way round the earth. Explosions continued through the rest of the day and night, but with diminishing intensity, and on the morning of the 28th the volcano was quiet again. Though small explosions occurred on Sept. 17, 26 and Oct. 10, and in the following year on Feb. 20, the great eruption was over.

The enormous discharge threw into the air nearly five cubic miles of rock fragments. Large quantities of ash fell over an area of 300,000 sq.mi. and in the sea near the volcano masses of floating pumice were so thick that ships could not force their way through them. The great amount of ash in the air resulted in total darkness in the surrounding region. At Batavia lamps had to be used all day on the 27th and at points as much as 50 mi. from the volcano darkness lasted for two and a half days. Rising high into the stratosphere, the fine dust drifted several times round the earth, giving rise to spectacular red sunsets all over the world through the following year.

When the eruption was over it was found that all of Perbuwatan and Danan, and about half of Rakata, had disappeared, leaving only an islet 2,677 ft. high, and in their place was a basin covered by 900 ft. of ocean water. The Polish Hat too was gone. As much as 200 ft. of ash and pumice fragments had accumulated on Verlaten and Lang Islands and the remaining southern part of Rakata. Careful study of this material revealed, however, that very little of it consisted of debris from the former central cones. The total volume of fragments of old rock was less than 10% of the volume of the missing part of the island. Most of the material was new magma brought up from depth, most of it distended into pumice by expansion of the gas it contained, or completely blown apart to form ash. Thus the evidence is overwhelming that the former volcanic cones were not blown into the air, as was at first believed, but that they sank out of sight as the top of the volcano collapsed due to lack of support resulting from the removal of a large volume of magma from the underlying reservoir. Other *calderas* throughout the world, such as that of Crater lake in Oregon and that formed during the 79 A.D. eruption of Vesuvius, have formed in the same manner.

One of the consequences of the collapse was the generation of a series of great sea waves (tsunamis, or tidal waves) that were recorded on tide gauges as far away as South America and Hawaii. The greatest was the wave that occurred just after the climactic explosion at 10 A.M. Aug. 27. That wave reached a height of 120 ft. and took the lives of 36,000 persons in coastal towns on the nearby shores of Java and Sumatra.

The eruption destroyed all life on the islands of the Krakatau group and covered them with a thick layer of sterile ash. This provided an excellent opportunity for study of the re-establishment of plant and animal life which began five years after the eruption.

For the next 44 years Krakatau was quiet, but on Dec. 29, 1927, new eruption started on the sea floor along the same line as the previous cones and about midway between the former vents of Danan and Perbuwatan. Jets of cinder and ash, accompanied by clouds of steam, rose from the sea surface. By Jan. 26, 1928, the growing cone had reached sea level and formed a small island, promptly named Anak Krakatau ("Child of Krakatau"). Activity continued, with many interruptions, until in 1953 the island had reached a height of 360 ft. above sea level. In the early 1960s it was still in eruption.

See J. W. Judd, "The Eruption of Krakatoa and Subsequent Phenomena," part i, *Report of the Krakatoa Committee of the Royal Society*, ed. by G. J. Symons (1888); 4th Pacific Science Congress, *Krakatau* (1929); H. Williams, "Calderas and Their Origin," *Bull. Dep. Geol. Univ. Calif.*, vol. 25 (1941). (G. A. M.)

KRAKEN, in Norwegian folklore, a sea monster, believed to haunt the coasts of Norway. The description given in 1752 by Norwegian bishop Pontoppidan, with the assertion that it darkened the water around it by an excretion, suggests that the myth was based on the appearance of a gigantic cuttlefish.

KRAKOW: *see* CRACOW.

KRALJEVO (known as RANKOVICEVO, 1945–62), a town and *srez* (district) in the people's republic of Serbia, Yugos., stands on the Ibar river 174 km. (108 mi.) S.S.E. of Belgrade by road. Pop. (1961) 26,770. Zica monastery, 3 mi. S.W., was built in 1219 for the first Serbian archbishop. In it the Serbian kings were crowned in the middle ages. Zica was partially damaged during World War II. The famous monastery of Studenica, 24 mi. S.W., lies under the Kopaonik mountain in beautiful scenery and consists of a group of timber and plaster buildings, a tall belfry and a diminutive church of white marble, founded in 1190 by King Stephen Nemanya, who himself turned monk and was canonized as St. Simeon. Studenica has the most valuable Serbian medieval frescoes (early 13th century). Kraljevo is situated in a fertile agricultural region. It has a factory for building railway coaches, and several other industries. During World War II it was the scene of the execution by the Germans, Oct. 17–22, 1941, of about 2,300 men. (V. DE.)

KRAMATORSK, a town of Donetsk *oblast* of the Ukrainian Soviet Socialist Republic of the U.S.S.R., stands on the left bank of the Kazenny Torets, a tributary of the Northern Donets, 50 mi. N.N.W. of Donetsk city. Pop. (1959) 115,385. It developed in the late 19th century as a centre of the Donets basin industrial area. Its large metallurgical plant was completely reconstructed after World War II. It is a major producer of heavy machinery for iron and steel plants, as well as making heavy machine tools, mobile excavators and hydraulic presses. There are railway repair shops, ceramics works and coking and cement-making undertakings. Kramatorsk is linked by rail to Slavyansk, Konstantinovka and Artemovsk. (R. A. F.)

KRASNODAR (until 1920 YEKATERINODAR), a town and the administrative centre of Krasnodar *krai* in the Russian Soviet Federated Socialist Republic of the U.S.S.R., stands on the right bank of the navigable Kuban, 142 mi. from its mouth. Pop. (1959) 313,110. Founded in 1793 as a Cossack guardpost on the Kuban frontier, it developed as a military town. In 1867, after the end of the Caucasian wars, it became a civilian town and centre of the fertile Kuban region, this latter role increasing after the coming of the railways in the 1890s. It was occupied by German troops in 1942–43. Its present industries are largely concerned with processing the agricultural products of the north Caucasus area, especially meat, flour, butter and fats, tobacco, leather (for footwear and saddlery) and wool. There are also considerable engineering industries, producing machine tools, petroleum machinery and spare parts for agricultural equipment. Petroleum is refined there and lubricants produced. Krasnodar is the focus of a network of railways, tapping its region and linking it to Novorossisk, Rostov, Volgograd and Stavropol. Its cultural establishments include four teaching institutes (pedagogic, medical, agricultural and food industry), research institutes for agriculture, tobacco, vegetable fats, canning and the petroleum industry, and several theatres and museums. (R. A. F.)

KRASNODAR KRAI (KRASNODARSKI KRAI), in the Russian Soviet Federated Socialist Republic of the U.S.S.R., occupies the western part of the north Caucasus area, along the shores of the Black sea and Sea of Azov, and extends from the crestline of the Caucasus in the south to the Gulf of Taganrog in the north. Its area of 32,278 sq.mi. includes the Adygei Autonomous Oblast (*q.v.*). The northern two-thirds of the *krai* forms an extensive plain, crossed by the lower Kuban and a number of lesser rivers, all flowing into the Sea of Azov. The plain is in steppe vegetation, developed on rich chernozem soils, but the natural grass cover has almost entirely disappeared under the plow. Along the Azov shore are widespread salt marshes and lagoons. The southern part of the *krai* is occupied by the western end of the Caucasus mountains, running parallel to the Black sea coast and dropping in height westward from Mt. Psysh (12,424 ft.), the highest peak. Along the Black sea is a narrow coastal strip. The mountains are covered by deciduous forest on the lower slopes, giving way higher up to conifers and alpine meadows. The climate of the plain is marked by high summer temperatures, averaging about 24° C. (75° F.) in July, and cool winters of about −1° C. (30° F.). The coastal strip has a nearly subtropical climate, with warm winters (6° C.

[43° F.] in January at Sochi), and there are many seaside resorts. Rainfall on the plain decreases eastward, Krasnodar town having 26 in. a year and the country farther east about 15 in. The seaward side of the mountains has a high rainfall, 55 in. and more.

The *krai* was established in 1937 after a number of administrative changes, and corresponds roughly with the former territory of the Kuban Cossacks. As the name *krai* ("edge") implies, this was a frontier area of Russia in the 19th century, during which most of it was annexed and settled. Its fertile soils now support a relatively dense population of 116 persons per square mile. The 1959 census gave the population as 3,762,499, of whom 1,462,630 (39%) were urban and 2,299,869 rural. The largest of the 20 towns and 26 urban districts are the administrative centre of Krasnodar, Armavir, the resort of Sochi, the port of Novorossisk, the Adygei administrative centre of Maikop, Yeisk and Kropotkin. Apart from the Adygei the population is mostly Russian and Ukrainian, with some Armenians, Belorussians and Tatars.

The *krai* is a major agricultural region. The plain is divided into very large state and collective farms, producing grains, especially winter wheat. Toward the south, winter barley is important. Maize (corn) and spring barley are chiefly grown for fodder. In the lower Kuban area much swamp has been reclaimed and given over to rice growing. Sunflowers, tobacco, sugar beets and flowers for perfume are the main industrial crops. Vegetables, especially melons, tomatoes and potatoes, are widespread, but are of particular importance along the Kuban. The lower foothill slopes of the Caucasus are covered by orchards and vineyards. Large numbers of cattle, pigs and poultry are kept. The processing and canning of agricultural products form the main branch of industry, but petroleum exploitation is important in several areas, notably round Maikop and on the Taman peninsula, and timber working is well developed in the mountains. (R. A. F.)

KRASNOVODSK, a Caspian port of the Turkmen Soviet Socialist Republic of the U.S.S.R., is situated on the Krasnovodsk gulf (Krasnovodski Zaliv) 320 mi. W.N.W. of Ashkhabad town. Pop. (1959) 39,272. It is an important transshipment centre and terminus of the Ashkhabad railway (the westernmost section of the former Central Asian railway). The main incoming goods handled are wheat and timber, and outgoing goods cotton, oil products, fish and ozocerite. It has an oil refinery (linked by pipeline with Nebit-Dag), ship-repairing facilities and building materials factories. There is a considerable food industry (fish, meat and soft drinks). The town was established in 1869 and developed after the extension of the railroad. It was the administrative centre of the former Krasnovodsk *oblast* which existed from 1939 to 1947 and was again formed in the 1950s before being abolished. (G. E. Wr.)

KRASNOYARSK, a town of the U.S.S.R. and the administrative centre of Krasnoyarsk *krai* of the Russian Soviet Federated Socialist Republic, stands on both banks of the Yenisei, where the Trans-Siberian railway crosses the river, at the confluence of the left bank, Kacha, and right bank, Bazaikha. Pop. (1959) 412,375. One of the earliest Russian settlements in Siberia, it was founded as the fort of Krasny Yar in 1628 on the left bank. To this point on the great navigable routeway of the Yenisei the Moscow Post road was established in 1735 and the settlement developed steadily as the chief town of central Siberia. The 19th-century discovery of gold and the opening up of the area for agriculture accelerated its growth. In 1822 it became the seat of the Yenisei *guberniya* (province) and in the 1890s the Trans-Siberian railway reached the town. Krasnoyarsk then rapidly developed and spread on to the right bank, extending for about 18 mi. along the river. Its industrial growth was considerably stimulated by the evacuation to the town in World War II of many factories from the west. Most of the newer and larger plants are on the right bank. Heavy machinery such as cranes, mining, agricultural and transport equipment and electricity pylons are produced and there are shipbuilding and repair yards, railway repair shops, cementmaking, timber working and food industries. On the Yenisei at Krasnoyarsk one of the largest hydroelectric stations in the world was under construction in the 1960s. (R. A. F.)

KRASNOYARSK KRAI (Krasnoyarski Krai), in the Russian Soviet Federated Socialist Republic of the U.S.S.R., covers an area of 927,258 sq.mi. in central Siberia, extending from the Severnaya Zemlya archipelago in the Arctic ocean to the Sayan mountains in the south. It includes the greater part of the Yenisei basin, the Yenisei itself flowing from south to north along the west of the *krai*. Much of the *krai* is taken up by the central Siberian plateau, covered by extensive basalt flows and cut into by the broad valleys of the Nizhnaya and Podkamennaya Tunguska rivers. The plateau attains its highest elevation in the Putoran mountains of the northwest (Mt. Kamen, 6,683 ft.). North of the plateau is the north Siberian lowland, beyond which are the hills of the Taimyr peninsula. Cape Chelyuskin on the peninsula is the most northerly point of the Eurasian continent. In the far south of the *krai* are the east and west Sayan mountains, enclosing the Minusinsk basin. A narrow strip all along the western bank of the Yenisei belongs to the flat, swampy west Siberian lowland. The vast area of the *krai* covers a wide range of soils and vegetation, from the tundra and thin gley (glei) soils of Taimyr to the steppes and black earths of the Minusinsk basin. The greater part, however, comprises podsol soils and taiga forest, dominated by larch, stone pine, pine and birch, which becomes sparser and more stunted to the north. The whole *krai* has a severely continental climate. January average temperatures are −24° C. (−12° F.) at Yeniseisk and −27° C. (−17° F.) at Turukhansk, while respective July averages are 18° (64°) and 15° (59°). Rainfall, except on the Sayan and Putoran mountains, is low—10–16 in. a year.

The *krai,* which was formed in 1934 from East Siberian territory, has three national areas: the Khakass Autonomous Oblast in the south and the Evenki and Taimyr National Okrugs which cover almost all the plateau and the Taimyr peninsula and adjacent mainland islands. The population (1959) of 2,615,098 is almost wholly concentrated in the south on the steppe lands along the Trans-Siberian railway and in the Minusinsk basin. The Evenki and Taimyr *okrugs* are very thinly inhabited (0.07 persons per square mile). About half the population (1,295,828) is urban, in 16 towns and 48 urban districts. The largest of these are Krasnoyarsk (the administrative, economic and cultural centre), Kansk, Achinsk, all on the Trans-Siberian railway, the northern mining town of Norilsk and the Yenisei river port of Igarka. The greatest economic importance of the territory lies in its mineral wealth and timber resources. Gold is found in the southwest of the plateau, nickel, cobalt, platinum and copper at Norilsk, iron ore around Abakan, uranium along the middle Yenisei, lignite at Kansk, Achinsk and elsewhere, mica at Kansk, antimony, bauxite and molybdenum elsewhere. Timber working is carried on at most towns along the Trans-Siberian and the Yenisei, notably at Krasnoyarsk and Igarka. Agriculture is limited to the south, where it is dominated by grain crops, chiefly wheat. From Minusinsk the Us highway starts, which crosses the western Sayan mountains into the Tuva Autonomous Soviet Socialist Republic. Apart from the south, the *krai* is almost devoid of all-weather communications. For much of it the only route is the Yenisei, which is navigable for steamers below Minusinsk for five months of the year in the upper and middle courses and for about three months in the lower course. (R. A. F.)

KRASZEWSKI, JOZEF IGNACY (1812–1887), Polish novelist, poet, literary critic, dramatist, historian and journalist, whose works in book form alone fill 641 volumes, was born in Warsaw on July 28, 1812. He attended Wilno university, was imprisoned in Dec. 1830 on a charge of conspiracy against the Russian government and released in March 1832. He next lived in Volhynia, 1834–59, dividing his time between writing, agriculture and social work. From 1841 he edited and from 1849 also published in Wilno the review *Ateneum* till 1852. Between 1859 and 1862 he edited the Warsaw daily *Gazeta Codzienna* (later *Gazeta Polska*). Forced to leave in Jan. 1863 by Count Aleksander Wielopolski, the head of the civil government, whom he had offended in a leading article, Kraszewski settled in Dresden. In 1883 he was arrested on a charge of espionage on behalf of France and in 1884 sentenced to three and one-half years' imprisonment in the

Magdeburg fortress. Released on bail in 1885 he went to Switzerland, died in Geneva on March 19, 1887, and was buried in Cracow. Kraszewski's works include nine novels dealing with peasant life, in which he approaches the problem of serfdom from an ethical standpoint and prepares the ground for emancipation and endowment with land, seven historical novels set against the background of Poland under the Saxon kings, and a cycle of 29 novels covering Polish history in chronological order, written between 1876 and 1886.

See P. Chmielowski, *Józef Ignacy Kraszewski* (1888). (L. R. Lr.)

KRAUS, KARL (1874–1936), Austrian journalist, critic and poet, who as a satirist has been compared with Juvenal and Jonathan Swift, was born on April 28, 1874, at Gitschin (Jicin, Czech.). He attended the University of Vienna and attracted notice by two brochures, *Die demolierte Literatur* (1896) and *Eine Krone für Zion* (1898). In 1899 he founded the periodical *Die Fackel;* at first largely, and later entirely, written by him, it achieved fame as the mouthpiece of a scathing critic of Austrian society. Its publication ceased only with the rise of national socialism in Austria (1936). His satire was constantly directed against the Austrian middle classes and the liberal press, but later he paid less attention to topical political issues and turned to the deeper problem of preserving the best in the Austrian cultural tradition. He saw that the age had lost its bearings and in language that rises to prophetic and even apocalyptic heights he foretold the coming European catastrophe. His position in German literature is unique. His satire is best seen in his collected essays (*e.g., Sittlichkeit und Kriminalität,* 1908; *Literatur und Lüge,* 1929; and *Die Sprache,* 1937) and in his brilliant antiwar drama, *Die Letzten Tage der Menschheit* (1918). Kraus has come to be recognized both as a master of language and aphorism and as a visionary who waged a relentless though hopeless battle against the disintegration of Austrian and European society. His other works include *Sprüche und Widersprüche* (1909); *Pro domo et mundo* (1912); *Nachts* (1918); and the drama *Wolckenkucksheim* (1923). He died in Vienna on June 12, 1936.

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(W. I. L.)

KRAUSE, KARL CHRISTIAN FRIEDRICH (1781–1832), German philosopher, whose panentheism attracted a considerable school of followers not only in Germany but also in Spain, was born at Eisenberg, in eastern Thuringia, on May 6, 1781. He taught as *Privatdozent* in various German cities from 1802 onward and died at Munich on Sept. 27, 1832.

For Krause, God, intuitively known by conscience, is not a personality (which implies limitations) but an essence which contains the universe within itself. This system he called panentheism, because it asserts that God contains the universe without being exhausted in it. Man and the universe form an organic whole made in the image of God, and the form in which the life of the whole develops is right, or the perfect law. Ideal society results from the widening of the organic operation of this principle from the individual man to small groups of men and finally to mankind as a whole. (Krause developed this concept of a *Menschheitsbund* ["union of mankind"] from his idea of freemasonry.) The differences disappear as the inherent identity of structure predominates in an ever-increasing degree, and in the final unity man is merged in God.

Krause's principal works are *Entwurf des Systems der Philosophie* (1804); *System der Sittenlehre* (1810); *Das Urbild der Menschheit* (1811; Eng. trans., *The Ideal of Humanity,* 1900); *Abriss des Systems der Philosophie,* 3 vol. (1825–28); *Vorlesungen über das System der Philosophie* (1828); and *Vorlesungen über die Grundwahrheiten der Wissenschaft* (1829).

See also his *Briefwechsel,* 2 vol. (1902–07); H. C. von Leonhardi, *Krauses Leben und Lehre* (1902).

KREBS, SIR HANS ADOLF (1900–), British biochemist, born in Hildesheim, Ger., on Aug. 25, 1900, won the 1953 Nobel prize for medicine and physiology jointly with Fritz Lipmann (*q.v.*) for his historic contributions to biochemistry and especially for his discovery of the citric-acid cycle in the metabolism of carbohydrates. He obtained the M.D. degree at Hamburg university in 1925.

In 1933 Krebs went to Great Britain as a refugee and was given a Rockefeller grant which enabled him to work as a research student at Cambridge. Two years later he became a lecturer at Sheffield university and in 1945 he was appointed professor of biochemistry, and in 1954 director of the Medical Research council unit for research in cell metabolism. He was elected a fellow of the Royal society in 1947, and became Whitley professor of biochemistry at Oxford university in 1954. In 1932, while he was working at Freiburg, he introduced what is known as the Krebs theory of the cyclic formation of urea, and in 1937 he announced his second major discovery, that of the citric-acid cycle, which is concerned with the oxidation of carbohydrate, fat and protein, and is the chief source of metabolic energy. In addition to these brilliantly conceived researches, he was responsible during World War II for the conduct of experiments on vitamin deficiencies.

Krebs was knighted in 1958. (W. J. Bp.)

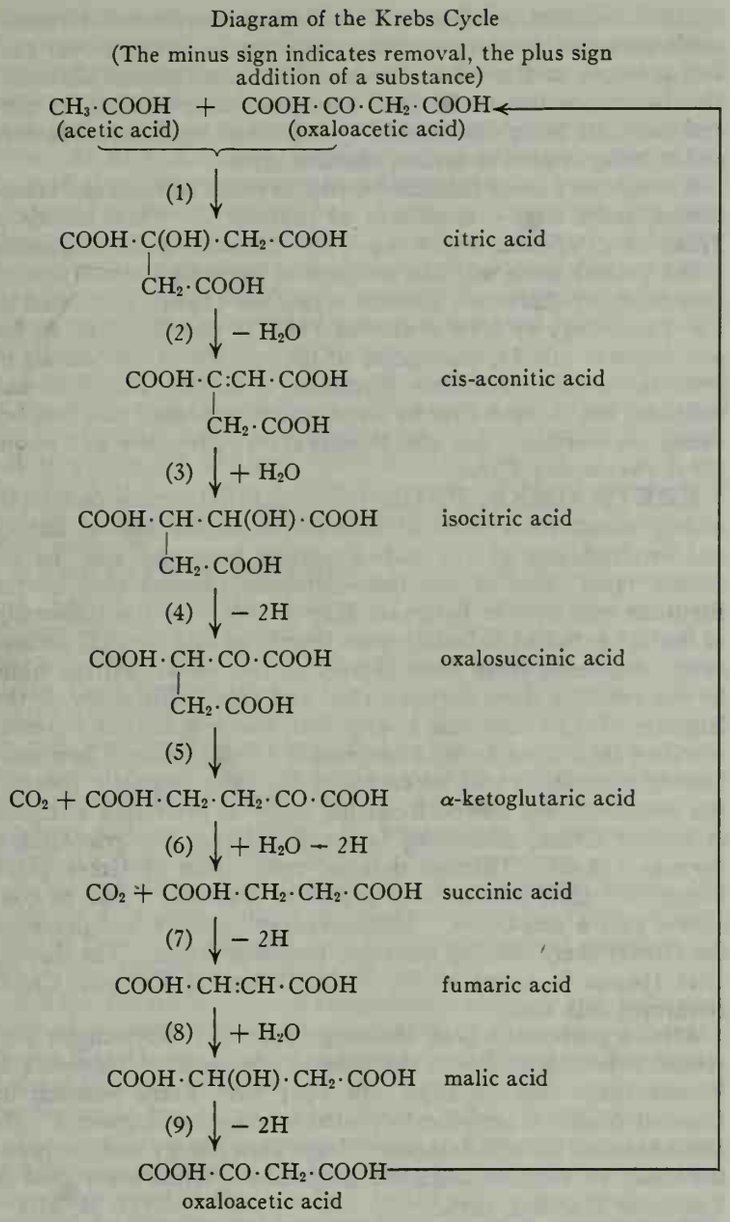
KREBS, JOHANN LUDWIG (1713–1780), German organist and composer, born at Buttelstedt, Thuringia, on Oct. 10, 1713. He studied music first with his father and in 1726 entered the Thomasschule at Leipzig, where he became a pupil of J. S. Bach. He later held posts as organist at Zwickau, Zeitz and at Altenburg, where he died in Jan. 1780. Krebs's organ music is composed in the forms used by Bach and leans heavily on his master's style. It is technically very accomplished and includes some especially fine trio sonatas. He also wrote sonatas for flute and harpsichord and some sacred vocal music. (C. P. Co.)

KREBS CYCLE, also called the "citric acid cycle" or the "tricarboxylic acid cycle," is a series of chemical reactions by which acetic acid is oxidized in living organisms. The biological oxidation (or "combustion") of foodstuffs—proteins, carbohydrates and fats—passes through many stages. The earlier stages represent a partial oxidation and in the case of all three foodstuffs they lead to the formation of acetic acid ($CH_3{\cdot}COOH$). The subsequent oxidation of acetic acid to carbon dioxide and water—through the Krebs cycle—is thus the terminal stage of the chemical processes by which cells burn and obtain energy from foodstuffs. Acetic acid does not appear and react in the free form but is attached to the sulfur atom of coenzyme A.

The oxidation of acetic acid is completed in nine main steps, which are shown in the diagram. The first is the condensation of acetate with oxaloacetate, giving citrate. The second and third steps cause a rearrangement of citric acid to isocitric acid, with cis-aconitic acid as an intermediate stage. Isocitric acid gives up two hydrogen atoms in step 4, forming oxalosuccinic acid, which in turn loses carbon dioxide in step 5 and forms α-ketoglutaric acid. Step 6 is the oxidation of the latter to succinic acid, which loses two hydrogen atoms in step 7 to form fumaric acid. This is followed by the hydration (addition of water) of fumaric acid, giving malic acid in step 8. The last step (9) is the loss of two hydrogen atoms by malic acid. This reaction completes the cycle and regenerates oxaloacetic acid to start another turn of the cycle.

Inspection of the diagram shows that the di- and tricarboxylic acids are interconverted through a cyclic pathway. One complete turn of the cycle causes the disappearance of one molecule of acetic acid and the formation of two molecules of CO_2 and of four pairs of hydrogen atoms. These are formed in the steps 4, 6, 7 and 9 and in further processes react with the oxygen of the air to form water. The over-all effect of the cycle is therefore the complete combustion of one molecule of acetic acid. The cycle contributes about two-thirds of the total oxidations in living cells. The remaining third comes from the reactions that convert the foodstuffs to acetic acid. The oxaloacetate required for the initiation of the cycle acts like a catalyst, as it is not used up but regenerated. The relatively small amounts of oxaloacetate that are needed for maintaining the cycle are either formed from aspartic or glutamic acid contained in the proteins of food or are synthesized in various tissues from pyruvate and carbon dioxide.

The cycle was first formulated in 1937 by Hans Adolf Krebs



(*q.v.*). Its occurrence has been established in numerous types of cells not only in higher and lower animals but also in plants, bacteria and molds. It is one of the features of the chemistry of cells that is shared by all types of life.

The reactions of the cycle, in combination with others, may also serve to synthesize the carbon skeletons of amino acids, in particular of glutamic acid, which is formed from α-ketoglutarate by reductive amination. Glutamic acid in turn is the parent substance of other amino acids in both higher and lower organisms.

Each step of the cycle requires a specific enzyme to catalyze the chemical changes. The set of enzymes for the whole cycle, including further enzymes that are concerned with the proper utilization of the energy liberated, is located in special compartments of the cell—the mitochondria, the "powerhouses" of the cell. They are usually rod-shaped, highly organized structures about 1/15,000 in. long in which the enzymes are so arranged that the reaction sequence occurs smoothly and rapidly and the energy can be utilized efficiently. (For later advances in the steps and compounds in the tricarboxylic acid cycle, *see* METABOLISM.)

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KREFELD (CREFELD), a town of Germany, *Land* of North Rhine-Westphalia, which after partition of the nation following World War II became part of the Federal Republic of Germany. It is situated 7 km. (4½ mi.) W. of the Rhine, 25 km. (15½ mi.) N.W. of Düsseldorf by road. Pop. (1961) 213,104. The town stretches in an east-west direction, with Ürdingen, a second city centre, lying on the banks of the Rhine. The town centre was planned by A. von Vagedes in 1819 and laid out as a rectangle bounded by promenades, the streets, where feasible, conforming to a grid plan. Several suburbs were incorporated from 1901 to 1929, and in 1929 also the town of Ürdingen, thus accentuating the east-west development.

Early remains include a Roman fortress and cemetery in Gellep (3rd–7th centuries A.D.). Among the historic buildings are the Catholic churches of Fischeln and Hohenbudberg (12th century); St. Peter's church, Ürdingen; the elector of Cologne's castle, Linn (*c.* 1200, but most of the surviving work 14th century), which was made into a museum; the hostelry chapel at Ürdingen (1403); the town hall (1790; extended 19th and 20th centuries); and the old and new town halls in Ürdingen. Other buildings include the Kaiser Wilhelm museum, the Museum Haus Lange and the textile museum housing a tapestry collection. There is a monument to Karl Wilhelm, composer of *Die Wacht am Rhein.* Krefeld is famous for its technical schools, which give instruction in textile manufacture and engineering. Railways run from Krefeld to Düsseldorf, Cologne, Mönchengladbach, the Ruhr towns and to the Netherlands. Steel, machinery, textiles, clothing, chemical products, silks, televisors and railway equipment are made, and printing and dyeing are carried on.

The emperor Charles IV granted Krefeld civil rights in 1373 at the instance of Dietrich, count of Mörs. During 1600–1702 it belonged to the house of Orange, and from 1702 it was Prussian. On June 23, 1758, Ferdinand of Brunswick defeated the French under Clermont at Krefeld during the Seven Years' War. Manufacture of the famous silks and velvets of Krefeld was begun by Mennonite refugees in the 17th–18th centuries. The town became part of Germany in 1871 and after World War I it was occupied by the Allies (1918–26). In World War II it was severely bombed and was captured by the Allies in March 1945. (GU. R.)

KREHBIEL, HENRY EDWARD (1854–1923), U.S. music critic, was born at Ann Arbor, Mich., March 10, 1854. After studying law in Cincinnati, O., he became music critic of the *New York Tribune* (1880–1923). He championed the cause of Wagner in the U.S. and also the music of romantic composers, but was unalterably opposed to the modern school. His early criticisms are contained in *Review of the New York Musical Season* (5 vol., 1885–90). He wrote a number of books on music and was responsible for the first publication in English of A. W. Thayer's *Life of Ludwig van Beethoven,* which he revised and completed (1921). He died in New York city on March 20, 1923. (N. SY.)

KREISLER, FRITZ (1875–1962), Austrian-born violinist known for the beauty of his tone and as a composer of short violin pieces, was born on Feb. 2, 1875, in Vienna. He studied with Joseph Hellmesberger and won the gold medal at the Vienna conservatory at the age of ten, after which he studied with Léo Delibes and Joseph Massart at the Paris Conservatoire. After a successful tour of the United States (1888–89) he returned to Vienna to study medicine, and during the period of his military service was an officer of a Uhlan regiment.

Kreisler reappeared as a violinist in 1898 and became one of the most successful virtuosos of his time. The technical features of his playing were an intensive vibrato and an economy in bowing. In 1910 he gave the first performance of Elgar's violin concerto, dedicated to him. After 1915 he lived mainly in the U.S., including in his programs his many short pieces, among them his *Caprice viennois* and *Schön Rosmarin.* His *Classical Manuscripts,* published as arrangements of works by Vivaldi, Porpora, Pugnani and others, were admitted in 1935 to be works of his own. He also wrote cadenzas for concertos of Mozart, Beethoven and Brahms and many violin transcriptions. He was naturalized as a U.S. citizen in 1943. He died on Jan. 29, 1962, in New York city.

See L. P. Lochner, *Fritz Kreisler* (1950); Carl Flesch, *Memoirs,* trans. and ed. by H. Keller (1957).

KREMENCHUG, a town in the Poltava *oblast* of the Ukrainian Soviet Socialist Republic of the U.S.S.R., stands on the left bank of the Dnieper, where it is crossed by the Kharkov-Kirovo-

grad railway, 60 mi. S.W. of Poltava city. Pop. (1959) 86,569. The town was founded as a fortress during the settlement of the left bank Ukraine in the 16th century and became the centre of an agricultural area, processing farm products. Its proximity to Krivoi Rog iron ore and Donets basin coal led to the development of large metallurgical industries. Badly damaged during World War II and held by the Germans (1941–43), it has been reconstructed and modernized. Steel castings, rolling stock, harvesting combines and mining machinery are made. Iron ore deposits have been discovered in the vicinity of the town. Light industries include flour milling and other food processing, tobacco making and the production of cloth, clothing, footwear and leather goods. Part of the industry is located in the suburb of Kryukovo, across the Dnieper. It is an important river port, transshipping particularly timber for Kharkov. A large barrage and hydroelectric plant on the Dnieper at Kremenchug was completed in 1959, forming a reservoir which extends upstream for 150 mi. The town is a railway junction, and is linked with, among other places, Aleksandriya, Romodan and Poltava. (R. A. F.)

KREMLIN (Russian KREML, formerly KREMNIK), the central fortress in medieval Russian cities, usually situated on the high bank of a river or in the angle formed by the confluence of two rivers, and separated from the surrounding parts of the city by a wooden—later stone or brick—wall with ramparts, a moat, towers and battlements. For better military defense and adaptation to topography the walls were usually built with slight angular breaks, so the kremlin had the form of an irregular polygon in plan.

Several important cities such as Moscow, Pskov, Novgorod, Smolensk, Rostov, Suzdal, Yaroslavl, Vladimir and Nizhni-Novgorod, which served as the capitals of principalities, were built around an old kremlin. Inside the kremlin were located the cathedral, palaces for the prince and for the bishop, buildings for governmental offices and for the princely retinue, as well as stores of munitions and provisions in case of siege. These buildings were arranged in a free, irregular pattern; their skyline was dominated by the cathedral and the towers of the walls. *See* also Moscow. (S. G. PU.)

KREMSIER: *see* KROMERIZ.

KRENEK, ERNST (1900–), Austrian-born composer known for his opera influenced by jazz, *Jonny spielt auf,* was born in Vienna on Aug. 23, 1900. He was a pupil there of Franz Schreker. In 1920 he followed Schreker to Berlin where his first opera, *Zwingburg,* was produced in 1924. He then became musical assistant at the opera houses of Cassel (1925–27) and Wiesbaden (1927–28). *Jonny spielt auf,* completed at Wiesbaden, was produced at Leipzig in 1927 and was an immediate international success. In the following year Krenek returned to Vienna, adopted Arnold Schoenberg's 12-note method of composition, and in 1930 began his opera *Karl V,* produced in Prague in 1938. The same year he emigrated to the U.S., establishing himself as a teacher of composition at Vassar (1939–42) and Hamline (1942–47). He became a U.S. citizen in 1945 and in 1947 settled in California. There he continued to experiment widely with many styles and techniques of composition, including those of electronic music, and produced a wide range of orchestral, choral and chamber works. (Co. MA.)

KRETSCHMER, ERNST (1888–1964), German psychiatrist, noted for his attempts to correlate body build and constitution with character and mentality, was born on Oct. 8, 1888, in Wüstenrot near Heilbronn, Baden-Württemberg. After studying medicine at the universities of Tübingen and Munich, he became *Privatdozent* (1918) and associate professor (1923) in psychiatry and neurology at the University of Tübingen and then professor and director of the psychiatric clinic of the University of Marburg (1926). After 1946 he held the chair of psychiatry and neurology at Tübingen. He died there on Feb. 8, 1964.

Kretschmer is perhaps best known for his *Körperbau und Charakter* (1921; 20th ed., 1947), translated as *Physique and Character* (1925), in which he presents his theory of the correlation of body types and mentality. His somatotypes are the pyknic, leptosomic (or asthenic) and athletic, which represent the constitutional predestination of mental phenomena, although he makes allowance for the conditioning influence of individual experience. Kretschmer's classifications represented a considerable advance over earlier attempts at the establishment of a constitutional anatomy. He also emphasizes the ancient concept of temperament, or general mood, as being conditioned by individual biochemical factors and as being related to certain physical types.

Kretschmer's other published works, in many editions and translations, range over a large area of psychiatry. They include a *Textbook of Medical Psychology; Der Sensitive Beziehungswahn* (1918), which deals with the problem of paranoia and the psychiatric study of character; *Geniale Menschen* (1929), translated as *The Psychology of Men of Genius* (1931); and *Hysterie, Reflex und Instinkt* (1923), descriptive of his concept of the genesis of hysteria, in which symptom formation is initially conscious and volitional but is taken over by automatic mechanisms and thus becomes unconscious. *See* also PERSONALITY: *Structure of Personality: Personality Types.* (I. V.)

KRETSCHMER, PAUL (1866–1956), German philologist mainly known for a series of monographs on the earliest history and interrelations of the Indo-European languages and the influence upon them of non-Indo-European tongues such as the Etruscan, was born in Berlin on May 2, 1866. At the University of Berlin he studied Indo-European linguistics and classical archaeology, combining these fields in his first two works, written while he was teaching there between 1891 and 1896. His study of the language of the Greek vase inscriptions, *Die griechischen Vaseninschriften ihrer Sprache nach untersucht* (1894), showed how nonliterary materials could be exploited for their linguistic content. His next book was an epoch-making study of pre-Greek elements in ancient Greek, *Einleitung in die Geschichte der griechischen Sprache* (1896). Through detailed comparison of Greek place names with their counterparts in ancient Anatolia, Turk., he concluded that a non-Greek, "Mediterranean" culture had preceded the Greeks there, leaving extensive linguistic traces. The discoveries (begun in 1900) of Sir Arthur Evans at Knossos, Crete, confirmed this view.

After a professorship at Marburg (1897–99), Kretschmer succeeded Friedrich Müller in the chair of comparative linguistics at Vienna from 1899 to 1936. In 1907 with Franz Skutsch he founded *Glotta,* a periodical devoted to classical linguistics. He also interested himself in modern Greek dialectology and furthered the study of German linguistic geography. Kretschmer died in Vienna on March 9, 1956. (G. M. M.)

KRETZER, MAX (1854–1941), German novelist, was born at Poznan on June 7, 1854, the son of an innkeeper. Kretzer was self-educated: he first worked in a factory, and his ability to describe working-class conditions and problems is the distinguishing quality of his best-known novel, *Meister Timpe* (1888), which describes the ousting of the independent artisan by the rapid developments of industrialization in Berlin. Kretzer was influenced by Émile Zola in his application of the Naturalistic view of literature and life to the Berlin environment with which he was familiar, and he was also an admirer of Charles Dickens. Although his many other novels (he wrote over 30) had considerable topical interest in the last two decades of the 19th century, they have been little discussed since then. He died in Berlin on July 15, 1941.

See G. Keil, *Max Kretzer: a Study in German Naturalism* (1928). (H. M. WA.)

KREUGER, IVAR (1880–1932), Swedish financier, the "match king," was born at Kalmar on March 2, 1880. Having practised as a civil engineer in the United States and in South Africa he returned to Sweden and in 1913, on the basis of two match firms in his family, founded a match company.

During World War I, the whole of the Swedish match industry, under Kreuger's initiative, was concentrated into a single firm, the Swedish Match company (Svenska Tändsticks AB), with Kreuger himself as managing director. When the war was over, Kreuger, with the backing of capital that was largely American, launched upon a series of highly speculative financial operations. The aim of these was primarily to acquire match factories and to secure a monopoly of the production and marketing of matches in countries outside Sweden. After 1925 the great majority of the

transactions took the form of long-term dollar loans by Kreuger to countries short of foreign currency in return for agreements granting such monopoly rights. Since matches were in the nature of necessities and the demand for them was consequently inelastic, these rights, even in quite poor countries, could be extremely valuable. At first, Kreuger's business tactics were very successful; in 1928 the Kreuger concern probably controlled more than half the world production of matches. Expansion continued even after the crisis of 1929: with Germany, for example, Kreuger concluded a monopoly agreement in consideration of a loan of $125,000,000. As the world slump developed, however, the liquidity position of the concern became more and more strained, and by 1931–32 the situation was critical in the extreme.

Kreuger shot himself in Paris on March 12, 1932; afterward it was discovered that both the current assets of the business and the great profits it had previously recorded were largely fictitious, and that accounts had been falsified. The concern, of which the Swedish Match company and the International Match corporation had been components, disintegrated and many of the companies went bankrupt. (E. F. Sd.)

KREUTZER, RODOLPHE (1766–1831), French composer and violinist, one of the founders of the French school of violin playing, was born at Versailles, Nov. 16, 1766. He was a pupil of Anton Stamitz and in 1795 was appointed professor of the violin at the Paris Conservatoire. In 1797 he toured Europe, rousing great enthusiasm by his playing. In 1798 he was in Vienna, where he met Beethoven, who dedicated to him his sonata for violin and piano, Opus 47, written for the violinist George Bridgetower and known as the Kreutzer sonata. Kreutzer did not appreciate the work and never played it. He wrote about 40 operas, several ballets, 19 violin concertos and many chamber works.

Kreutzer's works for students of his instrument include the *Méthode de violon,* written in collaboration with Pierre Baillot, and the *Études ou caprices,* which remain standard exercises for the violin. He died at Geneva, Jan. 6, 1831.

KREUZNACH (Bad Kreuznach), a resort and industrial town of Germany which after partition of the nation following World War II was in the *Land* (state) of Rhineland-Palatinate, Federal Republic of Germany. It lies on the Nahe, a tributary of the Rhine, 15 km. (9 mi.) S. of Bingen. Pop. (1961) 35,101.

The foundation of the town goes back to Roman times; the ruins of a Roman fortification, the Heidenmauer, and various antiquities have been found in the vicinity. In the 9th century there was a castle of the Carolingian kings, and bridgeworks date back to 1200. In 1437 the town became part of the Palatinate.

After the congress of Vienna in 1815, the town was ceded to Prussia. It became a popular spa with warm springs, the chief of which is on the island of Badewörth. The leading industries are the manufacture of optical instruments, and leather, machine and beverage industries.

KREVE-MICKIEVICIUS, VINCAS (1882–1954), Lithuanian poet, philologist and playwright whose mastery of style in verse and prose gave him a foremost place in Lithuanian literature, was born at Subartonys, Merkine, on Oct. 19, 1882. He studied literature, philology and philosophy in Kiev, Lvov and Vienna and taught literature in Baku. After serving as Lithuanian consul in Azerbaijan he became professor of Slavonic languages and literature at Kaunas university (1922–39), and later at Vilnius university. He went into exile in 1944, changed his name to Vincas Kreve, and from 1947 was professor at the University of Pennsylvania. He died at Marple township, Pa., on July 7, 1954.

Kreve became internationally known by his collection and publication of Lithuanian folk songs (*Dainos*). In his plays national feeling suppressed by foreign rule finds expression and this won him great popularity among Lithuanians. *Sarunas* (1911), *Dainavos kunigaikstis* (1923), *Skirgaila* (1925), *Likimo keliais* (1926, 1929) and *Karaliaus Mindaugo mirtis* (1935) show the past in romantic, idealistic colours; but he was also a realistic observer with deep understanding of human nature, as is shown in his village drama *Zentas* (1922) and particularly in his short stories portraying country people, such as those contained in *Sutemose* (1921) or *Po siaudine pastoge* (1922–23). He also adapted Lithuanian legends in *Dainavos salies senu zmoniu padavimai* (1912) and themes from oriental legends in *Rytu pasakos* (1930). Among his last works, *Dangaus ir zemes sunus* (1949) shows combined symbolism and realism and great power of expression in portraying Hebrew life in Herod's time.

See articles in *Studi Baltici,* vol. ii (1952). (J. A. A.)

KRIEGER, ADAM (1634–1666), German composer who is the most varied and original master of the German baroque song, was born at Driesen in Pomorze (later Drezdenko in west Poland) on Jan. 7, 1634. His musical education seems to have been an informal one in Leipzig; he is known to have visited S. Scheidt at Halle. From 1657 he was court organist to the elector of Saxony. He died at Dresden on June 30, 1666.

His compositions are mostly secular. His *Arien* (1657), often on his own texts, are for one to five voices and *continuo,* with instrumental ritornelli between stanzas. A further set (*Neue Arien,* 1667) was published after his death. (C. P. Co.)

KRIEGER, JOHANN PHILIPP (1649–1725), German composer born at Nürnberg, Feb. 25, 1649. After studying at Nürnberg and Copenhagen he was appointed organist at Bayreuth in 1670. He made a study tour of Italy, working under J. Rosenmüller in Venice and B. Pasquini in Rome. After a brief return to Bayreuth he was appointed *Kapellmeister* to the court of Halle and Weissenfels in 1680. He died at Weissenfels on Feb. 7, 1725.

Krieger was a prolific composer of sacred music, but of the 2,000 or so cantatas he is known to have written only about 80 are extant. He also composed suites of outdoor music for wind instruments and about 200 secular strophic *Arien.* Of Krieger's operas only a few arias remain. (C. P. Co.)

KRIEMHILD (Grîmhild): *see* Germanic Mythology and Heroic Legends; Nibelungenlied.

KRISHNA, the eighth avatar (incarnation) of Vishnu (*see* Vishnuism) and one of the most widely revered and most beloved Hindu gods. His cult is particularly prominent in literature and art. The basic sources of his mythology are the Mahabharata (*q.v.*) and the Puranas (*q.v.*). They relate how the demonic Kamsa usurped the throne of Mathura (in western Uttar Pradesh) and how, in order to overpower him, the preserver-god Vishnu was born in the Vrishni sept of the Yadava tribe as Krishna (literally "black," or "dark as a cloud"), son of Vasudeva and Devaki, the sister of Kamsa. Kamsa, hearing a prophecy that he should be destroyed by Devaki's child, attempted to slay her children, but Krishna and his elder brother, Balarama, were smuggled to Gokul where they were brought up by the leader of the cowherds, Nanda, and Yashoda, his wife.

As a child, Krishna performed many miracles and slew demons; he also humbled Indra (*q.v.*), whom the cowherds had ceased to worship at his instance. The cowherd Krishna became widely renowned as a lover and for the ecstatic delight with which the milkmaids, among them his sweetheart, Radha, followed the sound of his flute. At length, however, Krishna and his brother returned to Mathura to slay Kamsa. Afterward, finding the kingdom unsafe, he led the Yadavas to the western coast of Kathiawar and established his court at Dvaraka. He was revered as the Great Saviour and especially befriended the Pandava brothers; in the war between the Kauravas and the Pandavas he was both crafty counselor and supreme god, who taught the despondent Arjuna a new philosophy later epitomized in the Bhagavad Gita (*q.v.*). Later, at Dvaraka, a brawl broke out one day among the Yadava chiefs in which Krishna's brother and son were slain. As the god sat in the forest lamenting, a huntsman, mistaking him for a deer, shot at and killed him.

Krishna's personality is clearly a syncretic one, but it is not easy to separate and explain the different elements. Vasudeva-Krishna, a Vrishni prince who was presumably also a religious leader, had been elevated to the godhead by the 5th century B.C. His doctrine, later introduced in the Mahabharata as the Bhagavad Gita, emphasized renunciation by action (rather than renunciation of action) and devotion to a personal god. There was probably another Krishna who sponsored a new morality to supersede the ancient ideal of chivalry; a Krishna, son of Devaki, is mentioned in the Chandogya Upanishad as one who has learned to think of

man's life as a sacrifice. The cowherd Krishna is obviously the god of a pastoral community which abjured the Indra-dominated Vedic religion; his cult aimed at the sublimation of sensual love. The Krishna who emerged from the blending of these ideologies, though independent in origins and development, was ultimately identified with the All-God, Vishnu-Narayana, and hence considered his avatar. His cult preserved distinctive traits, which were celebrated by some of the later exponents of *bhakti*, among them Mira Bai, Chaitanya and Vallabhacharya. (R. N. D.)

KRISHNA, a district of Andhra Pradesh, India, is in general a flat country with a few low hills. Area 3,378 sq.mi. Pop. (1961) 2,076,956. The principal rivers are the Krishna (Kistna) and the Munyeru, Paleru and Naguleru (tributaries of the Gundlakamma and the Krishna). The Kolar lake, which covers an area of 21 by 14 mi., and the Romparu swamp receive the drainage on the north and south sides of the Krishna respectively. The Krishna delta system of irrigation canals, available also for navigation, connects with the Godavari system. The principal crops are rice, millets, pulses, oilseeds, cotton, tobacco and a little sugar cane. There are several cotton-ginning and pressing works; factories for sugar, cement, soap, pharmaceutical products and scientific instruments; and fruit-canning and rice-milling and cleaning works. The manufacture of chintzes at Masulipatnam, the district headquarters, has decayed, but cotton is woven for domestic use. Salt is evaporated, under government supervision, along the coast. Vijayavada (Bezwada) at the head of the delta is the central junction of the east coast railway system which crosses the inland portion of the district in three directions. Some sea-borne trade, chiefly coasting, is carried on at the open roadsteads of Masulipatnam, on the northeastern side of the delta, and Nizampatnam, on its western side. (B. S. R.)

KRISHNAGAR, a town and headquarters of Nadia district in West Bengal, India, lies on the left bank of the Jalangi river, 60 mi. N. of Calcutta. Pop. (1961) 70,440. It contains the residence of the maharaja of Nadia, and is also a centre of Christian evangelistic enterprise. A large fair is held there in March. Ghurni, a suburb, is famous for the clay figures and models of exquisite beauty made there. Krishnagar has two colleges affiliated to Calcutta university, a horticultural research station, the only one in West Bengal, a jute nursery and an agricultural training centre. (S. P. C.)

KRISHNA (KISTNA) **RIVER,** in southern India, rises near Mahabaleshwar (North Satara district, southeast of Bombay) in the Western Ghats, only about 40 mi. from the Arabian sea, and flows across almost the entire peninsula from west to east for a distance of 800 mi. before discharging into the Bay of Bengal. Its source is held sacred and is frequented by pilgrims. From Mahabaleshwar the Krishna runs southeastward in a rapid course into Mysore state. Turning eastward, it flows through the heart of Andhra Pradesh before turning southeastward between the Guntur and Krishna districts of that state. It enters the sea by two principal mouths and has built up a considerable and very fertile delta continuous with that of the Godavari to the north. The river is throughout too rocky and too rapid to allow navigation even by small native craft. The river derives its water from the monsoon rains, unlike the rivers of northern India which are fed also from the melting of Himalayan snows; consequently, it has proved more difficult to use the water for irrigation. At the head of the delta at Vijayavada is an important weir controlling water to irrigate the delta. There the river narrows between two hills of gneiss and then spreads over the alluvial plain. The channel there is 1,300 yd. wide. During the dry season the depth of water is barely 6 ft., but sometimes it rises by as much as 40 ft. Of the two main canals connected with the weir, that on the left bank is split into two branches, the one running 39 mi. to Ellore, the other 49 mi. to Masulipatnam. The canal on the right bank proceeds nearly parallel to the river, and also sends off two principal branches, to Nizampatnam and Comamur. The total length of the main channels is 349 mi. and the total area irrigated 716,500 ac. The main tributary of the Krishna is the Tungabhadra on which the huge scheme completed in 1957 supplies power to a large area of the Krishna basin. (L. D. S.)

KRISTIANSAND, a fortified seaport of Norway, chief town of Vest-Agder *fylke* (county) and seat of a Lutheran bishop. It is situated on a fjord of the Skagerrak at the mouth of the Otra river, 365 km. (227 mi.) S.W. of Oslo, on the Oslo-Stavanger railway. Pop. (1960) 27,941. The old centre of the town stands on a square peninsula flanked by the eastern and western harbours and the Otra. It was founded in 1641 and the fortress of Christiansholm was built about 1660. Oddernes church dates from around 1050. Kristiansand is an industrial centre with electrochemical industries, sawmills, woodpulp factories, shipbuilding yards and mechanical workshops. The port, with an ice-free harbour, is the largest on the south coast. There are good ship connections with other European ports; international air services operate from Kristiansand airport, at Kjevik. The numerous wooded islands in the vicinity are popular summer resorts. (A. U.)

KRISTIANSTAD, a town of southern Sweden, capital of Kristianstad *län* (county), is located on the Helge river, 97 km. (60 mi.) N.E. of Malmö. Pop. (1960) 25,763. Its seaport, Åhus, with an excellent harbour, is situated on the Baltic about 18 km. (11 mi.) S.E. Among Kristianstad's interesting buildings is the church of the Holy Trinity, built in 1618–28 to designs by the Dutch architect Hans van Steenwinkel the Younger, and having an interior in the Dutch Renaissance style. The Tyggården at Östra Boulevarden, built in 1615, was originally intended as a royal palace but became a royal stable instead; it is now a museum. Kristianstad is an industrial town with engineering works, flour and weaving mills, slaughterhouses and food-processing plants. It is an important road and railway centre and has air connections with Malmö and Stockholm. Kristianstad was founded in 1614 by Christian IV of Denmark who fortified it as part of his border defenses against Sweden. It was ceded to Sweden in 1658, retaken by Christian V in 1676 and again acquired by Sweden in 1678.

KRISTIANSUND, a town in Möre og Romsdal *fylke* (county), Nor., is located on three small islands off the North sea coast, 137 km. (85 mi.) W.S.W. of Trondheim by sea. Pop. (1960) 17,570; (1963 est.) 17,297. Almost destroyed by German bombardment in April 1940, it was rebuilt after World War II. It has a large trawler fleet, and exports large quantities of fish products, especially frozen. Evidences of habitation dating back to perhaps 8000 B.C. have been found in the vicinity (Fosna culture). Kristiansund was incorporated in 1742; many of its early inhabitants were Scotsmen who came to Norway to direct the curing and export of dried codfish, and there are still Scots family and street names in the town. It is known as Kristiansund N. to distinguish it from Kristiansand S. in south Norway. (Js. L.)

KRIVOI ROG, a town of Dnepropetrovsk *oblast* of the Ukrainian Soviet Socialist Republic, U.S.S.R., stands at the confluence of the Ingulets and Saksagan rivers, 85 mi. S. of Dnepropetrovsk city. Pop. (1959) 387,579 (almost double the pre-World War II figure). The town, with its suburbs, stretches in a long, narrow belt for nearly 28 mi. Founded as a village by Zaporozhye Cossacks in the 17th century, it had only 2,184 inhabitants in 1781. In 1881 iron ore deposits began to be worked there and a railway was built to the Donets basin (Donbass) in 1884. Since then Krivoi Rog has become a major Soviet iron mining town and the centre of one of the richest ore deposits in the world. The ores are mostly hematite, with an iron content up to 68%. In addition there are vast, unworked reserves of low-grade ferruginous quartzites. In and round the town are several ore-enriching plants and a very large iron and steel works. Coking, machine building (especially for the mining industry), the production of diamond drills, cement and foodstuffs and timberworking are also carried on. The city was occupied by the Germans during World War II and mines and industrial installations, put out of action or destroyed, have been reconstructed and modernized, usually on a larger scale. Most of the main shafts and factories are located in the Dzerdzhinski *raion* of the city. Railways radiating from Krivoi Rog distribute ore and metallurgical products to the Donbass, Dnieper area and the Black sea ports of Nikolayev and Kherson. Krivoi Rog has ore-mining and pedagogic institutes and a mining technical school. (R. A. F.)

KRIZANIC, JURAJ (1618–1683), Croatian Roman Catholic priest and early advocate of Pan-Slavism, was born at Obrh, near Ribnik. He studied at Zagreb, at Graz, at Bologna and at the *Collegium graecum* in Rome and laid the foundations for a wide missionary activity in the hope of converting the Orthodox Slavs (Russians, Serbs and Bulgars) to the Catholic faith. In 1647 and again in Sept. 1659, at a time when western influences began to play an appreciable part in Muscovite Russia, he went to Moscow. His first visit, undertaken with the permission of the Roman curia, lasted only a few months; but he undertook a second visit without such permission. It seems that between the two visits the idea of the political unity of the Slavs became in his mind more important than the idea of the union of the churches. In Jan. 1661, however, he was deported from Muscovy to Tobolsk in Siberia. The reason for the deportation is uncertain. He remained in Tobolsk for 15 years, but no hardship attended his exile and he was provided with a considerable state stipend. After the death of the tsar Alexis in 1676 he was allowed to return to European Russia; and in March 1677 he was allowed to go abroad. In 1682, having joined the Dominican order at Wilno (Vilnius), he left for Rome but died in 1683 in Vienna during the Turkish siege.

Krizanic's Siberian exile was spent in intense literary activity, which resulted in a number of theological treatises and an important work entitled *Politika ili razgovor ob vladateljstvu* ("Politics or a Discourse on Government"). Consisting in the main of a detailed examination of Russian life in the 17th century, it contains a biased but at times penetrating criticism of Russian national characteristics and, especially, of the Muscovite government, with suggestions for reform. Passages advocating the union of all Slavs under Russian leadership were published in Russia by P. A. Bessonov in 1859.

In addition, Krizanic wrote a large philological work, *Grammatichno izkazanje ob russkom jeziku* ("Grammatical Instructions on the Russian Language"), still considered valuable. Krizanic was a man of immense and versatile erudition and a political thinker of some originality. He advocated the principles of enlightened popular monarchy. Muscovite autocracy, in his view, failed to live up to these principles, and he described it as "a reign of brute terror." He also advocated progressive economic measures, including industrialization and agricultural reforms, but was convinced that these enterprises should be decided by the central government and kept under the control of the state.

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KRK (Lat. CURICUM; It. VEGLIA), in the Rijeka *srez* (district), Croatia, Yugos., is the largest and most northerly Yugoslavian island in the Adriatic. Pop. (1961) 14,548. Area 408 sq.km. (157 sq.mi.). The town of Krk, the capital, pop. (1961) 1,280, lies in a sheltered bay on the southern coast. The Croats probably settled there in the 7th century. Part of the Byzantine empire for centuries, it passed to Venice in 1000. In 1059 the Croats took it over, introducing the Croat language and the Glagolitic alphabet into the church services. From that period comes the *Bascanska ploca*, one of the first documents written in Croatian, which was found on the island. From 1133 to 1480, with a short interruption, the island was ruled by the counts of the Frankopani family, who recognized the sovereignty of the crown of Hungary. Then under Venice till 1797, it passed to Austria till 1918. After two years of Italian occupation the island became part of Yugoslavia.

Krk is the most fertile Adriatic island. The western part is covered by vineyards, olives and figs, and sheep are also raised. The eastern part is bare, mainly because of the bora wind. Near the village of Dobrinje there are ancient salt mines. The island is well known for its red wine. (V. DE.)

KRLEŽA, MIROSLAV (1893–), a dominant figure in modern Croatian literature, was born in Zagreb, July 7, 1893. He trained for a military career, but after World War I devoted himself to writing, and founded a left-wing review in 1919. After World War II he was elected vice-president of the Yugoslav Academy of Science and Art and later became director of the Croatian Institute of Lexicography and president of the Yugoslav Writers' union. He is a man of vigorous and powerful intellect and wide learning, who writes with great intensity of expression and has fearlessly criticized political and social injustices. Among his most typical works are the dramatic trilogy *Glembajevi* ("The Glembaj Family," 1932), an indictment of the decadence of the Croatian *bourgeoisie* of foreign origin; the psychological novel *Povratak Filipa Latinovicza* (1932; Eng. trans., *The Return of Philip Latinovicz*, 1960); and works concerned with the past exploitation and sufferings of the Croatian peasants, *e.g.*, the stories in the collection *Hrvatski bog Mars* ("The Croatian God Mars," 1922) and the *Balade Petrice Kerempuha* ("Ballads of Petrica Kerempuh," 1936). His collected works were published in 1953–56. (V. J.)

KROCHMAL, NACHMAN (1785–1840), Jewish scholar and philosopher of Jewish religion and history, a pioneer of modern historical and critical research in the origin and development of Judaism, was born at Brody, Galicia, Pol., on Feb. 17, 1785. Krochmal's aim was to be the Maimonides (*q.v.*), the guide for the perplexed intelligentsia, of his generation. For this purpose he composed his magnum opus, *More Nebukhe ha-Zeman* ("The Guide for the Perplexed of the Age"), which appeared posthumously in an incomplete form in 1851 (critical edition with a large and exhaustive introduction by S. Rawidowicz, 1924). The chief aim of the work is to bring the history of the Jewish people within the frame of world history and to apply the laws of change and development governing all people and cultures to the study and interpretation of the spiritual ideas and movements of Israel. Krochmal divides the history of nations into three periods: youth, maturity, decline. Accordingly, he sees also a succession of such periods in Jewish history, with the exception that in Jewish history there have been several complete cycles, Israel being exempted from the national death that follows the period of decline because of the Absolute Spirit which is the specific national individuality or the religious genius of Israel. The Absolute Spirit is indestructible and its activity manifests itself constantly in Jewish history. The influence of German idealistic philosophy on Krochmal's thinking is a matter of controversy. Krochmal is also considered by some to be the father of Jewish cultural nationalism or cultural Zionism.

See Meyer Waxman, *A History of Jewish Literature From the Close of the Bible to Our Own Days*, vol. iii, p. 451 ff. (1930–36); Abraham I. Katsh, "Nachman Krochmal and the German Idealists," *Jewish Social Studies*, vol. viii, p. 75 ff. (1946). (J. M. RL.)

KROEBER, ALFRED LOUIS (1876–1960), one of the most influential and important U.S. anthropologists of the first half of the 20th century, was born in Hoboken, N.J., on June 11, 1876. After receiving an M.A. degree in English in 1897 at Columbia university, he became a student of Franz Boas and received his Ph.D. in 1901, his thesis being on the decorative symbolism of the Arapaho, a Plains Indian tribe of Montana. In 1901 he founded the department of anthropology at the University of California, Berkeley, to which he remained attached until his retirement in 1946. After retirement, he held visiting professorships at Brandeis university, Waltham, Mass., The University of Chicago, and Columbia, Harvard and Yale universities.

His field investigations were concentrated on the Indians of California, but included important studies of Plains Indian tribes and the Zuñi. More than any other American anthropologist his interests and competence ranged over the entire field, and he made important contributions to the archaeology of California, the Valley of Mexico and Peru, as well as to linguistics, folklore, kinship and social structure. His book *Anthropology* (1923) was the first general teaching text on the subject. His main theoretical interest lay in the discovery of patterns or regularities of cultural phenomena on such varied subjects as changes in women's fashion, Mohave epic tales, classificatory systems of relationship, linguistic categories, art styles and sign language.

He was one of the founders of the American Anthropological association, its president (1917), and president of the American Folklore society (1906) and of the Linguistic Society of America

(1940). He received the Huxley Memorial medal of the Royal Anthropological institute in 1945, and the Viking medal of the Wenner-Gren Foundation for Anthropological Research in 1946. Honorary degrees in the United States were awarded him by the University of California, The University of Chicago, and Columbia, Harvard and Yale. He died in Paris on Oct. 5, 1960.

Of over 500 articles, monographs and books the following are most significant; *Peoples of the Philippines* (1919; rev. ed., 1928); *Anthropology* (1923; rev. ed., 1948); *Handbook of the Indians of California* (1925); *Cultural and Natural Areas of Native North America* (1939); *Stimulus Diffusion* (1940); *Three Centuries of Women's Dress Fashions* (with J. Richardson, 1940); *Peruvian Archeology in 1942* (1944); *Configurations of Culture Growth* (1944); *A Mohave Historical Epic* (1951); *Culture: a Critical Review* (with C. Kluckhohn, 1952); *The Nature of Culture* (1952); *Style and Civilizations* (1957); *Sparkman Grammar of Luiseño* (with G. Grace, 1960).

See J. H. Steward, "Alfred Louis Kroeber, 1876–1960," *American Psychologist*, vol. 63 (1961). (R. F. Hr.)

KROGH, (SCHACK) AUGUST (STEENBERG) (1874–1949), Danish physiologist who performed important experiments showing some of the means by which the smallest blood vessels govern the flow of blood, was born at Grenaa, Den., Nov. 15, 1874. He took his doctor's degree in 1903, with a thesis on the respiration of frogs, and in 1916 became professor of animal physiology at the University of Copenhagen. Krogh made important discoveries in connection with respiration, and in 1906 he was awarded a prize by the Vienna Academy of Science for the investigations which he carried out and described in a treatise, *Mechanism of Gas Exchange in Lungs*.

In 1920 he was awarded the Nobel prize for medicine for his discovery of capillary regulation of the conveyance of blood to the muscles. He discovered that the number of open capillaries is directly related to the activity of the tissue; and that the number of open vessels is significantly less in resting muscle than in active muscle. The difference, Krogh reasoned, was a part of the mechanism of oxygen supply to tissues. He died in Copenhagen on Sept. 13, 1949.

Among his publications are: *The Respiratory Exchange in Animals and Man* (1916) and *The Anatomy and Physiology of Capillaries*, being the Silliman lectures delivered at Yale (1922; rev. enl. ed., 1928); articles in the *Journal of Physiology*.

KROMERIZ, a town of South Moravia *kraj*, Czech., lies on the Morava river 60 km. (37 mi.) N.E. of Brno by rail. Pop. (1961) 21,990. A bishopric was recorded at Kromeriz in the 12th century, but the town is best known in history because the Austrian constituent assembly used it as a refuge during the 1848 disturbances. After the abdication of the emperor Ferdinand the assembly attempted to frame there the more liberal Kromeriz (Ger. Kremsier) constitution. Historic buildings include the 18th-century archiepiscopal palace and the churches of St. Jan (John) and St. Moric (Maurice). Kromeriz lies on the southern edge of the rich Hana farming region. Industries include the production of machine tools, milling and sugar refining.

KRONECKER, LEOPOLD (1823–1891), German mathematician whose primary contributions were in higher algebra, was born at Liegnitz (now Legnica, Pol.), Dec. 12, 1823, and died at Berlin, Dec. 29, 1891. At the Liegnitz *Gymnasium*, Kronecker had as his instructor in mathematics Ernst Kummer, from whom he acquired a passion for the theory of numbers. In 1845 he took his doctor's degree at the University of Berlin, with a dissertation on those special complex units which appear in cyclotomy. Kronecker managed the family mercantile and land business until the age of 30, when he was financially able to retire. While in business he pursued mathematics as a recreation. From 1861 to 1883 he lectured at the University of Berlin and in 1883 succeeded Kummer as professor.

Kronecker was primarily an arithmetician and algebraist. His major contributions were in elliptic functions, the theory of algebraic equations and the theory of algebraic numbers. In the last he created an alternative to the theory of J. Dedekind. His theory of algebraic magnitudes (1882) presents a part of this. Kronecker's philosophy of mathematics, however, seems destined to outlast his more technical contributions. He was the first to doubt the significance of nonconstructive existence proofs, and for many years carried on a polemic against the analytical school of K. Weierstrass on this and other points of classical analysis. He sought to reduce all mathematics to the positive whole numbers and showed how all but these could be eliminated. In some of his strictures on classical analysis, Kronecker was justified by 20th-century research on the foundations of mathematics.

Kronecker's works were edited by K. Hensel in five volumes (1895–1930) and his lectures, *Vorlesungen über Mathematik*, were edited by E. Nette and K. Hensel, three volumes (1894–1903).

See G. Frobenius, *Gedächtnisrede* (1893). (E. T. B.)

KRONOBERG, an interior *län* (county) in the southern part of Småland, Swed. Pop. (1960) 158,977. Area 9,913 sq.km. (3,827 sq.mi.). It is one of the plateau areas, rising to 692 ft. in Hälleberga, and has numerous lakes. The county is crossed by the trunk railway from Malmö to Stockholm. The county town is Växjö (pop. [1960] 23,971), a rail junction with industries based largely on forest products. Industries in the smaller towns include paper- and glassmaking. (A. C. O'D.)

KRONSHTADT (Kronstadt), a naval port of the Russian Soviet Federated Socialist Republic, U.S.S.R., on the island of Kotlin, near the head of the Gulf of Finland. Administratively it is part of Leningrad *oblast*. Pop. (1959) 40,000. The waters to the north of the island are not navigable for large ships. To the south a sandbank stretches along the opposite coast of Lomonosov, and a deep-sea dredged channel, close to the island, permits easy access of ocean-going ships to Leningrad. Defense installations are also erected on the Lomonosov coast, so that ships enter between fortifications to the north and south.

Kronshtadt is one of the chief naval bases of the Soviet Union; its strategic value was first recognized by Peter I the Great, who captured it from the Swedes in 1703 and constructed the fort and docks called Kronslot (later renamed Kronshtadt). It was at first an important commercial harbour, since ships could not reach St. Petersburg (later Petrograd and Leningrad) because of the shallowness of the channel, and cargoes had to be transferred to smaller vessels. In 1875–85 a canal 23 ft. deep was constructed through the channel, and the island lost its trading importance. New batteries and a new fort were constructed in 1856–71, and the fortifications have been frequently strengthened and improved since that date. The sailors and special troops of Kronshtadt always formed the most revolutionary element of the Russian army and navy; a Kronshtadt officer led the mutiny of the Dekabrists (Decembrists) in St. Petersburg in 1825. A Kronshtadt sailor, Sukhanov, was the leader of the military organization of the revolutionary Narodnaya Volya group and was shot in 1882. Mutinies broke out among the troops in 1905 and 1906 but were suppressed.

After the Feb. 1917 revolution, the Kronshtadt soviet opposed the provisional government, declared a "Kronshtadt Republic" and took part in the July 1917 mutiny. During the Oct. 1917 revolution, the Baltic fleet cruiser "Aurora" bombarded the Winter palace in Petrograd and thus helped in the Bolshevik victory. In 1919, during the first attack of Gen. N. N. Yudenich against Petrograd, Kronshtadt was bombarded from the air by White Army aviators who were established on the coast to the south of the island, and a British warship penetrated the harbour and torpedoed a cruiser. In the autumn of 1919 Kronshtadt aided in the repulse of Yudenich's second attack. In accordance with their revolutionary reputation, the Kronshtadt navy, in March 1921, mutinied against the Soviet government and took possession of the fortress and two ironclads. After a bombardment lasting many days the Soviet troops made a night attack across the ice, and the revolt was crushed with much severity. Kronshtadt's fortifications, during World War II, aided greatly in resisting the 1941–44 siege of Leningrad and in maintaining the Lomonosov bridgehead. The port is icebound from about the beginning of December until April. (R. A. F.)

KROONSTAD, a town on the Vals river in the Orange Free State province, Republic of South Africa, is an important industrial, transportation and agricultural centre, 127 mi. N.E. of Bloem-

fontein, 406 mi. N.W. of Durban, by rail. Pop. (1960) 42,438 (13,068 Europeans). Founded in 1855, it was capital of the Orange Free State from March 13 to May 12, 1900. Kroonstad has extensive marshaling yards, grain elevators, a clothing factory and milling and engineering works. It is the principal education centre for the northern part of the province. Its development at mid-20th century is largely attributable to its proximity to the Free State gold fields. (A. Rh.)

KROPOTKIN, PETR ALEKSEEVICH, Prince (1842–1921), Russian geographer and revolutionary, whose unworldly almost saintly character and cheerful endurance of hardships did much to win sympathy for the anarchist movement which he supported. He was born in Moscow on Dec. 21 (new style; 9, old style), 1842, the son of Prince Aleksei Petrovich Kropotkin. Educated at the School of Pages in St. Petersburg, he was appointed to serve in the personal suite of the emperor Alexander II. The tedious intricacies of court life, however, not only disappointed his expectations but also undermined his early belief in the tsar liberator, whom he found at close quarters to be a capricious and vindictive man. Accordingly in 1862, to the dismay of his ambitious relatives, he applied for a commission in the humble Amur Cossack cavalry regiment. Then, during five years of service in Siberia, while he lost all faith in government-imposed discipline, he noted the more instructive habits of animals in the wild country of Transbaikalia, studied geological phenomena and made some scientifically important discoveries about the structural lines of the main mountain ranges of eastern Asia.

Charles Darwin's *Origin of Species* was then the talk of intellectual Europe. Kropotkin's observations led him to believe that the savage laws of sociological Darwinism could be convincingly refuted by the fact of mutual aid practised among higher animals, even carnivorous ones. During his travels in eastern Siberia and Manchuria he sought but failed to find, he said, that ruthless internecine strife among animals of the same species which was claimed by Darwinists to dominate organic life. He concluded that human beings could profitably learn lessons in wise behaviour from the higher animals.

In 1871 Kropotkin was offered the congenial post of secretary to the Imperial Geographical society in St. Petersburg. He declined it on the ground that he had no right to "those higher joys, when all around me was misery, and the struggle for a mouldy piece of bread." Going to Switzerland in 1872, he met the noted anarchist M. A. Bakunin and lived among the watchmakers of the Jura federation (canton of Neuchâtel). The watchmakers' friendly, industrious and efficient craft guilds opened his eyes on a better world of practical social co-operation, outside state control: here was a shining example of disciplined and happy "anarchy." On his return to Russia, he joined the circle for self-education that had taken its name from the revolutionist N. V. Chaikovski, but in 1874 he was arrested and imprisoned for "seditious" propaganda. Two years later he escaped and went via Sweden to England and then back to Switzerland, where he spent most of his time until he was expelled shortly after the assassination of Alexander II in 1881. Arrested in France in 1882 and sentenced at Lyons to five years' imprisonment, he was released in 1886, after repeated protests in the French parliament. He then settled near London. In his years of exile he earned his living by writing articles, chiefly on practical and moral aspects of the anarchist movement, but also on geography and intensive agriculture.

BROWN BROTHERS

PETR A. KROPOTKIN

Kropotkin saw the 19th-century nation-state as a stultifying superstructure which had long since outgrown its original usefulness. He persuaded himself that numerous voluntary societies would inherit and transform that overgrown state. Though some decentralization was then taking place, with organizational benefits, it was hardly a general characteristic of the age. As a "scientific anarchist," however, Kropotkin predicted, without undue alarm, that all countries of the world would sooner or later follow the industrial example of the west. He assumed that machines would provide such abundant leisure that most men, instead of idling, would gladly undertake agricultural work in addition to mastering an industrial technique. Work on the land would restore their physical health and mental balance. For why should men submit to becoming the neurotic slaves of their own "iron slaves"? In the long run, he claimed, neither individuals nor nations would accept permanent functional specializations, if these crippled the natural growth of their full spiritual capacities.

Kropotkin welcomed World War I because he believed that it would destroy, once and for all, the obsolete military nation-states which had provoked it. In 1917 he rejoiced at the March revolution in Russia and hastened back to his own country; but later he denounced the November *coup d'état* of the Bolsheviks: he called the followers of Lenin "aliens, enemies of Russia, gangsters," who had "buried the revolution." He lamented that instead of setting Russia on the path leading toward voluntary federation, the so-called Communists (who never practised communism, but only national state socialism) would finish by making people hate their very name. Yet he vehemently denounced the western Allies' intervention in the Russian civil war.

Reduced to silent inactivity while the civil war was raging, Kropotkin died on Feb. 8, 1921, at Dmitrov, 40 mi. from Moscow.

People who had been impervious to Bakunin's spell and resentful of the bomb-throwing that it inspired in earlier anarchists were fascinated by Kropotkin's personality, for all the naïveté of his political ideas. He brought into the anarchist movement a strain of mellow respectability and personal warmth that had a strong appeal, especially in France and England. His major writings were: *Paroles d'un révolté* (1885); *La Conquête du pain* (1892); *L'Anarchie, sa philosophie, son idéal* (1896); *Fields, Factories and Workshops* (1898); *Memoirs of a Revolutionist,* two volumes (1899); *Mutual Aid, a Factor of Evolution* (1902); *Modern Science and Anarchism* (1903); and *L'État, son rôle historique* (1906). Among his geographic works *The Desiccation of Asia* (1904) and *The Orography of Asia* (1904) must be mentioned.

See G. Woodcock and I. Avakumović, *The Anarchist Prince* (1950). (R. Ha.)

KRU, a tribe of short, stocky Negroes inhabiting the coast of Liberia between the Cess river and Harper. Their language has been classed as semi-Bantu, but has not yet been analyzed. (People speaking related languages live in southwest Ivory Coast.) They are known as stevedores and fishermen throughout the west coast of Africa, and have established colonies in most ports from Dakar, Senegal, to Douala, Cameroon. With related tribes—Bassa and Grebo on the coast and Sikon, Sapo and Padebu inland—they occupy nearly a third of Liberia. The Kru are thought to have entered the country from the northeast in the 15th to 17th centuries. There are about 20 subtribes with dialectal and cultural differences.

Political organization was traditionally decentralized, each subtribe inhabiting a number of autonomous towns that varied in population from several hundreds to 5,000 or more. Within each town social organization is based on exogamous patrilineal clans. Clan heads and titled officials make up the council of the town chief. Although not hereditary in individual families, some titles are associated with particular clans or military age grades. With the efforts of the Liberian government since about 1920 toward more centralized administration, some traditional offices have changed function or disappeared.

Kru economy is based on fishing and the production of rice and cassava. The coastlands are cut by a series of unbridged rivers that have helped maintain the autonomy of the towns and restricted economic progress. This has influenced the continuing exodus of young people to Monrovia and other centres for work and education. By the 1960s there were probably more Kru out-

side tribal territory than within; but most emigrants maintained home contacts and many returned in old age. The largest single Kru community in the 1960s, at Monrovia, provided the majority of the port's workers. *See* also LIBERIA; IVORY COAST, REPUBLIC OF.

See H. S. Mekeel, "Social Administration of the Kru," *Africa,* vol. x (1937), vol. xii (1939). (ME. F.)

KRÜDENER, BARBARA JULIANE (BARONIN VON) (1764–1824), a Russian romantic-pietistic visionary, especially remembered for her influence on the Holy Alliance (*q.v.*), was born von Vietinghoff on Nov. 22, 1764, in Riga. In 1782 she married a Russian diplomat, Baron von Krüdener, from whom she later separated, and until 1804 led a life of amorous and literary-aesthetic pleasure seeking. In 1802, after Krüdener's death, she wrote the largely autobiographical novel *Valérie.* In 1804 she experienced a "conversion" and came under the influence of apocalyptic visionaries—among others, J. H. Jung-Stilling (H. Stilling). From 1808 to about 1818 she was surrounded by a swarm of admirers and protégés, holding Bible classes and confessions in various parts of southwestern Germany and in Switzerland. Her activities always ended in banishment. She also influenced well-known personalities such as the leader of the Swiss revivalist movement, Henri Louis Empaytaz, but her most important convert was Alexander I of Russia, whom she met in 1815. Baronin von Krüdener later claimed the Holy Alliance as her personal spiritual achievement, though it is probable that the influence of Franz Xaver von Baader should receive the greater credit. For several months the tsar attended her Bible classes but later withdrew, repelled by the type of people who surrounded her, and in 1821 he expelled her from St. Petersburg on her attempting to get his support for the War of Greek Independence. Baronin von Krüdener died on Dec. 25, 1824, in Karasu-Bazar, a pietist colony in the Crimea.

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KRUEGER, WALTER (1881–), U.S. army officer, commander of the 6th army during World War II, was born in Flatow, West Prussia, Jan. 28, 1881, and went to the U.S. in 1889. He volunteered for duty as an enlisted man in 1898 during the Spanish-American War and became a second lieutenant of infantry in the regular army in 1901. In World War I he was chief of the tank corps, American expeditionary force, then attended many military schools, served with the war department general staff and was in charge of the southern defense command from May 1941 to Jan. 1943. He gained a wide reputation as a skilled tactician and trainer of troops.

Early in 1943 General Krueger took command of the newly activated U.S. 6th army in Australia and New Guinea. In December his forces invaded New Britain and in April 1944 occupied Hollandia, capital of Dutch New Guinea. Krueger led the 6th army through the Philippine Islands campaign and into the occupation of Japan and retired with the rank of general in Jan. 1946. His memoirs were published under the title *From Down Under to Nippon* (1953). (R. R. SH.)

KRUGER, PAUL (STEPHANUS JOHANNES PAULUS KRUGER) (1825–1904), president of the South African Republic and leader of the Boers in the events that led up to the South African War, was born on Oct. 10, 1825, probably at Zoutpansdrift, near Middelburg in the northeast of Cape colony. He received little education but imbibed early the strict puritanism of this frontier area. Leaving the colony in 1835, he crossed the Vaal river with A. H. Potgieter's party and settled in the Rustenburg district of western Transvaal in 1841. The legend of a youthful Kruger fighting wild beasts, tribesmen and rival Boer factions derived largely from his semiauthentic *Memoirs,* dictated in old age and published in 1902. He played a prominent part in the unification of the Transvaal, notably during the civil war (1861–64), and was made commandant-general (1864–73). Kruger attended the Sand River convention (1852) and the Bloemhof arbitration court (1871) at which the Keate award was made (*see* BOTSWANA: *History*). He opposed the candidacy of T. F. Burgers for the Transvaal presidency in 1872, mainly because Burgers' modernism offended the Gereformeerde ("Dopper") Kerk, of which Kruger was a staunch member. Burgers' war against Sekukuni was resisted by Kruger, who refused to pay the war tax.

CULVER PICTURES, INC.

PAUL KRUGER

Kruger did not at first oppose the British occupation of the Transvaal, but later emerged at the head of a growing movement for the restoration of independence. On missions to England in 1877 and 1878 he challenged the legality of the British occupation. He discouraged Boers from siding with the Zulus against Britain in 1878–79, for "one must never join with savages in war against a civilized nation," but his campaign against British rule developed through a series of large public meetings after Dec. 1878. On a visit to Cape colony in mid-1880 he demolished colonial support for the imperial government's plan of federating South Africa, in an attempt to solve the Transvaal problem. Disappointed by the response to burgher demands of Sir Bartle Frere, the high commissioner, and above all by the failure of Gladstone's government to implement policies implied in his Midlothian speeches, Kruger took care not to race ahead of public opinion, but eventually agreed to the use of force. It was as head of a rival government, the triumvirate, that he negotiated with the British after the Boer victory at Majuba (1881).

Kruger was elected president of the restored Transvaal republic in 1883, and held that office continuously until his flight to Europe in 1900 (*see* TRANSVAAL: *History*). He was re-elected in 1888, 1893 and 1898, on the last occasion by an overwhelming majority, his chief opponent each time being Gen. P. J. Joubert. As president, Kruger was not a dictator, though certain of his actions, such as the dismissal of Chief Justice J. G. Kotzé following the judicial crises of 1897, revealed a reluctance to brook opposition when he was sure of his ground. Policy decisions of the president and his executive council were subject to review by the *volksraad,* which could, and sometimes did, refuse to support his plans, even on important issues. "God's Word should be my rule of conduct in politics and the foundation upon which the state must be established," Kruger said. Nevertheless he was equally careful to feel the pulse of enfranchised public opinion. In his internal policy, Kruger aimed to preserve intact the essential features of a rural Boer society without sacrificing the advantages to be gained from the exploitation of his country's mineral wealth by others. The circumstances of the temporary British annexation in 1877 had made him suspicious of *uitlanders* (foreigners) and though he did not take any effective steps to exclude them from the country, he nullified their political influence by progressively discriminatory franchise laws.

In 1890, he gave the *uitlanders* representation in a second *volksraad,* but increased the residential qualification of electors for the more powerful first *volksraad* to 14 years. He was prepared, in 1899, to agree under pressure to seven years' qualification; but public opinion prevented a closer approach to *uitlander* demands before negotiations collapsed. Kruger's suspicion of *uitlanders* did not on the whole extend to Hollanders, who were often preferred to Cape Afrikaners in public appointments, partly because Dutch, the official language of the Transvaal, was inadequately taught in Cape schools.

Kruger taxed the mines heavily to finance his government, and the resentment of capitalists of the Rand area to this policy underlay the agitation which led to war in 1899. His policy of granting monopoly concessions to favoured individuals stemmed in the first instance from the initial poverty of the country and the conse-

quent necessity of a protectionist economy. This policy had many antagonists, especially among the Rand capitalists, who objected in particular to the dynamite monopoly granted to a German, E. Lippert. Though he had originally favoured a customs union in 1885 (which the Cape government had opposed) Kruger's protective policy after 1886 was the main obstacle to the economic federation of South Africa. An isolationist railway policy, directed toward Delagoa bay at the expense of the Cape and Natal ports, failed for financial reasons in 1892, when a Cape line was admitted to the Rand. The dangers of isolationism were revealed in the Drifts crisis of 1895, when Kruger played his cards with unwonted impetuosity and had his bluff called.

"Oom Paul's" diplomacy hinged upon the maintenance of close relations with the Orange Free State, as reflected in the treaties of alliance of 1889 and 1897, and their eventual entry as allies into the war in 1899. He attached less importance to the support of Cape Afrikaners, whose leaders he suspected of working too closely with Cecil Rhodes. Dependent mainly on French and German supplies of heavy arms, he probably realized that these European powers would not become active allies, especially in view of the Transvaal's limited treaty-making powers under the London convention, which Kruger himself had negotiated.

His frontier policy, in an age of expanding frontiers in Africa, was conservative and limited to the incorporation of marginal areas of Boer settlement and the avoidance of British encirclement. He adhered to the letter, if not always to the spirit, of the Pretoria and London conventions, as is apparent from his handling of the Bechuanaland crisis of 1884–86. His strategy was so rooted in the idea of obtaining independent access to the sea on the east coast that in 1890 he bartered away all interest north of the Limpopo river to this end; but, having withdrawn his opposition to Rhodes's occupation of Matabeleland, he soon learned that coastward expansion was not worth the price he would have to pay.

Kruger's plans for expansion yielded few concrete results for the reason that he normally bowed before the threat of superior force, as when he met Gen. Sir Charles Warren at Fourteen Streams in 1885, or Sir Henry Loch at Blignaut's Pont in 1890, or when he retreated before the threats of Joseph Chamberlain during the Drifts crisis. The failure of Jameson's Raid, however, restored self-confidence to Kruger's diplomacy, and his burghers rallied behind him, enabling him to withstand pressure from Sir Alfred (later Viscount) Milner in 1899. But his resistance was that of a blunt man who believed his cause was right, rather than that of a skilled diplomat; for, by failing to make the sort of concessions to *uitlanders* which would have given the impression that justice was being done, he enabled Milner to develop the doctrine of paramountcy under cover of a defense of the rights of injured aliens. Cornered and outmaneuvered, Kruger anticipated an imminent British move by declaring war in Oct. 1899 (*see* SOUTH AFRICAN WAR).

After the occupation of Pretoria by British troops in 1900, Kruger escaped to Europe in a last vain attempt to persuade continental powers to intervene on behalf of the Transvaal. After a sojourn at Utrecht, he died at Clarens, in Switzerland, on July 14, 1904, and was later buried at Pretoria.

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KRUGERSDORP, a mining and industrial centre in the Transvaal, Republic of South Africa, on the Witwatersrand, 20 mi. W.N.W. of Johannesburg, at an altitude of 5,650 ft. Pop. (1960) 89,493, including 30,515 Europeans, 56,660 Bantu, 2,090 Coloureds and 682 Asians. The town dates from 1887, shortly after gold was discovered on the Witwatersrand, and was named after Pres. Paul Kruger. Manganese, asbestos and limestone deposits are worked, in addition to the gold, and a number of plants for the extraction of uranium have been established. Krugersdorp is the commercial, industrial and uranium centre for western Transvaal and the centre of rich farming country. There are many schools and sports facilities and a Carnegie public library. The town has a modern regional abattoir. The railway from Johannesburg to Mafeking and the Rhodesias meets the line from the Cape, via Fourteen Streams, at Krugersdorp. The Paardekraal monument marks the site of the meeting (1880) which proclaimed the republic on Dingaan's day (*see* TRANSVAAL). The famous Sterkfontein caves nearby (in the direction of Hekpoort), where prehistoric human remains were discovered in 1936 by R. Broom, attract many visitors. The Kromdrai Palaeontological reserve is also in the district.

KRUM (d. A.D. 814), khan or prince of the Bulgars, appears in history *c.* 803, when, as a chieftain of the Pannonian Bulgars, he completed the obliteration of the Avars north of the Danube after their defeat by Charlemagne. Firmly established by 808 as the ruler of the Bulgars in the Balkans, he soon became a menace to the security of the Byzantine empire. In almost continuous warfare, up to his death, he wrought much destruction on several parts of the empire. He twice lost his own capital, Pliska, but after the emperor Nicephorus I himself was killed in battle in 811, Krum's campaigns brought him to the walls of Constantinople. He died on April 13, 814, in the midst of preparation for a final attack on the imperial capital. Krum was a statesman of great ability and a reformer of ruthless energy. He brought law and order to Bulgaria, checked the military barons' ambitions and succeeded in organizing the Bulgar and Slav clans into a state.

(N. I. M.)

KRUMBACHER, KARL (1856–1909), German professor and the organizer of modern Byzantine studies, was born on Sept. 23, 1856, in Kempten, southern Bavaria, not far from the little town of Krumbach from which his name is derived. He studied classics at Munich university and then taught at the *Gymnasium* there. Early connections with modern Greece led him to medieval Greek literature which was neglected by scholars at that time. His first book, *Geschichte der byzantinischen Literatur* (1891), laid the foundations for later research on the subject. In the next year he founded the *Byzantinische Zeitschrift,* the central international organ for the whole of Byzantine studies; he remained its editor and most active bibliographical contributor until the end of his life. In 1897 there appeared the second much enlarged edition of his book, with extensive contributions from A. Erhard on theology and H. Gelzer on history; as a whole the work is still indispensable, though considerable parts of it now appear in a revised form. His seminar for medieval and modern Greek studies in Munich university (which created a chair for him in 1897) was also of the greatest importance. Byzantine scholars from all parts of the world received their specialist training in this seminar. Of Krumbacher's original works may be mentioned his editions with commentary of various poems by Romanos (*q.v.*) and *Das Problem der neugriechischen Schriftsprache* (1902). He died in Munich on Dec. 12, 1909.

See *Byzantinische Zeitschrift,* vol. 19 (1910), for a list of his works. (P. MA.)

KRUPP, a family of steelworks owners—established in Essen since the 16th century—which has played an important part in Germany's industrial and social development and in the production of armaments.

FRIEDRICH KRUPP (1787–1826) was born in Essen on July 17, 1787. In 1811 he founded a firm there for the purpose of making cast steel of a quality equal to that produced in England. Conducting many experiments and building plants that were far in advance of the times exhausted his strength and means. He died in Essen on Oct. 8, 1826, leaving to his son the secret of making high-quality cast steel, together with a small workshop in which production had come almost to a standstill.

ALFRED KRUPP (1812–1887), Friedrich's son, born in Essen on April 26, 1812, took full charge of his father's firm at the age of 14. Four years later he extended production to include the manufacture of steel rolls. He designed and developed new machines; invented the spoon roll for making spoons and forks; and manufactured rolling mills for use in government mints. He won new

customers, extended his firm's purchases of raw materials and secured funds to finance the expansion of his works. At the first World exhibition in London in 1851 he exhibited the largest steel ingot ever cast up to that time (4,300 lb.).

It was with the advent of railways that the rise of the firm really began. At first, railway axles and springs of cast steel were the only products made in this field; but in 1852 Alfred Krupp manufactured the first seamless steel railway tire, an invention which contributed greatly to the speed and safety of travel. Later he adopted three superimposed railway tires, the "three rings," as the trade-mark of the firm. He was also the first to introduce the Bessemer and open-hearth steelmaking processes to Europe (1862 and 1869). Mass production of rails began; and meanwhile the enterprise expanded to a vertically organized concern with collieries, ore mines, blast furnaces, steel plants and manufacturing shops. In 1863 Alfred Krupp established a physical laboratory for the testing of steels.

To prove the quality of his steel, Alfred Krupp turned to making guns. At first he could not sell his guns in Prussia, and the first orders came from Egypt (1856), Belgium (1861) and Russia (1863). As a result, however, of the performance of Krupp guns in the Franco-German War of 1870–71, the firm came to be called "the Arsenal of the *Reich*." Yet its output of goods for peaceful purposes always predominated over its output of armaments, even in wartime.

Recognizing early the human problems of industrialization, Alfred Krupp created a comprehensive welfare scheme for his workers. As early as 1836 he instituted a sickness and burial fund and in 1855 he established a pension fund for retired and incapacitated workers. These institutions proved so successful that they served as models for the social welfare legislation enacted in Germany under Bismarck from 1883 to 1889. Alfred Krupp's foresight was further demonstrated in 1861 when he began to build housing settlements, hospitals, schools and churches for his employees. He had started his steel plant with seven workers; at his death in Essen, on July 14, 1887, the enterprise was employing 21,000 persons.

FRIEDRICH ALFRED KRUPP (1854–1902), Alfred's son, born in Essen on Feb. 17, 1854, expanded the firm by acquiring the Gruson works in Magdeburg and the Germania shipyards in Kiel and by building the Rheinhausen iron- and steelworks. He extended the social services initiated by his father and founded a research centre with the object of employing scientific methods to improve the quality of his steel. At the time of his death in Essen, on Nov. 22, 1902, the number of employees had risen to 43,000. He left two daughters, the elder of whom, BERTHA KRUPP (1886–1957) became his sole heiress.

In 1906 Bertha Krupp married Gustav von Bohlen und Halbach, a diplomat (born at The Hague, Neth., on Aug. 7, 1870), who was then authorized by the German emperor William II to bear the name of Krupp von Bohlen und Halbach, this right to be passed on in perpetuity to the heir to the enterprise. Under GUSTAV KRUPP VON BOHLEN UND HALBACH the firm, which in 1903 had been turned into a joint-stock company, was carried on according to the principles laid down by Alfred Krupp. In 1912, Krupps applied for the first patents covering the use of certain steels for the manufacture of stainless, acid or heat-resisting objects. The firm played a major role in developing the artillery used by the German army in World War I, and during the war the number of its employees rose from 80,000 to 151,000. Among its most notable products were the so-called "Paris guns" that bombarded the French capital in 1918 from a distance of about 75 mi. From 1919, the firm took up the manufacture of rolling stock, locomotives, heavy commercial motor vehicles and other new items. In 1926 Krupps were the first to produce a sintered tungsten carbide, "Widia," which revolutionized metal machining and metal working.

Krupps were still mainly engaged in peaceful production even after Hitler had begun his aggressive policy, but nevertheless contributed to the development and production of weapons for the German military machine. In World War II the firm constructed a huge railway gun (known either as "Dora," or "Gustav") that fired 80-cm. shells against Sevastopol in 1941. After the war the Allies proposed to indict Gustav Krupp as a "war criminal" for his part in Germany's armament; but in view of his ill-health he was never brought to trial. He died at Blühnbach, near Salzburg, Aus., on Jan. 16, 1950.

ALFRIED KRUPP VON BOHLEN UND HALBACH (1907–), the son of Gustav and Bertha, was born in Essen on Aug. 13, 1907. In 1943, during his father's lifetime, the joint-stock company became a sole proprietorship again, with Alfried as the owner; and it was Alfried who in Aug. 1947, with other members of the firm, was brought before a U.S. military tribunal in Nürnberg. On July 29, 1948, he was sentenced to 12 years' imprisonment and the forfeiture of his entire property for Krupps' employment of prisoners-of-war and inmates of concentration camps, but on Jan. 31, 1951, the U.S. high commissioner in Germany, John McCloy, recognizing the problematic nature of the judicial proceedings as a whole and taking a different view of personal guilt, revised the sentence. Alfried Krupp was released and the confiscation order revoked.

In 1953 Alfried Krupp resumed the management of his firm, the major part of which had either been destroyed in the war or dismantled later. Under an agreement embodied in the Allied decree of March 4, 1953, he was required to sell through trustees within a period of five years all his coal and steel interests. There were no buyers, however; the time limit was twice extended for a year; and a commission (three Allied members and three Germans under a Swiss chairman), set up in 1959 to decide how to settle the matter, made no recommendation. A feature of the firm's activities in the early 1960s was the planning and construction of complete industrial plants.

See G. von Klass, *Krupps, the Story of an Industrial Empire,* Eng. trans. (1954); Alfred Krupp, *Letters, 1826–1887,* ed. by W. Berdron (1930); B. Menne, *Blood and Steel: the Rise of the House of Krupp* (1938).

KRUPSKAYA, NADEZHDA KONSTANTINOVNA (1869–1939), Russian educationalist and wife of Lenin (*q.v.*), was born on Feb. 26, 1869, in St. Petersburg (Leningrad), where she was educated at the Woman's college. She aided Lenin in his revolutionary activity, became his wife in 1898 and shared his years of work and exile in Europe. When Lenin came to power in Russia, she became a member of the commissariat of education and developed the party's plan for popular education. Mme Krupskaya was also vice-commissar of education and a member of the central committee of the Communist party and the presidium of the U.S.S.R. She remained influential after Lenin's death, particularly in education. She died in Moscow, in the Kremlin, on Feb. 27, 1939.

KRUSENSTERN, ADAM IVAN (1770–1846), Russian navigator and admiral, was born at Haggud, Estonia, on Nov. 19, 1770. After service in the British fleet (1793–99), he commanded in 1803–06 the first Russian expedition to explore the South Pacific and circumnavigate the world, visiting the Marquesas Islands, Kamchatka and Sakhalin. He died at Reval (Tallin) on Aug. 24, 1846. Krusenstern's *Voyage Round the World . . .* was published in Russian in 1809–13 (3 vol. and atlas), and in German in 1810–14 (3 vol. and atlas). An English edition (2 vol.) was published in 1813. Krusenstern also published *Atlas de l'Océan Pacifique* (1824–27), with *Recueil de mémoires hydrographiques* (1824–35).

(H. M. Ws.)

KRUSEVAC, a town and *srez* (district) in Serbia, Yugos., is situated 10 mi. S.W. of the point where the Zapadna Morava joins the Morava river and 95 mi. S.S.E. of Belgrade. Pop. (1961) 31,259. The town is built round a central square from which the streets radiate in the form of a cross. It is connected with the main Belgrade–Nis–Salonika railway line and by road with the Belgrade–Nis and Belgrade–Pristina roads. It has an active trade in grain, livestock, hemp, tobacco and wine. The best Serbian red wine, Prokupac, is produced in the vicinity. There are factories for munitions (Obilicevo), freight cars and soap. Krusevac has several schools. In the neighbourhood are the old Serbian monasteries of Ljubostinja and Kalenic (14th and 15th centuries) with well-preserved frescoes. It was from Krusevac that the last Serbian tsar, Lazar, marched against the Turks and lost his empire at Kosovo in 1389. After a Serbian uprising against the Turks, Krusevac was liberated in 1833 and joined Serbia. (V. DE.)

KRYLOV, IVAN ANDREEVICH (1769–1844), the leading Russian writer of fables, was born on Feb. 13 (new style; 2, old style), 1769, in Moscow, the son of a poor army officer. He received little formal education and at the age of nine was already working as a clerk. His father died in 1779. In 1782 his mother took him to St. Petersburg where in the following year he produced his first literary work, a comic opera in verse called *Kofeynitsa* ("The Coffee-stall Keeper"), which was not published until 1869. This was followed by the comedy *Prokazniki* ("The Rascals," 1788) and by the two tragedies *Cleopatra* (1785) and *Filomela* (1786), of which the former has not been preserved. In 1789 he turned his attention to satirical journalism and issued three satirical magazines: *Pochta dukhov* ("The Spirits' Post-box," 1789), *Zritel* ("The Observer," 1792) and the *Sankt Peterburgski Merkuri* ("St. Petersburg Mercury," 1793). These continued the tradition of the satirical journalist N. I. Novikov by attacking the corruption of officials, injustices in the courts, the abuses committed by serf-owners and the gallomania current at the time. On the whole these efforts showed more civic courage than literary skill, but one essay of the period, "Praise of My Grandfather," is a memorable character study. Between 1793, when the government put an end to his satirical journalism, and 1805 Krylov led a wandering existence, working as tutor, secretary with various families or simply living as a hanger-on of wealthy friends. In 1801 he wrote a comedy, *Pirog* ("The Pie"), which was performed in St. Petersburg in 1802. He continued to write satirical comedies including *Modnaya lavka* ("The Fashion Shop," 1807) and *Urok dochkam* ("A Lesson for Daughters," 1807) in which the aping of foreign manners by Russians is ridiculed.

In 1805 he had at last begun to find his true medium as a writer by beginning to experiment with the fable. He began by translating some fables of La Fontaine but was soon branching out on his own. In 1809 the publication of 23 of his fables in book form at once established his literary reputation. It also helped to place him under the patronage of the imperial family. He received a post in the St. Petersburg public library which was practically a sinecure and which he held for 30 years. Between 1809 and 1843 he published nine books of fables. These are unrivaled among the work of Russian fabulists because of their *narodnost* ("authentic national character"), displayed in the language of Krylov's verse (they are written in iambic lines of uneven length). He wrote salty, epigrammatic, down-to-earth Russian, so that many of his lines have passed into the language as proverbs. *Narodnost* is also sometimes found in the characterization of the animals (lions, crows, elephants and so on) which are the dramatis personae of the fables and which in their shrewd common sense, love of toil and strong feeling for justice are sometimes said (by Russians) to mirror the Russian national character.

Many honours came to Krylov in his later years, beginning in 1811 with membership of the Russian academy, of which he received the gold medal in 1823. He was well known in drawing-room society of the time as a lazy, self-indulgent, somewhat untidy figure with a generally malicious sense of humour, often content to sit without speaking and with an air of complete boredom through an entire social evening. He died on Nov. 21 (N.S.; 9, O.S.), 1844, in St. Petersburg. (R. F. Hi.)

KRYPTON, a gaseous element belonging to the helium family or the zero (noble) group of the periodic system. It finds some application in gaseous tube lighting and in negative glow lamps for Christmas tree ornaments, etc. Krypton also is used in a type of lamp that produces a flash of light of extremely short duration; such bulbs are employed in high-speed photography. If krypton and xenon were used in place of argon to fill hot-filament incandescent lamps, the efficiency and life of the lamps would be increased but so would their cost.

Krypton has an atomic number of 36, an atomic weight of 83.80 and is represented by the symbol Kr. The stable isotopes of the element, listed in the order of decreasing abundance, have the following mass numbers: 84, 86, 82, 83, 80, 78. Radioactive isotopes produced by the fission of uranium and by other nuclear reactions are also known. In its normal state the atom contains 2 electrons in the K shell, 8 in the L shell, 18 in the M shell and 8 ($4s^2$, $4p^6$) in the N shell. This structure is considered responsible for the relative chemical inactivity of the element.

Krypton is present in dry air, where it was discovered in 1898 by Sir William Ramsay and M. W. Travers, to an extent of only 0.00011% by volume, or 1 part in 910,000. Although it also occurs in traces in natural gas and in gases from hot springs and volcanoes, no source superior to the atmosphere (*q.v.*) is known for the element. The element is produced on a small commercial scale by the fractional distillation of air (*see* Neon).

A critically chosen list of the physical constants of krypton follows: density of the gas at 0° C. and 1 atm. pressure, 3.743 g. per litre; density of the liquid at its boiling point, 2.6 g. per millilitre; melting point, −157.0° C.; normal boiling point, −153.23° C.; critical temperature, −63.77° C.; critical pressure, 54.18 atm.; heat of vaporization at the normal boiling point, 25.78 cal. per gram; ionization potential for the first electron, 14.02 v.; solubility at 1 atm. pressure in water at 0.5° C., 0.12 ml. (measured at 0° C. and 1 atm.) per millilitre of water; solubility at 20° C., 0.06 ml. per millilitre of water. The ratio of the specific heat of the gas at constant pressure to that at constant volume has a value, 1.689, that indicates the molecules are single atoms. Krypton crystals have a face-centred cubic structure corresponding to the closest possible packing of spheres. One edge of the unit cell at −185.1° C. has a length of 5.69×10^{-8} cm. This corresponds to a radius of the atom of 2.01×10^{-8} cm.

After the discovery of the xenon fluorides in 1962 (*see* Xenon), attempts were made to synthesize analogous compounds of the other noble gases. Krypton tetrafluoride, KrF_4, was produced by reaction of the elements in an electric discharge. It is a volatile white solid that decomposes in a few hours at room temperature. Krypton also forms a few compounds of low stability in which the bonds between krypton and its neighbouring atoms are of the weak intermolecular type known as van der Waals forces. Prominent among these compounds are three solids: a hydrate, $Kr.nH_2O$ (n is thought to be about 5 or 6); a compound with phenol, $Kr.C_6H_5OH$; and a material having the composition $3C_6H_4(OH)_2 \cdot 0.74Kr$ formed by crystallizing hydroquinone from water saturated with krypton under high pressure. The first of these exists up to a maximum temperature of about 12.5° C. when under a pressure of 47.5 atm. The second has a dissociation pressure of about 6 to 10 atm. at 0° C.

Krypton is detected qualitatively by observing its characteristic lines in the spectrum. It is determined quantitatively by: (1) isolating the gas by chemical and physical means and then measuring its volume; (2) concentrating the gas and estimating its percentage in the concentrate from the intensity of its lines in the spectrum; (3) by use of a mass spectrometer.

See also references under "Krypton" in the Index.

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KSAR ES SOUK, a province and town of southern Morocco on the undemarcated and disputed frontier with Algeria. Pop. of province (1960) 380,949. The province includes part of the arid eastern High Atlas where nomadic herdsmen and a few cultivators in the valleys obtain a poor living. The Sahara desert stretches south from the mountains. The province is directly connected with the populous north by only one road; isolation has forced the inhabitants to a high degree of self-sufficiency and made the area difficult for the French to pacify. Lead and zinc deposits are worked and there is unexploited iron ore.

The town of Ksar es Souk, (pop. [1960] 6,554) on the south flank of the Atlas, has an annual rainfall of less than 6 in., but irrigation from the Ziz and other seasonal streams enables dates and olives to be grown. (M. D. Ch.)

KSHATRIYA (Kshattriya), the second highest in ritual status of the four varna, or social classes, of Hindu India (*see*

CASTE [INDIAN]). Earliest Vedic literature listed only three varna, first in rank being the Kshatriya (the holders of *kshatra,* or authority), then the Brahman (the priests and teachers of law) and lastly the Vaishya (the commonalty). Movements of individuals and groups from one class to another, both upward and downward, were not uncommon, a rise in status even to the rank of Kshatriya being a recognized reward for outstanding services to the rulers of the day. Tradition says that the original Kshatriya, created from the arms of the deity and given the gift of strength to protect treasure and life so that order could prevail, were destroyed by Parasurama, the sixth reincarnation of Vishnu (*see* VISHNUISM), as a punishment for their tyranny. The legend probably embodies the story of the long struggle for supremacy between priests and rulers, which ended in victory for the former. By the end of the Vedic era the Brahmans were supreme, the Kshatriya had been relegated to second place and a fourth varna emerged, Shudra, a class of artisans.

In modern times the Kshatriya varna includes a broad class of caste groups headed by the aristocratic Rajput (*q.v.*) lineages and differing widely in status. The main reason for these differences is the common practice by status-seeking sections of tribal and caste groups of distinguishing themselves from the main body of their own group by using the class label Kshatriya or the lineage label Rajput. Typical are tribal groups seeking Kshatriya status by claiming Rajput descent. They hyphenate their tribal names with Rajput, *e.g.,* Munda-Rajput, seek links with the latter through hypergamous marriage and after some generations drop the tribal half of the composite and call themselves Rajput. *See* also HINDUISM.

See J. H. Hutton, *Caste in India,* 3rd ed. (1961); T. Zinkin, *Caste Today* (1962). (H. N. C. S.)

KUALA LUMPUR, the capital of Malaysia and of the former Federation of Malaya, lies in the state of Selangor astride the confluence of the Klang and Gombak rivers in hilly country west of the central mountain range and about 25 mi. E. of the swampy coast of the Strait of Malacca. Municipal pop. (1957) 316,230, of whom 62% were Chinese and only 15% Malays.

Kuala Lumpur is a mixture of ultramodern architecture and traditional Chinese shop houses. The centre, along the Klang river, is congested, but the municipal area and the suburbs are well planned, and after 1954 six new satellite villages were created in the district. Notable buildings are the government offices and the railway station and offices, all somewhat Moorish in design; the new parliament house; the Institute for Medical Research (one of the best equipped in Asia); the Rubber Research institute; the Chinwoo building on top of a hill with an auditorium and swimming pool; insurance buildings; banks; and hotels. The palace of the federation's head of state is in Kuala Lumpur. The town is a nodal point for rail, road and air communications within the states of Malaya. It is connected by road and rail to its port, Port Swettenham; and at its airport, about 3 mi. S., large international airliners call. It has become the junction of passenger and freight services by road to Penang, Singapore and eastern Malaya. Kuala Lumpur's prosperity depends on tin and rubber from the surrounding lowland region (*see* SELANGOR), light industries and distributing trades, together with its status as capital since 1957 of an independent Malaya and as capital since 1963 of the federation of Malaysia (*q.v.*).

The town was founded in 1857 by 87 Chinese miners who started a tin mine at Ampang, now a suburb. Situated in a highly malarious jungle area, the town nevertheless flourished as a tin mining centre. Chinese settlers were under the control of a "Capitan China," formerly the title for a Chinese headman in the Malaya States. In 1880 Kuala Lumpur superseded Klang as the Selangor capital, and its rapid growth thereafter was largely due to Sir Frank Swettenham who became resident of Selangor in 1882. He caused the whole town to be rebuilt in bricks and tiles, as a precaution against fire and as an aid to better health, and he connected the town by rail with Klang. Its population increased from 5,000 to 25,000 and it was chosen as the capital of the Federated Malay States in 1895. It has more than doubled its size since World War II as a result of the great shifts of population during the long guerrilla war against the Communists in Malayan jungles, and new industries set up with some capital from Singapore. (C. J. S.; E. H. G. D.)

KUANG-CHOU WAN (KWANGCHOW BAY), a strategic bay leased to France for a naval base from 1898 to 1946 on the east coast of the Luichow peninsula (Lei-Chou-Pan-To) of Kwangtung province in south China. A roadstead 18 mi. long and 6 mi. wide between two islands leads to the harbour at the Ma-ch'ih river estuary where Chan-chiang (including former Fort Bayard and Tche Kam) is situated. In the late 1950s the Chinese Communists reported the building of a large deep-water port there, connected by a newly built railroad with Li-t'ang in Kwangsi on the line between Lui-chou and Nan-ning.

The new port appeared destined to be a major competitor with Hong Kong and Canton for the south China hinterland markets. Its exports were chiefly food grains, hemp and other local products, while imports included timber, crude oil, cement and salt. Rail connections with the large-scale shale-oil industry at Mou-ming (Kao-chou) add significance to the status of Kuang-chou Wan. Chan-chiang (*q.v.*), which has highway connections with the interior, is also the entrepôt for adjacent Hainan Island. Fisheries are significant in the bay. (H. J. Ws.)

KUAN YÜ (d. A.D. 219), Chinese military leader, legendary hero and deity, arose from obscurity in an age of chaos. He became intimate with Liu Pei, founder of the Shu kingdom, in whose service he gave his life. His brotherly loyalty to Liu and to the leader Chang Fei, sworn in the "oath of the peach garden," was recounted by public storytellers as early as the 9th century and in the *Romance of the Three Kingdoms* about 1500. Officially proclaimed a divinity in 1594, he was worshiped in numerous shrines as patron of wealth, literature and several provinces, as well as of war. (E. A. KE.)

KUBA (BAKUBA), a cluster of about 16 small tribes in the Democratic Republic of the Congo (formerly Belgian), living between the Kasai and Sankuru rivers east of their confluence in the Mweka area of Kasai-Occidental province and numbering about 75,000 in the 1960s. They are united in a kingdom ruled by the Bushongo, the central tribe. Kuba languages are Bantu, most of them in the Bushongo group, which is allied to the Lower Kasai languages; others belong to the Luba Kasai and Mongo groups.

Kuba cultivate maize (corn), manioc, millet, peanuts and beans as staples. They grow raffia and oil palms; maize is also a cash crop exported to Katanga; hunting and fishing are still pursued. They have kept aloof from modern economy and few have emigrated or engage in European-style occupations. The tribes are mainly matrilineal with shallow lineages in a huge number of widely spread clans. The social functions of these groups largely have been assumed by political institutions. The kingdom is a federation of chiefdoms, each ruled by a chief and two or three councils that represent the general population and so-called noble clans. The ruling Bushongo chief is king by divine right, and his army has been a uniting factor since the emergence of the kingdom around 1600. But other bonds of common culture, *esprit de corps* and a common administration also hold the Kuba together.

There is little ancestor worship; nature spirits and witchcraft dominate Kuba religion. Witch-finding associations came into existence after poison-drinking rituals to test witchcraft suspects had been barred by 1930; but after 1959 the rituals revived. Nearly all objects of daily use are decorated, and carved wooden figurines, initiation masks, cups and beautifully embroidered raffia cloth are especially prized export articles. The rich Kuba music, dance and oral literature are little known outside their territory. *See* also CONGO, DEMOCRATIC REPUBLIC OF THE; WOOD CARVING.

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KUBAN, a river of the Northern Caucasus region of the U.S.S.R., is 563 mi. long and drains a basin of 23,552 sq.mi. The Kuban issues from the glaciers on Mt. Elbrus and flows north through the Caucasus ranges in a series of narrow, rocky gorges,

with fast current and many rapids. Emerging from the mountains it crosses the Stavropol upland (Stavropolskaya Vozvyshennost) in a general northwesterly direction; its valley there is broad and terraced. North of the upland, the river swings west across the north Caucasus plain to enter Temryuk gulf (Temryukski Zaliv) of the Sea of Azov. This lower course is sinuous, with a broad flood plain on which are extensive marshes. Many of these marshes have been drained and are now under intensive horticulture. At one time the major distributary of the Kuban flowed into the Black sea, but this course was abandoned in the 19th century. There is a minor distributary, the Protoka, north of the present main course. The Kuban is noteworthy for the extreme asymmetry of its basin. There are almost no right-bank tributaries, but many on the left bank, of which the largest are the Teberda, the Great and Little Zelenchuk, Urup, Laba, Belaya and Pshish. The average annual flow of the Kuban is 14,126 cu.ft. per second at Krasnodar (*q.v.*), its chief port, and 12,713 cu.ft. (10% less) at the mouth. The river is navigable as far as the village of Tbilisskaya, below Kropotkin, and freezes firmly only two years in three, usually from the end of December to mid-February. Its water is used for irrigation, especially for rice growing along the lower reaches. The Kuban gave its name to a Cossack host, who established a chain of outpost villages along its north bank in the late 18th and early 19th centuries. (R. A. F.)

KUBELIK, JAN (1880–1940), Czech violinist and composer who was one of the leading virtuosos of his time. Born at Michle, near Prague, July 5, 1880, he was a pupil of O. Sevčik. Between 1898 and 1938 he made several world tours, but his best period was between 1900 and 1910 when his left-hand pizzicatos and brilliant runs recalled the style of Paganini. His compositions include an *American Symphony* (1937) and six violin concertos. F. Drdla's *Serenade* was written for him. He died at Prague, Dec. 5, 1940. His son (Jeronym) Rafael Kubelik (1914–), born at Býchory, near Kolín, June 29, 1914, was conductor of the Czech Philharmonic orchestra (1936–39) and the Chicago Symphony orchestra (1950–53), and was music director at Covent Garden from 1955 to 1958. He wrote four operas, two symphonies, violin and cello concertos and chamber music.

KUBERA (Kuvera), in post-Vedic Hindu mythology, god of the north and of wealth, typified in sculpture by his plumpness. Half brother to the demon Ravana, who drove him from Ceylon, his original home, he then dwelt on Mt. Kailasa, and his pleasance, the world's treasure house, is Chaitraratha on Mt. Mandara. In later times Lakshmi (*q.v.*) is his spouse.

KUBLAI (Khûbilai or Kubla) **KHAN** (1215–1294), the greatest of the successors of Genghis Khan and founder of the Mongol (or Yüan) dynasty in China (*see* China: *History*), was the fourth son of Tolui or Tulē (d. 1232), youngest of the four sons of Genghis by his favourite wife. Genghis was succeeded in the khanship by his third son, Ogadai (1229–41), whose widow Töregene reigned after his death until 1246 when Güyük, his eldest son, was elected khan. From 1248 to 1252 Güyük's widow Oghul Khaimish was regent of the empire. The election of Mangu, Tulē's eldest son, brought the khanship back to Tulē's line (1251), not without bitter opposition from Ogadai's descendants, who believed they had better claims to Genghis Khan's empire. (*See* Genghis Khan.)

Under Mangu's reign, his brother Kublai was entrusted with full civil and military powers over the eastern parts of the empire (1252). In 1253 he received the district of Changan (Sian) in the Wei river valley (Shensi province) as a personal fief where he established a permanent territorial administration on the advice of Chinese literati whom he had invited to his court. Kublai played a prominent role in the campaigns against the empire of the Chinese Sung dynasty, reigning at the great city of Linan, later known as Hangchow. Kublai's first operations were, however, not directed against the metropolitan provinces of Sung but against the western province of Szechwan where he took the provincial capital Ch'eng-tu in 1252. From there his armies proceeded south and conquered the Tai kingdom of Nan-chao in present-day Yünnan (1253–56). After the capture of the Tai capital, Kublai returned north and left the war to his general Uriyangqadai whose forces penetrated into Tonkin and compelled the Annamite king to recognize Mongol suzerainty.

In 1257 the khan Mangu himself entered on a new campaign in west China and died there during the siege of Ho-chou in Szechwan (Aug. 1259). Operations ceased immediately, and in 1260 Kublai was elected by the Mongol nobles as Mangu's successor, but his younger brother Ariq Böge disputed the election and proclaimed himself khan at Qara Qorum (Karakorum) in the Gobi desert. Kublai fought against his brother and defeated him (1264). Another pretender, this time from Ogadai's line, continued to challenge Kublai's rule and retained his independence in parts of Turkistan until his death in 1301. These internal struggles retarded Kublai's operations against southern China, and it was not until 1267 that a new campaign against the Sung was launched with full force. The twin cities of Hsiang-yang and Fan-ch'eng on opposite sides of the Han river were finally brought to surrender in 1273 after five years of siege. After this, Bayan, Kublai's most gifted general, took command. He entered the Sung capital Linan early in 1276; the young emperor of Sung, with his mother, was sent as a prisoner to Kublai's court but was treated with courtesy. Two young princes of Sung had been dispatched to southern China before the fall of the capital, and were successively proclaimed emperor by loyal adherents of the Sung dynasty. Attempts to maintain their cause were made first in Fukien and afterward near Hong Kong but in 1279 these efforts were finally extinguished. Kublai was at last undisputed sovereign of all China. His conquest was a consequence of the superior strategy of his armies but equally of the frequent voluntary surrender of Sung commanders. Kublai's rule as Great Khan of the Mongol empire was acknowledged by his brother Hulagu in Persia and the Mongol dominion in southern Russia (Golden Horde) whereas Qaidu in central Asia remained hostile. Even so, Kublai had become the sovereign of an empire which stretched from Korea to the Arabian desert and eastern Poland.

In conformity with Chinese tradition, Kublai demanded allegiance and tributary gifts from China's neighbours. Some of these, like Annam and Korea, had already submitted. To others, Kublai sent envoys asking for submission and launched campaigns if his demands were ignored. Although these foreign expeditions were prepared on a great scale and at huge costs, almost all of them ended in failure. Twice between 1274 and 1281 Kublai's armies tried to invade Japan but his forces were either destroyed by storms or annihilated by the Japanese. Attempts to subdue the Malay kingdom of Champa in Cochin China (1283–87) by joint land and sea attacks failed, and Kublai secured only nominal allegiance from the Champa kingdom. Repeated expeditions against Burma (1277, 1283, 1287) brought the Mongol forces to the Irrawaddy delta and the ancient capital Pagan, but here again Kublai had to be content with the acknowledgment of a formal suzerainty. The Khmer kingdom of Kambuja, perhaps impressed by these campaigns, declared formal submission in 1294. During the last years of Kublai's reign an attack was launched against the Javanese kingdom Majapahit (1293). After some initial successes the expeditionary forces were compelled to re-embark after considerable losses. Kublai also sent envoys to southern India but no force was used because Chinese relations with these parts had always been purely commercial.

In addition to his military gifts, Kublai was an able administrator. He felt himself to be as much a legitimate emperor of the Chinese as he was a descendant of Genghis Khan. He was the first to make what is today Peking the capital of all China when he established his court at Yenching, as it was until then called, under the name of Ta-tu ("great capital"). In central Asia and in the west this residence was known under the name of Cambaluc (from Turkish Khanbaliq, "town of the Khan"). Ta-tu was the winter residence; the summer residence was Shang-tu (the "upper capital") in southern Mongolia near Dolon-nor. The first Mongol rulers in northern China had had no administrative apparatus but relied on force and extortion. Kublai, on the other hand, tried from the beginning to establish a permanent bureaucracy on Chinese lines. He was also the first Mongol ruler to adopt Chinese reign titles (1260) and in 1271 gave his own dynasty the

Chinese name of Ta Yüan, "Great Origin." His rule in China is characterized by a synthesis of traditional Chinese features and Mongol elements. The social and economic structure of China was left basically unchanged. The rule of the Mongol minority was cemented by discriminatory legislation: the whole population of the Chinese khanate (in 1290 about 58,000,000) was divided into four classes: Mongols; Asian confederates (Uighurs, Persians, Turks, etc.); northern Chinese, Koreans and Juchen; and southern Chinese. The first two classes enjoyed considerable administrative, economic and judicial privileges; the third class held an intermediate position whereas the fourth—numerically by far the largest group—was practically excluded from state offices with the exception of literary and ritual functions. In trade and commerce, and also in science and medicine, Uighurs, Persians, Jews and Syrians played a great role. State revenues were, as under previous Chinese dynasties, based on taxes paid in kind and in currency, forced labour and numerous monopolies. The official currency was paper money.

In the religious field, Kublai favoured Lamaist Buddhism to which he himself became a convert. A Tibetan lama, Phags-pa, was appointed head of the Buddhist church. This cleric also devised a new alphabet for the Mongol language (1269) based on the Tibetan script but written vertically like Chinese. The use of this artificial and cumbrous alphabet was declared obligatory but it could not supersede the Uighur script for Mongol. In spite of his sympathies for Buddhism and some anti-Taoist legislation Kublai retained a benevolent attitude toward other religions, and servants of every recognized religious community continued to enjoy exemption from taxes and labour service.

Although Kublai spoke little if any Chinese and could certainly not write Chinese (he probably could read Mongol in the Uighur script), he patronized Chinese literature and culture and ordered the translation of some Chinese works on history and statecraft and excerpts from the classics into Mongol. An account of the splendour of his court and entertainments, of his palaces and hunting expeditions and of his postal services is given by Marco Polo (*q.v.*) through whom Europe received for the first time reliable information on the far east. Polo's China is Kublai's China, a rich, industrious and civilized country, open to commerce with and influence from the near east and Europe. Chinese sources record that European travelers (*fa-lang*, "Franks"), perhaps the first who ever reached China in the middle ages, were granted an audience with Kublai in 1261.

Kublai must be regarded as one of the great rulers in history. He showed natural magnanimity and was able to rise above the nomad mentality of his ancestors and to govern a huge state with an ancient civilization. He was not unpopular among the Chinese and was held in esteem even by Chinese orthodox historians. The first non-Chinese to rule over the whole of China, Kublai became famous in east and west alike as the Great Khan whose greatness was equally recognized by his Chinese, Islamic and European contemporaries.

His favourite son, Jingim, who had received instruction from Chinese scholars and been appointed as heir-apparent in 1273, died at the age of 42 (1286).

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KUBU, a small seminomadic group of people found primarily in swampy areas near watercourses in southeast Sumatra, Indonesia. They appear to be a mixture of an early Veddoid stock (*see* MALAY ARCHIPELAGO) and Negrito. Some are quite Negroid while others have long narrow heads and are lighter in colour than the pygmies. Hair ranges from closely curled to wavy.

Contact of the Kubu with their neighbours has been primarily through silent trade; *i.e.*, goods for barter are put where traders can look them over. They, in turn, place nearby what they are willing to give in exchange and retire to a distance. If the deal is satisfactory, the Kubu take what is offered and vanish into the bush. Shortly before World War II the Dutch forced part of these people into villages near the Malays and started them in agriculture, but these settlements were often deserted. Nevertheless the contacts thus made, as well as those brought about by oil exploration in their territory, have resulted in breaking down their isolation.

Settlements normally consist of 20 to 30 persons living in frail houses made of bamboo and leaves. An older person serves as headman but he has little authority. Rules with regard to sex relations are said to be lax and divorce is common. Jungle produce and small game provide most of the food, for in such a group there are no domestic animals other than an occasional dog or chicken. Dress consists of a bark loincloth and a headband to hold back the tangled hair. The Kubu seldom bathe and are subject to skin diseases. Children go naked.

Little is known about their beliefs beyond the fact that they have mediums, or shamans, and that they make offerings to the spirits.

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KUCHING, the capital of the state of Sarawak, Malaysia, dates from 1839, when Sir James Brooke, the "white raja," built the first European-style house on a jungled bank 15 mi. up the Sarawak River. Pop. (1960) 50,579. Now a vigorous administrative and business centre, Kuching has a population that is two-thirds Chinese and one-fifth Malay, the rest being Dayak, European (about 500), Indian, Pakistani, Bugi, etc. Another 50,000 persons, mostly Malays and Dayaks, live in the immediate vicinity. The focal centre is the Sarawak Museum, set in beautiful gardens. Old-style buildings, like the Astana and courts of justice, jostle concrete skyscrapers, including the best hotel in the Malay Archipelago.

Kuching possesses several motion-picture theatres; a badminton stadium and golf course; a new modern port on the muddy and crocodile-infested river; and a broadcasting station (Radio Malaysia in Sarawak). (T. HN.)

KUDIRKA, VINCAS (1858–1899), an influential publicist and writer of the Lithuanian renaissance during the occupation of his country by tsarist Russia, was born at Paezeriai in southern Lithuania on Dec. 31, 1858. Leaving the secondary school at Marijampole in 1881, he went to the University of Warsaw, where he studied history and philosophy, then medicine. He began medical practice in 1890, but had, however, contracted tuberculosis, and as his health failed he devoted himself entirely to literature. In 1889 he had begun to publish the cultural and political journal *Varpas* ("The Bell"), which was printed at Tilsit in German-controlled territory and smuggled into Russian-controlled Lithuania. This paper for a long time bridged the gap between liberals and socialists in Lithuanian politics. For ten years Kudirka was its soul, fighting against the tsarist Russian regime and against russification. While editing *Varpas* he matured as a writer; he published in it his satires and patriotic poems. He also translated a series of plays and novels into Lithuanian. His works were published in the United States in six volumes (1909–10). He wrote the Lithuanian national anthem and was the first to harmonize Lithuanian folk songs. He died on Nov. 6, 1899, at Naumiestis, which was later renamed after him. (MA. G.)

KUDU (KOODOO), a large African browsing antelope of the genus *Strepsiceros* (or *Tragelaphus*) of dry acacia-wooded grasslands. Both sexes are fawn gray with seven to ten narrow white vertical stripes coursing from behind the shoulder to the rump. Males, which may weigh over 650 lb., have slender corkscrewlike horns about 50 in. long; females are hornless. The greater kudu (*S. strepsiceros*) ranges from the Cape to Somaliland; the lesser kudu (*S. imberbis*) from Mount Kilimanjaro in Tanganyika to Somaliland. *See* also ANTELOPE. (H. K. B.)

KUEI-LIN (KWEI-LIN), city of Kwangsi Chuang Autonomous Region, China, situated in the northeastern part of the region on the Li river which flows southeast as the Kuei-shui to join the Hsi Chiang (West river) at Wuchow. Historically the city was an important administrative centre mainly because of its location on a productive valley floor which is also the easiest route south from Hunan. In 1939 the Hunan-Kwangsi railway was extended

through Kuei-lin to Liu-chou via this corridor. The city lies amid striking vertical, forested limestone peaks, many of them containing large water-solution caves, the inspiration of Chinese artists for centuries.

Kuei-lin is the location of the Kwangsi Agricultural institute and Provincial museum. During World War II the caves sheltered refugees, small industries, and supplies for the U.S. and Chinese air forces until the Japanese captured Kuei-lin, 1944. Pop. (1958 est.) 170,000 (mun.). (TE. H.)

KUEI-YANG (KWEIYANG), the capital and route centre of Kweichow province, southwest China, stands on a small plain over 3,400 ft. above sea level at the approximate radial drainage apex of the province and at the head of the Ch'ien Chiang which flows into Szechwan. Since the Ch'ing dynasty (1644–1912) the city has been a Chinese regional administrative centre for tribal peoples. During World War II it grew as a vital road centre between K'unming, Chungking and Liu-chou, and as a military and medical headquarters of the Chinese army, later augmented by U.S. forces. Kuei-yang was opened by rail from Kwangsi in 1959, with other lines approaching from Szechwan and Yünnan. In the same year the city opened its first steel plant and a textile mill. One of China's eight institutes for national minorities was established there, since the province has large numbers of at least eight different non-Han people. Pop. (1958 est.) 530,000. (TE. H.)

KUEN-LUN MOUNTAINS: *see* KUNLUN MOUNTAINS.

KUFA, a decayed city of Iraq, on the Hindiyah branch of the Euphrates, about 7 mi. E. by N. of Najaf. Founded as a garrison town by the Arabs in A.D. 638, it became the capital of the caliph Ali (*see* CALIPHATE) and the headquarters of Shi'ite opposition to the orthodox caliphs of Damascus and Baghdad. It remained a centre of Arab learning and culture until the 10th century, when it began to fall into decay before the rise of Hillah and later of Najaf.

KÜHLMANN, RICHARD VON (1873–1948), German diplomat who was foreign minister for ten months during World War I, was born on May 17, 1873, at Istanbul, Turk., the son of the director-general of the Anatolian railways. He entered the German foreign service in 1899 and, after serving in St. Petersburg (1900), Teheran (1901), Tangier (1904), Washington (1906) and The Hague (1907), was counselor of the German embassy in London (1908–14), where he prepared the Anglo-German treaties concerning the Portuguese colonies and the Baghdad railway. After the outbreak of World War I he became German minister at The Hague (1915) and ambassador at Istanbul (1916). Then, on Aug. 6, 1917, he was appointed secretary of state for foreign affairs under the chancellor Georg Michaelis. Though he believed in a compromise peace, he missed the opportunity of Pope Benedict XV's appeal as he wished to keep Belgium as a "dead pledge."

In 1918 Kühlmann led the German delegation that concluded the peace of Brest-Litovsk with Russia (March) and the peace of Bucharest with Rumania (May), but on June 24 he told the *Reichstag* that the war could not be decided by military measures alone. The supreme army command (Erich Ludendorff) thereupon forced his dismissal. Kühlmann, who was married to a daughter of the Saarland industrialist H. von Stumm, then devoted himself to the management of his estates and to company directorships in the iron industry. He died on Feb. 16, 1948, in Ohlstadt in Upper Bavaria. He wrote three volumes of memoirs (*Gedanken über Deutschland,* 1931; *Die Diplomaten,* 1939; *Erinnerungen,* 1948), and three novels.

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(R. Mo.)

KUHN, (FRANZ FELIX) ADALBERT (1812–1881), German philologist and folklorist, the founder of a new school of comparative mythology, based upon comparative philology, was born at Königsberg, Neumark, on Nov. 19, 1812. From 1841 he was connected with the Kollnisches gymnasium at Berlin, of which he was appointed director in 1870. He died at Berlin on May 5, 1881. He first devoted himself to German stories and legends, but his reputation is founded on his researches into the language and history of the Indo-Germanic peoples as a whole. In his *Zur ältesten Geschichte der Indogermanischen Völker* (1845), he gave an account of the earliest civilization of the Indo-Germanic peoples before their separation into different families, by comparing and analyzing the original meaning of the words and stems common to the different languages.

KUHN, RICHARD (1900–), German biochemist, was awarded the 1938 Nobel prize in chemistry for work on carotinoids and the vitamins, but was forbidden by the German government to accept. He was born Dec. 3, 1900, in Vienna. After receiving his doctor's degree at Munich, he became an assistant to Richard Willstätter. Following the years 1926–29, spent at the Technische Hochschule in Zürich, he became the director of the Max Planck Institute for Medical Research at Heidelberg, professor at the University of Heidelberg and associated with the Max Planck Society for the Advancement of Science at Göttingen. He investigated the structure of long-chain compounds containing conjugate double bonds—the polyenes and diphenylpolyenes connected with the chemical nature of carotenoids. These are the fat-soluble yellow colouring materials which are widely spread through nature and whose role is evidently vital. Kuhn discovered at least eight carotenoids, prepared them in pure form and by analysis determined their constitution. He ascertained one to be requisite for the fertilization of certain algae. Simultaneously with Paul Karrer, Kuhn announced the constitution of riboflavin, vitamin B_2, which is associated with the oxidation of sugar in the body cells. Kuhn was the first to isolate one gram of riboflavin, obtained from 53,000 l. of skim milk. With three co-workers, he isolated the important antidermatitic vitamin B_6. The studies of these complex organic compounds are of great significance for biological and medical problems. From 1948 Kuhn was editor of Liebig's *Annales der Chemie.* He received the Pasteur, Paterno and Goethe prizes. (V. Bw.; X.)

KUIBYSHEV (KUYBYSHEV), an *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., covers an area of 20,734 sq.mi. in the middle Volga area, by far the greater part lying on the left or eastern bank. The *oblast* is drained by the Volga and its tributaries, notably the Sok, Bolshaya Kinel, Samara and Chapayevka. There the Volga makes a great loop to the east, surrounding on three sides the Zhiguli hills, which rise to 1,214 ft. These hills are heavily forested with mainly deciduous species, and deeply cut up by ravines. The left bank of the Volga is mostly level plain, but in the extreme northeast of the *oblast* is a corner of the Bugulma-Belebeyev upland (Bugulminsko-Belebeyevskaya Vozvyshennost), from which the hills of the Sokskiye Yary extend southwestward to the Volga. The northern half of the left bank lies in the forest-steppe zone, with dark gray forest earths and leached chernozem soils. The oak woodlands of this area have been widely cleared. The southern part of the left bank is true steppe on rich chernozems, almost all now under the plow. The climate is strongly continental, with prolonged, cold winters (January average temperature −14° C. [7° F.]) and warm summers (July average 22° C. [72° F.]). Rainfall is low on the plain, about 12 in. a year, but rises to 18 in. on the hills. Droughts occur periodically and crops are liable to suffer from the scorching *sukhovey* winds of early summer.

Russians first entered the area after Ivan IV's conquest of the Volga in the mid-16th century, but the main period of settlement was in the 18th century, after the setting up of a defensive line along the Samara river. Of the 1959 population of 2,258,359, 76% was Russian, 8.8% Mordvinian, 7.2% Chuvash, 3.6% Tatar and 2.7% Ukrainian. About 1,400,000 (62%) of the population are urban, living in 10 towns and 11 urban districts. The largest towns are the administrative centre of Kuibyshev (pop. 806,356), Syzran (148,866), Chapayevsk (83,263) and Novokuibyshevsk (62,755). The *oblast* lies in the Second Baku (*q.v.*) and there are extensive deposits of oil and oil shale, natural gas, sulfur and phosphorite. Oil exploitation is important on the northern flank of the Zhiguli hills around Zhigulevsk and Stavropol, near Syzran and again east and northeast of Kuibyshev at Krasny Yar, Otradnoye, Sukhodol and Pokhyistnevo. Novokuibyshevsk and Syzran have refineries and petrochemical industries. Engineering is highly

developed in the three main towns, with special emphasis on precision engineering, equipment for the petroleum industry and agricultural machinery. Agriculture is of great importance, dominated by spring wheat, maize (corn), millet and sunflowers. There is market gardening around Kuibyshev and fruit growing on the Volga right bank. Irrigation, necessary to combat the recurrent droughts, is still little developed. (R. A. F.)

KUIBYSHEV (KUYBYSHEV), town and *oblast* centre of the Russian Soviet Federated Socialist Republic in the U.S.S.R., stands on the left bank of the Volga at its confluence with the Samara river 530 mi. E.S.E. of Moscow. In 1926 it had a population of 175,000 which by 1959 had grown to 806,356. The town was founded as Samara in 1586, as a fortress to protect the Volga trade route. Its military function continued for two centuries, the town forming the western end of the Samara defensive line, established in 1736. At the same time it developed as a major trading centre at the junction of the Volga and the route to the east by the Samara valley. It became the chief centre and river port for most of the Trans-Volga, later being made the centre of a *guberniya* (a pre-Revolution province). In 1935 the town was renamed in honour of Valerian Vladimirovich Kuybyshev, the prominent Bolshevik. Many Soviet government departments and diplomatic missions were evacuated to Kuibyshev after the German assault on Moscow during World War II. Industry developed, especially flour milling and the processing of livestock products. After the Revolution heavy industry grew rapidly. Engineering and metalworking take first place, producing complex and precision machine tools, ball bearings, agricultural machinery, cables, railway equipment and spares, river craft and, above all, machinery equipment for the petroleum industry. Kuibyshev lies on the oilfields of Second Baku (*q.v.*) and petroleum refining is important; petroleum by-products form the basis of a chemical industry. Oil pipelines link the town to Saratov and other centres of the Second Baku and in the 1960s another was projected to Bryansk. There is a natural gas pipeline from Buguruslan. Other industries include the production of building materials, footwear, clothing and foodstuffs, brewing and timberworking. Around Kuibyshev a ring of satellite industrial towns has grown up, notably Novokuibyshevsk, where the petrochemical industry is concentrated. Of great industrial importance was the building of the gigantic Kuibyshev barrage and hydroelectric plant at Zhigulevsk, a few miles upstream. Completed in 1957, the station has a capacity of 2,300,000 kw. Communications are excellent with the navigable Volga capable of taking seagoing ships, a railway westward to Syzran where lines radiate out to all parts of European Russia, and two railways eastward to Ufa, Orenburg, Siberia and central Asia. Kuibyshev has 10 research institutes and 8 higher educational establishments. (R. A. F.)

KUJAVIA (Pol. KUJAWY; Lat. CUIAVIA), the historical name of the eastern part of the Wielkopolska-Kujawy lowland in central Poland, comprising the area bounded on the east and north by the Vistula river between Wloclawek and Bydgoszcz and on the south and west by the source and upper course of the Notec. The area around Inowroclaw is the so-called Czarne (Black) or Polne (Field) Kujawy, as distinct from the forested region around Wloclawek. The land is abundant in "water pipe" lakes, the biggest being Goplo, which in the middle ages was connected with the Warta river in the south and with the Notec and Vistula in the north by a chain of smaller lakes and portages. The land is mostly flat and has generally good soil, especially west of Goplo.

The name Kujawy first appears in 1136, referring to the area closest to the Vistula, but was later extended to include the Goplo area. The principal stronghold of the Goplo region was Kruszwica, which dates from the 8th century. Even after its incorporation into the state of Polanians, this place still retained certain traditions of independence and in the 11th century became the seat of the bishops of Kujawy. At the beginning of the 12th century, however, the bishop's seat was transferred to Wloclawek.

When King Boleslaw III the Wry-Mouthed divided Poland among his sons in 1138, Kujavia formed part of the Mazovian-Kujavian duchy. Separated from Mazovia in 1233, the duchy of Kujavia was subdivided into the duchies of Inowroclaw, Gniewkowo and Brzesc Kujawski. From the Brzesc Kujawski duchy came Wladyslaw I the Short (Lokietek), king of Poland, who later either joined the various Kujavian duchies to the Polish crown or turned them into the vassal states. The last Kujavian duke (of Gniewkowo) ceased to rule in 1363.

After the reunification of the Polish state, Kujavia up to the 18th century formed two provinces or *wojewodztwa:* those of Brzesc Kujawski and of Inowroclaw. In 1772 Inowroclaw came under Prussian rule. At the time of the duchy of Warsaw (1806–14) the whole of Kujawy was included in it as the province of Bydgoszcz, but after 1815 only the eastern part of Kujavia was included in the kingdom of Poland as the district (*powiat*) of Wloclawek. After 1918 Kujavia was divided between the provinces of Pomorze and Warsaw. In 1945 the whole of Kujavia was included in the province of Bydgoszcz. The Torun museum contains many relics of wooden architecture, implements and furnishings from Kujavian peasant dwellings. The dance *kujawiak* has spread all over Poland. (A. GI.)

KŪKAI (KŌBŌ DAISHI) (774–835), founder of the Shingon ("True Word") school of esoteric Japanese Buddhism, with its headquarters on Mt. Kōya in central Japan. He was not only a learned priest, but he also contributed greatly to the development of Japanese art and literature, pioneered in public education, and promoted public welfare; his name is still a household word in Japan. Kūkai was born in Zentsūi-ji, Kagawa Prefecture, on June 15, 774. As a youth, he was trained in the Chinese classics by his uncle, Atono Ōtari, a Confucian scholar whose intention was to prepare Kūkai for the bureaucracy, the traditional profession of the nobility. At the age of 18, however, Kūkai publicly proclaimed his preference for Buddhism in his first significant work, the *Sangō Shiiki* ("Essentials of the Three Teachings"), a critical study of Confucianism, Taoism, and Buddhism. The text reflects the author's youthful frustration with the Confucian-oriented social order, intellectual resistance to bureaucratic vanity and corruption, and the strength of the individual desperately in pursuit of truth. Kūkai's preference for Buddhism was largely influenced by Gonsō, a Sanron priest of Nara, under whom he had studied. He was not contented, however, with the progress of his learning. Having come across the Chinese translation of one of the basic Tantric (*see* TANTRISM) writings, the *Mahāvairocana Sūtra,* which inspired him deeply, he decided to go to China for further study. He joined an embassy (Saichō, founder of the Tendai sect, also accompanied it) and after a perilous voyage arrived in South China in August 804. At the capital, Ch'ang-an, he studied under the Tantric master Hui-kuo, returning to Japan in October 806.

Kūkai's major work, the *Jūjū Shinron* (written in Chinese), a treatise on the "Ten Stages of the Consciousness," submitted to the imperial throne in about 830, shows his ability as a systematizer of the major philosophical schools of India, China, and Japan. Kūkai died on March 21, 835, on Mt. Kōya; he is posthumously known as Kōbō Daishi.

In 816 he had obtained permission to build the monastery on Mt. Kōya. In the 1960s it was one of the largest in Japan and perhaps the most vigorous. Mt. Kōya and associated Shingon sects had about 13,000 temples and shrines and 7,500,000 believers.

See also BUDDHISM: *Regional Variations in Buddhism.*

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KU KLUX KLAN, a secret, masked organization which after the American Civil War became the chief instrument of the white underground resistance movement in the south against northern and Negro domination. It has had many imitators of the same name since. After World War I a new organization assuming the K.K.K. name grew from southern beginnings to considerable, though brief, national political power. The process of imitation has also been one of degeneration into race-baiting at its most disreputable level. After World War II it was re-

pressed even in the south of its origin until its revival in the 1960s.

The original organization was formed as a purely social club by six young Confederate veterans in Pulaski, Tenn., on Christmas Eve 1865. They apparently derived the name from the Greek word Kyklos from which comes the English "circle." "Klan" was added for the sake of alliteration and Ku Klux Klan emerged. Even the long, ghostly robes they wore were at first adopted in an almost Halloween spirit. On their rides, so garbed, the young men were amused when they frightened superstitious freedmen. From the realization of the effectiveness of such fears, however, the Klan spontaneously spread. It became the organization and instrument for regulating the activities of ex-slaves and opposing the Negro and carpetbagger (*q.v.*) governments set up under the Reconstruction measures (1867–76) of the U.S. congress.

The formidable Ku Klux Klan of history was formally organized at Nashville, Tenn., in 1867. Set up as the "Invisible Empire of the South," it was divided into state Realms, county Provinces and individual Dens. Over the whole "invisible empire" presided a Grand Wizard and under him the hierarchy descended in Grand Dragons, Grand Titans and Grand Cyclopses. There were also giants, genii, hydras, furies, goblins and nighthawks. In robes designed to frighten the Negroes and prevent identification by federal troops, the Klansmen's asserted purpose was to protect the white people from obstreperous Negroes and to reassert the political and social superiority of the whites.

Klansmen whipped and sometimes killed in the dark and also were surreptitious members of juries in the courthouses. They posted placards warning those whose behaviour they did not approve to mend their ways or leave the community. And when congressional committees or other authorities questioned klansmen, they "lied like gentlemen," as one of their leaders put it after his interrogation by a congressional committee. A similar purpose moved the Klans in all parts of the south but the organization was never effectively disciplined from the top. There was wide variety in the regalia worn by different dens, ranging from ghostly white to flaming scarlet. Great differences, too, marked the character of various Klan groups. Indeed, not all those who carried out the Klan purposes in the Klan guise were members of the organization. In the same period similar societies such as the Knights of the White Camelia, the White league, the Invisible Circle and the Pale Faces spread throughout the former Confederacy.

Not all devoted southerners approved the secrecy or the methods of the Klan. Even the Grand Wizard of the "invisible empire," a former Confederate officer, Gen. Nathan Bedford Forrest, ordered it disbanded in 1869 because of increasing violence involving murder and kidnaping, at the hands of some overzealous or unscrupulous members. There were some ready to serve private grudges as well as a region's cause. Inevitably the Klan's activities in intimidation of Negroes, carpetbaggers and their southern white sympathizers (called scalawags) created great indignation in the north. Congress enacted laws to suppress the organization.

To many southerners, however, the Klan seemed the only answer to the activities of the Loyal leagues, which also were secret and ritualistic. The Loyal leagues were organized by the carpetbaggers to control the Negro vote by means sometimes similar to those of the Klan. There was widespread southern sympathy for the hundreds of suspected Klansmen who were arrested by federal authorities, and particularly for those who were sent to the state penitentiary at Albany, N.Y. When the last of these were freed in 1873, they came home as heroes.

20th-Century Klan.—No vestige of heroism attended the Ku Klux Klan of the 20th century. While taking its name from the old southern order, its inspiration can be more directly traced to the intolerance from which the nativist Know-Nothing party (*q.v.*) grew in the 1850s. Clearly also one prime purpose in the organization of the new Klan and particularly of its promoters was profit from membership, sale of regalia, publications, etc. The new K.K.K. was organized on Stone mountain, near Atlanta, Ga., in 1915 by Col. William J. Simmons, a preacher and promoter of fraternal orders. He proclaimed it as a "high-class, mystic, social, patriotic" society devoted to the protection of womanhood and the supremacy of white Protestants. To the hostility toward the Negroes and the ritual and regalia of the first Klan, the new one added bias against Catholics, Jews, foreigners and, finally, organized labour.

The organization remained small and weak until Edward Y. Clarke and Mrs. Elizabeth Tyler brought to it their talents as publicity agents and money raisers. Membership rose to between 4,000,000 and 5,000,000. Millions of dollars poured into the Atlanta offices for memberships, rituals and Klan costumes. Fiery crosses, a symbol of the new organization, burned in all parts of the country. The Klan controlled politicians in both parties. Justice Hugo L. Black of the U.S. supreme court, who admitted in 1937 that he had been a Klan member when elected to the senate from Alabama in 1926, was only one of many.

But Klan power bred Klan corruption. Clarke and Mrs. Tyler were involved in a personal scandal. In a struggle for power within the organization, Hiram W. Evans, a dentist from Texas, pushed Colonel Simmons out with a cash settlement of $90,000. Numerous acts of violence by its members or under the spreading shadow of its name created increased public sentiment against it. In Indiana the Grand Dragon was sent to prison for murder.

The nomination of a Catholic, Alfred E. Smith, for the presidency by the Democrats in 1928 gave the organization a last spurt of growth under the slogan, "Keep the Pope out of the White House." The Klan energetically participated in the prejudices stirred in that campaign but got little profit from its efforts. At the beginning of the depression in 1930, its membership was down to 30,000. In 1939 the remnant Klan's association with the fascist German-American Bund was disclosed. And in 1944 just enough of the order remained to disband hastily when the government tried to collect from it $685,000 in unpaid back taxes.

For the next 20 years the Klan was quiescent but in the mid-1960s there was a resurgence of Klan activity in some southern states as attempts were made by civil rights workers to spur compliance with the provisions of the Civil Rights act of 1964. There were numerous instances of bombings, floggings and shootings in southern communities, carried out in secret but apparently the work of Klansmen. Crosses were burned at night meetings of Klan members, sometimes with effigies of Negroes or white civil rights advocates attached. In some communities members of the Klan appeared in public to picket hotels and other business establishments that offered accommodations on a desegregated basis. In March 1965 President Johnson, while making a nationwide television announcement that four members of the United Klans of America, Knights of the Ku Klux Klan, Inc., had been arrested in connection with the slaying of a white woman civil rights worker in Alabama, called upon all members of the Klan to withdraw from the organization "before it is too late."

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KUKU KHOTO: *see* HUHEHOT.

KÜLPE, OSWALD (1862–1915), German psychologist and philosopher, a pioneer in experimental psychology, using the method of introspection, was born on Aug. 3, 1862, in Latvia. He studied with Wilhelm Wundt and was professor at Würzburg, Bonn and Munich. His study of the qualitative difference between a memory and the object it represents was important. Best known are the studies of the effects of attitudes and tasks upon perception and the course of recall and thought, which Külpe and his pupils conducted at Würzburg. He showed that if an individual is comparing two tones as to intensity and a little later is asked which is the higher pitch, he will be uncertain in his response, although he is accurate as to intensity. Similarly, what is recalled by a word depends upon the task that has been set. If a person is shown a word when the task is to name the class to which it

belongs, the class is recalled; if he seeks an instance, that is remembered (dog-animal for one, dog-terrier for the other). The principle was extended to cover all thought processes. Külpe died at Munich on Dec. 30, 1915.

Külpe's *Grundriss der Psychologie* was translated as *An Outline of Psychology*. A three-volume, partly posthumous work, *Die Realisierung*, was an important contribution to epistemology. *See* also INTROSPECTION. (W. B. PY.; X.)

KULTEPE (Turkish for "ash hill"), a mound hiding the remains of the Bronze Age city of Kanesh, is situated in the *il* (province) of Kayseri in central Turkey, about 12 mi. N.E. of the town of Kayseri (the ancient Caesarea Mazaca in Cappadocia, chief centre of the region since antiquity). Its bulk, covered with vegetation, comprises an expanse of stratified debris of about 1,900 by 1,500 ft., rising to a height of almost 70 ft. Although partly wrecked by earth removal and careless digging, it is an imposing landmark next to the village of Karahuyuk off the main highway from Kayseri to Sivas.

Kultepe was known to archaeologists during the 19th century, but began to attract particular attention as the reputed source of so-called "Cappadocian tablets" in Old Assyrian cuneiform writing and language, which found their way from the open antiquities market to various public and private collections from 1880 onward. Unsuccessful attempts were made by E. Chantre in 1893 and by H. Winckler and H. Grothe in 1906 to locate the precise spot where these tablets were being uncovered. At length, in 1925, F. Hrozný found the source of the tablets in a field some 100 yd. from the base of the mound, in the buried remains of what proved to be an Old Assyrian merchant colony attached to the Anatolian city proper and known as Karum Kanesh. Hrozný's excavations added many new tablets. Within the walls of the city he discovered a spacious central building, presumably a palace or temple.

The excavations at Kultepe were resumed in 1948 and continued annually by the Turkish Historical society under the direction of T. and N. Ozguc. Their painstaking and methodical excavations not only added thousands of new tablet finds, including the first such discoveries in the city mound itself, but also contributed a proper archaeological mapping of the site. The work, moreover, inevitably shed new light on the tablets themselves, which constitute the earliest historical documents of Anatolian provenance.

Texts of this Old Assyrian type have been discovered also at Alishar Huyuk, and in addition to earlier examples approximately 50 were discovered in 1956 at Bogazkoy, the site of the Hittite capital. They belong to what is known as the "colony period" in central Anatolia around the start of the 2nd millennium B.C. and more particularly to the 20th and 19th centuries. At that time Indo-European Hittites had already settled in the region, and the process of their assimilation to the indigenous Anatolian population is reflected in the local proper names recorded in the Kultepe tablets. Names of earliest Hittite history like Hattusa and Anitta are also attested. Amid such a society there existed for many generations flourishing Assyrian *karums*, of which Kanesh was doubtless the most important, though numerous others are mentioned on the tablets. These *karums* served as end stations for the caravan shipments by donkeys from and to Assyria and as distribution centres for the imports, notably lead and a wide variety of woven goods. Copper was the most important Anatolian export article, while silver served for currency transactions, unless a simple barter prevailed. A highly developed commercial system with features like "letters of credit" and "risk insurance" emerges from these business letters on baked clay, enclosed in clay envelopes and impressed with cylinder or stamp seals.

Reference to datable events and personalities in Assyria is of particular importance. The protracted peaceful periods of the *karum* were invariably interrupted by violent destruction by fire and attendant sudden abandonment by the inhabitants; as a result the everyday surroundings of the Assyrian merchants are still largely discernible in their original layout. The houses were of traditional Anatolian type, with stone foundations and superstructures of brick and beams enclosing an open court. Two stories are frequent, of which the upper generally served as living quarters, while the ground floor was used for business purposes. The hearths, pottery and general furnishings are thoroughly Anatolian; one is led to assume considerable adaptability on the colonists' part and frequent intermarriage with the indigenous people. This may explain the good relations that prevailed with the local population and authority, with the latter imposing only routine control and levies on the Assyrian imports.

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KUMAMOTO, large and populous Japanese prefecture (*ken*) of central western Kyushu. Area 2,846 sq.mi. Pop. (1965) 1,770,747. Predominantly agricultural, it produces large rice surpluses for shipment to northern Kyushu industrial cities and some silk, tobacco and other cash crops. Forestry is important in the mountainous interior, and fishing is the economic mainstay along the coast and in the Amakusa Islands. Industry consists mainly of food processing, cotton textiles, chemicals, pulp and paper and ceramics.

The capital, Kumamoto, is the largest and most influential city, followed by industrial Yatsushiro. Tourists visit the enormous crater of Mt. Aso in Aso National park. (J. D. EE.)

KUMAMOTO, largest city and capital of Kumamoto prefecture, Japan, is located on the lower reaches of the Shira river. Pop. (1965) 407,047. Kumamoto has long been the dominant city of central Kyushu. Its modern growth dates from the erection of a powerful castle at the end of the 16th century; this fortification played a central role in the Satsuma rebellion of 1877. Kumamoto serves as the main collection centre for the prefecture's thriving agricultural areas, has many regional offices of federal government agencies and is a military centre. Small-scale factories that process foodstuffs and cotton textiles employ about 20% of the city's labour force. (J. D. EE.)

KUMANS, a Turkish people, known also under the names of Kipchak (*q.v.*) and Polovtsy, who from the 11th to the 13th centuries were important in eastern Europe. There is no clear line of division between the Kipchaks and Kumans; and the name of the latter—Komanoi or Koumanoi in Greek, Comani or Cumani in Latin sources—is often applied to other Turkish peoples (such as the Pechenegs). It can be said that the Kumans constituted the western branch of the Kipchaks, and it was under the former name that this tribal confederation was best known in Byzantium, in Hungary and among the crusaders. The Hungarian name for the Kumans is Kún (Cuni or Chuni in Latin sources), a form difficult to explain, which may have to be connected with the name of the Huns.

The sources mention several attacks on Hungary by the Cuni in the second half of the 11th century, but these incursions were probably made by the Pechenegs. Hungarian expeditionary forces sent to Russia by the kings Kálmán, Géza II and Andrew II clashed repeatedly with the Kuman auxiliaries of the Russian princes. By the beginning of the 13th century the Kumans had become more aggressive, and the Knights of the Teutonic Order, settled by Andrew II in the southeastern parts of Transylvania, had to build forts against their incursions. In 1227 Robert, archbishop of Esztergom, visited Transylvania and Walachia, where he baptized the Kuman prince Barc and about 15,000 of his people. The following year saw the establishment of the first bishop of Cumania. Soon after Béla IV became king of Hungary (1235), he took the additional title of "king of Cumania." In 1239 the Kuman prince Kuthen, fearing a Mongol attack, was granted asylum by Béla IV and settled with all his people in Hungary. On the eve of the Mongol invasion of that country in 1241–42, the presence of this alien element proved highly dangerous. Accused of treachery, Kuthen was murdered, and his angered people left Hungary. In 1245 Béla IV resettled them in Hungary, and his son, the future Stephen V, married a Kuman princess. Under the rule of their son, László IV (1272–90), Kuman influence in Hungarian affairs became preponderant; but the assimilation of these nomad Turks into Hungarian life took centuries to complete. (DS. SR.)

KUMASI (formerly spelled COOMASSIE), a town in Ghana and

capital of Ashanti (*q.v.*), lies 125 mi. N.W. of Accra among hills rising to 1,000 ft. Carved out of one of Africa's densest forest belts, it has a humid climate and a heavy rainfall. Pop. (1960) 180,642.

The town is zoned into commercial, industrial and residential areas. Population is most dense where the civic activities are concentrated in the central and oldest part of the town within a two mile radius of the fort built by the British in 1897, which houses the museum of the Ghana regiment. The oldest buildings, put up by European commercial firms at about the same date, are along Harper road close to the fort. Nearby was the palace of the kings of Ashanti (1816), destroyed by Sir Garnet Wolseley's troops when they burned Kumasi in 1874. The old town of thatched mud houses surrounded by swamps and bush has since 1897 been modernized with paved streets, public parks and gardens. Among modern buildings are churches, including an interdenominational Christian chapel, a mosque, law courts, government departments, police headquarters and, dominating the town, the Kumasi Central hospital. The Prempeh Assembly hall is used for public meetings and social gatherings. Besides schools and teachers' training colleges there are the Kumasi College of Technology (1952) with courses up to degree standard, and the Kwadaso Agricultural station which conducts research into soil and agricultural problems and is the training centre for Ghana's agricultural officers. The Ashanti Cultural centre supports a museum and a zoological garden and has a regional library. A sports stadium was opened in 1959 by Prince Philip, duke of Edinburgh, to commemorate Ghana's independence. There is also a race track belonging to the Ashanti Turf club.

Kumasi lies at the junction of the main north-south and east-west roads, and from its Central Lorry park trucks carry passengers and goods daily to all parts of Ghana. The town is connected to Accra and Sekondi-Takoradi by rail, and daily air services operate to these towns and to Tamale. The wealth of Kumasi is principally derived from cocoa farming in the hinterland. The central market, one of the town's attractions, is believed to be the largest in West Africa. Minor crafts such as weaving the traditional "Kente" cloth, carpentry, gold and silver work, sandal-making and printing are next in importance to trade. The city exports cocoa, timber and foodstuffs to other parts of the country, and imports clothes, hardware and printed cotton.

About 1663, Nana Obiri Yeboa, one of the early kings of the Ashanti dynasty, bought a piece of land from an old lady, Adowaa Nkrawiri. The negotiations took place under a Kum tree, which gave the name to the town he founded there, at first called Kwaman. The settlers came from Asantemanso, 23 mi. S. Kumasi is historically the seat of the kings of Ashanti. It was there that the golden stool, symbol of the king's authority and the unity of the people, is alleged to have descended from the heavens, on a certain Friday in 1700 at Dwabirem, the precincts of the king's palace (near the fort). In the Central hospital's grounds a sword hilt protruding from the earth marks the spot where all the regalia of Ashanti chiefs that were made before the descent of the golden stool were buried so that they should not have pre-eminence over the golden stool. Four mausoleums contain the mortal remains of the Ashanti kings.

Following the Yaa Asantewaa rising in 1900, the British government took over the control of Kumasi which was administered by a resident commissioner with the help of a council of Kumasi chiefs. In 1925 the administration was entrusted to the Kumasi public health board which in 1943 was succeeded by the Kumasi town council; in 1954 the Kumasi municipal council was established.

(A. A. Y. K.)

KUMBAKONAM (formerly COMBACONUM), a town in the Tanjore district of the state of Madras, India, stands on the delta of the Cauvery river (*q.v.*), 194 mi. from Madras city on the Southern railway. Pop. (1951) 91,643; (1961) 92,581. The Government college has more than 1,000 undergraduates, and Kumbakonam is the home of some of south India's most celebrated lawyers. It is also an industrial centre noted for silk weaving and the manufacture of brass vessels. It was a subsidiary capital of the Chola dynasty (*see* CHOLA) and possesses a famous monastery, the Kashi *matha*, founded by the Hindu philosopher Sankara Acharya. There are several temples including the Nageswara, which dates from Chola times, and the great Vishnu temple, built in the Vijayanagar (*q.v.*) period, whose gopuras or monumental gateways are richly decorated. The nearby Mahamakam tank is believed to have direct subterranean connection with the Ganges, especially so during the Mahamakam festival celebrated once in 12 years. (G. KN.)

KUMMER, ERNST EDUARD (1810–1893), German mathematician, noted for his work in higher arithmetic and geometry, was born at Sorau on Jan. 29, 1810, and died at Berlin on May 14, 1893. In 1828 he entered the University of Halle, to study for the church, but quickly changed to mathematics, in which he took his doctorate in 1831. He taught at Sorau for a year and at the *Gymnasium* at Liegnitz, for ten years, meanwhile corresponding with the leading mathematicians of Germany. In 1842 he was appointed professor of mathematics at Breslau, where he remained until 1855, when he succeeded Peter G. L. Dirichlet at Berlin and was also appointed professor at the Berlin War college.

Kummer's outstanding achievement, comparable in mathematical and philosophical importance with the creation of non-Euclidean geometry, was the restoration of the fundamental theorem of arithmetic to those algebraic numbers fields which arise in connection with Pierre de Fermat's last theorem. The restoration was effected by Kummer's creation of what he called ideal numbers. (*See* FERMAT'S LAST THEOREM.) For this he was awarded the grand prize of the Paris Academy of Sciences in 1857, although he had not competed. In geometry, his researches on systems of rays led him to the surface named after him, the quartic which is the singular surface of the quadratic line complex. This surface is the wave surface in space of four dimensions.

He also made basic contributions to the theory of hypergeometric functions. All of Kummer's work is characterized by great power and penetrating originality. (E. T. B.; X.)

KUMQUAT, the name of several evergreen shrubs or trees of the genus *Fortunella,* closely allied to the orange and lemon and formerly placed under *Citrus japonica.* Natives of eastern Asia, these small trees are widely cultivated throughout the subtropics. They are grown to a limited extent in southern California and Florida. They reach 8 to 12 ft. high, the branches are mainly thornless and have dark-green, glossy leaves and pure-white, orangelike flowers, standing singly or clustered in the leaf axils. The bright orange-yellow fruit is round or ellipsoidal, about one inch in diameter, with mildly acid, juicy pulp and a sweet, edible, more or less pulpy skin. The kumquat long was cultivated in China and Japan and was introduced into Europe in 1846 by Robert Fortune, collector for the London Horticultural society, and shortly after into North America. It is much hardier than most plants of the orange tribe and succeeds well when grafted on the trifoliate orange, *Poncirus trifoliata.* In the U.S. hybrids have been produced with limes, Mandarin oranges and other citrus fruits. Kumquats are largely used by the Chinese as a candied fruit. They are also eaten fresh or preserved, and the branches are used as Christmas decorations.

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NAGAMI KUMQUAT (FORTUNELLA MARGARITA)

The oval or Nagami kumquat (*F. margarita*) is the commonest species; the fruits are elliptic, reddish when ripe and about one and a half inches to two inches long. The round or Marumi kumquat is *F. japonica.* The egg-shaped Meiwa kumquat (*F. crassifolia*), in which both the pulp and the rind of the fruit are sweet, is considered an intrageneric hybrid and is widely grown in China.

KUN, BÉLA (1886–1939), Hungarian political leader who

was the head of the short-lived first Hungarian Communist republic (March–July 1919), was born at Szilágycseh (Csehul Silvaniei), in Transylvania, of lower middle-class Jewish stock. He entered the University of Cluj in Transylvania, where his father was then employed, but broke off his studies in favour of politics. He took an active part in organizing the Social Democratic party in Transylvania, but having involved himself in irregularities in the management of the funds of a workmen's benefit society of which he was treasurer, he moved to Budapest where he obtained a minor post on the Social Democratic newspaper, the *Népszava*.

Mobilized in the Austro-Hungarian army in World War I, Kun was taken prisoner on the Russian front in 1916. After the Russian Revolution he attracted the attention of Lenin, who put him through a special course in revolutionary tactics and in Nov. 1918 sent him back to Hungary with a false passport and equipped with ample funds. With these Kun, on Dec. 10, started a Communist newspaper, the *Vörös Újság*, in which he agitated violently against the government of Mihály Károlyi, and on Dec. 20 founded the Communist Party of Hungary. He was imprisoned, but given every privilege and facility to continue his propaganda, which combined social agitation with promises that, if put into power, he would secure Russian help against the Rumanian forces then standing on Hungarian soil. On March 20, 1919, he was released by Károlyi and took power at the head of a Communist-Social Democratic amalgamation. From this the moderate elements were, in practice, soon eliminated, while Kun himself, although nominally only commissary for foreign affairs, became dictator of Hungary under Lenin, whom he regularly consulted by radio.

The history of Kun's regime is that of Hungary for the period. Kun himself displayed an energy which undoubtedly was inspired by genuine fanaticism and considerable shrewdness. However, he was rigid and doctrinaire in the extreme, and apparently entirely blind to the unpopularity of his measures, his colleagues and himself. The discontent evoked by his arbitrary rule, combined with the failure of Communist Russia to send the promised help, led to his fall. After he had undertaken an unsuccessful offensive against the Rumanians his regime collapsed on Aug. 1, 1919, and he fled to Vienna. After a brief internment he was allowed to proceed to Russia. He reappeared in Vienna in 1928 and made another attempt to promote revolution in Hungary. He was arrested and imprisoned, but again allowed to return to Russia. When Stalin turned actively against "Trotskiism" Kun fell into disfavour. He was liquidated in the purges of 1939. Kun was a simple fanatic prepared to use terror when necessary. He possessed energy, mental alertness and some capacity for organization, but his mind was unconstructive and inelastic. (C. A. M.)

KUNAR (Chitral, Yarkhun, Kashkar, Mastuj), a river in Pakistan and Afghanistan. Having a length of approximately 300 mi., it rises in northernmost West Pakistan, and derives its main headwaters from the Chiantar glacier close to the Afghan-Pakistan border, and from other snow-fed tributaries on the left bank. About 80 mi. from the source it becomes the Mastuj near the town of that name, and soon is joined by the Rich Gol, a major right bank tributary. Here the Kunar is 6,334 ft. above sea level, and is flanked by mountains reaching in places to 25,229 ft. in the Hindu Kush (*q.v.*). It passes the towns of Chitral and Drosh, and joined by the Bashgal enters Afghan territory at Birkot-Arandu, continuing southwest to join the Kabul river near Jalalabad, at 2,000 ft. above sea level. In this section its tributaries are mainly from the right bank and include the Kama Presungul. In Pakistan the valley floor is narrow and boulder-strewn but the hillsides support some poor agricultural settlements made more colourful in spring by flowering almonds. Wheat and corn (maize) are the staple crops obtained, often from terraced fields. Irrigation is practised but not to the same extent as in the Afghan section of the valley, which is wider and less rocky and contains numerous villages. As on many rivers in that part of Asia, bridges are built from massive tree trunks on the cantilever principle. The Afghan government has constructed a road up the Kunar valley to Chitral. The name Kunar applies properly to the southern portion of the valley only. (B. L. C. J.)

KUNCKEL (Kunkel) **VON LÖWENSTERN, JOHANN** (1630–1703), German chemist, who shares with Boyle the honour of having discovered the secret of the process by which Brand of Hamburg had prepared phosphorus in 1669, was born in 1630, near Rendsburg, his father being alchemist to the court of Holstein. He became chemist and apothecary to the dukes of Lauenburg and then to the elector of Saxony, John George II, who put him in charge of the royal laboratory at Dresden. In 1679 he became director of the laboratory and glass works of Brandenburg, and in 1688 Charles XI brought him to Stockholm, gave him the title of Baron von Löwenstern in 1693 and made him a member of the council of mines. He died on March 20, 1703 (others say 1702), at Dreissighufen, his country house near Pernau. Kunckel found how to make artificial ruby (red glass) by the incorporation of purple of Cassius. Kunckel's work also included observations on putrefaction and fermentation, the nature of salts and the preparation of pure metals. Although Kunckel derided the notion of the alkahest, or universal solvent, and denounced the deceptions of the fraudulent alchemists, he apparently believed in the possibility of transmuting metals.

His chief works were *Oeffentliche Zuschrift von dem Phosphor Mirabil* (1678); *Ars vitriaria experimentalis* (1679); *Laboratorium chymicum* (1716).

KUNDT, AUGUST ADOLPH EDUARD EBERHARD (1839–1894), German physicist who studied light and sound, was born at Schwerin in Mecklenburg on Nov. 18, 1839. He studied at Leipzig but afterward went to Berlin. In 1867 he became *Privatdozent* in Berlin university, and in the following year professor of physics at the Zürich Polytechnic; then, after a year or two at Würzburg, he was called in 1872 to Strasbourg, where he was one of the founders of the Physical institute. In 1888 he succeeded to the chair of experimental physics and the directorship of the Berlin Physical institute. He died at Israelsdorf, near Lübeck, on May 21, 1894.

In the field of sound Kundt developed a method for the investigation of standing waves within pipes. He used a finely divided powder, such as lycopodium, dusted over the interior of a tube to show the position of the nodes. The method can be used for the determination of the velocity of sound in gases and in solids.

In light August Kundt's name is widely known for his inquiries in anomalous dispersion, not only in liquids and vapours but even in metals, which he obtained in very thin films by means of a laborious process of electrolytic deposition upon platinized glass. He also carried out many experiments in magneto-optics and succeeded in showing the rotation under the influence of magnetic force of the plane of polarization in certain gases and vapours.

KUNENE (Cunene), a river in Africa, rises in Angola near the western end of the south equatorial divide, about 10 mi. N.W. of Nova Lisboa. At Chiamelu, about 38 mi. S. of Nova Lisboa, the river flows in a steep granite bed. At Matala it leaves the granite upland and falls about 42 ft. before entering the Kalahari sand surface of the Etosha plain. The Matala barrage raises the river about 26 ft., giving a head of about 68 ft. for the generation of hydroelectric power. On the Kalahari sand the river has a low gradient, flooding the adjacent flats during the wet season. About 70 mi. S. of Roçadas, at Olushandja, the river turns westward and, flowing over a succession of rapids (Caxambue, Okavare, Calenda, Ximbundi, Matanda), finally falls about 230 ft. over the Ruacana falls, at 17° 23′ S. From this point the river forms the boundary between Angola and South West Africa. At about 40 mi. W. of the Ruacana falls the river enters its gorge tract through the Zebra mountains and, farther west, the Baynes mountains which rise to a height of about 7,200 ft., the river bed being approximately 4,000 ft. below. In this gorge tract are the Epupa (or Montenegro) falls, somewhat more than 100 ft. high.

Issuing from the narrow Baynes gorge the river comes out into the Namib desert. Its course there is mainly over the low contorted rocks and sand. There the river has generally a very small volume, except after heavy rains in the interior. Its mouth is a lagoonlike feature, closed in the dry season by a sand bar which is, however, swept away by the occasional floods. It is thought that the upper part of the river once was entirely a plateau stream and the sudden westward bend at Olushandja is due to the behead-

ing of this river by a fast stream cutting back from the west.

The scanty records of the flow of the Kunene indicate a maximum discharge in the Roçadas area in March and a minimum in September. (J. H. Wn.)

KUNG-SUN LUNG (320–250 B.C.?), one of the "hundred philosophers" of the Classical Age, holds the distinction of being one of the few logicians in the history of Chinese philosophy. Living during the period of the "Warring States," he traveled among several states, urging upon the feudal lords (without success) the doctrines of universal love and pacifism. In accordance with the practice of the time, Kung-sun Lung spent a considerable period of his life as a "guest" under the patronage of the prince of P'ing Yuan, of the state of Chao, in the modern Shansi Province of North China. Presumably it was during this period that he was most productive as a logician.

The School of Logicians, of which Kung-sun Lung is usually considered to be the outstanding representative, was a minor school in ancient Chinese philosophy that had no influence after its own time. The term logic is used in a broad sense, to indicate the school's strictly intellectual character; its members expressed their thoughts in dialectics, sophisms, paradoxes, rather than in syllogistic or systematic argument. His *Kung-sun Lung-tzu* is the only independent work dealing with logic among ancient Chinese literature that is even partially preserved, but of its original "several tens of thousands" of words in 14 chapters only 6 chapters in some 2,000 words survive. The text is very corrupt, but its content is as intriguing as the language is formidable. It employs ingenious analysis to reduce complex substance to simple qualities; names are distinguished from reality, on the one hand, and attributes from things, on the other. Considering the antiquity of the work, the discussion of these highly abstract topics is creditable.

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KUNG-SUN YANG (d. 338 B.C.), ancient Chinese statesman and thinker of the Legalist School, who, in the service of Duke Hsiao of the state of Ch'in, introduced radical political reforms, so successful that they paved the way to the eventual unification of the Chinese empire by the Ch'in dynasty (221–207 B.C.). He came from the state of Wei and was ennobled as lord of Shang; he is therefore popularly known as Shang Yang or Wei Yang.

The work *Shang Chün Shu* ("Book of the Lord of Shang"), which with the *Han Fei Tzu* (*q.v.*) represents the thinking of the Legalist School, probably contains writings and ideas of Kung-sun Yang, although the exact authorship is in doubt. Topics discussed include law and punishment, military organization and strategy, agriculture and colonization. To Kung-sun Yang, the integrity of a state could be maintained only by power, and power consisted in a large army and full granaries. Statewide mobilization, requiring for its support a code of strict laws and severe punishment, was the way to maximum strength. Law was to be administered uniformly, kept separate from the administrative organs of the government, and made known among all the people. Military service was required of all, and a new system of land division and taxation was put in force. Feudalism was replaced by a central authority in government.

Many of Kung-sun Yang's ideas and practices have a modern ring, but his political system is definitely totalitarian; it regards the people as the means and the state as the end. The Chinese have always looked upon him with suspicion and distrust. His hideous death (he was tied to two chariots and torn apart), as well as the abrupt end of the Ch'in dynasty which he had exerted himself in setting up, appears to the Chinese mind as clear proof that the system of Legalism goes against natural law and is not a workable philosophy either for the individual or for the state.

See J. J. L. Duyvendak (trans.), *The Book of Lord Shang* (1928). (Y. P. M.)

KUNGUR, a town in Perm *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., stands at the confluence of the Sylva, Iren and Shakva rivers 45 mi. S.S.E. of Perm city. Pop. (1959) 64,796. Founded in 1648 as a fortress, Kungur was an important post on routes to Siberia. Before the Revolution it was noted as a centre of handicraft industries, especially in alabaster and crystal. Modern industry includes the making of excavators, leather goods and footwear, building materials and knitwear, together with sawmilling and timberworking. In the vicinity are alabaster-walled caves, notably the Kungur stalactite cave on the Sylva river. The town is on the railway and motor road between Perm and Sverdlovsk. (R. A. F.)

KUNIYOSHI (Utagawa Kuniyoshi) (1798–1861), the last great master of the Japanese colour print, was born on Jan. 1, 1798, in Edo, the son of a dyer of silks. His talent in painting was recognized in childhood, and in 1811 he entered the studio of Toyokuni, the head of the Utagawa school and a friend of his father. He served his apprenticeship until 1814, when Toyokuni bestowed upon him the art name of Kuniyoshi and he became an independent artist.

Kuniyoshi's first published work, illustrations for books and theatrical scenes in the Utagawa style, appeared in 1814 but in 1818 he designed several triptychs of historical subjects which proclaimed his natural bent. With the publication of *Suikoden* or "Hundred and Eight Chinese Heroes" in 1827, Kuniyoshi's career was assured. This work gives an overwhelming feeling of dramatic strength and originality of treatment in the fantastic costumes and attitudes of the superbly drawn figures. He introduced into his landscape prints elements of western ideas and methods most effectively as seen in the famous sets of "Views of the Eastern Capital" and "Mirror of the Twenty-four Paragons of Filial Piety." Kuniyoshi's output was enormous and varied, and he collaborated with Hiroshige, Kunisada and Zeshin. He had a genial nature and was inordinately fond of cats, which often appear in his drawings and prints. He died on April 14, 1861.

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KUNIYOSHI, YASUO (1893–1953), Japanese-American painter, a gifted artist, an influential teacher and a leader of artists' organizations, was born in Okayama, Sept. 1, 1893. After 1906 he lived in the U.S. He received his artistic direction essentially at the Art Students league under Kenneth Hayes Miller.

Kuniyoshi's early drawings and paintings were imbued with naïve fantasy and delightful humour. His mature work, in which figured predominantly moody, sensuous women, shows his indebtedness to Jules Pascin. His landscapes are at times reminiscent of Derain or Dunoyer de Segonzac. With the beginning of World War II the artist developed a deep social and political consciousness for which he created his own pictorial symbols. His colouring developed from earthen tones to luminous pastel hues. Kuniyoshi himself believed that there remained a basic connection between his concept and the Japanese pictorial tradition.

Kuniyoshi was the first president of Artists' Equity association. He taught at the Art Students league after 1933, at the New School for Social Research, New York city, and the artists' colony in Woodstock, N.Y., where he died on May 14, 1953.

See Lloyd Goodrich, *Yasuo Kuniyoshi* (1948); Milton W. Brown, *American Painting From the Armory Show to the Depression* (1955). (W. M. V. D. R.)

KUNLUN MOUNTAINS (K'un-lun Shan; sometimes spelled Kuenlun or Kwenlun), the longest mountain system of Asia and called the backbone of Asia by German geographer Ferdinand von Richthofen (*q.v.*), stretch along the northern limit of the Tibetan plateau in China, south of the Tarim basin between 74° and 103° E. and 34° and 40° N. The Tsinling Shan, an eastward extension, is not usually included in the system. In a narrower sense the term Kunlun has sometimes been restricted to the ranges which separate the Takla Makan (*q.v.*) desert of the Tarim basin in Sinkiang (*q.v.*) from the Tibetan plateau between the Pamirs and the Kara Muran Darya which flows northwest from a point west of Mt. Ulugh Muz Tagh in about 86° E.

Although the name is thus restricted, the mountain system so designated in fact extends eastward as far as the Tsaidam depression (about 95° E.). The Kara Muran Darya, however, is more usually regarded as the border between the western and eastern Kunlun.

The Kunlun mountains thus extend about 1,800 mi. from east to west, and while in the west their constituent ranges are folded and squeezed, in places being only 30 mi. broad with their summits being correspondingly high, in the east they spread out to some 320 mi., the ranges there being less folded, and consequently flatter and lower. The mean height of the crests is about 20,000 ft. but there are few individual peaks of commanding elevation, as there are in the Himalayas. The highest peak is Ulugh Muz Tagh (25,338 ft.). At the extreme western end of the Kunlun, which is known as the Muz Tagh Ata or Kashgar range, are the peaks of Kungur (25,324 ft.) and Muz Tagh Ata (24,757 ft.).

The western Kunlun consists of two systems of ranges approximately similar in size; the outer and inner mountain chains are divided by a belt of deep and narrow intermont depressions. This feature of a double mountain chain, and also the intermont lake basins, continues in the eastern Kunlun and is a peculiar feature of the Tibetan plateau. East of Yarkand, the Kunlun broadens out to about 90 mi., the northern ranges bearing the names Tiznaf, Sanju Tagh and Karanghu, while the more southerly ones are the Raskem, Karlik Tagh and Suget Tagh. Although they all decrease in altitude from west to east, they nevertheless reach elevations of 19,000 ft. with individual peaks about 2,000 ft. higher. On the north the ascent is steep, and the passes across both sets of ranges lie at great altitudes; the Karlik, Suget and Hindu Tash passes are all more than 16,000 ft. and the Yangi pass more than 19,000 ft. Beyond the meridian on which Khotan lies (80° E.) the outer, northern chains rapidly decline in altitude and disappear so that the breadth of the Kunlun decreases to less than 30 mi.; the main range is the glacial Muz Tagh Ata, with its peak of the same name.

Between the upper transverse glens of the Kara Muran and the Cherchan Darya stretches the short range of Tokuz Davan. From it the eastern Kunlun mountains, in about 86° E., become much broader and again form two chains of ranges. In the north these are the Russian, Astin Tagh and Nan Shan ranges, while in the south there are several parallel series including the Przhevalsky (Arkha Tagh), Columbus (Kaltaalaghan) and Marco Polo (Bokalyk Tagh) ranges. The two chains are separated from one another by the huge tectonic basin of Tsaidam, lying at an altitude of 8,800 ft. In the eastern Kunlun the main peaks exceed 23,000 ft. and have high level passes. The Przhevalsky is the highest range with the peaks of Ulugh Muz Tagh at its western end and Shapka Monomakha at the eastern end, both more than 25,300 ft.; the passes of Kara Muran and Requiem are at 18,300 and 17,800 ft. respectively. The broad features of the surface configuration are a series of nearly parallel mountain ranges, separated by high intermont valleys, choked with disintegrated material and divided into shallow lacustrine basins. Usually the crests of the ranges are worn down to rounded domes. Hard rock (mostly granite and crystalline schists, with red sandstone in places) appears only in the transverse glens, which are often choked with debris. The flanks of the mountains are deeply buried in debris and are barren of vegetation. As each successive range proceeding southward represents a higher step in the terraced ascent from the Gobi desert to Tibet, the ranges when viewed from the north frequently appear like distinct mountain ranges and this appearance is accentuated by the steepness of the ascent; but when viewed from the south, because of their long and gentle slope in that direction, they have the appearance of comparatively gentle swellings. As a rule the streams flow east or west down the intermont latitudinal valleys, until they break through to the north. There is a marked difference in precipitation between the valleys of the outer, northern ranges and those of the south. Those in the north are arid and desolate in the extreme, while those of the Przhevalsky range and beyond are so damp that, in summer, the surface is in many parts little better than a quagmire. Vegetation throughout is scanty and animal life poor in species.

Northeast of the Tsaidam depression the main ranges, which there run from northwest to southeast, are the Richthofen, Humboldt, South Tsing Hai and the Mushketov ranges; the latter is continued to the southeast by the Semenov and Tasurkhai ranges, which terminate south of Lan-chou (Lanchow). These parallel ranges of the Nan Shan, as the northern part of the system is called, have broad, flat longitudinal valleys, at altitudes of 12,000 to 14,000 ft., declining to 9,000 to 10,000 ft. in the southwest. There are two large lakes, the fresh-water Khara Nur (Ch'ing-yü Hu), and the salt-water Koko Nor (*q.v.*) which lies at an altitude of 10,515 ft. and covers an area of 1,630 sq.mi.; the latter is rich in fish, but is frozen from November to March.

Generally speaking, the Nan Shan plateau with a mean altitude of 12,000–14,000 ft. is intersected by wild, stony and partly snow-clad mountains towering another 4,000–7,000 ft. above its surface, and arranged in narrow, parallel chains. The chains of mountains are from 8 to 17 mi. wide, seldom as much as 35 mi., while broad, flat valleys between them attain widths of 20 to 27 mi. Passes are at 12,000 to 14,000 ft., and the peaks reach 18,000 to 20,000 in the west, while in the east they are 2,000 ft. lower. The western Kunlun, near the Pamirs, and the extreme northern chains, such as the Astin Tagh and Nan Shan, usually have a snow line at an altitude of 14,000 to 14,700 ft., while the inner, more southerly ranges have a snow line approaching 20,000 ft.

The mineral resources of the area have been little studied. Deposits of iron, copper, gold and coal are, however, known to exist. Copper and salt occur in the northern foothills of the Kunlun between Yarkand and Khotan, while gold occurs from the region of Khotan eastward to the Tokuz Davan range. Yarkand (*q.v.*; Chinese *So-ch'e*), which is a busy market, has a population of about 80,000. Zinc deposits have also been located in the Khotan district, and jasper is mined there; the town has a population of about 50,000.

The population of the Kunlun area is very sparse in general and consists mainly of Uigurs who engage chiefly in nomadic pastoralism, but with some agriculture. The western Kunlun and the eastern parts of the Nan Shan are quite well watered and, especially on the moister northern slopes, are able to support meadow vegetation and coniferous woods; in the former area, alpine meadows are found between altitudes of 9,800 ft. and 11,400 ft., while above that height up to about 13,700 ft. there are conifers; in the eastern Nan Shan are rich meadows and many coniferous woods at heights from 10,400 ft. to 13,000 ft. The Kunlun are very inaccessible for the whole of their length, but especially in the west, because of the swift streams and the deep cover of debris, the steepness of the passes, and the lack of water and vegetation in the central section of the system. All tracks across the Kunlun are suitable only for pack animals and are mainly in the western and eastern extremities where grass and shrubs grow in the valleys. A motor road runs from Lan-chou to Kashgar (*qq.v.*) skirting the northern foothills and the Takla Makan desert. This route follows part of the old Silk road which was used from about 100 B.C. to convey Chinese silk to the oases of the Fergana valley and central Asia and also to the populated centres of what is now Afghanistan and the India-Pakistan subcontinent.

In 1950 China and the U.S.S.R. concluded an agreement for the formation of mixed joint-stock companies for the extraction of oil and nonferrous metals in the autonomous region of Sinkiang; in connection with this, exploration of the mineral resources of the area, which includes part of the northern foothills of the Kunlun, has been intensified.

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K'UN-MING (formerly YÜNNANFU), capital of Yünnan province, China. Pop. (1953) 698,900; (1958 est.) 900,000. Long

isolated from the rest of China in traditional times, the city is now a regional political and cultural centre situated in a level lake plain on the Yünnan plateau. It has comparatively easy transport routes east to the Hsi-chiang (West river) in Kwangsi, northeast to Kuei-yang, and southwest to Burma; there is also a sure local food supply from the surrounding large expanse of fertile alluvium. Modern influences came in 1910 with the opening of the twisting, narrow-gauge French-built railway from Haiphong, 530 mi. away. During World War II K'un-ming received many refugees from eastern China and later from southeast Asia, and became a Chinese military base. It was also of great importance as the transport terminus for the Burma road and for cargo flown over the "Hump" by U.S. air forces. During this period, industries were developed for the manufacture of cotton cloth, electrical and radio parts, specialized metals, cement, copper smelting and for truck repair. Four institutions of higher learning temporarily moved into the city. These events helped change the physical appearance of K'un-ming. The old walls were demolished, streets widened and paved, modern-style buildings and stores erected, electric light and power increased, and residential development grew up around the south shore of sparkling T'ien ch'ih (lake). However, much of this mushroom growth has since declined. The city is now a major transportation centre with the railway to Haiphong reconstructed, and the extension of newer lines north to Szechwan, and northeast to Kweichow and beyond. K'un-ming is the seat of Yünnan university and also has a medical college and an institute of technology. Students from more than 50 national minorities of southwest China are accommodated at the city's Institute for National Minorities. (TE. H.)

KUNSAN, port city at the mouth of the Kum river on the west coast of North Cholla province, Republic of Korea, about 125 mi. S.S.W. of Seoul and 30 mi. W.N.W. of Chonju. Pop. (1960) 90,437. Due to the influence of the sea, the temperature range in Kunsan is comparatively narrow, from a January average of −1° C. (30° F.) to an August average of just under 27° C. (80° F.). Average annual precipitation is 43 in. Utilization as a port is hampered by the extremes of high and low tide common to the Korean west coast.

Originally a poor fishing village, Kunsan underwent rapid development when the modern port was opened at the end of the 19th century and a rail link was established by a branch line from Iri. Kunsan is particularly noted as a rice-shipping port and much of its commercial activity centres around the processing, storing and transport of the rice grown in the rich Kum river basin. The countryside around Kunsan also produces important crops of barley, beans, cotton and rushes, while the adjacent waters yield good catches of fish and shrimp. Kunsan has little modern industry, but the manufacture of salt by spontaneous evaporation is well developed and such cottage industries as straw mats and cotton cloth are of local importance. (E. W. WA.)

KUNZITE, a transparent lilac-coloured variety of spodumene, used as a gem stone. *See* SPODUMENE.

KUO HSIANG (d. 312), Neo-Taoist thinker, author (or, more likely, part-author) of a celebrated commentary on the *Chuang-tzu* (*q.v.*), one of the basic Taoist writings. Kuo deviated from Lao-tzu (*q.v.*) in interpreting *Tao* (the Way) as nothingness. As nonbeing, *Tao* does not produce being—that is, it cannot be regarded as a first cause.

"We may claim that we know the causes of certain things. But if we push our investigation of these causes to the furthest limit, (we reach) something which is self-produced without any cause. Being self-produced, we can no longer ask what is the cause of this something. We can only accept it as it is" (5.57) (quoted in Fung Yu-lan, *A History of Chinese Philosophy,* vol. ii, pp. 209–210; Princeton, Princeton University Press, 1953).

Kuo thus maintained that everything spontaneously produces itself. The "self-transformation" of a thing as well as its existence is conditioned by other things and in its turn conditions them. Applying this general principle to human affairs, Kuo argued that social institutions and moral ideas must be changed when situations change. If one clings to the past and merely imitates the ancient sages, one will lose one's individuality; let everyone act according to his natural endowment. He gave a more positive meaning to the Taoist term "nonaction" by interpreting it to mean spontaneous action, not sitting still. In these points Kuo deviated from original Taoism, but the result which he inferred from his conception of nonaction agreed with Chuang-tzu's thought. For Kuo meant also that everything has a definite nature; if it follows its own way, it finds satisfaction and enjoyment; if it is not content with what it is, and craves to be what it is not, then there is dissatisfaction and regret. The Perfect Man ignores all such distinctions as right and wrong, life and death; his happiness is unlimited. *See* also TAOISM: *Philosophical Taoism: Later Developments.*

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KUOMINTANG. Literally "national people's party," the Kuomintang or Chinese Nationalist party ruled China from 1928 until 1949, when Communist armies defeated it in civil war and drove it to the island of Formosa (Taiwan). Originally a revolutionary league working for the overthrow of the Chinese monarchy, the Kuomintang became a political party in the first year of the Chinese republic (1912). It participated in the first Chinese parliament, which was soon dissolved by a *coup d'état* (1913). This defeat moved its leader, Sun Yat-sen (*q.v.*), to organize it more tightly, first (1914) on the model of a Chinese secret society; later (1923–24), under Russian guidance, on that of the Bolshevik party. The Kuomintang owed its early successes largely to Soviet aid and advice and to close collaboration with the Chinese Communists (1924–27). After Sun Yat-sen's death in 1925, the party's leadership passed gradually to Chiang Kai-shek (*q.v.*), who brought most of China under its control by ending or limiting regional warlord autonomy (1926–28). Kuomintang rule, inseparable from Chiang's, became increasingly dictatorial but never totalitarian. The party program rested on Sun Yat-sen's Three People's Principles: nationalism, democracy and people's livelihood. Nationalism demanded that China regain equality with other nations; this was accomplished by repelling the Japanese invasion (1931–45) and by securing the abrogation of China's unequal treaties with the west (1943). By contrast, the realization of democracy through successive constitutions (1936, 1946) remained largely a formality. Equally ineffective were attempts to improve the people's livelihood, although in its long-range programs the party anticipated some of the sweeping economic changes wrought by its Communist successors. Its failure to effect such changes itself derived partly from weaknesses in leadership and partly from forced preoccupation with fighting the Japanese without and the Communists within. *See* also CHINA: *History;* and references under "Kuomintang" in the Index. (C. BT.)

KUOPIO, capital town of Kuopion *lääni* (county), is situated on Lake Kallavesi in south central Finland. Pop. (1960) 44,911. Important water and rail routes converge on the town which functions as a commercial, industrial, educational, religious and legal centre. Originally founded in the mid-17th century its municipal charter dates from 1782. It has general, children's and mental hospitals. Industries include sawmilling, food processing and the manufacture of prefabricated houses, hardboard, spools and other wooden items, machinery and clothing. Nearby Puijo hill is one of the best-known centres for winter sports in Finland. Kuopio is linked with Savonlinna by a summer steamer service, and there is an airport at Rissala. A television relay tower, completed in 1963, is surmounted by a rotating restaurant.

KUOPION LÄÄNI comprises the northern part of the Savo forest region and lumbering is an important activity. Pop. (1960) 270,504. About one-fifth of its area of 7,727 sq.mi. is covered by lakes. (E.-S. KU.)

KUPKA, FRANTISEK (FRANK, FRANÇOIS) (1871–1957), Czech abstract painter, born at Opocno, Bohemia, Sept. 23, 1871, studied at the Prague and Vienna academies and at the École des Beaux-Arts in Paris, where he settled in 1895. There he produced satirical drawings (in *Cocorico, Le Canard sauvage,* etc.) and illustrations (for C. M. R. Leconte de Lisle's *Les Erinnyes,* 1908; Aristophanes' *Lysistrata,* 1911; etc.). In 1908–11, however, he experimented with Fauvism and pointillism, and his interest in

Georges Seurat's colour-contrast theories led him to study the use of prismatic colours.

Kupka, in his painting "Disks of Newton" (1912), and Robert Delaunay, in his similar "Disks" (*c.* 1913), were the earliest exponents of curvilinear pure abstraction. This art (called *simultanéisme*—simultaneous colour contrasts—by Delaunay) was dubbed "Orphism"—an art of "musical" colour lyricism—by Guillaume Apollinaire in 1913. Kupka painted abstractions with such titles as "Fugue en deux couleurs" (1912) and "Solo d'un trait brun" (1913). In 1920 Kupka was at the Prague academy as a professor. In 1937 he won the gold medal at the Paris International exposition for his painting "Abstraite."

See A. Grémilly, *Frank Kupka* (1921); E. Siblik, *François Kupka* (1929).

KUPRILI: *see* KOPRULU.

KUPRIN, ALEKSANDR IVANOVICH (1870–1938), Russian writer best known for his short stories, was born in Narovchat, Penza province, on Sept. 7 (new style; Aug. 26, old style), 1870, into the family of a minor civil servant. Educated in military schools, he served as officer in the army for four years. He resigned in 1894 and engaged in a variety of professions, including theatre and circus, but eventually devoted himself to literature. His first major story, *Moloch* (1896), dealt with factory life, but it was *Poedinok* (1905; Eng. trans., *The Duel,* 1916), a realistically sordid picture of army life, which made him famous. For many years he was closely associated with Gorki's publishing enterprise *Znanie* and the group of realist writers centred on it (I. Bunin, A. Serafimovich and others). Emigrating after the Revolution of 1917, Kuprin lived and worked in Paris but returned in 1937 to the U.S.S.R., where he died on Aug. 25, 1938.

Kuprin's novels include *Yama* (1909–15; Eng. trans., *Yama: the Pit,* 1927), describing the life of the prostitutes in Odessa; *Koleso vremeni* (1930); the autobiographical *Yunkera* (1933); and *Zhaneta* (1932–33). He is at his best, however, in short stories, many of which have been translated into English and collected in volumes, such as *The River of Life* (1916), *A Slav Soul* (1916), *The Bracelet of Garnets* (1917), *Sasha* (1920) and *Gambrinus* (1925). Kuprin has sometimes been described as the Russian Kipling, but although he had virility and zest for life, not common among his Russian contemporaries, the resemblance is not great.

BIBLIOGRAPHY.—*Collected Works* (1957–58). *See* also C. Ledré, *Trois Romanciers russes* (1935); M. Kuprina-Iordanskaya, *Gody molodosti* (1960), the reminiscences of Kuprin's first wife. (G. ST.)

KURA, the largest river of Transcaucasia, rises in Turkey as the Kurucay and crosses the Georgian and Azerbaijan Soviet Socialist Republics of the U.S.S.R. In length 941 mi., it drains a basin of 72,587 sq.mi. The Kura's source is on the western slopes of Mt. Kisirindagi, west-northwest of Kars, Turkey, and it flows first west and then east into the U.S.S.R. The river crosses the Lesser Caucasus by a series of gorges, with many rapids. Near Khashuri it enters the broad, alluvial Katalinskaya plain, between the Greater and Lesser Caucasus. Just above Tbilisi it passes the Mtskheta narrows, where the Zemo-Avchala hydroelectric plant has been built. Below Tbilisi its valley broadens out steadily into an extensive lowland. The narrows near Mingechaur farther downstream are the site of a barrage and hydroelectric station, the large reservoir of which has drowned the Kura-Iori-Alazani confluence. Below the reservoir the Kura's course is highly sinuous, with low banks often subject to flooding. In the lowest areas the river has been diked. The Kura discharges into the Caspian sea by way of a "birdsfoot" delta, with two main distributaries. The average annual discharge is 20,483 cu.ft. per second, with a prolonged maximum in spring and early summer from snow melt and a minimum in late summer and autumn. Flow is variable, with a maximum of 85,462 and a minimum of 2,119 cu.ft. per second recorded at Mingechaur. The river is navigable as far as Yevlakh, just below Mingechaur and 480 km. (300 mi.) from its mouth. The Kura has a very large number of tributaries, mostly relatively short mountain streams, but some of considerable size. Of these the largest is the Aras (*q.v.*; Araks), 568 mi. long, which includes in its basin Lake Sevan; others are the Alazani (248 mi.), Iori, Khrami, Aragvi and Terter. Many of the tributaries provide hydroelectric power. The water of the Kura is extensively used for irrigation, both in the Rustavi area and throughout the Kura lowland. (R. A. F.)

KURAKIN, BORIS IVANOVICH, PRINCE (1676–1727), one of the first Russians to make diplomacy his career after the fashion of western Europe, was born in Moscow on June 30 (new style; 20, old style), 1676. In 1682 he was appointed *spalnik*, or groom of the bedchamber, to Tsar Peter I, and in 1691 he became Peter's brother-in-law by his marriage to Ksenya Fedorovna Lopukhina (d. 1698). He took part in the first Azov expedition in 1695 and was sent to Venice in 1696 to learn mathematics, geometry, navigation, mechanics and fortification. On his return in 1698 he was sent on to Voronezh to make use of his technical knowledge. Between 1700 and 1705 he fought in the Great Northern War. In Jan. 1707 he was sent on his first diplomatic mission, to persuade Pope Clement XI to pronounce Stanislaw Leszczynski a usurper; he was successful in so far as the pope did not grant his official recognition to Leszczynski as king of Poland.

The victory over the Swedes at Poltava (1709), in which he took part at the head of the Semenovski regiment, enabled Kurakin to devote himself entirely to diplomacy, and henceforth his life was spent abroad except for a few months in 1711. In 1709 he conducted the negotiations leading to the marriage between Charlotte of Brunswick-Wolfenbüttel and the tsarevich Alexis. In 1710 his mission to Hanover resulted in a defensive treaty of friendship between Peter I and the elector George I, the future king of Great Britain. In 1711 he was sent to The Hague, where he seconded the Russian ambassador, A. A. Matveev, before succeeding him in 1712. He was adroit at exploiting the latent Anglo-Dutch antagonism, and from 1714 he divided his time between The Hague and London (where he was appointed ambassador). In Oct. 1715 he concluded the treaty of Greifswald, in which territorial guarantees were exchanged between Peter and George I as elector of Hanover, but in 1716 he failed to obtain similar undertakings from Great Britain. In 1717 he joined Peter in Paris and participated in the negotiations that led to the treaty of Amsterdam between Russia, France and Prussia. In 1723, at the time of Peter's Persian campaign, Kurakin was entrusted with the co-ordination of the work of all Russian envoys. In 1724 he was appointed ambassador in Paris, where he died on Oct. 28 (N.S.; 17, O.S.), 1727. Ten volumes of his papers were published in the *Arkhiv knyazya F. A. Kurakina* (1890–1902). (L. R. LR.)

KURBSKI, ANDREI MIKHAILOVICH, PRINCE (1528–1583), Russian boyar and army commander, at first the friend but later the enemy of the tsar Ivan IV the Terrible, was a member of the princely house of Yaroslavl, which had been his family's patrimony since 1293. His mother came of the educated boyar family of the Tuchkovs, and Andrei early acquired a love for books and things intellectual. At age 21 he was appointed groom-in-waiting to the 19-year-old tsar. He started his military career in the campaign of 1549 against Kazan, was wounded at the storming of the city in 1552 and was subsequently employed (1553–56) in pacifying the newly conquered khanate. Kurbski was one of the tsar's intimates and apparently remained loyal during the crisis occasioned by Ivan's illness in 1553. He was promoted boyar in 1556 and returned to the army in the south as an attack by the Crimean Tatars was anticipated. Ivan dispatched Kurbski to the western frontier in 1557, having decided to conquer Livonia in order to obtain direct communications with the west. Although critical of the Livonian scheme, Kurbski was appointed one of the Russian commanders. His campaigns were mostly successful, but in 1563 he was virtually banished to Dorpat (Tartu). When Ivan failed to renew his appointment, Kurbski, having obtained a safe-conduct from the Polish-Lithuanian authorities, fled on April 30, 1564, to the Polish royal camp at Wolmar (Valka).

From his correspondence it is evident that the Russian nobles—until very recently independent rulers of their principalities—found a spokesman in Kurbski. He was critical of Ivan's absolutist tendencies. In the 1540s and '50s the tsar's policy-making had been influenced by the more moderate ideas of his advisers, but by the early 1560s the tsar would no longer heed criticism or

tolerate any attempts to limit his authority. When his friend A. F. Adashev, one of the tsar's advisers, was disgraced, Kurbski saw that he must flee, as his own position had become insecure. Sigismund II, king of Poland, granted him large estates, and from Sept. 1564 Kurbski took up arms against Russia. His mother, wife and son died in Ivan's prison. Kurbski married twice in Poland and had two children by the third marriage. In Poland he allied himself with protagonists of the Orthodox faith and encouraged resistance to both Catholic and Protestant encroachments.

Kurbski was a brilliant writer, the author of *Istoria o velikom knyaze moskovskom* ("History of the Grand Duke of Muscovy"), in which he attacked Ivan's reign of terror, and the translator of several religious works. His letters are very interesting—undoubtedly the most famous being those he wrote to Ivan after his flight. There is an edition of his correspondence with Ivan, with an English translation, by J. L. I. Fennell (1955).

See E. Denissoff, "Une biographie de Maxime le Grec par Kourbski," *Orientalia Christiana Periodica,* vol. xx, 1–2 (1954); N. Andreyev, "Kurbsky's Letters to Vasyan Muromtsev," *The Slavonic and East European Review,* 81 (1955). (N. AN.)

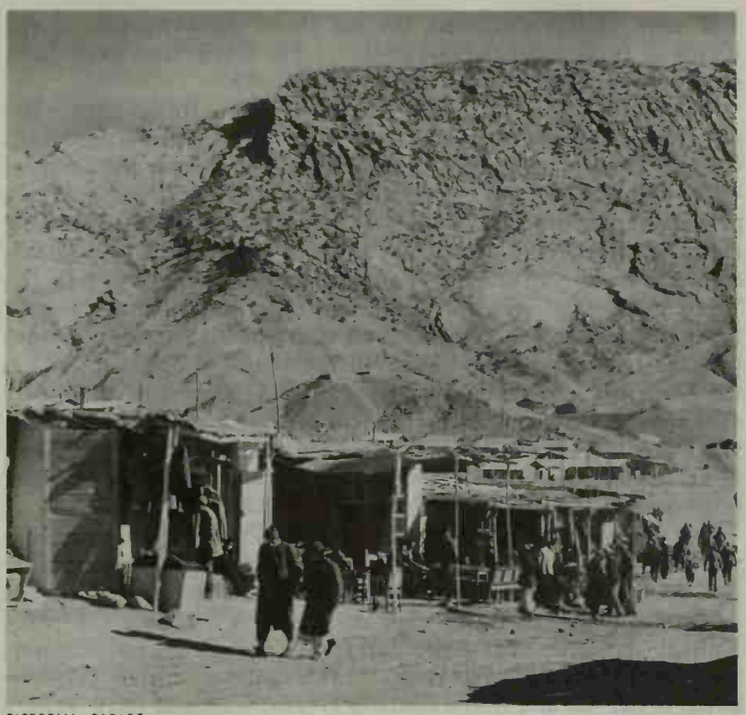
KURDISTAN (KURDESTAN or KORDESTAN) ("the land of the Kurds"). Loosely used the name refers to the extensive plateau and mountain area where Kurds live exclusively or in the majority; *i.e.,* large parts of eastern Turkey, northern Iraq, northwestern Iran and parts of Soviet Armenia. More specifically it designates an *ostan* (province) in western Iran which is bounded west by Iraq, north by West and East Azerbaijan, east by Gilan and the Central *ostan* (Teheran) and south by Kermanshah. Once part of Media (*q.v.*), this administrative unit came into existence in the Seljuk period under the names of Kurdistan and Ardelan. In 1938 it was merged into the newly formed *ostan* of Kermanshah; after 1946 it became the autonomous region of Sanandaj, and in 1961 an *ostan*. Area 10,873 sq.mi. Pop. (1961 est.) 625,766. The capital is Sinandaj (1964 est.) 53,904.

The western part belongs to the Zagros system, being crossed by ranges of 6,000–8,000 ft. in a northwest-southeast direction. Jurassic and Cretaceous limestones with igneous intercalations and a flysch-type series of shales and other sediments play a dominant role. The eastern part is a plateau, 4,500–5,500 ft., largely covered by Plio-Pleistocene sediments partly topped by freshwater limestones and metamorphic-based. The province is drained in the west by the headwaters of the Rudkhaneh-ye Sirvan (Nahr Diyala), a tributary of the Tigris; in the east and north by those of the Qezel Owzan which empties into the Caspian through the Safid Rud; in the south by the Rhudkhaneh-ye Qareh Su which becomes the Karkheh river, ending in the Hoveyzeh swamps.

The climate is extreme on the plateau: the winters are bitterly cold and snow lies four to five months. The summers are hot but not dry enough to destroy the mountain pastures. The western valleys are agreeable in winter but oppressively hot in summer. Most of the western ranges were originally covered by oak mixed with ash, elm, wild pear, pistachio, almond and many other trees and bushes which have, however, largely been destroyed. The plateau is cultivated, wheat and barley being the foremost crops. In the western valleys irrigation is extensively used and a great variety of crops include rice and maize (corn), cotton, tobacco, oilseeds, melons, grapes and other fruit. Some valleys are devoid of cultivation, being reserved as winter quarters of the tribes, for whom also all the rich elevated grazing grounds are reserved as summer quarters.

The population is of old Iranian stock, predominantly Sunni Kurds. Minorities include Persians, Jews and Syrian Christians in the towns, Persians and Azari Turks in the villages round Qorveh. Relics possibly of pre-Kurdian Iranian speech are also found. While most of the settled Kurds are detribalized, the tribal element plays a leading role in social affairs and landownership. Some groups practice nomadism in spite of the difficulties of the almost closed frontier. Seminomadism is widespread. Tribal groups include Jaf, Shakak, Mukri, Kalhor, Guran.

The province is easily accessible and in the past the international frontier offered no serious obstacle to movement. Motorable roads are few. Sanandaj is the main market. It is connected



PICTORIAL PARADE

TYPICAL VILLAGE IN THE MOUNTAINS OF KURDISTAN

by road with Hamadan, Kermanshah and, via Saqqez (17,579), with Tabriz and Mahabad. Other centres are Garrus (9,387) and Qorveh (2,929).

Exports include grain, fruit, wool, skins and hides, and gallnuts. In spite of the natural wealth of the province modern economic development has been slow. The tobacco factory of Sanandaj is the only modern plant of any size.

Excavation of the famous circular Sasanian ruined city of Takht-e Sulaiman (northeast of Garrus) was begun by German archaeologists in 1959.

For Kurdish ethnography and history *see* KURDS. (H. BO.)

KURDS, the name applied since the 7th century A.D. to western Iranians and neighbouring iranicized peoples established astride the mountain systems of the Zagros and the eastern extension of the Taurus.

Their ethnic origins are uncertain. The Kurtioi or Cyrtii of Atropatian Media and Persis mentioned by Polybius (*c.* 200–120 B.C.) and later by Strabo and Livy were probably Kurds; also possibly the Kardouchoi who attacked Xenophon and the Ten Thousand (401 B.C.) near modern Zakho. The records of the early civilized empires of the plain (Sumer, Akkad, Babylonia and Assyria) contain frequent references to wars on their eastern and northern frontiers with mountain tribes that had names resembling Kurd. Personal names in contemporary documents indicate the presence of Indo-Aryan elements in Mesopotamia in the 16th century B.C. These were followed into the region of the western Persian plateau by the Iranians (*i.e.,* Medes and Persians). Names of Iranian type borne by Median princes are found in Assyrian texts of the 8th century B.C. Thereafter the Medes pushed on westward and southward until by 650 B.C. they dominated the Zagros and beyond. According to Herodotus (book i, 72 and 74) the western boundary of the Median empire was the Halys river, modern Kizil Irmak, having been fixed by a treaty with the Lydians (585 B.C.). The Medes, like the Persians, appear to have constituted an aristocracy controlling a mixed population on whom they imposed their language and their religion.

From about 550 B.C. the Median empire was replaced by the Persian, which was overthrown in 331 B.C. by Alexander the Great at the battle of Gaugamela between Mosul and Irbil. The region formed part of the empires that followed: the Seleucids (331–129 B.C.), the Parthians (247 B.C. to A.D. 226), the Persian Sasanians (226–636), the Arab caliphate (636–1258), the Mongols and the Turkmens (1258–1501). By the 16th century the frontier between the Ottoman-Turkish and the Safawid-Persian empires

was more or less stabilized, leaving about three-quarters of the Kurds in Turkey and the rest in Iran. The Kurds thus never have enjoyed anything approaching political unity.

The Kurdish dialects, called Kirmanji, belong to the northwestern division of Iranian languages (*q.v.*) as distinct from the southwestern Persian. Though showing minor differences, almost from valley to valley in the higher altitudes, the dialects fall into two principal groups, northern and southern, the dividing line running approximately from the southern shore of Lake Urmia to the nearest point on the Greater Zab and thence down that river to the Tigris confluence. To the southeast, on a line running roughly from Kermanshah through Karand to Mandali, Kirmanji merges into the Lakki and Luri dialects of the southern Zagros. Within the Kirmanji area there are pockets of another group of dialects (belonging to the central division of Iranian) called Zaza in the northwest and Gorani in the south. Distinguishing characteristics in all the Kirmanji dialects suggest descent from an ancient and powerful basic language, perhaps the Median.

For 600 years after the Arab conquest (A.D. 636) and their conversion to Islam, the Kurds played a recognizable and considerable part in the troubled history of western Asia but as individuals or turbulent groups rather than as a nation. Among the petty Kurdish dynasties that arose during this period the most important were: the Shaddadids ruling a predominantly Armenian population in the Ani and Ganja districts of Transcaucasia (951–1174); the Marwanids of Diyarbakir (990–1096); and the Hasanwaihids of Dinavar in the Kermanshah region (959–1015). The most famous of all Kurds was Salah al-din (Saladin; *q.v.*), the chivalrous opponent of Richard I of England and founder of the Ayyubid dynasty of Egypt and Syria (1169–1250). Less is written of the Kurds under the Mongols and Turkmens, but they again became prominent in the wars between the Ottomans and the Safawids in circumstances favourable to the growth of a feudal system and a chain of semi-independent principalities. In spite of the later centralizing policies of both governments, several of these principalities survived into the first half of the 19th century, notably those of Bohtan, Hakari, Bahdinan, Soran and Baban in Turkey and of Mukri and Ardelan in Persia.

Kurdish nationalism is no recent growth. Before and after the suppression of the principalities, there were frequent risings against the central governments in which the leaders appealed to racial sentiment to rally their followers. A sturdy patriotism animates the work of the poet Ahmad-e Khani of Bayazid (1651–1706), who wrote in the northern dialect, as it does that of many of his successors, notably Haji Qadir of Koi (1815–96), who wrote in the southern dialect. In its modern form, Kurdish nationalism developed along with similar movements of the other minorities of the Ottoman empire, the Arabs and the Armenians. The first Kurdish newspaper, *Kurdistan*, appeared in 1897 and was published at intervals until 1902 in Cairo, Geneva, London and Folkestone, Eng.; it was revived at Istanbul in 1908 (when the first Kurdish political club, with an affiliated cultural society, was also founded) and again in Cairo during World War I.

World War I marks an important turning point in the history of the Kurdish people. Their aspirations were encouraged by the defeat of Turkey and by point 12 of Pres. Woodrow Wilson's "program of the world's peace" (Jan. 1918), which stipulated that the non-Turkish nationalities of the Ottoman empire should be "assured of an absolute unmolested opportunity of autonomous development." A delegation representing the Kurdish patriotic societies attended the peace conference. The treaty of Sèvres, signed in Aug. 1920 by representatives of the Allies and of the sultan, provided for the recognition or creation not only of the three Arab states of Hejaz, Syria and Iraq but also of Armenia and, to the south of it, Kurdistan, which the Kurds of the Mosul vilayet, then in British occupation, would have the right to join. Owing to the military revival of Turkey under Mustafa Kemal Atatürk, this treaty was never ratified. It was superseded in 1923 by the treaty of Lausanne, confirming the provision for the Arab states but omitting Armenia and Kurdistan. Mosul was excluded from the settlement, and the question of its future was referred to the League of Nations, which awarded (1925) in favour of Iraq. This was made effective by the treaty of Ankara signed in 1926 by Turkey, Iraq and Great Britain.

Although the treaty of Sèvres was stillborn, this project for an independent Kurdish state on record in an international document was not forgotten. Although not applicable to the Iranian Kurds, it excited similar hopes among them; short-lived armed risings occurred. In Turkey the most serious was that of Sheikh Said in the Kharput region (1925), followed by such outbreaks as that near Ararat (1930). For some years after 1920 the Kurds south of the Greater Zab continued to resist incorporation in Iraq, and in 1922–23 Sheikh Mahmud of Sulaymaniyah proclaimed himself king of Kurdistan; in 1931–32 and again in 1944–45 serious risings in Barzan in the extreme north were suppressed with difficulty. In 1922 for several months, and again from 1941 to the end of World War II, Iranian administration virtually ceased to exist in parts of the frontier region, and in Jan. 1946 the Kurdish Republic of Mahabad was set up under the presidency of Qazi Mohammed.

The liberal ideas that had inspired the treaty of Sèvres nevertheless continued to have important consequences, directly in Iraq and indirectly in the other countries. In 1925 the League of Nations, endorsing for the whole of Kurdistan in Iraq the policy introduced for the southern part as early as 1918 by the British, stipulated that Kurds or those proficient in the Kurdish language should be appointed for the administration of their country, dispensation of justice and teaching, and that Kurdish should be the official language. In 1932, when Iraq applied for admission to the League of Nations, the council required from the Iraqi government a declaration, which was to rank as part of the constitution and an obligation of international concern, reaffirming these rights; the Local Languages law was enacted to give it statutory effect. However, a sense of grievance was kept alive by what was considered, not entirely without justification, to be grudging and halfhearted implementation by the government. An article in the temporary constitution of Iraq promulgated immediately after the military *coup d'état* of July 1958, specifically mentioning the Kurds as partners with the Arabs in the state, was therefore warmly welcomed. But hopes of a measure of administrative devolution, enhanced status for their language and a fairer share of social services and development projects were not fulfilled, and in 1961 there began a rebellion that had the character of a national uprising rather than that of tribal resistance to the restraints of orderly administration.

Most Kurds are Sunni Muslims of the Shafi'i rite (*see* ISLAM). The mystical dervish orders, especially the Qadiri and the Naqshbandi, have numerous adherents. Heterodox sects of interest are the Bektashi-Qizilbash, the Yezidis (*q.v.*) and the Ahl-i Haqq, popularly known as Kakai in Iraq and Ali-Ilahi in Iran.

On the basis of the census of 1957, the Kurdish population of Iraq is about 1,200,000. Reliable statistics for other countries are lacking, but 2,500,000 for Turkey, 1,400,000 for Iran, 250,000 for Syria and 60,000 for Soviet Transcaucasia are acceptable estimates, making a total of nearly 5,500,000, including Iraq. A figure of 10,000,000 often claimed by nationalists includes the Lakks and Lurs (Shi'i Muslims with some Ali-Ilahis), who are classed as Kurds in the *Sharafnama* (1596, in Persian), the earliest history of the Kurdish people, but are not covered by the term as generally understood. Islands of Kurds are found isolated from the main body: for instance, in Damascus, Syr., near Aleppo, Syr., and as far away as Ankara, Turk., and in the Iranian provinces of Kazvin, Khurasan and Kerman. Until 1914 the Kurds lived close to Christian communities with a similar mode of life: Armenians of the Anatolian plateau, Old Chaldeans of the Hakari highlands and the adjacent Urmia plain, and Uniate Chaldeans farther south. Relations were reasonably good, but the record was stained from time to time by bloody incidents generally attributable to provocation from outside. After World War I most of these Christians disappeared from Turkey, but several thousand Assyrians, including many from Turkey, remain compactly settled in the Amadiyah district in Iraq. Small colonies, probably dating back to the Babylonian exile, of Jewish weavers, dyers, tanners and peddlers survived in many towns and market villages until after World War II, when they emigrated to Israel.

Outside the towns the population consists chiefly of settled agriculturists. Nomads, who lived throughout the year in black goat-hair tents, driving their flocks between the Mesopotamian plains and the highlands of Turkey and Iran, were formerly numerous. But after World War I a combination of economic and governmental pressures obliged many to turn to agriculture or to assimilate themselves to seminomadic villagers who move their flocks in summer to hillsides within their own frontiers. Improvements in communication, the consolidation of the administrations, the spread of education and the emergence of a new type of labour force, trained in the oil industry and on the great development projects financed by oil royalties, are tending to change the social structure. The traditional tribal or feudal society was based on groups of villages owing allegiance to a hereditary chief, a sheikh of one of the dervish orders, or a landlord, who, in return for certain fees and perquisites, was expected to protect the interests of his peasants vis-à-vis their neighbours or the government.

Kurdish peasant women are said to have enjoyed greater freedom than their Turkish, Persian and Arab neighbours. A number of women of the upper classes have been prominent in tribal administration, local politics, nationalist agitation or even war. The environment was thus favourable for female emancipation, and all classes have been eager to take advantage of any opportunities for modern education.

In Iraq, since 1918, Kurdish has become widely used in private correspondence, and there has been continuous journalistic activity; there also has been a steady if not very prolific output of anthologies, collected works of classical poets, contemporary verse, histories, books on religion and morals, grammars and the like. In Iran, Kurdish newspapers and pamphlets appeared at Mahabad between 1943 and 1946, and in 1959 an official weekly, *Kurdistan,* was inaugurated at Teheran. In Syria for a few years from 1932 onward a monthly magazine and some books were published in both the Arabic and the Roman scripts. Kurdish studies are encouraged in Soviet Armenia, where a modified Cyrillic alphabet is used. Programs in Kurdish have been broadcast in Iraq, Iran, Armenia and (for reception abroad) Egypt. In Turkey any manifestation of Kurdish political or cultural activity was firmly discountenanced in the mid-1960s.

See IRAQ: *History;* IRAN: *The People;* KURDISTAN; *see* also references under "Kurds" in the Index.

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KURE, a city and port of Japan in Hiroshima prefecture, southwest Honshu. With an excellent natural harbour surrounded on the land side by mountains and screened from the Inland sea by mountainous islands, Kure had a seclusion which appealed to Japanese naval authorities who established a major naval base there in 1886.

The population was 420,000 during World War II, dropped to 199,304 in 1955, but had increased to 210,032 in 1960. In the same period its area was increased by amalgamation from about 18 sq.mi. to 56 sq.mi. The shipyards and foundries, which during the war produced the giant battleship "Yamato," build merchant ships and oil tankers of 80,000 to 100,000 tons. (C. A. MR.)

KURGAN, an *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., lies on the southern margin of the West Siberian lowland. Pop. (1959) 999,170. It is drained by the Tobol river, which bisects it, and its tributary, the Iset. The surface is a level plain, with innumerable small lakes, often saline, occupying shallow depressions. Soils are either black earth (chernozems) or chestnut brown and bear a steppe vegetation, but this has largely disappeared through plowing. In the north are extensive birch groves. The climate is strongly continental, with cold winters. January average temperature is about −17° C. (2° F.), but in cold spells minima may be about −45° C. (−50° F.). Summers are warm with average temperatures about 21° C. (70° F.) and dry. Annual rainfall is 14–16 in.

The *oblast* was formed in 1943 out of Chelyabinsk *oblast* and a high proportion (67%) of the 1959 population was rural. The 332,108 urban dwellers live in 8 towns and 6 urban districts, but these are all small except the administrative centre of Kurgan (145,712) and Shadrinsk (52,345). Agriculture is the main occupation, particularly the growing of spring wheat. Barley, oats, rye, buckwheat, sunflowers and mustard are also important, as are potatoes and other vegetables in the west. Considerable areas were plowed up there in the 1950s under the Virgin and Idle Lands scheme. Dairy farming is common in the north and sheep farming in the south. (R. A. F.)

KURGAN, a town and *oblast* centre of the Russian Soviet Federated Socialist Republic, U.S.S.R., stands on the left bank of the Tobol river 1,075 mi. E. of Moscow. Pop. (1959) 145,712. The town was founded in the late 17th century as the fortress of Tsarevo-Gorodishche, on the Ishim defensive line. The name Kurgan, meaning "tumulus," was derived from the ancient burial mounds in the locality. As the area was colonized and opened up for agriculture, the town became the collecting centre for farm produce. With the coming of the railway in the late 19th century its focal importance was increased, as the main Trans-Siberian route westward from Omsk there divides into two branches, to Sverdlovsk and Chelyabinsk. A modern line runs from Kurgan southeastward to Peski on the new Central Siberian railway. The Tobol, which is frozen from November to May, is navigable and links Kurgan to the Ob-Irtysh system. The town's modern industries reflect its significance as an agricultural centre. There are two plants producing agricultural machinery and a range of food industries. Kurgan has electrical and other machine-building works, and leather and footwear industries. (R. A. F.)

KURIA MURIA ISLANDS (KHURYAN MURYAN), a group of islands in the Arabian sea, 900 mi. east of Aden and 25 mi. off the south coast of Oman, and a British possession. Pop. (1963 est.) *c.* 70. East to west the islands are Al Haskiyah, 1 sq.mi. and 500 ft. high; Suda (As Sawda), 5 sq.mi. and 1,310 ft. high; Al Hallaniyah, the largest and the only one inhabited, 20 sq.mi. and rising to 1,500 ft.; Gharzaut (Qarzawit) and Jibliyah (Al Qibliyah), 500 ft. high. The name Zenobian by which they are called in the *Periplus of the Erythraean Sea* derives from the Beni Genab, the tribe of the neighbouring coast and probably the Genabti of Egyptian inscriptions. The inhabitants fish from inflated skins as in ancient days.

In 1853 a British merchant captain found guano there and the consul at Zanzibar was instructed to ask the sultan of Oman for the cession, or sale for up to £10,000, of the islands to Britain, without mentioning the guano, in order to protect the captain's interests. Seiyid Said insisted on making a gift of them and they were ceded in 1854 and the guano removed. A cable station was set up on Al Hallaniyah in 1861 but abandoned the following year. Included in Aden colony in 1937, the islands were left in charge of the resident in the Persian gulf and given a separate constitution in 1959.

See R. Coupland, *East Africa and Its Invaders* (1938).

(W. H. Is.)

KURIL ISLANDS (KURILSKIYE OSTROVA; Japanese CHISHIMA-RETTO), a chain of islands in Sakhalin *oblast* of the U.S.S.R., stretches from the southern tip of the Kamchatka peninsula to the northeastern corner of Hokkaido and separates the Sea of Okhotsk from the Pacific ocean. The islands, Japanese from 1875 to 1945, were ceded to the Soviet Union under the Yalta agreement and the Japanese population repatriated. The chain is 750 mi. long and extends over 7 degrees of latitude. In all there are 56 islands and innumerable uninhabited rocks, with a total area of 6,023 sq.mi. The main islands from north to south are Shumshu, Paramushir, Onekotan, Shiashkotan, Matua, Ketoi, Simushir, Urup, Iturup (the largest) and Kunashir. In the north a 60-mi. chain of small islets

runs parallel to the main chain. Deep straits separate the islands, the deepest being Bussol (over 6,600 ft.) and Kruzenshterna (5,940 ft.). Along the southeast of the Kurils is the Kuril-Kamchatka trench, one of the deepest trenches in the Pacific floor, with depths to 34,587 ft.

The island arc was formed by earth movements in the Alpine folding period and forms part of the circum-Pacific belt of tectonic instability. This is evinced by the presence of nearly 100 volcanoes, of which 38 are still active. The highest peaks are the Alaid volcano on Atlasova Island (7,674 ft.), which has emitted only fumes since its eruption of 1778, Tyatya on Kunashir (5,978 ft.), Fuss on Paramushir (5,814 ft.) and Sarycheva on Matua (4,908 ft.), which erupted in 1946. Earthquakes are common and are often accompanied by tidal waves. The wave of 1737 reached 210 ft., the highest on record. There are many hot springs, one on Kunashir being a commercial source of sulfur. Some islands have no fresh springs.

The climate of the Kurils is unpleasant, with cool, wet summers from the onshore monsoon and prolonged, cold and snowy winters from the offshore monsoon across the Sea of Okhotsk. Average August temperatures are about 16° C. (60° F.) and February averages −7° C. (20° F.). Annual precipitation is 30–40 in., most of which falls as snow, which may occur in any month from the end of September to the beginning of June. Snow cover attains 6–15 ft. in depth. The meeting of the cold water of the Sea of Okhotsk and the warmer Pacific water causes frequent fogs in summer. Wind speeds are high, often reaching 46 m.p.h. The latitudinal range of the Kurils causes considerable variation in vegetation. The northern islands have a bushy tundra, with dwarf pine, dwarf birch and willow. The larger southern islands have a dense forest vegetation, mainly of Japanese species. Kuril bamboo and Sakhalin fir are common. There is also marked variation with increasing height. The islands are noted for the very large numbers of birds, many of which are migratory.

The Russian population of about 15,000 which has replaced the Japanese is chiefly concerned with fishing, especially for crab. The two towns of Kurilsk on Iturup and Severo-Kurilsk on Paramushir are fishing ports and canning centres, as is the urban district of Yuzhno-Kurilsk on Kunashir. Whaling is important and there is a whale-processing station at Kurilsk. Agriculture is limited to a little vegetable growing on the southern islands. (R. A. F.)

KURNOOL, a town and district of Andhra Pradesh, India. The town, headquarters of the district, lies at the confluence of the Tungabhadra and Hindri rivers, 240 mi. N.W. of Madras. Pop. (1961) 100,815. It was made a municipality in 1866, and was the capital of Andhra Pradesh until replaced by Hyderabad in 1956. The ruins of the fort built by the kings of Vijayangar in the 16th century and the tomb of the first Muslim governor are the places of interest. The town has colleges of arts and science and medicine affiliated to the Andhra university, a high school, and two training schools. It is a trade centre and has a number of oil mills.

KURNOOL DISTRICT (area 9,277 sq.mi.; pop. [1961] 1,908,740) is crossed from north to south by two parallel mountain ranges, the Nallamalais and the Yellamalais. Kurnool suffers severely in time of drought. Several mountain streams were dammed long ago to form irrigation tanks. A government irrigation canal (25 mi.) starts from the Tungabhadra, one of the two principal rivers, near Kurnool town. The other main river is the Krishna. The Bhavanasi rises in the Nallamalais, and joins the Krishna at Sungameswaram, a place of Hindu pilgrimage. Other pilgrimage places are Srisailam to the northeast and Ahobilam to the southeast.

During the 18th century Kurnool formed the jagir of a semi-independent Pathan nawab whose descendant was dispossessed by the British government for treason in 1838. The former principality of Banganapalle, a fief of Hyderabad ceded to Madras in 1800, was merged with Kurnool district in 1948. Banganapalle town, 17 mi. S. of the Guntakal-Vijayavada railway, has a diamond mine.

The principal crops are millets, cotton, pulses, oilseeds and rice, with a little tobacco. Many minerals occur, and barite, iron and steatite are worked. Coarse cotton cloth is woven, and there are cotton presses, an oil mill and saltpetre refineries. The district is served by the Southern railway. (B. S. R.)

KUROPATKIN, ALEKSÉI NIKOLAEVICH (1848–1925), Russian army officer, commander in chief of the Russian army in the Russo-Japanese War, was born on April 10 (new style; March 29, old style), 1848, at Shemchurino, in Pskov province. He entered the army in 1864. He took part in the capture of Samarkand in 1868, was engaged in diplomatic work in Kashgaria in 1875 and saw active service in the conquest of Kokand in 1876. In the Russo-Turkish War of 1877–78 he was chief of staff of an infantry division, serving under Gen. M. D. Skobelev. He later wrote a detailed account of this campaign, *Deistvya otryadov generala Skobeleva*, two volumes (1885). Promoted in 1882 to the rank of major general, he was regarded by the army as destined for the highest office. During the period of 1890–98 he commanded the army in the Transcaspian region.

In 1898 Kuropatkin became minister of war. He then supported Count S. Y. Witte, the minister of communications and transport, who favoured Russian economic expansion in the far east. Like Witte, however, he was alarmed when extremists at the court of Nicholas II pressed for action that was bound to provoke war with Japan. Seeing that Japan had gained preponderance in the far east, Kuropatkin proposed in the summer of 1903 that Russia withdraw from Manchuria and the Liaotung peninsula and concentrate on developing the Vladivostok region. His proposals were adopted, but were then nullified by extremists at court and by the strong commercial interests supporting the aggressive expansionist policy.

Kuropatkin proved himself an able minister of war, but was unsuccessful as commander in chief of the land forces in the war against the Japanese (1904–05). His failures, though in part attributable to Adm. Evgeni Alekseev, the emperor's viceroy in the far east, were in the main due to his own lack of initiative and leadership. He was removed from his command in March 1905 after the loss of Mukden. In his *Otchet* ("Account," 4 vol., 1906; Eng. trans. *The Russian Army in the Japanese War,* 2 vol., 1909) he frankly admitted his own mistakes.

During World War I, Kuropatkin commanded for a time on the northern front. After July 1916 he was governor general and commander in chief in Turkistan. He was arrested by revolutionaries in April 1917 and sent to Petrograd, but was released by the provisional government. He returned to Shemchurino where he taught in a school. He died there on Jan. 25, 1925. His *Dnevnik* ("Journal") was published in *Krasny Arkhiv* (1922, 1924–25 and 1935). (I. Gy.)

KURSK, an *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., formed in 1934 and covering an area of 11,506 sq.mi., lies across the southern end of the Central Russian upland, in the upper basin of the Seim river. Pop. (1959) 1,483,305. A large part of the *oblast* was separated off when Belgorod *oblast* was formed in 1954. The surface of Kursk *oblast* is a rolling plateau, broken by the broad, shallow valleys of the Seim and its many tributaries, notably the Rat, Tuskar and Svapa on the right and the Polnaya and Reut on the left. The extreme south is drained by the headwaters of the Psel. The subsoil of the plateau is loess, the friable structure of which renders it highly susceptible to erosion. Severe gullying has taken place over the whole *oblast* and is continuing despite efforts made to check it. The soil quality improves from west to east, from gray forest soils, through leached "northern" chernozems to "thick" chernozems. The west is the edge of the mixed forest zone, but the woodland areas, mainly of oak, have been reduced by clearance to scattered groves. The rest of the *oblast* belongs to the forest-steppe transitional zone, but there too the woodland areas and the natural steppe vegetation have largely disappeared under the plow, which facilitates the development of gullies. The climate is mild continental, with January average temperatures about −8.9° C. (16° F.) and July averages about 22.2° C. (72° F.). Rainfall averages 20 in. a year in the northwest of the *oblast* and decreases gradually to the southeast.

An exceptionally high proportion (80%) of the 1959 population was rural, a reflection of the agricultural richness of the area. The density of 129 persons per sq.mi. is one of the highest in the

U.S.S.R. outside industrial areas. The 303,364 urban dwellers live in 8 towns and 10 urban districts, more than two-thirds in the administrative centre of Kursk (204,712). The remaining towns are small agricultural centres. More than 70% of the *oblast's* area is arable land. The main crops are grains—wheat (mostly winter wheat), rye and maize (corn) (both for human consumption and for fodder), buckwheat, oats and millet. Sugar beet and hemp are the main industrial crops, while potatoes and other vegetables occupy about 8% of the arable area. Pig keeping is important. Until the 1950s industry in the *oblast* was almost wholly concerned with processing farm products—flour milling, distilling, meat and vegetable processing and leather working. Then, however, exploitation of the extensive iron ore deposits known as the Kursk Magnetic Anomaly was begun near Mikhailovskoye and by the 1960s this was increasing at a rapid rate. The ores are not of particularly high quality, but their location is convenient for the metallurgical industries of the Donets or Donbass basin and the Moscow area. Moreover the ores occur near the surface and are mined by opencast methods. The overburden reaches 100 to 250 ft. Near Shchigry and Dmitriyev-Lgovski phosphorite is mined. The *oblast* is well served by railways, with lines to Orel and Bryansk, Voronezh, the Donbass, Kharkov and Kiev. (R. A. F.)

KURSK, a town and *oblast* centre of the Russian Soviet Federated Socialist Republic, U.S.S.R., is located in the Central Russian upland, on the upper Seim, at its confluence with the Tuskar, 280 mi. S.S.W. of Moscow. Pop. (1959) 204,712. Kursk is one of the most ancient towns in Russia, being first mentioned in documents under the year 1095. St. Theodosius of the Orthodox hagiography was born there. In the Tatar invasion of 1240 Kursk was sacked and razed to the ground. The town was not rebuilt until 1586, when it became a military outpost to protect the advancing Russian colonization from Tatar attack. As the rich chernozem soils of the neighbourhood were developed, Kursk became an important agricultural centre, with flour milling and other food industries, and it was made seat of a *guberniya* (pre-Revolution province). Modern Kursk has large agricultural processing industries, producing especially flour, spirits, tobacco and footwear. Since the Revolution metallurgical and engineering industries have grown up, making pig iron, machinery for elevators and milling, electrical apparatus and calculating machines. Pharmaceutical goods, glass, cord and clothing are also manufactured. In World War II fierce fighting took place round Kursk and the town was severely damaged and occupied by the Germans (1941–43). Since 1950 the opening up of the iron ore deposits of the Kursk Magnetic Anomaly brought new importance and accelerated growth to the town. Four railways, from Tula, Voronezh, Kharkov and Kiev converge on the town. Kursk is the cultural centre of the *oblast* and has a regional museum and medical and pedagogical institutes.
(R. A. F.)

KURUKSHETRA, a town and tract, considered sacred by the Hindus, in the Karnal district of Punjab, India. The town (pop. [1961] 16,828), now united with Thanesar, lies 97 mi. N.N.W. of Delhi on the Delhi-Ambala railway. The holy Kurukshetra tank, lined with bathing stairs, is said to have been built by Raja Kuru, the ancestor of the Kauravas and Pandavas immortalized in the epic of *Mahabharata*. The bathing fair held there on the occasion of a solar eclipse is attended by about 500,000 pilgrims. It is believed that on this occasion the waters of all other tanks visit this one, so that the pilgrim bathing therein at the ecliptic moment earns the cumulative merit of them all. There are many temples, including Gita Bhawan and the modern Birla Mandir. To the north lies a ruined Muslim fort. The principal building is the tomb of Shaikh Chilli Jalal (d. 1582), an octagonal building of off-white marble with finely carved marble screens in the window openings. The town is the seat of the unitary-teaching Kurukshetra university, established in 1956, and of a government training college.

Thanesar was once the capital of King Harsha (A.D. 606–647). It was sacked by Mahmud of Ghazni in 1011, and near there Shahab-ud-din Ghori was first defeated and later (1192) himself defeated the last Hindu king of Delhi, Prithvi Raj.

KURUKSHETRA tract forms an irregular quadrilateral of about 160 mi. extending west to Pehowa and southwest to Kaithal. The oldest account of it is probably given in the *Mahabharata* which mentions it as lying between the Saraswati and the Drishadwati streams, and describes it as a forested area divided into a number of *bans* (forests). The tract derives its name, Kurukshetra ("the field of Kuru"), from Raja Kuru. Hsüan Tsang, who visited the area in the 7th century, called it the "land of happiness."
(S. S. BH.; J. B.-P.)

KURUNEGALA, a town in the North-Western province of Ceylon, lies 23 mi. N.W. of Kandy. Pop. (1953) 17,505 (mun.). It was the residence of the Sinhalese kings from A.D. 1319 to 1347. It has a number of steep rocky hills which provided citadels in those troubled times and now provide a splendid background to the town. Later it lay on the road from the capital, Kandy, to its seaport, Puttalam. Kurunegala is today a main road junction and the growing centre of an important agricultural district (pop. [1953] 626,336) which it serves administratively and commercially. The part of this district that lies in the wet zone (*see* CEYLON: *Geographical Regions*) produces rice, rubber and, above all, coconuts, cultivation of which spread rapidly there between 1890 and 1910. The dry zone part (which is larger) contains much forest, but with the construction and restoration of irrigation works rice production was increasing. (B. H. F.)

KURYLOWICZ, JERZY (1895–), Polish historical linguist who demonstrated in 1927 the identity of Hittite *ḫ* with the Indo-European speech sounds postulated in 1879 by the Swiss scholar Ferdinand de Saussure, thus laying a cornerstone of Indo-European phonology. He was born at Stanislawow (Ukraine, formerly Poland) on Aug. 26, 1895, and, after Romance and Germanic studies in Poland, worked on Indo-European linguistics in Paris under A. Meillet. Kurylowicz's contributions in these fields began from 1924; from 1928 he was professor at Lvov, and after World War II at Wroclaw and Cracow. His major works are *Études indo-européennes* I (1935), *L'Accentuation des langues indo-européennes,* 2nd ed. (1958), *L'Apophonie en indo-européen* (1956). (C. Ws.)

KURZ, HERMANN (1813–1873), German writer chiefly remembered for his powerful historical novels *Schillers Heimatjahre* (1843) and *Der Sonnenwirt* (1855), and colourful tales of Swabian life, such as *Erzählungen* (3 vol., 1858–63). Born at Reutlingen, Nov. 30, 1813, he studied at Maulbronn and Tübingen, and later earned his living by writing. His work, still neglected despite its high quality, brought him little profit or recognition, even in the homeland which he portrayed so vividly. He produced some good translations from English, Spanish, Italian and Middle High German, and from 1843 to 1854 was active as a political and literary journalist and editor. Later he held a post as university librarian at Tübingen, where he died on Oct. 10, 1873. His collected works were edited by Hermann Fischer in 12 volumes (1904).

ISOLDE KURZ, his daughter, born at Stuttgart, Dec. 21, 1853, lived 27 years in Italy. Her poems, *Gedichte* (1888, 1905 and 1933), stories, *e.g., Florentinische Novellen* (1890) and *Italienische Novellen* (1895) and novels have won her a high place among German women writers, partly for her sense of form and style. She died at Tübingen, April 4, 1944. Her collected works were edited by G. Müller in six volumes (1925).

See Isolde Kurz, *Herman Kurz* (1906); Wilhelm Kosch, in *Deutsches Literatur-Lexikon,* vol. 2, pp. 1435–36 (1953). (L. H. C. T.)

KUSCH, POLYKARP (1911–), U.S. physicist and co-winner of the 1955 Nobel prize for physics, was born in Blankenburg, Ger., on Jan. 26, 1911, and moved to the United States at the age of one. He graduated from Case Institute of Technology, Cleveland, O., in 1931, and received his Ph.D. in 1936 from the University of Illinois, Urbana, for research in optical spectroscopy. After a year at the University of Minnesota, Minneapolis, he went to Columbia university in 1937, where he worked with I. I. Rabi on the first radio-frequency atomic beam experiments. After technical research at the Westinghouse (1941–42), Columbia Radiation (1942–44) and Bell Telephone laboratories (1944–46), he returned to Columbia as professor of physics in 1946.

The slightly anomalous hyperfine interaction found by J. E. Nafe, E. B. Nelson and Rabi in hydrogen in 1947 led G. Breit to suggest, on empirical grounds, that the intrinsic magnetic moment of the electron might not be in agreement with existing theories of the electron. Through precise atomic beam studies of the Zeeman effect in several kinds of atoms, Kusch demonstrated this anomalous property of the electron. The simultaneous theoretical studies of J. Schwinger showed that the anomalous spin moment, with the Lamb shift in hydrogen, formed the principal experimental basis for important developments in the theory of radiation. Kusch subsequently (1952) made definitive measurements of the electron magnetic moment and hyperfine interaction in hydrogen. For the discovery of the anomalous electron spin moment Kusch shared the Nobel prize with Willis Eugene Lamb, Jr. (*q.v.*). In work characterized by great accuracy and reliability Kusch has measured numerous atomic, molecular and nuclear properties by radio-frequency beam techniques. (H. M. Fy.)

KUSHK (Russian Kushka), a river in Afghanistan and the U.S.S.R., rises in the Paropamisus mountains of Afghanistan which attain heights of 5,764 to 8,983 ft. Its course of 150 mi. passes northwest through Kushk (3,599 ft.) and turns north shortly afterward to enter the Turkmen Soviet Socialist Republic. For about 10 mi. it forms the border between U.S.S.R. (Turkmen S.S.R.) and Afghanistan. At the Turkmen frontier post of Kushka (2,060 ft.) it changes to a northeast direction on being joined by the Moghar river and subsequently by the Egri Geok. Eventually the Kushk joins the Murghab near Tashkepri (Tashkepristroi). The Merv-Kushka post railway, a branch of the Trans-Caspian line, follows the river in Soviet territory to its terminus 12 mi. S. of Kushka only 66 mi. from Herat in Afghanistan. The region through which the river flows is semiarid and would form part of the Kara-Kum desert but for the irrigation water it provides to cultivate crops in its middle course. (B. L. C. J.)

KUSTANAY, an *oblast* and town in the north of the Kazakh Soviet Socialist Republic of the U.S.S.R. Pop. of *oblast* (1959) 710,690. Formed on July 20, 1936, the area is 197,000 sq.km. (76,062 sq.mi.). It is divided into 19 *raions* and has 3 towns and 6 "settlements of town type."

The *oblast* contains the Turgay gates (Turgayskiye Vorota), which lie between the foothills of the Urals and the Kazakh upland (Kazakhski Melkosopochnik) and connect the west Siberian lowland in the north with the Turgay tableland in the south. There is a wide, fertile black earth belt in the north, changing into dry steppe toward the south. There are important mineral deposits, including titanium, bauxite, lead, asbestos and brown coal. The climate is continental and dry with January temperatures of around −18° C. (0° F.) and July temperatures of 19° to 24° C. (66° to 75° F.). Precipitation is 300 to 390 mm. (12 to 15.6 in.) a year. The main rivers are the Tobol, a tributary of the Irtysh, in the north, and the Turgay in the south. There are a number of lakes, the largest being the Kushmurun.

The economy is mainly agricultural: wheat, oats and millet are grown largely in the north, while in the south the main industry is cattle and sheep raising. Industry is growing, principally in connection with mining. There is an important gold mining area in the upper reaches of the Tobol river and Dzhetygara, the site of an asbestos combine.

The *oblast* is traversed by the Middle and South Siberian railways, the principal lines being: Tselinograd-Kartaly, Troitsk-Kustanay, Kustanay-Uritskoye, Kustanay-Tobol-Dzhetygara.

About 70% of the population is rural. In addition to Kazakhs there are large numbers of Russians and Ukrainians as well as Tatars, Belorussians and Koreans. The towns are Kustanay, Dzhetygara and Rudny. In addition to more than 900 schools there are a number of special training establishments.

Kustanay, the capital, located 160 mi. S.E. of Chelyabinsk, was founded by the Russians in 1879. Pop. (1959) 86,382. There are several light industries, veterinary and medical training establishments, a theatre and a geological museum. (G. E. Wr.)

KUT (Al Kut), a town of Iraq and administrative centre of Kut *liwa* (province), stands on the left bank of the lower Tigris opposite the point where an extensive distributary channel, the Shatt al Gharraf, turns southward, while the main river makes a sharp bend northeastward. Pop. (1957) 26,524. As with many other riverine settlements, the fortunes of the town have been greatly influenced by changes in the river course; after a period of decline following prosperity in Abbasid times, a revival took place when the present river system became established, and the development of steam navigation fostered Kut's rise as a river port. Following upon the construction of irrigation works on the Tigris and the Shatt al Gharraf, Kut became a market centre for grain, dates, fruit and legumes. Much of the town was destroyed in the fighting of 1917, it has been rebuilt with wider streets and the main activity centres along or near the river front. The *liwa* (area 5,720 sq.mi.; pop. [1964 est.] 310,630) in effect comprises the agricultural hinterland of Kut together with a number of uncultivated zones.

In World War I, following a rapid advance from the south in 1915, British forces occupied Kut after a successful engagement at As Sinn, 8 mi. E., and pursued the Turkish forces about 60 mi. beyond, toward Baghdad. A Turkish victory at Ctesiphon halted this advance, and the British under Maj. Gen. Charles Townshend retreated to Kut where they were invested by the Turks on Dec. 8. Efforts made by land and river to relieve the garrison failed, and on April 29, 1916, after a siege of 143 days, the British forces surrendered, to be sent into captivity in eastern Turkey. In Feb. 1917 fresh British troops under Gen. Sir Stanley Maude retook Kut and advanced beyond Baghdad—the first important Allied success in the middle east. (W. B. Fr.)

KUTAHYA, a town and *il* (province) in western inner Anatolia, Turkey. The town is situated on the Porsuk river, a tributary of the Sakarya, 160 mi. W.S.W. of Ankara. Pop. (1965) 49,227. Kutahya, the ancient Cotiaeum, lay at an important point of the great road from the Marmara region (Istanbul-Bursa) to Mesopotamia (Aleppo-Baghdad). The town flourished and declined according to the changing importance of the trade routes, but never ceased to exist. During the Ottoman empire, it became a centre for ceramics, supplying tiles and faïence for centuries to the mosques and other monuments in Turkey. It lost its former importance after the development of Eskisehir and the latter's connection with the Anatolia-Baghdad railway in 1894. The development of various industries at Kutahya in the mid-20th century again increased its importance and the town has a hydroelectric plant, a sugar refinery and several ceramic and brick factories. A branch line connects it with the Anatolian railway from Eskisehir to Afyonkarahisar.

Kutahya Il has an area of 4,590 sq.mi. and a population (1965) of 398,214. There are lignite deposits in the northwest at Degirmisaz and Tunçbilek; chromium is extracted in small quantities. Agriculturally the *il* is highly developed, its chief products being cereals and sugar beet. Stock raising is of equal importance. (N. Tu.; S. Er.; E. Tu.)

KUTAISI, a town of the Georgian Soviet Socialist Republic of the U.S.S.R., stands on the Rioni river where it emerges from its narrow valley through the Caucasian foothills into the Kolkhida lowland 110 mi. W.N.W. of Tbilisi. Pop. (1959) 128,203. Kutaisi is one of the most ancient towns of the Caucasus, and was long the capital of successive kingdoms in Georgia: Colchis, Iberia, Abkhazia and Imeretia. During its long and stormy history the town has been sacked many times. The ruins of the 11th-century cathedral of St. George are still to be seen. With the 19th-century conquest of Georgia by the Russians, Kutaisi became the seat of a *guberniya* (pre-Revolution province). Since the Revolution it has developed as the major industrial centre of western Georgia, producing motor vehicles, a wide range of mining machinery, textiles (especially silk), clothing, footwear, furniture, canned fruit and vegetables, jam and other foodstuffs. Coal, building stone, barites and fuller's earth are all obtained locally. Power for the industry is obtained from a hydroelectric plant on the Rioni. Two branch railways link Kutaisi with the axial Trans-Caucasian line, and two further branches with the coal mining town of Tkibuli and with Tskhaltubo. It has roads to the Black sea coast and the interior. There are pedagogic and agricultural institutes, the latter specializing in subtropical agriculture. (R. A. F.)

KUTCH: *see* CUTCH.

KUTCHEAN LANGUAGE: *see* TOCHARIAN LANGUAGE.

KUTENAI (KOOTENAY), a tribe of American Indians of Algonkian speech. They are probably descended from the *tunáha,* an ancient Blackfoot group that migrated westward from the northwestern plains to the drainage of the Kootenay river, a tributary of the upper Columbia. In the 1960s they are distributed over southeastern British Columbia, northwestern Montana, and northern Idaho, and are separable by residence and culture into the Upper (or eastern) and the Lower (or western) Kutenai. Magnificent streams and lakes, adequate rainfall, a moderate climate, plentiful game and fish make their range the most favourable part of the intermountain plateau. The typical Kutenai personality is quiet, reserved and somewhat repressed, in contrast with the more boisterous Plains peoples.

After acquiring horses from the Plains Cree, the Kutenai accepted many Great Plains ways (*see* PLAINS INDIANS) during their increasingly important bison hunts through enemy country beyond the Rockies. Conical skin tents, mother-in-law avoidance, the sun dance (*q.v.*), formalized war honours as means of social advancement and modified plains costume suggest a Plains classification for recent Kutenai culture, but fundamentally the Kutenai belong to the Intermountain area. This is illustrated by their communal fishing, their remarkable bark canoes reminiscent of central Siberia, and the older, long, communal dwellings with reed or mat coverings. Their customs of counting ancestry along both sides of the family instead of exclusively along the father's or the mother's line, and of following band chiefs who have mild but real authority are Plateau traits.

See H. H. Turney-High, *Ethnography of the Kutenai* (1941); U.S. Department of the Interior, *United States Indian Population and Land* (1961). (H. H. T.-H.)

KUTNA HORA (German, KUTTENBERG), an ancient town of Bohemia in Stredocesky *kraj* (region), lies 44 mi. E. by S. of Prague (by road or rail) above the Vrchlice valley on the southern edge of the Polabi plain. Pop. (1961) 16,740. Its fame dates from the development of the silver mines in the early 13th century, chiefly by German immigrant miners. In the 14th century large mints were established, the coin stamps being designed by Italian metalworkers. Kutna Hora then ranked as the second city in Bohemia and owned a royal residence, *Vlassky dvur* ("Italian court"), part of which was the royal mint. It was there that Vaclav (Wenceslas) IV, the Bohemian king, issued in 1409 the famous decree giving the "Bohemian nation" special privileges above the three other "nations" at Prague university. Endemic quarreling between the mining community and the surrounding Czechs, the Hussite wars and the Thirty Years' War ruined Kutna Hora's prosperity, and the mines were virtually abandoned by the end of the 18th century. It remains a small, picturesque town of great tourist attraction. The late 14th-century Gothic cathedral of St. Barbara with its five naves is the main relic of medieval distinction; its flying buttresses, stone tracery and richly carved pinnacles are unequaled in Czechoslovakia. The *Vlassky dvur,* the Gothic St. Jacob's 14th-century church and the Late Gothic 14th-century Trinity church are outstanding buildings, and Kutna Hora has many late medieval houses. The Wocelovo museum contains the Kutna Hora Bible (1489) and a collection of locally minted coins. (H. G. S.)

KUTUZOV, MIKHAIL ILARIONOVICH, PRINCE (1745–1813), Russian army officer, the victorious commander in chief during the French invasion of 1812, was born in St. Petersburg on Sept. 16 (new style; 5, old style), 1745, the son of a lieutenant general who had served under Peter the Great. He entered the engineering-artillery school at the age of 12 and was posted as a corporal in the artillery two years later. Commissioned in 1761, he saw active service in Poland from 1764 to 1769. Transferred to the Turkish front in 1770 at his own request, he gained invaluable experience under P. A. Rumyantsev and A. V. Suvorov. He was severely wounded in the head in 1774 and lost an eye, but after recovering served for six years under Suvorov in the Crimea. He was promoted colonel in 1777, brigadier in 1782 and major general in 1784. In the Russo-Turkish War of 1787–91 he distinguished himself at Ochakov (where he was again severely wounded), at Odessa, at Bender and, especially, at Izmail.

Between 1793 and 1798 Kutuzov was successively ambassador in Turkey, governor general of Finland and director of the corps of cadets in St. Petersburg. He was also ambassador in Berlin, commander of the Russian army in Finland, governor general in Lithuania and military governor of St. Petersburg.

In Sept. 1802 Kutuzov fell into disgrace and retired to his country estate; but when in 1805 the emperor Alexander I found himself compelled to join England and Austria in the third coalition against Napoleon, he appointed Kutuzov to command the army which opposed the French advance on Vienna. Before Kutuzov could join with the Austrians, however, Napoleon had inflicted a major defeat on them at Ulm (Oct. 20). Kutuzov skilfully retreated, after defeating the French at Dürrenstein (Nov. 11) and preserved his army intact. He proposed now to fall back to the Russian frontier and there to await reinforcements, but Alexander overruled him. On Dec. 2, 1805, the Russians and Austrians were defeated by Napoleon at Austerlitz. (*See* NAPOLEONIC WARS.)

Alexander blamed Kutuzov for this defeat and removed him from active command, but Kutuzov was appointed military governor of Kiev in Oct. 1806 and military governor of Vilnius in June 1809. War had again broken out with Turkey, and in 1811 Alexander sent him to command the army in Moldavia. On July 4, 1811, at Rushchuk (Ruse) and later on the banks of the Danube, Kutuzov inflicted major defeats on the Turks, and on May 28, 1812, he concluded the advantageous treaty of Bucharest with them. For this campaign he was made count.

In June 1812 Napoleon's army advanced into Russia and the Russians fell back before him. On Aug. 9 (N.S.; July 28, O.S.), Alexander, under the pressure of opinion, appointed Kutuzov commander in chief of all Russian forces, making him prince the following day. Napoleon sought a general engagement, but Kutuzov's policy was to wear down the French by incessant minor engagements while retreating. At Borodino, however, Kutuzov decided to hold the invaders from reaching Moscow, but after a great battle on Sept. 7 (N.S.), he reverted to his policy of falling back, though it meant giving Moscow up. The steady attrition of Russian guerrilla tactics and the onset of winter compelled Napoleon to withdraw from Moscow on Oct. 19 (N.S.). He tried to move southward, via Kaluga, to avoid the devastated region through which he had advanced, but at Maloyaroslavets he was forced to return to the main route from Moscow to Smolensk. Kutuzov, now a field marshal, harried the retreating French, engaging them at Vyazma and Krasnoi, and the remnants of Napoleon's army narrowly escaped annihilation at the crossing of the Berezina river on Nov. 26–28 (N.S.). In Jan. 1813 Kutuzov led his army into Poland and Prussia, but on April 28 (N.S.; 16, O.S.), he died at Boleslawiec (Ger. Bunzlau) in Silesia. (I. GY.)

KUWAIT (AL KUWAYT), an independent Arab state and town in the northwestern angle of the Persian gulf (*q.v.*), is bounded north by Iraq and south by Saudi Arabia. Pop. (1965) 567,422 (state). Area 5,800 sq.mi. Kuwait also owns several offshore islands, the most important of which is Failaka (Faylakah), an inhabited island where archaeological remnants dating from about 2500 B.C. have been discovered. The town stands on the mainland at the southern entrance to a bay 20 mi. long and 10 mi. wide. Except for the small oasis of Al Jahrah (Jahra), 18 mi. W. of the town, the country is unrelieved desert. In summer the heat is severe but the humidity is less than in Bahrain; the winter climate is agreeable except when the frequent strong winds bring dust storms. Rain, usually slight, falls mostly in winter.

History.—According to oral tradition the name Kuwait is derived from *kut* meaning "a small fort." Early in the 18th century three clans of the 'Anaiza tribe abandoned nomadism to settle in Kuwait. Sheikh Sabah Abdul Rahim founded the present as-Sabah dynasty in 1756. After a Turkish attempt to control Kuwait its ruling sheikh entered into treaty relations with Great Britain in 1899, and was thus able to reject a German request to build the terminus of the Berlin-Baghdad railway on his territory. Following the outbreak of war with Turkey in 1914 Great Britain

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KUWAIT CITY: OLD TOWN GATEWAY CONTRASTED WITH MODERN BUILDINGS

recognized Kuwait as an independent state under British protection. Relations with Najd (later Saudi Arabia) were unsatisfactory and Kuwait sustained several attacks from Wahhabi (*q.v.*) fanatics. The Kuwait-Najd boundary was settled by the treaty of 'Uqair (1922), a compromise being reached by the creation of a neutral zone of 2,200 sq.mi. southeast of Kuwait. The northern frontier was agreed with Iraq in 1923, but in June 1961, immediately following the revocation of the 1899 treaty by mutual agreement and the announcement of Kuwait's full independence, the Iraqi prime minister claimed Kuwait as an integral part of Iraq. Threatened with invasion, the ruler of Kuwait, Sheikh (Sir) Abdullah as-Salim as-Sabah, appealed to Great Britain for military aid. This was promptly sent and deterred Iraqi action. Relations with Iraq subsequently improved and in October 1963 Iraq recognized Kuwait's independence. However, the death of the ruler in November 1965 led to fears of a rift in the ruling family, which might be exploited by outside interests. (L. Lo.)

When war broke out between Israel and Egypt on June 5, 1967, the amir declared war on Israel. Oil supplies to the U.S. and Britain were cut off on June 6. (X.)

Population, Administration and Social Conditions.—Most of the people live in Kuwait town. The basic population is Arab and includes many Arabs from neighbouring territories; in addition there are a number of Iranians, Pakistanis and Indians and about 2,500 British and U.S. citizens. Under the ruler, who is head of state and prime minister, is a cabinet of 14 ministers (10 appointed and 4 elected). Suffrage was in 1961 extended to all Kuwaiti males over 21 and a constituent assembly was thereafter elected. The ruler promulgates laws and decrees and the assembly also has legislative powers. The government is organized in 14 ministries under cabinet ministers and staffed by a civil service numbering about 4,000. The state is divided into three governorates: Kuwait (the capital); Ahmadi; and Hawalli.

Although the state has a budget law it does not publish a budget nor any development program, but it provides excellent free education and medical services and spends large sums on buying land for state building and development. By the 1960s the annual revenue exceeded £150,000,000, mainly from oil royalties. Expenditure is mainly on education, health services, town planning, electricity and water supply, ports, roads and housing. The currency is based on the Kuwaiti dinar at par with the pound sterling.

Economy.—Until the 1950s the principal Kuwaiti industries were pearling, fishing and boatbuilding. In 1934 the Kuwait Oil company, ownership of which is divided equally between the British Petroleum company and the Gulf Oil corporation of the U.S., obtained a concession covering the whole territory except the neutral zone. Oil was struck in 1938 but World War II deferred development until 1946. Thereafter progress was spectacular. In 1953 the American Independent Oil and Getty Oil companies, which jointly held the concession for the neutral zone, struck oil in commercial quantities and in 1955 oil was discovered in northern Kuwait. By the 1960s total Kuwaiti production was about 650,000,000 bbl. annually, mostly from the Burgan (Burqan), Magwa (Maqwa') and Ahmadi fields in southern Kuwait. European and Japanese companies operate offshore oil concessions.

The Kuwait Oil company's headquarters are at Ahmadi, a modern township 25 mi. S. of the capital. Its refinery at Mina al Ahmadi, 7 mi. E. of Ahmadi, has an annual throughput of 8,500,000 tons and also provides bunkers for tankers, which berth for loading at either of two very large jetties. At Shuwaikh (Bandar ash Shuwaykh), just west of Kuwait town, is a port (completed 1959) able to accommodate vessels of moderate size; and also one of the world's largest sea-water distillation plants, which has a capacity of 6,000,000 gal. daily. A natural source of potable water (about 5,000,000 gal. daily) is at Raudhatain, 60 mi. N. of the capital. Experiments under irrigation in the government research farm south of the capital have yielded promising results in the cultivation of vegetables and citrus fruits. Kuwait has an extensive modern road system and its own tanker company and national airline. Other airlines and numerous shipping lines also operate scheduled services to Kuwait.

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Current history and statistics are summarized annually in *Britannica Book of the Year*. (L. Lo.)

KUWATLI (QUWATLI), **SHUKRI AL-** (1891–), Syrian politician who played a prominent part in the period before and immediately after Syria's independence (1946). Born in 1891 in Damascus, then under Ottoman rule, he served in the Ottoman administration and took part in secret Arab nationalist activities before and during World War I. Opposed to the French mandate in Syria, he emerged in the 1920s and 1930s as a nationalist leader. In 1936 he became minister of finance and defense, but resigned in 1938 when it became clear that France would not ratify in full the treaty of 1936 granting Syria independence. From that time he was the most powerful nationalist leader and after the nationalist victory in the elections of 1943 became president of the republic. He played a leading part in securing the withdrawal of the French and the complete independence of Syria (1946). But his regime was discredited by the failure of its economic policy and of Arab policy in Palestine, and in 1949 a coup led by Husni al-Zaim removed him from power. After a few years in exile, he returned to public life in 1954. He became the titular leader of those who advocated a broad Arab union led by Egypt. In 1955 he was again elected president of the republic and remained so until the formation of the United Arab Republic in 1958. Effective leadership of the nationalist movement had meanwhile passed to younger hands, but it was Kuwatli's willingness to give up his position which made the union (dissolved in 1961) of Egypt and Syria possible. Thereafter he held no official position but enjoyed general respect and some influence. *See* also SYRIA.

See S. H. Longrigg, *Syria and Lebanon Under French Mandate* (1958); N. A. Ziadeh, *Syria and Lebanon* (1957). (A. H. H.)

KUYPER, ABRAHAM (1837–1920), Dutch theologian and statesman, one of the foremost publicists of Protestant orthodoxy in the Kingdom of the Netherlands, generally known as "Abraham the Mighty," was born at Maassluis on Oct. 29, 1837. He studied theology at the University of Leiden and was successively pastor at Beesd (1863), Utrecht (1867) and Amsterdam (1870), moving away from modernism in an orthodox-dogmatical direction. In 1872 he started the *Standaard* newspaper, which became the organ for the ideas of the Dutch politician and historian, Guillaume Groen van Prinsterer, and was elected to the states-general in 1874. Even before Groen's death (1876) Kuyper was leading Groen's political group; and he subsequently expanded it to form the Antirevolutionary party (1878). This was the first properly organized political party in the Kingdom of the Netherlands: its aims, formulated by Kuyper himself in *Ons Program*, were more

practical than Groen's; and under his leadership it attracted the Protestant lower middle class (*see* NETHERLANDS, THE: *History*). Together with the Roman Catholic priest and political leader Herman Schaepman, Kuyper organized the "Coalition" of 1888 between the parties of the right based on the idea of "antithesis"; *i.e.*, that all Christians should co-operate against the godless forces in politics. This coalition made possible the formation of a great many ministries between 1888 and 1925.

From 1874 to 1877 and from 1894 to 1901 Kuyper was a member of the second chamber of the states-general. From 1901 to 1905 he was minister of home affairs and virtually prime minister. In 1902 he mediated between England and the Boers during the South African War. The antistrike laws which he initiated in 1903 alienated the Socialists, but his social views (in favour of a wider franchise and social benefits) were quite advanced. After 1905, however, his influence gradually declined. He sat again in the second chamber from 1908 to 1912 and then in the first chamber until 1920.

A Neo-Calvinist, Kuyper wanted Calvinist principles, developed in accordance with the needs of the present, to underlie all activities; he also felt the necessity for a more thorough training in doctrine for pastors. This was why he founded the Free university at Amsterdam (1880), of which he was the first rector; and when difficulties arose over the appointment of its alumni to pastorates, he led the group which established the "Reformed Churches" (1892). Kuyper died at The Hague on Nov. 8, 1920. There is an account of his ideas in his *Stone Lectures on Calvinism* (1898).

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KUZNETSK BASIN (KUZNETSKIY BASSEN; also KUZBASS) is the name given to the second largest coal field (after the Donets basin), by production, and one of the major industrial areas of the U.S.S.R. It lies in the southeast corner of western Siberia, covers an area of about 27,000 sq.mi. and corresponds approximately to the basin of the Tom river (a tributary of the Ob) and the Gornaya Shoriya region of high plateau at the head of the basin. The Kuzbass is bounded east by the ranges of the Kuznetski Alatau and west by the Salair ridge (Salairski Kryazh). Administratively almost the entire Kuzbass lies within Kemerovo (*q.v.*) *oblast* of the Russian Soviet Federated Socialist Republic, but closely associated with it are the adjoining Altai *krai* on the west and the Khakass Autonomous *oblast* on the east, both rich in minerals.

Coal was first discovered on the Tom in 1721 by the prospector Mikhaylo Volkhov but, although during the 18th century the mining and smelting of copper and other nonferrous metals developed, the first small efforts to exploit the coal were made only in 1771. First diggings were along the Kondoma river to supply fuel for the iron works set up in that year, about 30 mi. W. of Novokuznetsk (formerly Stalinsk). Although further surveys took place in the 19th century and ore mining, especially for gold, made progress, exploitation of the coal remained insignificant until the latter part of the century. Even then production was on a small scale, at three main centres: Taiga in the north, Shcheglovsk (now Kemerovo) in the centre and Kolchugino (now Leninsk-Kuznetski) in the south. The first five-year plan (1928–32) established a major industrial base and since then growth has been rapid and continuous. Before World War II the primary purpose of the Kuzbass was to supply coal to the Urals' metallurgical region, and the so-called Urals-Kuzbass *kombinat* was set up, with iron ore as a return freight. At either end of the 1,500-mile rail link, giant steel works grew up—at Magnitogorsk in the Urals and at Novokuznetsk in the Kuzbass. The loss of the Donets basin in World War II gave great impetus to the rapid development of the Kuzbass and many industries were evacuated there. During and after the war, iron ore deposits in the south of the basin were opened up and these largely replaced Urals ore, while the Urals' industries drew more of their coal supplies from Karaganda and Ekibastuz in Kazakhstan.

The coal deposits of the Kuzbass are the greatest proved, minable reserves in the U.S.S.R. (66,870,000,000 tons). In addition there are 233,000,000,000 tons of probable reserves and a further 504,300,000,000 tons of possible reserves. They are distinguished by thickness of seam and concentration. The coal measures lie in a bowl-shaped basin, with three main coal-bearing series. The oldest is the Balakhonka series of the Carboniferous-Permian Age, which outcrops in a ring round the basin and occurs at depth under most of it. It contains 30–35 workable seams, some up to 50 ft. or more thick and in one or two places reaching 130 ft. This series provides anthracite and the best coking and steam coals of the basin. Of Upper Permian age is the Yerunakovo series, with more than 50 workable seams, not usually over 7 or 8 ft. thick, but in some seams reaching 16 ft. In the centre of the basin is the youngest (Jurassic Conglomerate) series, containing mostly lignite. Kuznetsk coal is in general of high quality, with less than 1% sulfur, but there is sometimes a rather high ash content and many pits have an associated enriching plant. In the north much is mined by opencast methods (more than 10% of the total production) and this is steadily expanding. Total Kuzbass production in 1961 was 84,929,000 tons, including 30,205,000 tons of coking coal. The main mining centres are Anzhero-Sudzhensk in the extreme north, Kemerovo, Leninsk-Kuznetski, Prokopyevsk and Osinniki, with smaller but still important centres at Belovo, Kiselevsk, Kaltan and Mezhdurechensk. In all there are 88 deep and opencast pits.

The iron ore of the Kuzbass is found in the south of the basin, centred on Telbes, Temir-Tau and Tashtagol. Iron content is 43%–53%, but there is a fairly high zinc content. The ores of the neighbouring Khakass Autonomous *oblast,* especially around Abakan, are being exploited at an increasing rate and are outstripping the local ores in importance, above all since the construction of a direct rail link from Novokuznetsk to Abakan. North of the Kuzbass, in Tomsk *oblast,* newly discovered and as yet unexploited iron ore deposits provide a potential major source of supply. Manganese is found at Usa in the east of the Kuzbass. Lead, zinc, barium and arsenic are found, but only in small quantities. Around Salair bauxite mining is growing rapidly. The major source of nonferrous metals is the adjoining Altai *krai,* where lead, zinc, tin, copper, gold and mercury are mined.

The supplies of coal and metal have been the basis of large-scale heavy industry. Iron and steel production is mainly concentrated in Novokuznetsk and Guryevsk, the former being also the chief aluminum-producing centre. In Novokuznetsk, Kemerovo and Anzhero-Sudzhensk the coke-chemical industry has developed, producing plastics, fertilizers and medical goods. Engineering and metalworking are widespread in all the major towns, with the emphasis on heavy machinery. Subsidiary industries include brick- and window-glassmaking and timber working. The forested mountain slopes provide pit props for the mines. Power for industry is largely from thermal electric stations, the largest being in Novokuznetsk, Belovo and Kemerovo. The main axis of communication for the Kuzbass is the north-south railway from Yurga on the Trans-Siberian, through Leninsk-Kuznetski, Belovo, Prokopyevsk and Novokuznetsk and terminating at Tashtagol. From this line there are two branches to the east, to Kemerovo and Barzas and to Abakan and three to the west, to Novosibirsk, to Guryevsk and Salair and to Barnaul, centre of the Altai mining area. (R. A. F.)

KVASS (a Russian word for "leaven") was one of the most popular alcoholic drinks in Russia from the 16th until the 19th century. It has lost its popularity and little is now produced; none is exported.

Kvass is similar to rye beer and different qualities used to be made, although it was primarily a peasants' drink. In some places its manufacture was commercial, but in general it was (and is) made in individual households. The exact method varies with local or private custom, although rye bread fermented with malt is the base; mint is frequently added for flavouring, or sometimes fruits, such as apples or raspberries. (C. C. H. F.)

KWAKIUTL, a group of American Indians that belongs to the culture area of the northwest coast of North America. The

name, Kwakiutl, applies to the Northern as well as the Southern Kwakiutl, but it is the Southern Kwakiutl who are famous in ethnology and who are invariably referred to as *the* Kwakiutl. The Southern Kwakiutl live in British Columbia on the shores of the waterways between Vancouver Island and the mainland opposite from Cape Mudge in the south to Rivers inlet in the north. They originally spoke a language of the Wakashan linguistic stock as did the Northern Kwakiutl who spoke Haisla (Xa. islá) and Heiltsuk (Hēi'ltsuq, Bella Bella); the Nootka on the ocean side of Vancouver Island spoke a language of the same name. (*See* CANADA: *Native Peoples.*)

Traditionally, the southern Kwakiutl consisted of a number of village bands. Their names are important because it is only the Kwakiutl of Ft. Rupert who called themselves Kwakiutl; otherwise the proper band name was used: Klaskino, Quatsino, Koskimo, Nuwitti, Quawshela, Nakwakto, Mamalillikulla, Kwilwisotenok, Tlawitis, Nimkish, Tanakteuk, Tsawataineuk, Kwawwawainck and Lekwiltok. (Spelling in Canadian government usage.)

The great scientific importance of the Kwakiutl is a result of the monumental ethnographic studies of Franz Boas, who published more than 5,000 pages on the culture of the people over a period of almost half a century. Boas' works describe almost every aspect of Kwakiutl culture as well as analyzing relationships to other Northwest Coast cultures with which Kwakiutl shared general features of basic technology and economy, art style, myth and ceremonialism.

The most distinctive features of Kwakiutl culture are the elaborate development of the potlatch (*q.v.*) and of a system of social ranking. The Kwakiutl potlatch was remarkable for its financial elaborations and for its dominant importance in the lives of the people. The social organization was remarkable for its ranking elaborations and for the wealth of crests of a literary and ceremonial as well as of a graphic-artistic character. These distinctive features were developed around the mid-19th century and continued to flourish until about the mid-1920s when economic circumstances no longer favoured them.

The Kwakiutl population is a young and growing one after years of decline from an 1835 population estimated at from 6,000 to 7,000 to a low point of 1,039 in the 1920s. In the 1960s there were 1,482 Southern Kwakiutl, most of whom were significantly assimilated to modern Canadian culture. *See* also INDIANS, NORTHWEST COAST.

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KWANDO (Portuguese CUANDO), a river in Africa, rises in the Kalahari sandveld at about 13° S., 19° 12′ E., and flows in a general southeasterly direction forming, for rather more than 100 mi., the boundary between Angola and Northern Rhodesia, and reaching the northern boundary of the Caprivi strip about 400 mi. from its source. In this area it is known locally as the Mashi. To the south of the Caprivi boundary it spreads out into marshes and is known to different tribes as the Linyanti and the Chobe. The Linyanti marshes, as they are generally called, cover an area estimated at about 550 sq.mi. in which is Lake Liambezi. The drainage of these marshes is toward the Zambezi (*q.v.*) river, a great deal of floodwater from the Zambezi mingling with the Chobe waters in the flood plain of the two rivers. The confluence of the two rivers is located a mile or so below an exposure of basalt which the Zambezi clears at the Mambova rapids and the Chobe at the Kasane rapids.

The regimen of the Chobe is indicated by a rise of the water level in May at the northern Caprivi boundary, to a high flood level in June, the normal rise of the water level in the swamps being about 3 ft. The annual discharge of the river, from the 37,000 sq.mi. of its basin, was tentatively estimated at 2,500,000 to 3,000,000 ac.ft. (an acre-foot is the equivalent of 43,560 cu.ft., or 1,233.5 cu.m.).

In years of high flood the Linyanti receives water from the head of the Okovango (*q.v.*) delta along the Makwegana (or Selinda) spillway. Formerly, water from the marshes passed along the Savuti channel to the Mababe depression but the channel is now completely choked by reeds. The canalization of the Makwegana spillway and the Savuti channel for the irrigation of the Mababe depression is part of a development project. (J. H. WN.)

KWANGJU, a city in South Korea, 40 mi. N.W. of the port of Mokp'o, is the hub of an important rail network. Formerly an old market site, it was developed into a major cotton textile and commercial centre. Other industries are breweries and rice mills.

In the surrounding hills are ancient temples and tombs. During the Korean War the city became a major military training centre. Pop. (1960) 314,420. (S. McC.)

KWANGSI (KUANG-HSI SHENG), a former province of south China renamed in 1957 the KWANGSI CHUANG AUTONOMOUS REGION. Area 85,096 sq.mi.; pop. (1957 est.) 19,390,000. It is drained chiefly by the Hsi (West) river that enters the sea south of Canton. Kwangsi forms the upper part of this basin, sloping east and southeast from 3,000 ft. almost to sea level. The area is everywhere hilly to mountainous, largely the result of surface dissection of this edge of the Yünnan plateau together with underground solution of limestone strata that have produced numerous broad lowland pockets often marked by resistant towerlike remnants.

The Hsi tributaries long have been important routeways. At the extreme east, the Kuei drains southeast from the Kuei-lin area to Wuchow; next, the Liu rising in Kweichow flows southeast through Liu-chou to Kuei-p'ing; while into Nan-ning pours the main stream of the Hsi from Yünnan to be joined by the Tso or Li from North Vietnam. More important as a land route is the pass formed by the upper Hsiang flowing into southern Hunan.

Historically the Han Chinese entered Kwangsi up the rivers from Kwangtung and Hunan. They took over as farmers, merchants and administrators forcing the non-Hans back into the hills and western mountains. Although the Chuangs, a Thai people and the largest minority group in China, formed only about 34% (6,500,000) of Kwangsi's population by the second half of the 20th century, they were the dominant ethnic group over more than half the total area; eight other non-Han groups have been recognized, living chiefly in the mountains. The change in Kwangsi's political status indicates at least in principle an attempt to change the traditional conflict relation between Han and non-Han Chinese in the region.

Kwangsi suffered considerable damage during World War II. In late 1939 Japanese troops pushed north from the Gulf of Tonkin to seize the railway into central China, but settled down eventually in Nan-ning. Again in 1944 they moved south from Hunan, north from Indochina, and west from Canton to break up Chinese and U.S. air bases and to open a corridor across the Asiatic mainland. The large cities quickly fell and the Japanese pushed up the railway toward Kwei-yang (Kuei-yang), but most of the area was recovered by June 1945.

The Tropic of Cancer runs through Wuchow, and Kwangsi is green all year with subtropical hardwoods, hillside pines and heavy bamboos. Two rice crops and one dry crop annually are possible on the lowlands, while corn and sweet potatoes have become common on the drier and poorer uplands. Citrus, especially the famous Sha-t'ien pomelo, cinnamon, cassia, aniseed, camphor and tung oil, are basic commercial crops, moving downstream mainly to Wu-chou. Hillside land is not very productive because of the poor soils and coarse grasses.

All the main cities are river ports for native craft, since Kwangsi does not touch the coast. Many of these cities were growing in importance in the early years of the second half of the 20th century with the building of railways through the river valleys. The Hunan-Kwangsi line touches North Vietnam at Mu-nan-kuan, while a spur southeast from Li-t'ang to Chan-chiang in south Kwangtung, 190 mi. away, offers access to a deep-water port that promised to change greatly the flow of outside trade. Under government planning, Kuei-lin, Liu-chou and Nan-ning were to be developed for light industry.

Kwangsi has been an important producer of antimony and manganese, with indications of areas of aluminum clays, iron ore, bituminous coal and crystals. Except for the coal, however, none of these had much significance for Kwangsi's immediate industrial growth.

Early in 1956 the fossilized remains of a giant ape were found near Liu-ch'eng in central Kwangsi, apparently of the same age as Peking man but not generically related. (TE. H.)

KWANGTUNG (KUANG-TUNG SHENG), the southernmost coastal province of China is the main trade artery between south China and the rest of the world. It lies south of the 1,000 ft. Ta-yu range and is marked by alternating long ridges and troughs parallel to the coast, broken through completely only at two points: the Han river in the extreme east to form the Swatow delta, and the Hsi (West) river in the centre to form the Canton delta. The valleys of the Hsi and its tributaries, the Pei (north) and Tung (east), are the core of the province in which Canton is the focus. These river valleys are the natural avenues of communication with the rest of China to the west and north. Kwangtung also includes Hainan Island (*q.v.*) to the south and a long coastal strip to the west stretching almost to the Red river in North Vietnam, thereby cutting off Kwangsi (Kuang-hsi sheng) from the South China sea.

Population is concentrated on the alluvium of the valley floors and delta lowlands, in contrast to the infertile granitic hills of the coast and the coarse sandstone uplands of the interior. Total population was (1957 est.) 37,960,000 within 89,344 sq.mi., ranking Kwangtung ninth in order of density among the provinces of China. Since only 10% of Kwangtung is lowland, actual crowding on arable land and even on to the waterways is intense. The Swatow delta and the eastern coastal strip are inhabited by the Hoklos of Fukien, and the upper basins of the Han, Tung and Pei by the Hakka ("guest people"), a vigorous mountain folk with marked group consciousness and distinct social characteristics. In the early 1950s three areas of limited autonomy were designated for national minority groups: two counties for Yao and Chuang peoples along the mountainous northwest border of Hunan, and a larger area for Li and Miao in the southern half of Hainan.

Kwangtung has been one of the main scenes of European contact with China. For almost a century Canton was the only port through which foreign trade was permitted, and from Kwangtung and Fukien has come most of the traditional emigration to southeast Asia and other parts of the world. Conversely, it is to their native areas that many of the overseas Chinese have returned, either for retirement or visits, so that distinct evidences of new influences appeared, whether of civic improvements or bizarre building styles intended to demonstrate worldly success abroad. The main centres in Kwangtung have been Swatow, Ch'ao-an, Mei-hsien, Canton, San-shui, T'ai-shan, Chung-shan and Ch'iung-shan in Hainan.

Two foreign holdings remain along the coast: British Hong Kong and Portuguese Macao. On either side of the entrance to the Pearl river, both are directly dependent on Kwangtung for articles of daily use and as a market for many of their imports.

Under the imperial regime Kwangtung had a persistent reputation for disaffection, and to a large extent the active leaders of the revolution were fellow Cantonese of Sun Yat-sen, a native of the Chung-shan district. During the war lord period Canton became the centre of the reorganized Kuomintang, the struggle against foreign treaty rights and the formation of strong labour unions.

The lowlands are the only part of China with a truly tropical climate. Uniformly high temperatures and a fairly well-distributed rainfall of 60 in. or more permit cultivation of two rice crops and one dry crop on the valley floors, but rice is always shipped into the province. There is not much hillside terracing because of infertile soils and strong cultural aversion, so that the slopes are used for growing trees (mainly pines) and bamboo and for desultory grazing.

Other important crops are oranges, bananas, litchi nuts, pomelo, sugar cane and some pineapple. Silk has long been raised in the Canton delta, while fine grass-cloth linen made from ramie is a specialty of Swatow; on the dark-red soils of the upper Pei river farmers grow a high-quality cigarette tobacco that is popular in southeast Asia.

The Japanese captured the Canton area in 1938, Swatow and much of Hainan in 1939, all important coastal bases for Japanese naval and air units. In and around Canton (*q.v.*) were most of the large, modern provincial factories, so that with their loss to the Japanese more industries were started at Chiu-chiang on the Pei river. After the war these were quickly forgotten in favour of reviving the usual concentration around Canton and Swatow. Heavy industry does not have a good resource base in Kwangtung.

The most promising coal deposit in the second half of the 20th century was in the Ju-yüan district on the upper Pei river, with an estimated 50,000,000 tons of coal of questionable coking value. On Hainan Island, Japan exploited rich iron ore and bauxite deposits during its occupation. Tin is panned sporadically near Chieh-yang, inland from Swatow, and tungsten is likewise produced from small deposits in northeast and south central Kwangtung; both of these minerals are largely exported to Hong Kong. Clays for pottery and earthenware abound widely, and are made into graceful small figures and gardenware in Shih-wan, 20 mi. W. of Canton; good oil shales were producing at Mao-ming in the southwest.

Industry by the early years of the second half of the 20th century had been largely the processing of agricultural and fisheries products, making of handicrafts from local plants and clays and some imported materials, and the manufacture of light consumers goods in the cities.

Canton is a rail and air centre between Hong Kong and central China. In 1957 the government opened a large new port at Chan-chiang, including former Fort Bayard in the French leased territory at Kuang-chou Wan (*q.v.;* Kwangchow bay) on the eastern side of the Luichow peninsula. A modern port with a depth of 33 ft., joined by rail to Li-t'ang, on the Hunan-Kwangsi railway, 190 mi. N., it promised to stimulate one of Kwangtung's most backward areas and markedly reduce Canton's monopoly of trade with southwest China. (TE. H.)

KWANTUNG (KUAN-TUNG), a name applied in the late 19th century to the southern tip of Liaotung peninsula of northeast China (Manchuria), now within Liaoning province. The peninsula projects south from a silting coast into the ice-free Gulf of Chihli (Po Hai), only 60 mi. across from the Shantung peninsula. Rocky hills overlook the sea and restrict farming. Its strategic significance is obvious for north and northeast China and for western Korea.

Lü-shun on the southeast tip was captured by the British in 1860 and renamed Port Arthur (*q.v.*) but Russia built it into a deep-water naval base as part of the 25-year lease of the Kwantung territory, 925 sq.mi., forced from the Ch'ing dynasty in 1898. Two years before, Russia had extended a broad-gauge railway south from Harbin to Dairen (Ta-lien), only 20 mi. from Port Arthur along the east coast. Following the Russo-Japanese War (1904–05), Japan took the territory and the railway, expanded the area to 1,300 sq.mi. with some islands, and in 1915 extended their lease to 1997. It became one of Japan's most closely guarded industrial and military areas, of which Dairen was the industrial centre for machinery and machine tools, textiles, cement, glass, chemicals and shipbuilding, and as the main port for shipping soybeans, soybean cake, wheat, hemp, peanuts, salt, coal and metallic minerals and products.

Dairen looked like and was a modern Japanese industrial port, the gateway for both Japanese business and technical people into Manchuria and for thousands of poor Chinese farm families migrating from Shantung to the new lands in the north. It also boasted an elaborate educational system, including technical and commercial colleges. Port Arthur, called Ryojun by the Japanese, was a key naval base. Aside from copper, sea salt and fisheries, the southern end of the peninsula does not share in the natural wealth of the rest of Liaotung peninsula.

The area was much damaged by aerial bombing toward the end of World War II, just before its occupation by Soviet forces. By treaty between the Republic of China and the U.S.S.R. in 1945,

the territory and the whole Ch'ang-ch'un railway (formerly the Chinese Eastern across northern Manchuria plus the South Manchuria railway) reverted to China with special rights of use and management to the U.S.S.R., while Dairen became a free port for all nations, with Soviet nationals sharing in the administration of the harbour. Port Arthur was designated a joint-use naval base for 30 years, the defense to be under the U.S.S.R. By subsequent treaty between the Chinese People's Republic and the U.S.S.R. (1950), Soviet administration of the railway (renamed the Harbin railway) was ended. Dairen's status was not much changed, and Soviet forces were to be withdrawn from Port Arthur by the end of 1952 (later extended to May 1955). These forces were to return at the request of China "in the event of either party becoming the object of aggression by Japan or any state collaborating with Japan and becoming therefore involved in hostilities." In 1954 the Chinese placed the Lü-Ta municipality (Port Arthur-Dairen, or Lü-shun-Ta-lien) under the administration of Liaoning province; the population of Lü-Ta in 1958 was estimated to be 1,590,000, of which Ta-lien had about 800,000. Under Chinese control but without the Japanese, both cities expanded their previous functions. (TE. H.)

KWANZA (CUANZA or QUANZA), a river of west Africa in the Portuguese overseas territory of Angola, rises about 50 mi. S.E. of Chitemba at an altitude of over 5,000 ft. on the Bié plateau. It flows northward and then curves westward to enter the Atlantic ocean 40 mi. S. of Luanda. At about latitude 10° S. and at intervals during its passage through the outer plateau escarpments the Kwanza is broken by rapids and flows in a well-defined valley. The lowest fall is that of Cambambe (*c.* 70 ft.), below which the river is navigable by small steamers to the sea, about 160 mi. distant. But it is little used for transportation because of its shallowness in the dry season and because of a shifting bar at its mouth; moreover the middle basin is served by the Luanda railway. A right-bank tributary, the Lucala, is also navigable and is famous for the 330-ft. falls at Duque de Bragança. In 1958 a dam was begun at Cambambe; this is associated with a hydroelectric installation for supplying power to a pumping system for irrigating 740,000 ac. and to an aluminum smelter. (A. A. G. P.)

KWEICHOW (KUEI-CHOU SHENG), an upland province in southwest China, consists of a lofty plateau lying between the upper courses of the Yangtze on the north and the Hsi (West) river on the south, and continuous with the higher plateau of Yünnan to the southwest. Although the general slope of drainage is from west to east, Kwei-yang (Kuei-yang; *q.v.*), the capital, marks the general drainage apex in the centre of the province over 3,400 ft. above sea level. The tributaries of the Yangtze flow north and northeast as the Ch'ien river in Szechwan and the Yuan in Hunan, while the Liu flows into the Hsi in southeast Kwangsi. The deeply incised river meanders do not provide easy routes for boat, truck or train, so that most highways avoid the river valleys. Most of the fertile land is on the less dissected plateau around Kwei-yang, but even there much of it is in sunken limestone pockets that result in isolated settlements and costly transportation. In China, Kweichow has the reputation of one of the poorest and hilliest parts of the country, with abrupt limestone peaks that typify traditional Chinese landscape painting. Area 67,181 sq.mi.; pop. (1957 est.) 16,890,000.

The province has a temperate climate because of its altitude. Rice is grown on the limited valley floors by Chinese farmers, while on the slopes and upland surfaces corn, wheat, beans and potatoes are cultivated to a large extent by the non-Han tribes. Valuable forests exist, protected by the high cost of transportation; they include the camphor tree, the varnish tree and tung tree, as well as conifers and hardwoods. The best-known mineral deposit is mercury, normally the largest producer in China, and mined since the 14th century around T'ung-jen on the upper Yuan river in the northeast corner. Iron ore is known in the western part, close to the projected railway link with the line being built between Szechwan and Yünnan.

About 4,000,000 of the 15,000,000 inhabitants are non-Han. The Chinese may be descendants of soldier colonists settled there as early as the 8th century, or immigrants during the last 200 years. The province was organized primarily from the Miao territory plus the basin of the Ch'ien river formerly within Szechwan. Chinese pushed the aboriginal tribes out of the fertile valleys onto the slopes and uplands, where, except for the major trade centres on the plateaus, the non-Hans still live, concentrated particularly in the southwest. The record of exploitation, revolt and reprisal is an old one.

Under the Chinese People's Republic a new approach was attempted with the setting up of autonomous areas for the Miao, Tung, Pu-yi, and smaller groups, and training in the Kuei-yang Institute for National Minorities. These people of Thai and other early stocks have their own languages, customs, and music, while the Miao are especially famous for intricate coloured cross-stitch work and heavy silver ornaments.

World War II began the opening up of Kweichow with the construction of the Yunnan extension of the Burma road through Kwei-yang and 170 mi. N. to Chungking, as well as east into Hunan and Kwangsi. The railway from Liu-chou, Kwangsi, was built as far as Tu-yun, 90 mi. from Kwei-yang, which became at the end of 1944 the farthest point of Japanese military penetration toward Chungking.

Railways were under construction in the second half of the 20th century south from Chungking to Kwei-yang, and through the western end on the line from K'un-ming to southwest Szechwan, as well as east to Ch'ang-sha in Hunan. In Kwei-yang an iron and steel plant of 40,000 tons capacity, a new textile mill of 1,000 looms, and a modern chemical fertilizer plant, were established for local needs. (TE. H.)

KWENI (GURO, LO), a tribe of the Ivory Coast, inhabiting the valley regions of the middle Bandama river, which corresponds administratively to the old district of Bouaflé, reorganized in 1961 into the *sous-préfectures* of Bouaflé and Zuénoula, and the newly created *sous-préfectures* of Sinfra, Oumé and Vavoua. The Kweni came originally from the north and northwest, driven by Mande invasions in the second half of the 18th century. The Kweni are better known as the Gouro (as their Baule neighbours call them); their language is thought to belong to the Mande-fu group of Mandingo (*q.v.*) languages.

Villages are composed of several family groups; political and religious power (except where the latter involves agriculture) is centred in the village chief, who comes from the oldest warrior family. Inheritance is roughly patrilinear, operating from brother to brother and then to son. Communal fields characterize their economy, but are being partly replaced by industrial plantations. Crops include bananas, rice, yams; some poultry and cattle are kept. Arboriculture (in the southern part of the territory) includes palm wine extraction; kola oil and nuts are traded in the north, in exchange for dried fish from the Niger.

The Kweni retain their own religion, involving many cults, and totemism survives in tribal mythology, in ritual and in daily life, involving food restrictions and avoidances of certain gestures. *See* also IVORY COAST, REPUBLIC OF. (B. Ho.)

KYAKHTA, a town of the Buryat Autonomous Soviet Socialist Republic, U.S.S.R., lies in the basin of the Selenga river, on the frontier with the Mongolian People's Republic (Outer Mongolia). Pop. (1959) 10,300. The town is on the railway and the modern motor road from Ulan-Ude (115 mi. distant) to Ulan Bator; this road follows an ancient caravan route, which was the only recognized link between Russia and China in the 17th and 18th centuries. The Russian fortress Troitskosavsk, founded in 1728 (with the adjacent Kyakhta village), derived considerable historical importance as the frontier post, being surpassed only by St. Petersburg and Riga as an entry point to the Russian empire. The entire settlement has been called Kyakhta since the mid-1930s. Beside the transit trade, there is an abattoir and a shoemaking industry. (R. A. F.)

KYANITE is a rock-forming mineral composed of alumina and silica ($Al_2O_3.SiO_2$). It is a major source of mullite (*q.v.*), used in spark plugs and other refractory porcelains. It crystallizes in the triclinic system and occurs in rocks as long, bladed crystals. Its colour ranges from gray-green to black to blue, with blue and blue-gray being the commonest colours. It has cleavage and is

particularly marked by having a variable hardness. The hardness is approximately 4.5 parallel to the length of the crystals (the *c* crystallographic axis), and 7 at right angles to it (parallel to the *b* crystallographic axis). Specific gravity is 3.6.

Kyanite is one of the many phases in the system $Al_2O_3.SiO_2$ and can only form stably over a limited range of pressures and temperatures. It may be formed in the laboratory, and is presumably formed in nature, at pressures exceeding 14,000–18,000 atmospheres, over the temperature range 600°–900° C. At pressures below these, the stable phase is sillimanite (*q.v.*). At high pressures, *i.e.*, in excess of 25,000–30,000 atm., kyanite in turn inverts to another denser polymorph; at low pressures, the minerals mullite and andalusite (*q.v.*) exist as stable phases.

Kyanite is formed in nature by the metamorphism (*q.v.*) at high pressures of clay-rich sediments. It is an indicator of deep burial of a terrain and not of stress as it has been commonly supposed. It occurs principally in gneiss and in mica schist. It is often accompanied by garnet, quartz and micas. (G. C. Ky.)

KYAUKPYU, the middle of the three districts of the Arakan division of the Union of Burma, lies along the coast of the Bay of Bengal. Area 4,793 sq.mi.; pop. (1962 est.) 335,386. It consists of, first, a strip of mainland, extending from Hunters bay to the Ma-i river (Ma-e Chaung) and from the Bay of Bengal to the crest of the Arakan Yoma, and, secondly, the large islands of Ramree and Cheduba (*q.v.*), with many others to the north. The mainland in the north and east is highly mountainous and receives the full force of the southwest monsoon and is forest-clad, and the lower portion is cut up into numerous islands by a network of tidal creeks. Between the mainland and Ramree lies a group of islands separated by deep, narrow, salt-water inlets, forming the northeastern shore of Kyaukpyu harbour. The Arakan Yoma sends out spurs and subspurs almost to the coast. The An pass, allowing access by bullock cart with the heart of Burma, rises to a height of 4,947 ft. above sea level. The Dalet and the An rivers are navigable by native boats for 25 and 45 mi. respectively. Above these distances they are mere mountain torrents. Considerable evergreen forests of hardwood trees occur on the hills, but large areas are occupied by useless bamboo brake and there are only small tracts of cultivated land. Kyaukpyu contains numerous mud volcanoes, caused by the disruption of mud charged with inflammable gas. From time to time evanescent islands have been formed along the coast by the mud volcanoes which are usually indicative of the presence of oil. Petroleum does occur in small quantities in Kyaukpyu, but the production, despite exploration by modern methods, has never been significant.

Kyaukpyu town on the west coast of Burma, lies at the north end of Ramree Island. Pop. (1953) 7,335. It is a municipality and port and coastal steamers between Rangoon and Calcutta make regular calls. (L. D. S.)

KYAUKSE, a district in the Mandalay division of Burma, has an area of 1,601 sq.mi., and a population (1962 est.) of 242,892. It consists of a generally level strip south of Mandalay in the heart of Burma's Dry Belt, running north and south at the foot of the Shan hills, and of a hilly sparsely populated and forested region rising up these hills to the east. The Panlaung and Zawgyi rivers from the Shan states flow through the district and are utilized for numerous irrigation canals. Notwithstanding this, much timber is floated down, and the Panlaung is navigable for small boats all the year round. The main lines of the canal system are said to have been dug by King Anawrata in 1092. He is alleged to have completed the system of nine canals and weirs in three years. They were repaired and others constructed during the British period. Two-thirds of the population are dependent entirely on cultivation for their support, and this is mainly rice on irrigated land.

Kyaukse town is situated on the Zawgyi river and on the Rangoon-Mandalay railway line, 25 mi. S. of Mandalay. It is well laid out in regular streets and had a population of 8,659 (1953). (L. D. S.)

KYD, THOMAS (1558–1594), English dramatist, author of *The Spanish Tragedy,* which initiated the Elizabethan revenge play and brought together the Senecan and the popular English dramatic modes. The register of St. Mary Woolnoth, London, records his baptism on Nov. 6, 1558; he was the son of Francis Kyd, scrivener, and was educated at Merchant Taylors' school. The dramatist may have followed his father's profession (Thomas Nashe may be referring to Kyd in his preface to Robert Greene's *Menaphon,* 1589, where he speaks of a "sort of shifting companions" who leave "the trade of *Noverint*," *i.e.*, scrivener, in order to write plays), and there is no evidence that he went to either university. Almost all that is otherwise known of Kyd's life is given in his letter to Sir John Puckering, the Lord Keeper, probably written in the summer of 1593. From this we know that Kyd and Christopher Marlowe were sharing lodgings around 1591, and that on May 12, 1593, Kyd was in prison and had been put to the torture: a search of his lodgings had led to the discovery of certain "atheistical" disputations which he averred were the property of Marlowe (by this time dead). Apparently Kyd was soon released. The letter also refers to his having been in a lord's service (possibly Lord Strange's) for almost six years. On Dec. 30, 1594, his mother made a formal repudiation of Kyd's estate, probably because he had died in debt.

Kyd's authorship of *The Spanish Tragedy* is first made apparent in Thomas Heywood's *Apology for Actors* (1612). The only other play certainly to be ascribed to him is *Cornelia* (1593), a translation of Robert Garnier's *Cornélie* (1574): this was an essay in the neo-Senecan tragedy, not intended for the stage. He may have written an early version of *Hamlet* alluded to in Nashe's preface to *Menaphon* mentioned above, where a reference to "the Kidde in *Aesop*" as a symbol of the dramatists attracted by Italian translations may be a derogatory pun indicating the play's authorship. His hand has also been believed to show itself in the anonymous *Arden of Feversham* (printed 1592) and in several other plays (cf. E. K. Chambers, *The Elizabethan Stage* [1923], vol. iii, p. 397). *The First Part of Ieronimo,* published in 1605, deals with events leading up to the action of *The Spanish Tragedy*: as it stands, it cannot be Kyd's, for it refers to the papal jubilee of 1600, but it may be based on a play which was apparently acted as a forepiece to *The Spanish Tragedy* several times in 1592.

The Spanish Tragedy was entered in the Stationers' Register in 1592 and the undated first quarto almost certainly appeared in that year. Philip Edwards, who edited the play in 1959 (see *Bibliography*), suggests as date of composition *c.* 1590, *i.e.*, a little later than Marlowe's *Tamburlaine the Great* (*c.* 1587, printed 1590) which, jointly with Kyd's play, inaugurated the tragic writing of the later Elizabethan years. While Marlowe gave to English drama the idea of the tragic hero and an authoritative utterance in his use of blank verse, Kyd anticipated the structure of many later plays (with both a medial and a final climax) and had a strong sense of the tragic situation. His Ghost of Don Andrea, a spectator of the entire action, derives from the Senecan drama, and many of the play's speeches have a stiff rhetoric which comes from the same source. But the psychological scrutiny of Hieronimo, whose son Horatio has been killed by murderers at first unknown and, when known, apparently beyond the revenger's reach, is a new departure and a manifest clearing of the way for Shakespeare's Hamlet. Hieronimo reproaches himself for inaction, he sees another man more active in a similar situation, and his will for revenge is finally stiffened by the murderer's sister, Bel-imperia, who loved Horatio. The action terminates in a play within the play where pretence turns to earnest as the act of revenge is accomplished.

The play is remarkable also in its deliberate use of rhymed verse and prose for special purposes. The grotesque comedy of act III, sc. v, where a boy reveals that a condemned man will go to execution in the certitude of a last-minute pardon, is in racy prose, and the love scene between Horatio and Bel-imperia (II, iv), which is brusquely interrupted by the murderers' entry, shows a planned variation of blank verse, rhymed stichomythia and speeches in rhyming couplets, each change of pattern corresponding to a change in mood and tempo.

The play was often reprinted, and the 1602 quarto added certain passages, including the famous "painter's scene," of unknown authorship: Philip Henslowe's *Diary* records payment to Ben Jon-

son for additions to the play in 1602, but the printed additions were perhaps written for the 1597 revival of the play. Coleridge wondered if Shakespeare were responsible for them, and Charles Lamb, less probably, suggested John Webster. Certainly the painter's scene, in its combination of authority and informality, in its shrewdly intimate presentation of a disordered mind, belongs to the world of Jacobean tragedy. The contrast, however, should not prevent us from seeing the extent of Kyd's own achievement in the original play.

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KYFFHÄUSER GEBIRGE, a double line of hills in the Thuringian region of Germany about 20 km. (12½ mi.) long with a maximum height of 477 m. (1,565 ft.). Lying in the lowland of Thuringia on the south side of the Harz mountains, it is scarped steeply to the north and slopes gently to the south. The northern part looks steeply down upon the valley of the Goldene Aue, and is crowned by two ruined castles, Rothenburg (1,440 ft.) on the west, and Kyffhäuser (1,542 ft.) on the east. The latter, built probably in the 10th century, was frequently the residence of the Hohenstaufen emperors, and was finally destroyed in the 16th century. The ruins are those of the Oberburg with its tower, and of the Unterburg with its chapel. The hill is surmounted by an imposing monument to the emperor William I, the equestrian statue (erected in 1896) of the emperor being 31 ft. high and the height of the whole 210 ft. Legend states that the emperor Frederick I (Barbarossa) is asleep within the mountain, and that he will one day awaken and lead the united peoples of Germany to victory against its enemies. There are cogent reasons for believing that the hero of the legend was originally Frederick II (1194–1250), not Frederick I (d. 1190). This is not the only legend of a slumbering future deliverer to live on in Germany. Similar hopes were associated with Charlemagne, sleeping in a hill near Paderborn; with the Saxon hero Widukind, in a hill in Westphalia; with Siegfried, in the hill of Geroldseck; and with Henry I, in a hill near Goslar. (R. E. DI.)

KYLSANT, OWEN COSBY PHILLIPS, 1ST BARON (1863–1937), English shipowner, who at one time controlled the largest shipping organization in the world, was born at Warminster, Wiltshire, on March 25, 1863. After apprenticeship to a shipping firm at Newcastle upon Tyne, he had by 1888 already set up a shipping company of his own on the Clyde. By 1902 he had become chairman of the Royal Mail Steam Packet company, operating between Europe and the West Indies and South America. He soon added to this company most of the competing lines in the South American refrigerated meat trade. He also acquired old-established liner companies such as Elder Dempster, and in 1912 the Union-Castle line. After World War I he amalgamated many small coastal shipping companies into the Coast Lines group and also purchased, for nearly £7,000,000, the White Star line. Eventually Kylsant controlled a merchant fleet totaling nearly 3,000,000 tons gross, besides obtaining control of Harland and Wolff, the largest shipbuilding company in the world.

In 1931, during the slump in international trade, Kylsant was tried and found guilty of having published a false prospectus and was sentenced to imprisonment for 12 months. He had earlier twice been a member of parliament and was raised to the peerage in 1923. He died at Coomb, Carmarthenshire, on June 5, 1937. (P. DF.)

KYMI (Swed. KYMMENE), a frontier county (Kymen *lääni*) in southeast Finland. Area 4,961 sq.mi.; pop. (1960) 337,772. Its administrative area was extended eastward from the Kymi river to include the part of former Viipuri county that was not ceded to the U.S.S.R. under the peace settlement of 1944. Kymi has two of the largest export harbours in Finland, Kotka and Hamina (Fredrikshamn). Kouvola, a rail junction and pulp- and paper-milling town, is the administrative centre. The *lääni* includes a short stretch of the Vuoksi river, with the urban district of Imatra, the old Saimaa port of Lappeenranta (Villmanstrand), Lauritsala at the entrance to Saimaa canal, and the manufacturing towns of Karhula and Kuusankoski. (W. R. ME.)

KYNASTON, EDWARD (NED) (1640?–1706), English actor, probably the last and certainly the best of the male actors of female roles, was born in London and first appeared in Rhodes's company at the Cockpit in Drury lane. His personal beauty admirably fitted him for female parts, the last of which was Evadne in *The Maid's Tragedy* in 1661 with Killigrew's company. Earlier in that year, Pepys reports having seen Kynaston play several parts in *The Silent Woman,* one as a woman gallant in fine clothes: "And in them was clearly the prettiest woman in the whole house; and lastly, as a man; and then likewise did appear the handsomest man in the house."

Kynaston was an excellent actor, and by 1665 he was one of the leading actors, in male roles, in the company at Covent Garden. He joined Betterton at Lincoln's Inn Fields in 1695, but soon his memory began to fail him, and he received less important roles, retiring in 1699. Kynaston died in 1706. (M. Rs.)

KYŌSAI, SHŌJŌ (1831–1889), known also as KAWANABE KYŌSAI, was a Japanese painter of considerable distinction and the designer of a few very fine prints. He was born on May 18, 1831, in Kogo. After working for a short time as a boy with Kuniyoshi Utagawa, Kyōsai received most of his artistic training in the studio of Kano Tōhaku. He soon abandoned the formal traditions of this master for the greater freedom of the popular school. Katsushika Hokusai (*q.v.*) greatly influenced his work, and, like that artist, Kyōsai delighted in sketching figures. Even in his roughest sketch his aptitude for conveying in a few masterly strokes the impression of living energy and momentary action was marvelous.

During the ferment which produced and followed the political revolution of 1867, Kyōsai attained a considerable reputation as a caricaturist. Often arrested and imprisoned by the authorities, he continued to express his opinions in caricatures with great popular success. Many of his caricatures were published, as well as his sketchbooks and a five-volume work on hawks. Kyōsai's originality and humour are obvious in his sketches of goblins and animal life, especially birds, fishes and reptiles.

Kyōsai was fond of drinking sake and is said to have done his best work when under its influence. Many of his prints, illustrated books and sketches are signed "Shōjō (drunken) Kyōsai." He died on April 25, 1889, in Tokyo.

See Mortimer Menpes, "A Personal View of Japanese Art: a Lesson From Kyōsai," *Magazine of Art,* pp. 192–199 (1888); William Anderson, "A Japanese Artist, Kawanabe Kiosai," *The International Studio,* 6:38 (1899). (M. O. Gs.)

KYŌTO, once the capital city of Japan and residence of the imperial family for nearly 11 centuries, from 794 to 1868, is still a cultural and industrial centre. Located on Honshu in the great Yamashiro fault basin, 25 mi. N.E. of Ōsaka, in the prefecture of the same name (*see* below), the city is surrounded on three sides by low mountains.

It increased more slowly in population in the 20th century than the other great cities of Japan. Pop. (1955) 1,204,084; (1960) 1,284,818.

During its long history the city has been rebuilt many times after earthquakes, fires and war. The most complete destruction was during the Ōnin no Ran War, 1467–77, which left little of the previous city remaining.

In the late 16th century the city was rebuilt by Toyotomi Hideyoshi, who was responsible for many of the magnificent Shintō shrines, Buddhist temples, palaces and gardens.

In 794 the emperor Kwammu moved his capital from Nagaoka, which had only briefly been the capital, to the nearby village of Uda, which he renamed Heian-kyō ("capital of peace and tranquility"). Although this name has been given to the Heian period of Japanese history, 794–1185, the capital has been more frequently known as Miyako, Raku, Rakuyo or Kyōto—various words of Chinese origin meaning capital. Heian-kyō was modeled after the T'ang capital of Ch'ang-an. The principal streets crossed

AUTHENTICATED NEWS
THE GOLDEN PAVILION, KYŌTO. BUILT 1394, DESTROYED BY FIRE 1950, REBUILT 1955. ORIGINALLY THE VILLA OF THE SHOGUN YOSHIMITSU, THE BUILDING BECAME A BUDDHIST TEMPLE WHEN HE DIED

at right angles and were 98 to 131 ft. wide while the secondary streets were 43 to 66 ft. wide. The city extended about four miles north to south and three miles east to west. The palace of the emperors was located in the middle of the northern section of the city. (For additional details *see* JAPAN: *History: The Imperial State: The Heian Period.*) Considerable change has occurred in the city plan, and the palace constructed by Toyotomi Hideyoshi in 1591 was about one mile east of the original site. From the early days of the founding of Kyōto the tendency has been for the city to expand eastward and southeastward. By 818 the population may have been over 500,000—greater than that of any contemporary European city. In later centuries the population fluctuated with the fortunes of the city. In the 13th century when the military capital was at Kamakura, the population of Kyōto fell to about 100,000. While there is considerable variation in estimates of the population during the Tokugawa period (1603–1867), it gradually increased until it was more than 1,000,000 in the early 19th century.

After the restoration of 1868 the residence of the emperor was moved to Tokyo ("eastern capital") but the palace in Kyōto continues to be used for coronations. Kyōto was renamed Saikyō ("western capital") but this name has not become popular. The city contains the headquarters of some of the most important Buddhist sects and contains many Shintō shrines. The Kyōto National museum (the former Kyōto Imperial museum) is one of the most important museums of Japan.

Long a traditional centre of education, Kyōto contains several important universities, including Kyōto university, founded in 1897 and one of the leading universities of the country. Dōshisha university has been a centre of Christian education since its founding in 1875 in co-operation with the American Board of Foreign Missions.

Classical Chinese music, which was introduced from China in the early days of the city, is still performed. Nō plays owe much of their early development to the patronage of the Ashikaga shoguns, who were residents of Kyōto. They are performed in special nō theatres.

Fine brocades and other silks, lacquer ware, pottery and books are important products of the city, which has a long tradition of producing materials of high quality and art goods for the discriminating taste of the court. Expanding industries in the second half of the 20th century included other textiles, machinery and chemicals.

Kyōto, an urban prefecture of Japan, was formed from the provinces of Yamashiro, Tango and five counties of Tamba after the restoration of 1868. It contains, in addition to the old capital city of Kyōto (*see* above), the cities of Fushimi, Maizuru and Miyazu. Historic sites and famous buildings associated with the long history of the area are found throughout the prefecture. Pop. (1960) 1,993,403; area 1,789 sq.mi. (C. A. MR.)

KYRIE, vocative of the Greek *kyrios* ("lord"), is used in the Septuagint to translate the Hebrew word Yahweh (*q.v.*). In the New Testament, it is the title given to Christ, as in Phil. ii, 11. As part of the Greek formula *Kyrie eleison* ("Lord, have mercy"), it is used as a preliminary petition before a formal prayer and as a congregational response in the liturgies of many Christian churches.

See also LITANY; MASS. (P. L. C.)

KYUSHU, southernmost of the four main islands of Japan, is separated from Honshu by Shimonoseki strait. Area, 13,768 sq.mi. Pop. (1960; Fukuoka, Saga, Nagasaki, Ōita, Kumamoto, Miyazaki and Kagoshima prefectures) 12,903,515. It is the site of Mt. Aso, largest active Japanese volcano, and Aso, Kirishima and Unzen-Amakusa national parks. Beppu is a well-known hot springs resort. The chief cities are Fukuoka and Nagasaki, the oldest open port in Japan. *See* JAPAN: *Geographic Regions.*

KYUSTENDIL (KÜSTENDIL), a district town in southwestern Bulgaria, is situated on the edge of a small alluvial basin in the Struma river valley about 43 mi. (69 km.) S.W. of Sofia, to which it is linked by rail. Pop. (1963 est.) 37,082. It was known in Roman times as Pautalia and Ulpia Pautalia, and during the first Bulgarian kingdom as Velbuzhd. In the 14th century a local feudal lord, Constantine Dragash, established a short-lived independent principality. From an old oriental-type town Kyustendil has developed into a modern town with factories for canned fruit, plywood, crates and vegetable oils, as well as hothouses for early vegetables. The hothouses are heated by the waters of the Kyustendil mineral springs, which also serve modern sanatoriums. Because of the orchards and vineyards surrounding it, the town is called Bulgaria's orchard. It has a school of fruit growing, among other technical schools. For the defeat of Bulgarian power at Velbuzhd in 1330 by the Serbs under Stephen Urosh III, *see* BULGARIA: *History.* (AN. BE.)

KYZYLKUM (meaning "red sand"), a desert in the Kazakh and Uzbek Soviet Socialist Republics of the U.S.S.R., stretches southeast of the Aral sea between the Syr-Darya river on the northeast and the Amu-Darya river on the southwest. It covers an area of more than 115,000 sq.mi. and is in part covered with drift sand or dunes, many of which are advancing slowly but steadily toward the southwest. In character they resemble those of the neighbouring desert of Kara-kum. On the whole the Kyzylkum slopes southwest toward the Aral sea, where its altitude is only about 160 ft. as compared with 2,000 in the southeast. Previously the only population was nomadic but there is now a settlement at Taldy in the centre of the desert, which is traversed by caravan routes. There is seminomadic raising of Karakul sheep, camels and horses. (G. E. WR.)

KZYL-ORDA, an *oblast* and town in the Kazakh Soviet Socialist Republic, U.S.S.R. The *oblast* straddles the lower Syr-Darya river and includes just east of the Aral sea one of the most arid regions of Kazakhstan. A large part is covered by the sandy deserts of the Aral Kara-Kum and Kyzylkum. The climate is continental with hot, cloudless summers and cold winters with only slight snowfall. Agriculture is only possible with water from the Syr-Darya. Before the Revolution the population was nomadic and the main occupation stockbreeding. Rice and other food grains, cotton and melons are now cultivated with the aid of irrigation canals. Along the shore of the Aral sea are extensive deposits of phosphorite, saltpetre, sodium and magnesium sulphate.

There are fisheries and a cannery at Aralsk. The *oblast* is traversed by the Orenburg-Tashkent railway, and there are two regular shipping lines in the Aral sea plying between Aralsk and Muynak (Kara-Kalpak Autonomous Soviet Socialist Republic) and Aralsk and Taldyk at the mouth of the Amu-Darya. The population (327,323 in 1959, of which 152,227 are urban), is mainly located along the Syr-Darya valley. The majority are Kazakhs; there are also Russians, Ukrainians and Koreans. The chief towns are Kzyl-Orda (the administrative centre), Aralsk and Kazalinsk.

Kzyl-Orda (pop. [1959] 65,902), which lies 585 mi. W.N.W. of Alma-Ata, was originally founded early in the 19th century as the Kokand fortress of Ak-Mechet. In 1853 the name was changed to Perovsk; it reverted to Ak-Mechet about 1920, and after the Revolution it was renamed Kzyl-Orda, which means "red settlement." From 1924 to 1929 it was the capital of Kazakhstan and has been the *oblast* centre since 1938. There are a number of light industries including rice cleaning, brickmaking and brewing.

(G. E. Wr.)

L ANCESTORS of this letter were Semitic 𐤋 (*lamedh*), which may derive from an earlier symbol representing an ox-goad, and Greek Λ, Λ (*lambda*). The form appearing on the Moabite stone was rounded. Other Greek forms were ⅃, Λ in early inscriptions from Attica and Corinth. The former was also usual in the Chalcidic alphabet, and the Etruscan form was similar ⅂. Thus the Latin and Faliscan alphabets derived their form L with the oblique stroke becoming horizontal. Another Faliscan form was ⅄. In the Lydian alphabet the form of the letter was ⅂. The modern form L derives from the Latin.

In the uncial writing of the 7th century or earlier the vertical stroke was raised above the line, the shape of the letter being ʟ. In Latin cursive of the 6th century appears a rounded form, ℓ, and this is the parent of the Carolingian ʟ from which derive the current rounded minuscule ℓ or the straight form l. The sound consistently represented by the letter throughout its history has been the liquid or "lateral" for which it at present stands. This is not made like the sound of R by twirling the tip of the tongue but by allowing the air to escape at both sides of the tongue, or (as in Welsh) at one side only (written *ll* a breathed consonant). In some languages, *e.g.*, in certain Slavonic languages, the contrast between a back *l* and a front *l* is distinctive. This is not the case in English, but in general the English *l* is pronounced farther back than the *l* in German and certain other continental languages. The *l* in "could," "would" is silent. An *l* is never doubled at the beginning of an English word except in a few words of Spanish or Spanish-American origin (*e.g.*, "llama") or Welsh origin (*e.g.*, "Lloyd").

NAME OF FORM	APPROXIMATE DATE	FORM OF LETTER
PHOENICIAN	1200 B.C.	𐤋
CRETAN	1100-900	𐌋
THERAEAN	700-600	𐌋
ARCHAIC LATIN	700-500	⅂
ATTIC	600	⅂ ⅃
CORINTHIAN	600	⅂
CHALCIDIAN	600	⅂
IONIC	403	⅂
ROMAN COLONIAL	PRECLASSICAL AND CLASSICAL TIMES	⅂
URBAN ROMAN		L
FALISCAN		⅃
OSCAN		⅃
UMBRIAN		⅃
CLASSICAL LATIN AND ONWARD		L

THE DEVELOPMENT OF THE LETTER "L" FROM THE PHOENICIAN THROUGH CLASSICAL LATIN TO THE PRESENT FORM

See also ALPHABET. (B. F. C. A.; J. W. P.)

LA ALTAGRACIA: *see* LA ROMANA.

LABADIE, JEAN DE (1610–1674), French theological writer who changed from being a Jesuit to Protestantism and finally became the founder of a separatist pietist community. He was born Feb. 13, 1610, at Bourg. At Bordeaux he became a Jesuit novice and famous as a preacher and catechist, but eventually, after profound study of the Bible and of St. Augustine and St. Bernard, he became dissatisfied with the Jesuits and received permission to leave the order in 1639. In 1644, after contact with both Oratorians and Jansenists, he founded small societies for frequent communion and holy life similar to those eventually founded by P. J. Spener (*q.v.*). After studying Calvin's *Institutes* he entered the Reformed church of France and in 1650 became professor of theology at Montauban. In 1659 he went to Geneva where Spener heard him preach, and in 1666 moved to the French church at Middelburg in Holland, where Dutch pietism was strong. After he had accused a minister of rationalist interpretation of the Scriptures the synod suspended Labadie from his ministry there, and he went to Amsterdam, where he founded a separatist pietist group. He was excommunicated in 1670 and left for Herford (Westphalia) with his group, and then for Altona, the Mennonite sanctuary, where he died on Feb. 13 (his birthday), 1674.

Labadie produced over 70 writings, among which was *La Réforme de l'église par le pastorat* (1667). He emphasized that the church consists of the regenerate, who were guided by the Holy Spirit, to whom alone the sacraments could be administered, while always affirming his orthodoxy. His community returned to Holland (Wievert) under the leadership of Anna Maria van Schürman, whose book *Eucleria* expounded Labadist principles. His community practised sharing of goods and meals in common, and wore simple uniform dress. It died out before 1750. Labadie foreshadowed the work of Spener and N. L. Zinzendorf (*q.v.*).

See A. Ritschl, *Geschichte des Pietismus,* vol. i (1880); P. Balsenq, *Labadie et Labadisme* (1908). (B. H.)

LABANOTATION. The system for recording movement originated by Rudolf Laban (*Kinetographie Laban,* published 1928) further developed by the Dance Notation Bureau and used in dance, drama, anthropology, physical therapy and industry. *See* DANCE NOTATION. (AN. H.)

LABARUM (Gr. LABARON), the sacred military standard of the Christian Roman emperors, first adopted by Constantine I the Great. It incorporated the chi-rho (☧), the sacred monogram of Christ. The use by Constantine of the monogram, as opposed to his adoption of the labarum, dates from the battle of the Milvian bridge (312) in which Constantine defeated Maxentius. The circumstances in which Constantine adopted the monogram itself are described differently in the pamphlet *De mortibus persecutorum,* in Latin, by the Christian rhetorician Lactantius (probably written not long after the event) and in the account in Greek in the *Life of Constantine,* written many years later by Eusebius, who, like Lactantius, knew Constantine personally. According to Lactantius, Constantine saw in a dream the two first letters of

Christ's name in Greek (Χριστος) and the words in light "In this sign thou shalt be victorious"; Christ instructed him to have the monogram on his helmet and painted on his soldiers' shields. The passage in Lactantius is obscure and the manuscripts defective, but what was painted on the shields appears to have been the chi-rho or, more probably, a well-attested variant of it, a chi (X) crossed by an I surmounted by a circumflex (☧). In Eusebius' account, which he claims he obtained from the emperor himself, Constantine, awake, saw above the setting sun the sign of the cross outlined in rays of light and the words "in this conquer." Afterward in a dream Christ instructed him to copy the sign and use it in battle as a talisman; Constantine then ordered a "copy" (*mimema*) to be made which was henceforward to be carried as a protection at the head of his armies. This "copy" was a long gilded spear, crossed at the top by a bar from which hung a square purple cloth, richly jeweled. At the top of the spear was a golden wreath encircling the sacred monogram. The standard also incorporated medallions of the emperor and his two sons Crispus and Constantine. Eusebius also mentions that he caused the initials of the Redeemer's name to be set on his helmet.

Common to the two accounts are the mention of the monogram on the helmet; but Eusebius is clearly referring to the labarum as well. Certain details in his description of it however (such as the heads of the *Caesares,* the sons of Constantine, impossible before their nomination in 317) betray it as anachronistic. Numismatic evidence does not support the adoption of the labarum, as opposed to the monogram, until after Constantine's victory over Licinius in 324, when it appears on coins issued at Constantinople as a military standard surmounted by the chi-rho. For all its difficulty, Lactantius' is the better-attested account.

The labarum was a Christianized version of the *vexillum* or military standard of the type normally used under the empire; the name *labaron* itself, mentioned in no text before 313, has been much discussed; it was probably an incorrect rendering in Greek of the Latin *laureum,* a word employed among the soldiery for the military standard, equivalent to the conventional term *vexillum.*

The antecedents of the monogram itself have also been the subject of controversy: some would derive it from the symbolism of the solar religion of the Gauls; some from the *crux ansata* or *ankh,* the symbol of life in Egyptian hieroglyphics (*see* Cross); others suggest, more plausibly, that it may have been the personal monogram of Constantine's father, Constantius Chlorus. In the latter case it would have been used originally as a non-Christian imperial symbol and afterward absorbed into the propaganda of Constantine's conversion. There is however no need to trace its origins so exactly: the chi-rho monogram was used widely in Greek antiquity for diverse purposes, some of them purely practical (*e.g.,* on coin types as an abbreviation of the name of the person minting the coin). But it was first used as the monogram of Christ by Constantine and then as a conscious innovation.

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LABÉ, LOUISE CHARLY PERRIN, called La Belle Cordière (d. 1566), French poet, a member of the 16th-century Lyons school of humanist poets of which Maurice Scève was the leading figure. She was born at Lyons, probably between 1516 and 1523, the daughter of a prosperous ropemaker, Pierre Charly, trading under the name of Labé. She was married to another middle-aged ropemaker, Ennemond Perrin, perhaps in 1544 and certainly by 1551. Before and after her marriage she appears to have enjoyed a freedom which has evoked romantic legend. Her wit, charm and accomplishments, extending to reading, writing, music and horsemanship, attracted a circle of distinguished admirers including Scève, Clément Marot and Olivier de Magny. It remains doubtful whether she presided over a literary *salon* or was a cultured courtesan. In 1555, about the time of her husband's death, she published a slim volume of love-sonnets and elegies, evidently not inspired by him, and showing a remarkable intensity of emotion and simplicity of style. A prose "Débat de Folie et d'Amour" (Eng. trans. by Robert Greene, 1584) was included, vividly combining imagination and realism and vindicating the "ancient league" between Love and Folly. She passed her last years more quietly and died early in 1566, leaving much of her fortune to the poor.

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LABEO, MARCUS ANTISTIUS (*c.* 50 B.C.–A.D. 18), Roman jurist, the greatest figure in imperial jurisprudence before the age of Hadrian, came of a superior plebeian family of Samnite origin. His father, also a jurist, was of Brutus' circle and the younger Labeo adhered, almost aggressively, to the same republican views. He attained the praetorship but refused the consulate when it was offered to him by Augustus, devoting himself to jurisprudence. A pupil of Trebatius, Labeo had a wide general culture and a special interest in dialectics and language as aids in the exposition of the law. He is reputed to have written 400 books, including commentaries on the XII Tables, the praetorian edicts and pontifical law, collections of cases (*Epistulae* and *Responsa*) and the *Pithana,* a collection of definitions and axiomatic legal propositions. His progressive outlook is confirmed in the fragments of his works and the abundant citations of his views by subsequent jurists. His prestige is evidenced in later epitomes and annotations of his works and, most strikingly, in the fact that his *Posteriora,* a systematic exposition of the law, was published posthumously, the only known instance of the procedure.

Labeo was also a teacher and is regarded as the first of the Proculian school (named after his follower, Sempronius Proculus), while Labeo's rival, C. Ateius Capito, is considered the first Sabinian.

See L. A. A. Pernice, *M. Antistius Labeo. Das römische Privatrecht im ersten Jahrhunderte der Kaiserzeit* (1873–92). (J. A. C. T.)

LABERIUS, DECIMUS (*c.* 105–43 B.C.), a Roman knight and one of the two leading writers of mimes; a man of caustic wit. In 46 or 45 he was compelled by Julius Caesar to accept the challenge of his rival, Publilius Syrus, and appear in one of his own mimes; the dignified prologue which he pronounced on this degradation has survived. Caesar awarded the prize to Publilius but restored Laberius to his equestrian rank, which he had forfeited by appearing as a mime. The titles of about 42 of his mimes have been preserved, with fragments.

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LABIATAE, the mint family, a large, readily recognizable and widely distributed family of flowering plants, many of which —such as lavender, marjoram, peppermint and thyme—have been in use as condiments and medicines since antiquity because of their pungent, aromatic oils. About 170 genera and 3,000 species, mostly of herbs, shrubs and occasionally trees or climbing plants, are included in this family.

Many labiates have four-angled stems, simple, opposite or whorled leaves and bisexual, mostly two-lipped (bilabiate) flowers with tubular corollas, often grouped in whorled inflorescences (verticillasters). The four (rarely two) stamens are attached to the inside of the corolla and may differ in length, one pair being longer than the other. The superior ovary consists of two carpels and usually contains four ovules, but soon becomes four lobed (each lobe then containing an ovule). The shortly two-branched (at the apex) style is inserted between these four chambers of the ovary and usually matures after the stamens do. The fruit, normally surrounded by the persistent calyx, breaks up into four independently attached nutlets, which are one seeded and commonly smooth. Most labiate seeds lack endosperm. The pungent aromatic oils are secreted in special glandular hairs.

Variation within the family affects especially the nature and composition of the inflorescence and the structure and appearance of the flower. Generally the corolla consists of a tube (base to middle) and a limb, which may be straight or S-shaped. The upper lip is often hooded or boat shaped and contains the stamens

ROCHE

SPOTTED DEAD NETTLE (LAMIUM MACULATUM)

and the style branches. The lower lip is generally spreading and three lobed, the middle lobe often being expanded and shaped like a dipper or boat. The corollas, like the calyxes, contain a ring of hairs above the ovary or higher. These may secrete nectar and assist in bringing about pollination by insects and hummingbirds.

Flowers with short tubes are mostly bee-pollinated, whereas those with long tubes are normally pollinated by butterflies or moths. Visiting insects either use the lower lip as a resting place while obtaining nectar and dusting their backs with pollen, or they cover their bellies and legs with pollen.

As a family, the labiates have a world-wide distribution, but the different tribes do not. Distribution of individual groups is apparently linked to growth habit and ecological preferences. Genera are primarily found in four main types of habitats: (1) openings peripheral to dry tropical hardwood forests; (2) open areas peripheral to temperate hardwood forests; (3) shrublands of the great cordilleras of both hemispheres; and (4) arid and desert subtropics. These habitats are of fairly recent origin, at least in their present expanse. Although the fossil record of the family is very meagre, it is quite probable that certain modern genera have been in existence since early Cenozoic times in areas where they now occur.

On the other hand, nutlets of the genus *Hancea*, which is now found in eastern Asia, are represented in the famous London Clay flora of Eocene age. The few fossil records together with the modern distribution patterns suggest that the family was differentiated during Mesozoic times into groups similar to its present tribes. Local topographic and climatic changes during Cenozoic times opened up vast areas of brushland, grassland and desert and brought about greater differentiation within the tribes.

Volatile (essential) oils, abundant in labiates, are secretion products of numerous multicellular hairs found as modified epidermal outgrowths primarily on leaves, stems, petioles and sepals. Oils derived from certain labiates are of great economic and pharmaceutical importance. Mint oils are used mostly as carminatives, whereas oils of basil, marjoram, sage, savory, lavender and rosemary are used primarily as condiments and in cosmetics.

Peppermint (*Mentha piperita*), a perennial found in temperate parts of Europe, Asia and America, is one of the most important aromatic herbs. It has long been in cultivation in Europe and, since the middle of the 19th contury, in the United States, especially in Indiana, Michigan, New York and the Pacific northwest, where it is grown in mucky soils, unsuited for other crops. Peppermint oil is used extensively in flavouring gums, candy, perfumes, soaps and tobacco, as well as in pharmaceutical preparations for both external and internal application. Hundreds of thousands of pounds of peppermint oil are produced annually in the United States, and more are imported from England, South America and Australia. Peppermint oil is a clear, colourless liquid with an aromatic odour and pungent taste, obtained by distillation from the fresh aerial parts of the plant during flowering time. Two varieties are the main sources, namely *M. piperita* var. *officinalis*, white peppermint with green stems, and var. *vulgaris*, with purple stems (the latter supposedly yielding more oil than the former). As the plants hybridize freely, the crude oil is never uniform and must always be blended. Menthol or peppermint camphor, a saturated cyclic alcohol, is the chief constituent (50%–75%), valuable as an antiseptic and used in the treatment of colds. Japanese peppermint, *M. arvensis* var. *piperascens*, widely cultivated in Japan and the United States as a source of menthol, yields more (but very bitter) menthol. Synthetic menthol is generally produced from thymol and other terpene derivatives. Spearmint oil, derived from fresh aboveground parts of *M. spicata*, probably of hybrid origin, has a sweeter odour than peppermint oil but lacks the latter's cooling action.

Other important labiate oils are: basil oil, derived from *Ocimum basilicum;* lavender oil, obtained from *Lavandula officinalis;* rosemary oil, procured from *Rosmarinus officinalis;* patchouli, obtained from *Pogostemon cablin;* and perilla oil, derived from *Perilla frutescens*. Well-known savoury herbs are marjoram, *Marjorama hortensis;* sage, *Salvia officinalis;* horehound, *Marrubium vulgare;* savory, *Satureia hortensis;* and thyme, *Thymus vulgaris*. Thymol, a derivative of the oil of thyme, is used in dentifrices and as an internal medicine.

Several labiates are cultivated as vegetables because of their tuberous rhizomes. These include the Chinese artichoke, *Stachys sieboldii; Coleus rotundifolius* in tropical Asia and Africa, *Coleus edulis* in Abyssinia and *Coleus parviflorus* in tropical Asia; and various species of *Plectranthus*.

The number of labiates grown as ornamental plants is legion, including representative species of more than 75 genera. Outstanding among them are species of the American genera *Monarda* and *Salvia;* the old world genera *Coleus* and *Plectranthus*, widely grown for their colorful foliage; and the numerous herbs and culinary plants. Because of their aromatic properties labiates are particularly suitable for cultivation in gardens for the blind. *See* also PERFUME; ESSENTIAL OIL; SCENTED PLANTS; and articles on the various individual members of the family, as MINT; LAVENDER; SALVIA. (T. K. J.)

LABICHE, EUGÈNE MARIN (1815–1888), French playwright, author of popular farces, was born in Paris, May 5, 1815. He took a law degree and then became a journalist. In 1838 he published his first book, *La Clef des champs,* and collaborated with M. Michel and A. Lefranc in writing his first play, *Coyllin, ou l'homme infiniment poli.* Later collaborators included E. Martin, L. Delacour, P. Dumanoir and V. Varin. A long series of hilarious full-length and one-act plays, produced mainly at the Palais Royal, the home of light comedy, treated the theme of man's stupidity from every angle. The best known are *Le Chapeau de paille d'Italie* (1851; produced, New York, as *Horse Eats Hat,* 1936; London, as *The Italian Straw Hat,* 1952), typical in being based on a fantastic situation and full of improbable incident, and *Le Voyage de M. Perrichon* (1860), which, like *Le Misanthrope et l'Auvergnat* (1852) and *La Poudre aux yeux* (1861), shows insight into human nature despite the obvious dramatic devices used to express it. He was well served by actors, particularly by Jean Geoffroy, who seems to have inspired the ridiculous bourgeois whom he portrayed in many plays. During the Franco-German War, Labiche formed a company of sharpshooters, and was made a Chevalier of the Légion d'Honneur. In 1880 he was elected to the Académie Française. He died in Paris, Jan. 23, 1888. His *Théâtre Complet,* 10 volumes, with preface by E. Augier, was published in 1878–79.

See P. Soupault, *E. Labiche, sa vie et son œuvre* (1945). (D. Ks.)

LABLACHE, LUIGI (1794–1858), Italian bass singer, born at Naples of French and Irish parents on Dec. 6, 1794. He studied at Naples and at the age of 18 appeared at the opera there as a *basso buffo,* later singing at Palermo, Milan and Vienna. In 1830 he had great success in London and Paris in the role of Geronimo in Cimarosa's *Il matrimonio segreto.* In 1836 he lived in London, where his pupils included Victoria, the future queen. He was admired for his musicianship by contemporary composers, among them Schubert, who dedicated songs to him. He died at Naples on Jan. 23, 1858.

LABOR, DEPARTMENT OF: *see* GOVERNMENT DEPARTMENTS: *United States.*

LABORI, FERNAND GUSTAVE GASTON (1860–1917), French lawyer best known as a defense advocate in political cases and who is especially remembered for his defense of Alfred Dreyfus, was born at Reims on April 18, 1860, and called to the bar in 1884. He defended the anarchists Duval and Pini; Émile Zola, prosecuted for libel because of his championship of Dreyfus (1898); Thérèse Humbert in the Crawford inheritance case (1902); and Mme Joseph Caillaux, who was acquitted of the

murder of Gaston Calmette, editor of *Le Figaro*, in 1914. Labori's defense of Dreyfus continued from his trial in 1894 through the revisions of 1898 and 1899. Labori was also the founder of the *Revue du Palais* and the editor in chief of the *Gazette du Palais*. His works include *Le Mal politique et les partis* (1902) and *Les Idées morales et la politique* (1903). He died in Paris on March 14, 1917.

LABOUCHERE, HENRY DU PRÉ (1831–1912), British politician and publicist, familiarly known as "Labby," was born in London on Nov. 9, 1831. His independence and unconventionality, his wit, his wealth and his marked ability, all made him a formidable and provocative figure, though, together with a certain easygoing indolence, the combination proved fatal to political preferment. Educated at Eton and Trinity college, Cambridge, he entered the diplomatic service in 1854, but abandoned this career for politics in 1864. He was elected Liberal member of parliament for Windsor in 1865, but was unseated on petition; he was returned unopposed at a Middlesex by-election in 1867, but failed of re-election in 1868; from 1880 to his retirement in 1906 he sat for Northampton as a radical.

Already well-to-do under the will of his grandfather, Pierre César Labouchere, the financier, he inherited in 1869 about £250,000. This inheritance came at a convenient time, for he was then involved in the adventure of theatrical management—a diversion stimulated by a love affair with the actress Henrietta Hodson, whom he married in 1868. He was also involved in the financial support of the *Daily News*, of which he became part proprietor, just before the Franco-German War. Labouchere's messages to the *Daily News* from the besieged city of Paris brought him journalistic fame. In 1877 he launched the periodical *Truth*, which acquired a remarkable record in the exposure of shams and organized impostures. *Truth* survived until 1957, though somewhat changed in character in its later years. Labouchere was a strenuous advocate of the abolition of the house of lords; at the time of the Parnell commission he had much to do with the unmasking of the Irish journalist Richard Pigott; and he was a member of the inquiry into the Jameson Raid, his hostility to Joseph Chamberlain being as pronounced as against Lord Rosebery when the latter became leader of the Liberal party. After 1903 Labouchere lived mainly in Italy, at a villa near Florence, where he died on Jan. 15, 1912.

See A. L. Thorold, *Life of Henry Labouchere* (1913); Hesketh Pearson, *Labby* (1936). (D. Hn.)

LABOUR. In economics, as in ordinary discourse, the word labour is used as a name for the general body of wage-earners. It is in this sense, for example, that one speaks of "organized labour." In a more special and technical sense, however, labour means, in economics, any valuable service rendered by a human agent in the production of wealth, other than accumulating and providing capital or assuming the risks that are a normal part of business undertakings. It includes the services of manual labourers, but it covers many other kinds of services as well. It is not synonymous with toil or exertion, and it has only a remote relation to "work done" in the physical or physiological senses. The application of the physical energies of men to the work of production is, of course, an element in labour, but skill and self-direction, within a larger or smaller sphere, are also elements. A characteristic of all labour is that it uses time, in the specific sense that it consumes some part of the short days and years of human life. Another common characteristic is that, unlike play, it is not generally a sufficient end in itself, but is performed for the sake of its product or, in modern economic life, for the sake of a claim to a share of the aggregate product of the community's industry. Even the labourer who finds his chief pleasure in his work commonly tries to sell services or products for the best price he can get.

If labour could be measured adequately in simple homogeneous units of time, such as labour-hours, the problems of economics would be simplified. But labourers differ among themselves in the amount and character of their training and the degree of skill, intelligence, capacity to direct one's own work or the work of others, and the other special aptitudes which they require. Tasks differ, too, in the degree of their irksomeness, the prospects which they offer for permanent employment and advancement, the social status generally associated with them, and in respect to other characteristics that make one task more attractive than another. Quite apart, therefore, from the circumstance that the mobility of labour is imperfect, that it cannot be transferred easily and quickly to the employments in which its products have the highest value, there is the further circumstance that the wages of different kinds of labour cannot be taken to be payments for larger or smaller "quantities of labour." The price per unit of time that a particular kind of labour commands in the market depends not only upon the technical efficiency of the labourer but upon the demand for the particular services he is able to furnish, upon their relative scarcity, and upon the supply of other productive agents. The attempts of the older economists and of some of the Socialists to find a simple and direct relation between the value of a product and the quantity of labour that it embodies were fruitless.

Different uses of the available supply of labour, however, whatever its composition, can be compared with reference to the quantity and the value of the product that they yield, and such comparisons are being made continuously in the ordinary course of the planning and management of competitive business undertakings. By means of economic analysis, moreover, it is often possible to know whether a proposed change in the organization of the community's labour or of the uses to which it is put (as, for example, by encouraging certain types of industries at the expense of others) would be more likely to increase or to decrease the annual production of wealth. For the individual worker, as well as for the community as a whole, the practicable way of measuring the "labour costs" of production is by reference to the other possible products that might have been secured by means of the same labour, or to possible alternative uses of the time given to labour. Thus the fact that in most countries both the number of hours per day and the part of the average worker's life given to labour are less than they were 100 years ago, means, not that labour has become intrinsically more arduous or more painful, but that it has become more costly, in the sense that, with the increase of the general level of incomes, the alternative uses of the worker's time have become relatively more valuable. *See* also Economics; Labour (Trade) Union; Wages and Salaries. For the term labour in physiology *see* Childbirth.

See also references under "Labour" in the Index. (A. Yo.)

LABOUR, MINISTRY OF: *see* Government Departments: *Great Britain*.

LABOUR, PRIMITIVE. It has been thought that primitive peoples in their home conditions are indolent and that the pressures of supervision in industrial or plantation employment are necessary to get them to perform hard work. But although in the primitive economic cycle there may be considerable underemployment, work in hand is often performed systematically and energetically. In shifting agriculture of the slash-and-burn type, for instance, an intensive period of about six weeks is commonly required for clearing and planting a crop. In subsequent operations many days are spent in steady toil, from careful, monotonous weeding, to fencing, guarding the crop and final harvesting and storing. It has been calculated, for example, that on the average throughout the year a yam farm unit of about 1½ ac. in eastern Nigeria requires at least 60 man-days of labour, and that a Hanunóo Philippine rice farmer puts in about 1,200 hours of agricultural work. For its immediate purpose such labour is often technically highly efficient.

Incentives.—Desire to have a share of the product or some equivalent reward is a common inducement to work; also, other incentives often are strong. In primitive society great emphasis is attached to the personal aspect of a man's work; the absence of any widespread system of division of labour and delegated employment renders the product peculiarly his own and allows scope for development of a spirit of craftsmanship. Extra finish and decoration are thus often applied to weapons and tools beyond a corresponding increase in their utility. Social factors also are of great importance: vanity in seeing handiwork admired; rivalry, rooted in a desire to attract public attention and acquire status;

obedience to tribal usage and traditional teaching—these motives are responsible for much exacting labour by primitive workmen. Production of food is often dictated not by pressure of immediate physical wants but by social considerations (as a marriage or a mourning feast) or by the wish to gain prestige by accumulation and disbursement of wealth (*e.g., see* POTLATCH).

Organization.—A primitive economic system has no complex division of labour. Work is normally divided between men and women, this being enforced by custom and sometimes by ritual injunction as a tabu. In agriculture, men perform the heavier though more interesting and even dangerous work such as tree felling; women tend to do work that involves less physical strain but is more regular and monotonous, such as weeding. But the savage woman in primitive society is no drudge for an idle husband; a certain economic equality is observed. Broad divisions of employment are made also by age and rank. Specialist craftsmen occur to a limited degree, such as canoe builders and carvers in Polynesia, or smiths in central Africa; women often specialize in weaving.

Enterprises such as house building and fishing often require a large labour force. Organization and supervision ensure that the contribution of each person is adequate and harmoniously welded into the whole scheme of work. The bonds securing adequate cooperation in labour are ties of kinship (including ties by marriage) among members of the working group, and the authority of elders or chiefs. Where rules of magic or religious ritual help to govern conditions of work, the local magician or priest may have an important co-ordinating role. To relieve the fatigue of labour and beguile its monotony, primitive communities have adopted various devices, including narcotics (rarely); work songs or rhythmic choruses are the commonest. The value of working in company is well-recognized; a powerful factor in keeping the activity of individual workers up to full pitch is the pressure of public opinion, sometimes made explicit through traditional tales and proverbs. Since care and skill in work enhance reputation and marriageability, young folk in a primitive community have an additional incentive to industry.

Study of organization and incentive in work in primitive communities has practical importance. Success of plans for rural development may hinge on correct appreciation of the factors involved, and they may even be relevant for the recruitment and efficiency of a local labour force for an industrial undertaking. *See* also ECONOMIC ANTHROPOLOGY.

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LABOUR DAY. (1) May 1, the date generally selected by trade unions, Socialist parties and labour organizations in general for a public celebration. It is observed by a portion of the population in nearly every industrial country except the United States and Canada (*see* below) and Italy, where its observance was forbidden and the traditional date of the foundation of Rome substituted. In the U.S.S.R. it is an official holiday.

The connection which certain Socialist writers attempted to make between Labour day and the old May day festivals appears imaginary. Robert Owen in 1833 appointed May 1 as the day for the commencement of the millennium, but apart from that mention the observance of the day cannot be dated earlier than 1889, when the first (Paris) congress of the Second Socialist International selected the date for annual international celebration. By the movers of the motion it was originally intended that the workers should by direct action enforce a holiday on May 1 no matter what day of the week it might be. In Great Britain the Labour day celebration generally takes place on the first Sunday after May day; in London the traditional meeting place is Hyde Park. The first Labour day celebration was not held in Britain till 1892.

(2) Labor day is celebrated on the first Monday in September in the United States. Agitation for the celebration of the day was begun by the Knights of Labor, who, in 1882, 1883 and 1884, paraded on that day in the city of New York. In 1884 the organization adopted a resolution that the first Monday in September should be considered Labor day, and steps were taken to have it recognized as a holiday. Workmen of all organizations aided in the movement. Colorado, on March 15, 1887, passed a law recognizing the day, and New York, New Jersey and Massachusetts soon followed. On June 28, 1894, a bill passed congress making the day a legal holiday throughout the union. Except for the District of Columbia and federal workers in other states, further legislation was needed by the separate states to put the law into operation. All states and territories eventually enacted such laws.

In Canada most of the provinces observe the day regularly by law; in others it may be observed upon the governor's proclamation. Celebration of the day in the United States and Canada differs from that in Europe in that all classes participate and it is marked by the closing of virtually all commercial, business and industrial firms and by meetings, picnics, parades, speeches, athletic events and other holiday activities. (A. McQ.)

LA BOURDONNAIS, BERTRAND FRANÇOIS MAHÉ, COMTE DE (1699–1753), French naval commander who took a prominent part in the affairs of the French possessions in India, was born at St. Malo on Feb. 11, 1699. He entered the service of the French India company as a lieutenant in 1718, was promoted captain in 1724 and took part in the capture of Mahé on the Malabar coast in 1726.

For two years he was in the service of the Portuguese viceroy of Goa but returned to French service in 1735 as governor of the Île de France (Mauritius) and the Île de Bourbon (Réunion). At the outbreak of hostilities with Great Britain after 1740, La Bourdonnais was put at the head of a fleet in Indian waters. He saved Mahé, relieved Joseph François Dupleix at Pondicherry and defeated Capt. Edward Peyton in two naval actions. Peyton then returned to the Hooghly river, thus enabling La Bourdonnais to blockade Madras by sea while French forces attacked it by land. After a six-day siege Madras surrendered on Sept. 21, 1746. He quarreled with Dupleix over the conduct of affairs in India and his anger was increased, on his return to the Île de France, at finding a successor installed there by his rival. He set sail on a Dutch vessel to present his case at court, was captured by the British, but was allowed to return to France on parole. Arrested in 1748 on a charge of peculation and maladministration, La Bourdonnais was imprisoned in the Bastille for more than two years. He was tried in 1751 and acquitted. La Bourdonnais died in Paris on Nov. 10, 1753, leaving valuable memoirs which were published by his grandson.

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LABOUR LAW. Labour law is a convenient term to include all the rules of law governing the conditions under which persons may work under the control of other persons, their employers. The expression industrial law is often used to cover the same ground, but this is apt to be understood in too narrow a sense as including only that part of the law which affects industrial undertakings. It seems, therefore, better to avoid the use of an expression which would tend to imply any limitation of the subject to certain branches of employment. If a person is engaged by and works under the control of an employer, there is a relationship which becomes the necessary subject of legal regulation. It may be necessary also for the law to intervene to help a person who desires to be so engaged or an employer who desires to find a worker to work for him. Whenever the relationship of employer and dependent worker exists, either actually or potentially, one is within the sphere of labour law. It does not matter whether the work to be done is manual labour or brainwork. The subordination of the worker to the employer is the only test to be applied, and the word labour seems convenient to convey this idea of subordination provided it is clearly understood that labour does not

mean only manual labour. It is not always an easy matter to draw exactly the line which divides a dependent worker from an independent contractor or from a professional expert. The rules of English common law relating to an employer's responsibility for the acts of or for injuries to a servant have laid it down that in order to be an employer a person must control the worker as regards the manner in which he does his work, as well as control the kind and amount of work to be done. This general definition suggested for the scope of labour law must be accepted with caution, since there are exceptions which spread outside it. But it can be taken as a rough working rule to define the branches of law included within the term labour law.

In a general survey of the subject it is logically impossible to rule out any law expressly affecting employers or workers as such. For instance, the law relating to the civil rights of workers and employers to organize in defense of their interests is an important branch of labour law (*see* LABOUR [TRADE] UNION). Again, measures for the insurance of workers against accidents, sickness or old age form, strictly speaking, a branch of labour law (*see* WORKMEN'S COMPENSATION; SOCIAL SECURITY). There is, too, the vast question of unemployment (*q.v.*) which involves much labour law regarding the establishment and control of employment exchanges, the organization of unemployment insurance (*q.v.*) and various other measures intended to prevent or relieve unemployment. Even emigration and immigration laws may or may not be labour law within this definition according to their scope and intention. Other special aspects of the subject are treated in CLOSED SHOP; HOURS OF LABOUR; INDUSTRIAL RELATIONS; STRIKES AND LOCKOUTS.

Labour law, covering the ground indicated above, cannot be found conveniently and completely codified in any country. It is to be sought in rules of unwritten common law, where any such system exists, in legislative enactments of all kinds, acts of parliament, decrees of autocratic governments and codes of all sorts—civil, industrial, commercial, labour. Even in written constitutions principles of labour law exist. The decisions of higher courts of law must also be considered wherever these are of a binding nature, as in the United States and England. These decisions may take the form of expositions or applications of common-law principles, or they may be interpretations of the statute law. In some branches of U.S. and English labour law the decisions interpreting the statute law are extremely important.

(S. S.; H. Ss.)

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I. UNITED STATES

A. EARLY HISTORY

1. Common-Law Conspiracy.—The development of the law in the United States governing labour unions and their activities took place mainly in the state courts; the effect of English developments was perceived only in some of the common-law principles that U.S. courts inherited from that country. Prior to 1800 conditions of labour were frequently regulated by legislation. Shortly thereafter workers in various trades began to form unions. By concerted refusals to work, etc., they attempted to compel their fellow workers to join them and to help them secure improved terms of employment. Until 1842 the doctrine of criminal conspiracy was generally used by the courts to discourage unionism. This doctrine made it a criminal offense for labour unions to use economic or social pressures to make workmen join with them. As a result unions were unable to achieve sufficient power for effective wage strikes. Popular reaction against this doctrine influenced the Massachusetts supreme court in *Commonwealth* v. *Hunt* (1842) virtually to abolish its continued use and that decision was generally followed elsewhere. Subsequently there were a few state statutes making criminal the use of economic coercion to organize unions and to secure the closed shop. But there seem to have been no early authoritative decisions or statutes denying organized workers the right to strike for wage and hour adjustments.

2. The Labour Injunction.—The consensus among state and federal courts after the American Civil War was that it was a tort—an actionable civil wrong—for labour unionists, by exerting economic pressures, to coerce nonunion workers into joining with them and to extend union organization throughout an industry. Regarding such activities as threatening irreparable harm to the property of employers, U.S. courts began in the 1880s to issue injunctions preventing their continuance. The courts found these injunctions, together with temporary restraining orders, far more effective as a suppressive device than actions for damages or criminal prosecutions, which required elaborate and time-consuming pleadings as well as trial by jury. But an equity court could issue a temporary injunction immediately and, without a jury, could convict for contempt any unionist who disobeyed its order. Judgments for money damages against unions and their leaders were usually hard to collect, but an injunction broke up a strike before any harm occurred. Incidentally, injunctions did not compel strikers to return to work. That would have been involuntary servitude. Rather, they prohibited illegal concert of action. When leadership was thus smothered, strikes tended simply to collapse.

3. The Illegal Purpose Doctrine.—General use of the labour injunction around 1900 threatened to stifle the growth of unions and a few leading jurists such as Justice Oliver Wendell Holmes of the Massachusetts supreme court challenged the theory on which injunctions were issued. Most of the courts held that the legality of a strike was determined by its purpose. A strike for an illegal purpose was an unlawful strike. Without benefit of legislation, courts tended to regard as illegal all objectives of concerted action deemed incompatible with prevailing economic values. Thus, since organizational strikes and boycotts of any kind tended to create union monopolies, they were called illegal.

Strikes against technological change, jurisdictional strikes,

strikes to compel removal of unpopular foremen and to require the hiring of unnecessary workers were enjoined because their objectives were held illegal. At the same time the courts treated all peaceful picketing—except in connection with wage strikes—and all secondary boycotts as torts. Secondary labour boycotts occurred where a union threatened to strike an already organized employer unless he in turn ceased business relations with another employer whom the union was attempting to organize.

4. Justification Theory.—Holmes's view—ultimately thought to be the better one—was that in the absence of legislation making it so, combination was not unlawful. Concert of action was illegal at common law only where the conduct, if done by one alone, would have been illegal. Some judges thought that the proper test was whether the conduct fell into a traditional category of tort such as assault and battery. But Holmes preferred the broader view, that purely economic pressures, even when they caused harm to others, were not illegal at common law if they were used in the pursuit of self-interest and gain. An instance would be business competition. A corollary to Holmes's "economic interest approach" was that when anyone used otherwise lawful pressures merely to hurt another, this constituted an unjustifiable infliction of harm and was hence illegal. Under this justification theory all concerted economic pressures exerted by unions to promote their interests, however harmful they were to others, would be lawful and hence not enjoinable. This would be true of strikes and picketing designed to increase union power through extended organization. For this increased strength was thought necessary to protect what the unions had already won and as a preliminary step to future collective bargaining.

5. Early Regulatory Statutes.—After 1880 congress and various state legislatures experimented with direct regulatory legislation such as minimum wage and maximum hours acts, as well as laws governing child labour and the sale of prison-made goods. Virtually all such state legislation was declared unconstitutional under the due process clause of the 14th amendment of the federal constitution, while similar congressional acts were held unconstitutional under the due process clause of the 5th amendment or were declared invalid exercises of power under the commerce clause of the federal constitution.

Many employers required their employees to promise as a condition of securing or retaining employment that they would not join a union. These antiunion undertakings were commonly called "yellow dog" contracts. These commitments served employers in combating union organization, since courts usually held that union leaders persuading employees to break these promises were guilty of the tort of inducing breach of contract. Indeed this tort became the favourite basis of issuing injunctions against unionists. Attempts by congress and the states to make it criminal for employers to require such antiunion promises from employees or to declare such contracts invalid as against public policy were held by federal and state supreme courts to be unconstitutional interferences with liberty of contract. Likewise, an attempt by Kansas to prohibit strikes in certain industries and to substitute compulsory arbitration of bargaining disputes was declared unconstitutional.

6. Workmen's Compensation.—The irresponsibility of society toward employees and their dependents who were the victims of industrial injuries had become a conspicuous sore spot by 1900. England and other European countries had long before accepted this responsibility, while injured workers had only the common law to fall back on in the United States. Under the common law an injured worker could recover damages against his employer only upon proving him to have been negligent. And even then the employer could escape liability if he could show that the injured employee had assumed the risk, was contributorily negligent or had been hurt by the negligence of a fellow servant. Moreover, the delays and expense of litigation were an intolerable burden for workers who lived under fairly marginal circumstances at best.

Congress passed the Federal Employers' Liability act in 1908 to cover actions for industrial injuries sustained by employees on interstate carriers—chiefly railroads. Under this act injured employees could sue either in state or federal courts, with ultimate review by the U.S. supreme court. Liability of the carrier depended on proof of its negligence. While the "fellow servant rule" was abolished, assumption of risk remained as a complete defense and contributory negligence served to reduce recovery but was not a complete bar. In 1939 the defense of assumption of risk was abolished under this statute and the law was extended in the Jones act to cover the injuries of seamen and otherwise to protect the employees of other interstate carriers. This federal statute is not a real workmen's compensation act since it conditions recovery of damages on proof of the carrier's negligence. However, if recovery is allowed at all, a jury sets the damages—and at a figure far greater than the limited awards set under state compensation laws. Since the U.S. supreme court has allowed all cases arising under the Federal Employers' Liability act to go to the jury, the practical result is the coverage and broad liability of a compensation act, with unrestricted damages—a method of redressing industrial injuries completely out of line with that prevailing in the rest of U.S. industry.

Under state workmen's compensation acts one who is hurt in the course of his employment may recover from the employer. He does not have to prove the employer's negligence; nor is he subject to any of the common-law defenses, which are all abolished. His claim is tried by an administrative commission, without a jury; and compensation awards are made in accordance with a schedule of limited amounts. Awards of an industrial commission are subject to judicial review. These acts were held constitutional, even though it was contended that compulsory liability of employers for industrial injuries, in the absence of fault or negligence, was an unconstitutional deprivation of property without due process of law. But all states now recognize the propriety of compensation acts which place on employers the burden of statistically predictable loss caused by industrial injuries, to be administered by them as an overhead cost and to be passed on to society through increased commodity and service prices.

7. Sherman Act of 1890 and Clayton Act of 1914.—The Sherman Anti-Trust act of 1890 was aimed primarily at the concentration of power among business groups, although it made illegal *all* combinations in restraint of trade or commerce. It covered only restraints in interstate commerce, being an exercise of congressional power to regulate commerce among the states. The U.S. supreme court in 1908 held that the Sherman act applied to organized labour, a hotly debated point when the act was passed. A secondary organizational boycott of the hatters' union interfered with the shipment of hats from Danbury, Conn., to other states. This was held a violation and the union paid more than $200,000 in triple damages to the hat company. In 1914 congress added sec. 6 to the Clayton Anti-Trust act, declaring that the labour of human beings is not a commodity of commerce and that unions as such are not illegal combinations. But the U.S. supreme court held in 1921 that this provision did not exempt labour unions from the Sherman act and meant only that unions as such were not illegal.

Consequently the Sherman act was construed to prevent any union restraints on the movement of goods from one state to another, except when such interference was caused by a strike. That exception was made because by the 1920s virtually all effective wage strikes interfered with the export by the struck plant of its products to other states; and since such bargaining strikes were then universally regarded as lawful by state courts, it would hardly do to treat them as unlawful restraints under this federal act. Organizational strikes were held to be offensive under its terms, but only on proof that by organizing a plant the union intended to eliminate competition between its nonunion-made products and union-made goods in national markets. In the meantime several state courts had come to regard even organizational strikes and other economic pressures of unions as lawful.

8. Railway Labor Act of 1926.—Labour unionism in the railroad world has always been in a class by itself. In the Railway Labor act of 1926 congress adopted as law what the railroads and brotherhoods had evolved as a treaty to govern their relations. This unique statutory development (1) declared it to be the duty of the carriers and the unions to bargain collectively and to set-

tle all disputes; (2) created a board of adjustment to process grievances arising under collective agreements; (3) set up a board of mediation to assist the parties in handling bargaining disputes; (4) established a voluntary arbitration procedure for the handling of grievances not disposed of by the board of adjustment and for disposition of unsettled bargaining disputes, awards to be final and binding on the parties; and (5) provided for an emergency board to act if everything else failed. This statute promised well but had to be replaced in 1934 by a more detailed measure, discussed briefly below.

B. Labour Law Under the New Deal

1. Anti-Injunction Acts and Expansion of Union Organization.—During the early 1900s labour union adherents pressed for legislation to curb the continued indiscriminate use of the injunction for the purpose of breaking up the concerted economic pressures of unions to expand their organization throughout entire industries. In 1914 congress enacted sec. 20 of the Clayton act, which purported to make nonenjoinable in federal courts certain vaguely described union activity suggesting strikes, picketing and secondary boycotts when it occurred in the context of a labour dispute between employers and organized labour. A number of states immediately copied this statute. But in the 1921 *Duplex* case, sec. 20 was held by the supreme court to have changed nothing. The concerted activity made nonenjoinable, the court said, was only conduct that was already legal at common law; and even then the statute applied only to disputes between employees and their own employer. Thus, it had no effect where it was most needed—when through exertion of economic pressures unions attempted to make unorganized employers recognize and deal with them.

In 1932 congress passed the Norris-LaGuardia anti-injunction act. Most of the work on the drafts of this statute was done by Felix Frankfurter (later supreme court justice), and it was carefully designed to achieve what congress was mistakenly thought to have accomplished in sec. 20 of the 1914 Clayton act. This 1932 statute so clearly defined the conduct that was not to be enjoined during the course of a labour dispute that practically all purely economic pressures were included. It then so broadly defined a labour dispute—the context within which such economic pressures would not be enjoinable, regardless of the harm they caused—that for the first time in the federal arena unions were free to exert organizational pressures against employers who did not yet recognize any union and did not employ union members. For this definition of a labour dispute expressly stated that the proximate relationship of employer and employee did not have to exist between the unionists involved on the one hand and the employer being organized on the other. Indeed, this definition was so broad that it almost seemed to allow for the exercise of sympathetic pressures.

By declaring antiunion contracts void as against public policy, this statute made inducing breaches of so-called "yellow dog" contracts nonenjoinable. It also made it difficult to procure injunctions even in those situations where union conduct was not made nonenjoinable. It did this by specifying certain conditions and formalities with which applicants for injunctions must comply before they could get either a temporary restraining order or a permanent injunction. The introductory statement of public policy declared that workers were entitled to organize into unions autonomously, without employer interference. But this was not a substantive part of the statute, being merely the "sentiments" of congress.

The Norris-LaGuardia act operated only to restrict the power of federal judges to issue injunctions in cases properly before their courts; but it was copied in more than a dozen states. None of these statutes, except that in Wisconsin, purported to make lawful for all purposes the self-help pressures in the allowable area of economic conflict. But the labour injunction had become the only effective legal remedy available to employers against the organizational economic pressures of unions. With this remedy gone, employers anxious to prevent the growth of unions were compelled to resort to direct economic resistance and reprisals against unions and workers. Consequently industrial conflict became intensified over increasingly broad areas. In the National Industrial Recovery act (NIRA) of 1933, sec. 7(a) declared that workers had a right to organize without interference from their employers. Although there were no sanctions underlying this directive, a board was set up to make determinations in accordance with such policy. Because of this, employers became apprehensive and to forestall popular demand for unions, many set up company unions called employee representation plans, dominated by management. The NIRA was declared unconstitutional in 1935, but these employee representation plans survived long enough to become the hard core around which industrial unionism was started in 1936.

2. Railway Labor Act of 1934.—In 1934 congress passed an amended Railway Labor act that guaranteed to railroad employees the right to form autonomous unions free from management interference, establishing a board to administer these guarantees. Also, it put teeth into the former method of adjusting grievances and of settling bargaining disputes. The president was empowered to defer imminent strikes pending the investigation and recommendation of special emergency boards. And the act said that any union selected by a majority of the employees voting in an election would have exclusive bargaining representational rights over all employees in the unit in question.

3. Social Security.—Next came developments well established in Europe but until the 1930s untried in the United States. The devastating impact of the great depression, with its distressing decline in employment that necessitated organized government relief and make-work projects, brought the Social Security act and the Railroad Retirement act into being. The former was designed to provide pensions for retired workers and in other ways to lessen the economic insecurity of old age. The part most closely affecting workers, however, was the unemployment compensation feature. This provided a cushion against the economic hazard of unemployment just as the workmen's compensation acts alleviated the hazards of industrial injuries. This part of the social security program is financed through federal taxation on employers. But it is administered under separate state laws enacted in conformance with general standards stipulated by congress. The tax funds are then turned over to the states for distribution as benefits.

During the 1950s supplementary unemployment benefits (occasionally called guaranteed annual wage provisions) were negotiated in several collective agreements and most state unemployment compensation acts were modified or were interpreted to allow laid-off employees to accept benefits from both sources. The Railroad Retirement act provided for compulsory pensions for retired workers of all instrumentalities under the jurisdiction of the Interstate Commerce commission. The original enactment was declared unconstitutional but was immediately replaced by the present Railroad Retirement act. There was also enacted a railroad unemployment insurance act, to achieve for railroad workers what the unemployment compensation acts do for employees of industry in general.

4. National Labor Relations Act of 1935.—The most important of the Roosevelt administration's—or the New Deal—labour legislation was the National Labor Relations act (NLRA) of 1935, usually called the Wagner act. Its stated purpose was to free interstate commerce from the disruptive effects of organizational strikes by eliminating the causes of such strikes—that is, employer interferences with the autonomous organization of employees into unions. But this statute may have been adopted as an inflationary device to combat depression by creating strong unions which would achieve high wages and shorter work weeks through collective bargaining, thus providing more purchasing power and jobs.

Its basic provision, sec. 7, guaranteed employees the "right to self organization, . . . to bargain collectively through representatives of their own choosing, and to engage in concerted activities for the purpose of collective bargaining or other mutual aid or protection." Section 8 set forth five unfair labour practices of employers which were to be prohibited: (1) interferences with attempts by employees to form and join independent unions; (2) fostering, domination and control of dependent unions; (3) dis-

crimination, such as discharge, against employees because of their interest in unions, with a proviso that discharge for refusal to join a union under a valid closed- or union-shop contract was privileged —a closed shop being one in which only union members may be hired, and a union shop being one in which anyone may be hired, although everyone must join the contracting union to retain his job; (4) retaliation against employees for testifying or participating in proceedings under this act; and (5) the refusal to bargain in good faith with the union representing the employer's workmen. The 1935 NLRA created no unfair labour practices of unions, containing no sanction against them at all. A board of three—the National Labor Relations board (NLRB)—was established to hear complaints under sec. 8 as well as to dispose of issues raised in connection with organizational and representational matters. This board could issue cease and desist orders and also order affirmative remedies such as reinstatement of discriminatorily discharged employees, with or without back pay, as well as other acts necessary for the correction of certain types of employer conduct in violation of sec. 8. The board had no power to enforce its orders directly. Such orders were reviewable by a federal circuit court of appeals, which issued an order of enforcement if the record were found to sustain the board's action. If it did not, the board's order was denied enforcement. Noncompliance with the court's judgment enforcing an order was treated as contempt.

Section 9 of the act set up an elaborate representation procedure under which the board assisted employees with the formalities necessary for organization into unions. First, the board designated an appropriate unit of organization—on a departmental, plant- or company-wide basis. Then it could hold elections to decide whether or not a majority of the employees in such bargaining unit desired to organize at all, and if so, to choose a specified union. An election was not always necessary, an employer being free to recognize and bargain with a union at any time if he was convinced that it was the choice of a majority of his employees. Whether a union was elected and certified by the board, or was informally recognized, it became the employer's duty to bargain with it in good faith. When such bargaining culminated in a collective agreement, the board's powers theoretically ceased, since it had no jurisdiction to enforce agreements. But the board could intervene at any time to prevent discrimination and other conduct in violation of sec. 8. The board's dispositions under sec. 9 were not subject to direct judicial review, since they were not "final orders." A rival union dissatisfied with board dispositions under sec. 9 had no recourse at all unless it could persuade the employer to refuse to bargain with the certified union. Then review of what the board had done under sec. 9 would occur incidentally in connection with complaint proceedings against the employer for his refusal to bargain.

The effective choice of a union in a particular bargaining unit was made by a majority of the employees actually voting, as in ordinary political elections. And a union certified to an employer became the exclusive bargaining representative of all of the employees in the unit in question, whether or not they belonged to the union. Hence it was illegal for the employer to deal with individual employees in the unit concerning terms and conditions of employment.

5. Changing Constitutional Concepts and Union Policies.—When the National Labor Relations act became law, many employers refused to comply with the first board orders, believing that the statute would be held unconstitutional. But times were changing and a sharp division occurred on the supreme court concerning the application of traditional constitutional principles. Early in 1937 the supreme court upheld a state minimum wage law, thus reversing a historical trend. Then it declared valid the Wagner act and the social security legislation. For the first time congress and state legislatures seemed free to regulate by law the relationship between employers and employees, in spite of the constitutional concepts of due process and liberty of contract. At the same time the supreme court revised its notions of the jurisdiction of congress to legislate on such matters, construing its power over commerce among the states as broad enough to warrant regulation of what had traditionally been regarded as matters of only local importance, such as manufacturing and mining.

Under the Wagner act unions began to form in industries where they had never existed. In 1936 the Congress of Industrial Organizations (C.I.O.) was established, with its various member C.I.O. unions; and the American Federation of Labor (A.F. of L.) was faced with its first real competition. The Wagner act completely revised union organizational techniques. Previously unions had brought pressure on employers, compelling them to grant recognition regardless of their employees' wishes. Now, however, what the employer wanted or agreed to was no longer important. Indeed, if he influenced the choice of unions, or the rejection of any union at all, he was guilty of an unfair labour practice. But the act contained no unfair practices of either workers or unions and unions hence were free to exert economic organizational pressures against employees, even if they disrupted work and thus caused harm to the employers.

The rivalry created between the A.F. of L. and the new C.I.O., heightened by the presence of occasional independent unions, made the National Labor Relations board's task difficult, for it had to designate appropriate bargaining units in accordance with varying types of union economic philosophy, and to hold elections to sort out the conflicting claims. Fortunately the board had a large staff, with regional offices in various key cities all over the nation.

The sudden growth of unions and increase in collective bargaining created the problem of enforcing the resulting agreements. The most cumbersome common-law methods of enforcement prevailed in the courts, procedurally so archaic that they encouraged recourse to the strike as the only practicable method of enforcement. Happily, as a result of government control over collective bargaining during World War II, grievance arbitration was evolved to provide a practical means of enforcing these agreements.

6. Wage and Hour Legislation.—In 1935 and 1936 congress enacted two statutes dealing with government contracts. They were passed on the theory that the United States could spend its funds as it saw fit and could in this way surmount constitutional obstacles by attaching any conditions it pleased to such spending. Thus on government-sponsored building projects and for the government purchase of goods, the Davis-Bacon and Walsh-Healey acts, respectively, established labour standards such as the prevailing union hourly rate, maximum hours of work, etc. But these statutes were rendered completely unnecessary when the Fair Labor Standards act of 1938 was upheld by the supreme court. Very likely they would not have been passed at all had congress then believed that the later Fair Labor Standards act type of law would be held constitutional. Nevertheless, they have remained on the statute books as anachronisms, despite the great annual expense of administering them.

The Fair Labor Standards act was enacted in 1938 in reliance on the new constitutional theories of due process and congressional commerce power. It contained many complicated features in connection with administration, but its principal substantive provisions were a minimum hourly wage, a maximum work week of 40 hours with a penalty of time and one-half for weekly overtime, child labour restrictions and regulations of homework and sweated labour. Also it included sanctions against employers who violated the act: criminal prosecutions, injunctions and recovery by underpaid employees of double payment, with costs of litigation assessed against the employer.

The maximum work week feature was put into effect gradually over a two-year period—44 hours per week the first year, 42 for the second and 40 for the third. While the minimum wage was set at 40 cents per hour, it began at 25 cents for the first year, 30 cents for the next six years (except where raised sooner on recommendation of special industry committees) and then 40 cents. In 1949 the minimum wage was raised to 75 cents per hour; in 1955, to $1; and in 1961, to $1.25. The original act contained a provision for the setting up of industry committees to recommend accelerating the minimum wage to 40 cents per hour or to some intermediate figure. Several such recommendations were acted on by the secretary of labour. The Fair Labor Standards act was part of the New Deal's fight against the depression by creating more purchasing power and jobs. Penalty overtime was

referred to as a make-work device and operated as such, encouraging the employment of additional men in order to avoid payment of time and one-half for overtime work. Many employers decreased work weeks to 40 hours while maintaining weekly take-home pay by voluntarily increasing hourly rates.

The administrator of this act had a large staff but lacked the power to make binding decisions under the statute. His staff mainly inspected books and records of employers to see that the act was being observed. While the administrator issued interpretative bulletins, compliance with his edicts did not protect any employer from liability to employees for back-pay claims if the courts disagreed with his reading of the statute. As a result, the provisions of the statute acquired authoritative definition only in a case-by-case skirmish all the way up to the supreme court. Moreover, it proved difficult to tell exactly who was covered by the terms of the act. While it applied to everyone engaged directly in interstate commerce (with certain exceptions), the act also purported to apply to all employees engaged in the production of goods, etc., for interstate commerce.

The resulting litigation led to many hairsplitting decisions on who was or was not covered by the act, revolving around notions of whether or not congress had exercised complete commerce power to cover all workers possible. Moreover, the supreme court so interpreted the term "work week" that it threatened U.S. industry with litigation for back overtime pay involving literally billions of dollars for time spent by workers between factory portals and the actual job, regardless of tradition and appropriate provisions bargained between employers and strong unions. Congress in 1947 passed an amendment to the act which forestalled such litigation, clarifying the act to obviate the necessity for making such back payments. This amendment also provided protection to employers who in good faith relied on the administrator's bulletins and interpretations of the act. In 1961 congress extended the coverage of the act to about 3,600,000 workers, mostly in retail trade.

C. Federal Antitrust Laws After 1937

While congress in the Norris-LaGuardia act of 1932 and the Wagner act of 1935 had entirely reversed prevailing labour relations policy by officially approving the extension of employee organizations into strong, nationally affiliated unions, the federal antitrust laws remained unchanged. After these new laws were declared constitutional, it became plain that using an antimonopoly act to make union expansion unlawful was ridiculous. For under the prevailing interpretation of the Sherman act, any successful attempt by a union through economic pressure to organize a nonunion shop engaged in interstate commerce, in order thus to eliminate the competition in national markets between union-made and nonunion-made goods, was a violation of the federal antitrust law. Recognizing this paradox, Justice Harlan F. Stone, speaking for a majority of the supreme court in the 1940 *Apex* case, said that the Sherman act should no longer be applied this way. He noted that the object of all labour unions was to keep nonunion-made goods from competing with union-made goods in the same markets. And he declared that attempts to achieve this result by extending organization through economic pressure were not in violation of the Sherman act. The policies of the Norris-LaGuardia and the Wagner acts in favour of economic self-help pressures in extending union power reversed the older view. But the supreme court failed expressly to overrule its secondary boycott precedents under the Sherman act. According to those precedents evidence indicating that a union prevented the shipment of goods to other states by secondary boycott pressures would establish a violation.

A year later, however, in *U.S.* v. *Hutcheson,* the supreme court for all practical purposes placed organized labour beyond the reach of the Sherman act. That case involved a secondary boycott in interstate commerce, and the officials of the union were indicted under the antitrust law. Here the supreme court declared that congress in the Norris-LaGuardia act had overruled the court's 1921 decision in the *Duplex* case, thus revitalizing sec. 20 of the Clayton act and equating its coverage with that of the 1932 anti-injunction act so that the conduct rendered nonenjoinable was not in violation of any federal law—including the Sherman act—under the terms of the concluding clause of sec. 20. Whatever one may think of this odd line of reasoning, the *Hutcheson* case took the nonviolent and nonfraudulent economic activities of the labour unions completely out from under the Sherman act, except where unions were colluding with employers in effecting restraints of commerce which would be illegal for the employers to do unaided. In the meantime, of course, unions acting alone remained subject to the sanctions of the Sherman act where they imposed restraints of trade by conduct not included in that described by sec. 20 of the Clayton act as redefined in sec. 4 of the Norris-LaGuardia act or by any conduct not occurring during the course of a labour dispute as defined in sec. 13 of the latter statute.

Subsequent attempts to draft legislation making the antitrust laws generally applicable to labour unions and to abolish what practically amounts to an exemption in their favour have not been successful because, in pursuing that course, it is difficult to avoid curtailing union objectives and techniques acknowledged to be legitimate. Leading academic authorities believe that labour unions are necessarily monopolistic and that their objectionable activities can practically be prevented only in statutes like the Taft-Hartley act (*see* below), although other academic authorities disagree with this. When the A.F. of L. and the C.I.O. formally merged in 1955, many feared that this merger would result in a concentration of power which could be controlled only by revising and applying the antitrust laws. But such has not been the case, the merger actually having made little perceptible change in power alignments.

D. National Labor Relations Act: Crucial Issues

In the meantime the National Labor Relations board and the federal courts were giving fairly precise definition to the National Labor Relations act. The supreme court upheld the board when it ordered employers to cease engaging in a great variety of practices calculated to discourage employee interest in unions. And it went far in allowing the board to impose affirmative remedies, even upholding its requirement that employers hire, with back pay, applicants for jobs who were denied employment because of their union interests. One of the most important developments concerned the difference between so-called "protected" and "unprotected" activities. Section 7 of the NLRA guaranteed to employees the right to form unions and "to engage in concerted activities for the purpose of collective bargaining or other mutual aid or protection." The board took a very broad view of the types of conduct employees might concertedly engage in while remaining immune from employer retaliation and reprisals, such as discharge. Participation in sit-down strikes and seizures was a good example. Although a few prominent educators and outstanding liberals defended the sit-down seizures of 1936–37 as lawful, these acts were obviously illegal invasions of property interests. The Fansteel company discharged employees who had participated in a sit-down seizure and the NLRB ordered their reinstatement with back pay after finding that the company's unfair labour practices had provoked the strike in the first place. But the U.S. supreme court held the order unenforceable, declaring that the NLRB did not have the discretionary power to reinstate workers who had engaged in such illegal conduct. In other words, such activity was not protected under the guarantee in sec. 7. The board had incorrectly assumed that congress had given it discretion to reinstate discharged employees whenever it believed such remedy necessary to effectuate the policies of the act.

Eventually the board itself developed precedents indicating that concerted attempts by employees to make their employer do something illegal, such as granting a wage increase without government approval during a period of wartime controls or disregarding the board's certification of another union, were unprotected so that the employers might with impunity discharge the employees concerned. But the line between protected and unprotected recourse to concerted economic pressures, such as refusals to do the work assigned or to follow schedules imposed by the employer and publicly cheapening and belittling their employer's product during a strike, remained a close one. The federal courts generally took the view

that employers could discharge employees who behaved outrageously, although not necessarily illegally, while engaging in concerted union activities.

An extremely important aspect of the NLRA was the expanded scope of the employer's duty to bargain in good faith. This duty was originally imposed to prevent employers from discouraging newly organized workers by refusing to undertake serious bargaining with their unions. It was ultimately used, however, to expand the subject matter of collective bargaining by increasing the number of items that had to be submitted to bilateral control. Probably this duty to bargain originally had reference only to traditional contractual items such as wages, hours, seniority and the like. Now it was applied to matters over which employers preferred and frequently needed exclusive control, such as pensions and merit increases. As a result of this development, unions have eventually secured bilateral control over matters over which they otherwise would probably not even have risked calling strikes. Where unions are strong this duty of employers to bargain in good faith seems no longer to be needed, although its original purpose is still served in areas where union organization has lagged.

Another development concerns the expansion of employers' freedom to discuss unionism with their employees. At first employers were held to have committed an unfair labour practice if they commented to their employees on unions at all. But after recognizing peaceful picketing of unions as constitutionally protected free speech, the U.S. supreme court developed an area of immunity for employers discussing unionism with their employees, as long as they refrained from coercive or threatening language and did not simultaneously engage in any overt antiunion conduct which could lend a coercive implication to otherwise innocent speech. One aspect of this matter was the so-called "captive audience." When an employer paid his employees to sit and listen to a speech criticizing unions, which in itself was not violative, and then refused to let the interested union reply to the same audience, the board held that the employer's speech was an unfair labour practice, especially if it was timed just before a board election. The Taft-Hartley amendments modified this captive audience doctrine so that such speeches, if inherently innocent, could not become unfair labour practices simply because the employees were forced to listen. But in spite of this amendment, the board continued the doctrine in practical effect by setting aside elections as invalid where the union was rejected in balloting that occurred immediately after an employer's speech to a captive audience, if the platform was not shared with the union.

E. Picketing as Free Speech

The NLRA spurred unions to extend organization to all units of all industries—not only to build up their financial and political strength but also to standardize working conditions and thus to eliminate the undercutting influence of lower nonunion terms of employment. As yet nothing existed in federal statutes restricting the use by unions of economic organizational pressures; and a few states had already conceded the legality at common law of the favourite union organizational techniques: peaceful stranger picketing and the secondary labour boycott. Stranger picketing occurs when a union moves in on a plant where it has no members, in an attempt by peaceful picketing to persuade the employees to join the union and strike or otherwise to co-operate in organizing the picketed employer. And by peaceful picketing is meant picketing which is nonviolent, nonmass, nonlibelous and nonfraudulent.

While some courts at common law recognized a broad area of permissible economic conflict, others took a very narrow view. In 1937 the U.S. supreme court in a 5–4 decision upheld the constitutionality of the Wisconsin anti-injunction statute, modeled on the Norris-LaGuardia act. There it held that a state had the power to declare peaceful stranger picketing lawful when it was used to promote the economic ends of unionists through extended organization. Most state courts still took the view that secondary boycott pressures were illegal; and this supreme court decision indicated that they also thought peaceful stranger picketing to be tortious at common law. Indeed, the close vote in that case showed how doubtful it was in 1937 that a state legislature had the constitutional power to make peaceful organizational picketing lawful.

Yet three years later, in 1940, the whole approach to picketing underwent a fundamental change. In the *Thornhill* case the U.S. supreme court declared that peaceful picketing was constitutionally protected free speech and that state statutes and court decisions holding such picketing unlawful and enjoining it were unconstitutional under the 14th amendment. While this notion was not new, it had never been taken very seriously by the legal profession. This drastic change must be regarded as part of the hysteria of the times or as a calculated attempt by the supreme court to impose on the states a uniform labour policy, as far as giving labour unions a free hand to extend organization was concerned, where congress had failed to do so. After a stormy career this doctrine collapsed, for all practical purposes, in the 1949 *Giboney* case and in a series of supreme court decisions handed down in 1951. In those decisions it was held that, although a state could not make peaceful picketing illegal, it could enjoin it where the object of the picketing union was to compel the picketed employer to do something illegal or contrary to the public policy of the state.

A vital blow to the *Thornhill* doctrine had occurred when the U.S. supreme court held that the use of picketing to exert secondary boycott pressures in violation of sec. 8(b)(4)(A) of the amended NLRA, title I of the Taft-Hartley act, was illegal and enjoinable. And in the 1957 *Vogt* case it became apparent that virtually nothing remained of the *Thornhill* doctrine except a constitutional prohibition against statutes or court decisions outlawing peaceful picketing as such, regardless of the context in which it occurs.

F. Taft-Hartley Act of 1947

In 1947 congress passed the Labor Management Relations act, commonly known as the Taft-Hartley act. Of the five separate titles to this statute, title I, the amended National Labor Relations act of 1947, proved to be the most important.

The 1947 NLRA basically modified the act of 1935. It increased the board to five members and made the general counsel independent of the board, giving him alone the function of filing and prosecuting complaints. This change made the board a little more like a labour court, placing emphasis on its judicial function and relieving it of the former charge that it acted as prosecutor, judge and jury.

1. Union Unfair Labour Practices.—The most notable change was the introduction of union unfair labour practices. Under sec. 8(b), unions would commit unfair labour practices if they engaged in the following conduct: (1) coercing or restraining employees in their autonomous choice of a union or employers in their selection of bargaining representatives for themselves; (2) compelling an employer to discharge any employee under a union-shop contract for any reasons other than the nonpayment of initiation fees or reasonable monthly dues; and (3) refusing to bargain in good faith. Originally the board read the first part of sec. 8(b)(1) to mean the use of force or threats of violence against employees; but later on it said that economic coercion indirectly focused on employees by peaceful picketing of the employer, which caused him loss of business and thus threatened the economic security of his employees, was a violation. The federal circuit court of appeals, however, refused to enforce the board's cease and desist order; and in 1960 the U.S. supreme court agreed with the federal circuit court that no violation had occurred, concluding that congress had had in mind outlawing only the use of force or threats of violence in this provision. In the meantime, however, congress had again amended the NLRA in 1959, and the supreme court implied that under this new measure (discussed below) union conduct of this type would probably be an unfair labour practice and hence preventable. Section 8(b)(2) has been used to declare unlawful a variety of union attempts, by provisions in collective agreements and otherwise, to give work only to union members or to confer employment advantages of any kind upon workers who have belonged to the union for the longest period of time, or in any other way to favour loyal union members as against others, so as to place a premium on union membership. Of course, allowance is made in the amended statute for the union shop and law-

ful arrangements thereunder conditioning retention of employment on membership in the contracting union. As for sec. 8(b)(3), this ambiguous requirement of good faith bargaining by unions has not been clearly understood. The board held that sporadic work stoppages and harassing tactics by unions to promote bargaining of collective agreements were violations, but the courts have held otherwise, the U.S. supreme court's decision on this point being handed down in 1960. Hence about all this provision means is that where an agreement already exists, then according to sec. 8(d) which defines good faith bargaining, neither party shall terminate nor modify the agreement except in accordance with stated conditions. There is, therefore, little if any resemblance between the employers' duty to bargain and that which congress purported to impose on unions.

Section 8(b)(4) established the most important of the restrictions on unions. Subsection A made it an unfair labour practice for a union to exercise pressure on any employer *through his employees* to cause him to cease dealing with another employer as a means of focusing compulsive pressure on the latter employer. This is the secondary labour boycott. But it was early established that this subsection A would not be violated if the neutral (or secondary) employer on request agreed to help the union by ceasing to deal with another employer. For according to the wording of the statute, the initial pressure on the neutral or secondary employer must be exercised against him through his employees in order to show a violation. This initial pressure might be created through peaceful picketing, which the supreme court in this particular context held not to be constitutionally protected free speech. Subsection A proved to be so ambiguous that it lent itself, particularly in the building industry, to the prohibition of union activities long recognized as legal and not thought of as traditional secondary boycotts at all. The 1959 Landrum-Griffin amendments (*see* below), while probably intended to clarify this ambiguity, did not do so. Two notable exceptions to the stricture against secondary boycotts were developed. Thus, where a union lawfully pickets a primary employer but can do so only at premises where another employer is also located, and an incidental effect of the picketing may or does compel the other employer to cease relations with the primary employer, the union will not be in violation (1) if such result was not intended; (2) if there was no other place the picketing could have occurred; and (3) if the union made it plain by signs, etc., that it was picketing only the primary employer. Another exception occurs where the union has called a strike against the primary employer who then farms out his struck work to another employer. If the union pickets this second employer and succeeds, through his employees, in compelling him to stop doing business with the primary employer, the board and federal courts have held this not to be a violation because the second employer is an ally of the first, and in effect is identified with him, so that the picketing is thus regarded as having been confined in legal effect to the primary employer.

Because co-operation of the secondary employer in agreeing not to continue business relations with the primary employer could lawfully be secured by the union on request *after* the primary dispute arose, unions began to secure ahead of time in collective agreements promises from employers to cease on request to do business with or to use the products of other employers, when, as and if the union in the future should have disputes with such other employers. These were called "hot cargo" clauses. In 1958 the U.S. supreme court held that such advance consent in the agreement did not render the union immune from having violated subsection A where, after the secondary employer refused to abide by his agreement, the union forced him to cease relations with the primary employer when it notified his employees to hold him to his promise by not performing the work necessary for continuing such relations. But these "hot cargo" clauses were not held to be invalid or against public policy by the supreme court. Hence they arguably were enforceable in the courts. Before the implications of such a possibility were realized, however, congress in the 1959 Landrum-Griffin act made it unlawful—with exceptions for two industries—for employees and unions to enter into such agreements or for a union to bring pressure against an employer forcing him to enter into one. Subsection B of the 1947 act forbade secondary pressures to force one employer to cease dealing with another employer in order to compel the latter to recognize and deal with the union, unless such union had been certified by the board to the latter employer. Subsection C made it unfair for a union to compel recognition from an employer to whom another union had already been certified by the board. And subsection D outlawed the jurisdictional strike, where union X strikes a general contractor who assigned certain work to the members of union Y, each union contending that its members have sole jurisdiction over the right to do such work. The board was empowered in sec. 10(k) to resolve such jurisdictional disputes and to award the work to the appropriate group. Title III of the Taft-Hartley act made the last four union practices the bases of statutory actions for damages against unions by injured employers. And in dealing with complaints concerning these four practices, the board was instructed to secure injunctions to prevent their continuance, pending its hearing and disposition of these alleged violations. Section 8(b)(5) made it unfair for a union acting under a lawful union-shop contract to set excessive initiation fees and dues; and sec. 8(b)(6) prohibited union pressure to make an employer pay an exaction for services not performed. This proved to be an almost futile attempt to stop "featherbedding" or the required payment for waste time, unnecessary employees or duplicated work.

2. Employer Unfair Labour Practices.—Section 8(a) dealing with employer unfair labour practices remained substantially as it was under the Wagner act, with one major exception—in sec. 8(a)(3). Under the old subsection 3 an employer might agree with a union to condition securing employment on membership in the union under a valid closed-shop contract. The new subsection in the 1947 act, however, outlawed the closed shop. At first under the amended act a union shop was permissible only after a majority of the workers in the bargaining unit had authorized the union in a board-conducted election to bargain out such a contract. But this union authority election was made unnecessary by a 1951 amendment. In sec. 14(b) of the act, however, congress permitted state laws against any form of union security to take precedence, so that in the territorial limits of a state which outlawed all union security, a union-shop contract would be unlawful and an employer engaged in interstate commerce would not be privileged by the terms of an otherwise valid union-shop contract negotiated under sec. 8(a)(3) to discharge an employee who refused to join a union. In the early 1960s there were about 18 of these state laws, commonly known as right to work statutes. Although the unions attacked the constitutionality of these statutes, they were upheld by the U.S. supreme court on the ground that there is no constitutional right to have a closed or union shop. In 1952 congress amended the Railway Labor act to allow railroads and their unions to make union-shop contracts. The supreme court held in the 1956 *Hanson* case that this federal provision for union security took precedence over conflicting state "right to work" statutes, since sec. 14(b) of the Taft-Hartley act did not apply to the railroads.

3. Other 1947 Changes in the NLRA.—Section 8(c) of the 1947 NLRA purported to eliminate as conduct in violation of sec. 8(a) and 8(b) the expressing of any views or arguments in the usual verbal forms. This provision had little, if any, effect on the state of the law as it was prior to 1947, although arguably it contributed to the subsequent modification in the "captive audience" doctrine.

Section 9, dealing with matters concerning representation, underwent some changes. Thus, an employer might settle grievances directly with an individual employee, as long as certain formalities were observed; the facilities of the act were no longer made available to supervisory workers; and the board was given less of a free hand than before in designating appropriate bargaining units. New standards were set governing the eligibility of workers or strikers to vote in board elections and the disposition of runoff elections. Also, for eligibility in using sec. 9 procedures unions were required to file certain fiscal information with the U.S. department of labour, and their officers had to swear that they did not belong to the Communist party. These requirements were abolished in the 1959 Landrum-Griffin act and others were substituted. The balance of

the amended NLRA was much the same as the original Wagner act, with a few modifications concerning the board's powers of enforcement and judicial review of board orders.

4. National Emergency Strikes.—Title II of the Taft-Hartley act set up a procedure for handling so-called national emergency strikes. It established the Federal Mediation and Conciliation service to facilitate adjustment of labour disputes which threatened widespread disruption of commerce. Thus if the president feared that a big strike would tie up the nation's economy, he might appoint a special board to investigate and to report the facts to him, although this board was not to make any recommendations. Thereafter the president might conclude that there was an emergency and direct the attorney general to secure a court injunction against continuance of the strike. This injunction could last 80 days, after which it would be dissolved. The strike could then be resumed if the union so wished and the dispute remained unsettled. Before the 80 days were up, however, the NLRB was required to hold an election among the striking employees to determine whether or not the employer's last offer was acceptable to them. None of this applied to interstate carriers, since they were covered by a separate emergency procedure in the Railway Labor act. The emergency provisions of title II have been invoked about 15 times and have proved moderately effective. The first real court test of title II occurred in the 1959 steel strike, when the U.S. supreme court upheld the power of the president and the special board to perform their prescribed duties and of the district court to issue an injunction stopping the strike for 80 days. This strike was settled before the injunction was dissolved. But the incident left in its wake the general feeling that something more effective than the procedure set up in title II was necessary in order to protect the national economy from a repetition of such a widespread strike in the future.

5. Private Actions by and Against Unions.—Title III of the Taft-Hartley act in sec. 301 allowed actions between unions and employers in the federal courts for breaches of contract. In the 1955 *Westinghouse* case the U.S. supreme court held that this did not permit a union to sue an employer in order to enforce a clause in a collective agreement which provided for some term of employment uniquely personal to the employees as such. Examples would be clauses providing for wages, holiday pay, seniority advantages such as promotions and vacations. According to the supreme court, actions to enforce these provisions would have to be brought by employees themselves and could not be prosecuted by a union under sec. 301. These actions by individuals to enforce the terms of collective agreements would have to be brought under the common law as it existed in the various states. According to such common law, collective labour agreements were not regarded as true contracts but rather as "gentlemen's agreements" or treaties, not enforceable in themselves. This was partly because labour unions had no legal personality at common law to become parties to contracts or lawsuits, although this has now been changed by statutes in most states and in federal legislation. At any rate, under existing common law, individual employees whose terms and conditions of employment are fixed by a collective agreement may bring actions to enforce these terms as third-party beneficiaries of such agreements. Indeed, it is now generally recognized that such terms and conditions, bargained out between employers and unions, are incorporated into the individual contracts of employment of the various workers in the bargaining unit.

Returning to the NLRA of 1947, however, the U.S. supreme court in the 1957 *Lincoln Mills* case held that sec. 301 did create a new substantive federal right to sue in a federal court for breach of a collective agreement and that a union could sue thereunder to enforce a promise in favour of the union, as such, in contradistinction to one creating personal rights only in employees. Examples of promises to unions, as such, are union-shop clauses, the check off of union dues and arbitration provisions. Thus a union, by suit in a federal court under sec. 301, could compel an employer to comply with an undertaking to arbitrate unsettled grievances arising out of the agreement. And this was so even when the unsettled grievances involved provisions concerning the uniquely personal rights of employees. The supreme court instructed the lower federal courts to evolve a body of law and rules to govern litigation of this sort, a venture that has so far created more complexities than solutions. At any rate, it is apparent that whenever a collective agreement provides for the arbitration of unsettled grievances, the union can achieve through arbitration the enforcement of contract provisions which it cannot sue upon directly under the rule of the *Wèstinghouse* case. The arbitration of unsettled grievances arising under collective agreements has become a far more important means of enforcing the provisions of these contracts than have actions at law brought by individual employees directly against the employers. Such arbitration is private and is voluntarily agreed to by the parties. They select their own arbitrators who act for a fee, the parties sharing the fee and all expenses equally between them. All grievances raised by individual employees under the agreements, which are settled during the earlier steps of the contract grievance procedure, are thus submitted to arbitration and are usually disposed of within a few weeks of the time they are heard, the awards usually being accepted as final and binding on the parties.

Courts will enforce awards against employers who refuse to obey them if the arbitrator has not exceeded his jurisdiction or acted capriciously. If the employer wins the arbitration award, the grievance is usually dismissed and there is nothing to enforce, since a grievance ordinarily is an attempt to get something from the employer that he was obliged to give under the contract. In the absence of statute, courts would traditionally not enforce undertakings in contracts to arbitrate disputes that might arise after the contract was made. But sec. 301 of the 1947 NLRA has changed this wherever the employer is engaged in interstate commerce.

Grievance arbitration has for all practical purposes supplanted attempts by individual employees to enforce collective agreements through direct action in the courts. Such litigation is costly, time consuming and fraught with legal technicalities. Of the thousands of arbitration awards continually being handed down, very few have to be taken to the courts for enforcement. And a sort of common law of industrial relations is steadily accumulating in such cases, many of which are published. These reports are studied by employers and unions and have a real influence in the future bargaining between the parties. While most arbitrators are reluctant to follow such precedents where the language differs from contract to contract and the conditions underlying different grievances vary, nevertheless trends toward uniformity of provisions are perceptible in this fast-growing and intricate development. And with such increasing uniformity, a sort of *stare decisis* or rule of law governing their application may eventually evolve.

Section 302 of title III placed extensive restrictions on payments to union representatives, apparently in an attempt to stop graft and bribery. Amendments to this section in the 1959 Landrum-Griffin act were included to plug up a few loopholes in the previous measure and generally to broaden its coverage as well as to tighten up the existing restrictions. Another provision forbade unions to contribute money to the support of political candidates; and under this provision the U.S. supreme court held in 1957 that it was illegal to use union funds to sponsor television broadcasts intended to influence voters in electing candidates for congress. Three dissenting justices, however, contended that this reading of the provision rendered it an unconstitutional invasion of freedom of speech. A concluding provision of title III forbade government employees to strike, on pain of immediate discharge if they did so, although the paradox remains that the largest employer of all—the federal government—which has set the tone for extensive organization and collective bargaining throughout industry, still fails to practice for its own employees what it preaches for those of others, and makes available no device allowing them to air legitimate demands or grievances or to have them arbitrated. Title IV of the Taft-Hartley act provided simply for the creation of a joint committee of industry and labour representatives to study and report periodically on basic problems of labour relations; and title V of the act consisted merely of a few definitions.

G. Other Developments

1. Federal Pre-emption *v.* States' Rights.—The expansion of federal jurisdiction under the commerce clause of the U.S. con-

stitution greatly increased the importance of federal pre-emption over the control of labour relations law. Indeed, this trend led to a uniform labour law policy throughout all industry engaged in or affecting interstate commerce. Under it the U.S. supreme court declared local state legislation in conflict with the prevailing federal labour law to be invalid. But it recognized the validity of state laws covering matters which did not affect interstate commerce or, when they did, where congress expressly permitted the states to apply conflicting rules within their territorial limits. Several states passed labour relations laws analogous to the NLRA, including prohibitions against stated unfair union labour practices. Others passed laws forbidding employees or unions to strike without following certain procedures, such as notifying state mediation officials, sanctioning the strike by majority vote, etc. Several states enacted statutes outlawing local strikes in public utilities, where the company fell under federal jurisdiction but the strike was isolated and had only a local disruptive effect. These laws substituted for the strike compulsory arbitration of the demands in issue. Again there were instances where state labour relations boards, with state court approval, disposed of representational matters in plants falling under the federal jurisdiction when the NLRB had not been asked to intervene or, because of some policy of its own, had refused to act when requested. There were instances when state courts directly enjoined union conduct, such as peaceful picketing that was causing harm to the picketed employer or was possibly in violation of some part of sec. 8(b) of the NLRA of 1947. Also there were cases where state courts enjoined violence by unions or made unions pay compensatory and/or punitive damages to employers or workers whom they had treated violently. The U.S. supreme court finally took the position that the states were not free to interfere in any way with purely economic concerted activities of unions which caused harm to employers engaged in interstate commerce. That was because such conduct was protected under the guarantees of sec. 7 in the NLRA. Nor would it allow the states to stop union conduct which was in violation of sec. 8(b) of the NLRA. That was because the NLRB alone had jurisdiction to act. And whether or not peaceful concerted union activity was either protected under sec. 7 or prohibited under sec. 8(b) was for the NLRB alone to determine in the first instance. However, if the union conduct involved violence of any kind, or might be rectified only by some peculiar remedy which the state alone could provide, then the local enforcement agency was not pre-empted from acting.

During most of the 1950s the NLRB refused to handle certain cases arising under the NLRA and admittedly within the federal jurisdiction. These were situations where the business of the employer concerned fell below a certain annual dollar volume. The NLRB refused to handle these cases because, due to lack of funds or for other reasons, it was unable to process them. At the same time, because these cases were within the federal jurisdiction, the U.S. supreme court would not allow the states to process them unless they fell into one of the special categories mentioned above. Hence, with the exception of a very few situations in which the supreme court required the board to take jurisdiction, there were a number of small cases that were not being processed at all—that fell into what was called "no man's land." This gap was closed by the 1959 Landrum-Griffin act when congress provided that all cases rejected by the board under its monetary standards as of a certain date could be processed by state courts or agencies, apparently in accordance with their own law and without regard to the protection and prohibitions set up in the federal statute.

In spite of this change, the problem of federal pre-emption remains as important as ever. States are continually trying to curtail the use by unions of peaceful economic coercion which causes harm to employers. Most of this union pressure is exerted through peaceful stranger picketing; and formerly the unions relied for protection from state action on the *Thornhill* doctrine, under which peaceful picketing was held to be constitutionally guaranteed freedom of speech. But when that doctrine virtually collapsed, the U.S. supreme court provided a similar but far more effective protection for picketing and allied union pressures. By regarding them as concerted activities under sec. 7 of the NLRA, it pre-empted the states from imposing controls over conduct which fell within the federal jurisdiction. The scope of this protection to unions is very wide. It shields unions from state action not only when their conduct is protected under sec. 7 of the NLRA and whenever it is in violation of sec. 8(b) of that act. It does this also by implication, when the union activity is neither so protected nor so prohibited, as long as it is not violent or is not the sort of conduct with which the National Labor Relations board is usually concerned.

2. Internal Union Affairs at Common Law.—The common-law tradition has generally been for the courts to refrain from meddling with the internal affairs of unions. Courts will interfere when disputes arise concerning the disposition of union property. But they seldom lend assistance to ousted union members except when property interests are involved, and then only when the ousted member has exhausted the remedies provided in the union's internal laws or can show an arbitrary denial of due process in administering such remedies. At the end of the 1950s unions could still generally exclude anyone from membership, for any reason, except under a few state laws prohibiting exclusion on grounds of race, creed or national origin. Under modern statutes unions selected by a majority of the employees voting in a bargaining unit are given the exclusive right of representing all employees in such unit, whether or not they belong to the union. Since conferring such exclusive right by statute is a state act, unions arguably should not be allowed to exclude any employees from membership on arbitrary grounds. Certainly it is recognized that a union enjoying statutory powers of exclusive representation cannot maintain a closed union and at the same time make the securing or retaining of employment conditional on membership in the union, thus denying employment to those whom it did not want as members. But under union security agreements unions still seem free to exclude certain employees from membership as long as they do not try to get them discharged because of nonmembership. Some labour organizations have created auxiliary unions, thus affording a second-class nonvoting membership—an arrangement which is obviously a device to get the dues of employees not wanted as members while excluding them from any participation in the union's affairs.

Most courts, including the U.S. supreme court, have continued to hold that employees excluded from unions representing them were adequately protected if they were not also excluded from their jobs. They said that such employees sufficiently enjoyed all the rights they were entitled to when they originally voted for or against the contracting union (or for another union) in the election to select the bargaining representative. The trouble with this argument is that members of a minority group excluded from membership in the contracting union do not have any voice in shaping the union's policies, although their interests are entirely under its control. There has been some judicial authority to the effect that federal and state statutes endowing unions with exclusive bargaining representation should be held unconstitutional unless all members of each bargaining unit may participate in running the union's affairs by holding voting memberships in the union. This was because modern unions existing under state or federal statutes amount in effect to public agencies and their exercise of statutory powers amounts to state activity. However impressive this analogy may seem to some, it has only the sparsest support officially. Even the U.S. supreme court has evaded facing this issue squarely.

3. Internal Union Affairs and the 1959 Landrum-Griffin Act.—The revelations following the investigations of the McClellan committee of the U.S. senate during the late 1950s indicated serious maladministration of various kinds within unions. Existing laws seemed inadequate to prevent or control this. Hence congress enacted the Labor-Management Reporting and Disclosure act of 1959, commonly called the Landrum-Griffin act. This consisted of seven titles, the first six of which contained important strictures on the previously unchecked power of union officials over the funds and internal affairs of unions as well as over the rank and file through the suppression of democratic controls within the organizations. In a statement of public policy congress noted that breaches of trust, corruption and disregard of the rights of indi-

vidual employees required further legislation to promote the responsibility of unions in managing their internal affairs. Title I of the 1959 act purported to be a bill of rights for the rank and file of labour unions, guaranteeing each individual equal voting rights and freedom of speech with respect to the operation of the union's affairs. Proper allowance was made, however, for the practical necessity of a union to deal with the conduct of an individual member which interferes with the union's legal or contractual obligations. It set forth procedures, including the secret ballot, for establishing dues, initiation fees and assessments; and it preserved the right of individual members to sue the unions and its officers after stated recourse to internal union procedures had been observed, also laying down rules governing union discipline of members. Also it required that every union shall make available to each member a copy of the controlling collective agreement and should acquaint him with the provisions of the 1959 act.

Title II required every labour union to adopt a constitution and bylaws and to file copies of them with the secretary of labour, together with elaborate fiscal statistics, including information about dues, fees, receipts, salaries, loans, participation in pensions and insurance plans, etc., and also about all rules in any way prescribing or limiting member participation in union affairs, as well as measures for discipline, such as fines and expulsion from membership. This title repealed sec. 9(f), (g) and (h) of the 1947 NLRA. It also required reports by labour union officials on their stock and bond interests and receipts from all sources in connection with labour relations work. These provisions were aimed at the sort of collusion between labour leaders and employers which investigation indicated was likely to result in the "selling out" of the rank and file membership by the officials of the union—usually through bribery coming from employer sources. Likewise, employers were required to file information about any payments or loans to any union officers or to anybody on their behalf, and information concerning any expenditures designed to restrain or coerce employees in connection with collective activities or to secure information concerning them, including complete disclosure of arrangements with labour consultants. This is not designed to cover arrangements where attorneys or others, including full-time managerial employees, undertake to and do handle for employers the negotiation with unions of regular collective agreements or grievance and arbitration issues, as well as the handling of cases before administrative boards and the courts. There are provisions governing the retention of this information for a certain time and for making available the contents of these records to the general public. Part of this title includes criminal sanctions against violators and empowers the secretary of labour to secure compliance in civil proceedings. Title III includes elaborate provisions governing the trusteeships over local unions that were originally devised to give an international union control over a local union that was either insolvent or was irresponsibly run. This device ultimately came to be used by unscrupulous international officials to deny democracy to the members of local unions and to suppress attempts by local officers and members to oppose the oppressive tactics of international officials and to frustrate their attempts to plunder local treasuries and to mismanage local affairs to their political and pecuniary advantage. This title undertook to provide legitimate purposes for trusteeships and to indicate how they could be established and operated in such cases. The necessary sanctions were enacted to make this title operative.

Title IV provided for honest elections within unions, laying down elaborate rules and standards and empowering the secretary of labour, on complaints from union members, to investigate alleged departures from such standards and, in appropriate cases, to have the courts set aside elections, remove the wrongfully elected officers and order new elections, as well as to certify the results of the latter to those concerned.

Title V set forth the fiduciary relationship existing between the officials and the members of unions. It also stated that when any member alleges a violation of the fiduciary duty and demands an accounting, which is refused, he may go to court and secure an order for such accounting. The court was empowered to allot part of the recovery against such officers, if any, as legal fees to the members in question. This title included elaborate bonding provisions for union officers. Also it forbade unions to lend union officials more than $2,000; and it disqualified Communists and certain ex-convicts from holding specified offices in unions or acting as labour consultants until a certain number of years have elapsed, with appropriate criminal sanctions to enforce these provisions. This title also amended sec. 302 of the Taft-Hartley act to broaden its scope and tighten its restrictions against payments of any kind by employers to union officials. Title VI included miscellaneous items. Among other things, it outlawed extortionate picketing, made sure that the statute's criminal sanctions do not by pre-emption interfere with the operation of state criminal law, and made it a crime for anyone to interfere with any member of a labour organization, by violence, threats or coercion, while he was attempting to exercise rights conferred upon him by the statute.

4. Title VII and Amendments to the Taft-Hartley Act.—Title VII included a miscellaneous collection of unrelated and somewhat ill-thought-out amendments to the 1947 NLRA. Some of these seem to have been included to placate elements in congress who wished to eliminate certain union self-help techniques involving economic coercion. Others were probably included to secure the support of some of the unions not found guilty of the offensive practices revealed in the McClellan committee hearings. Section 701(a) abolished the "no man's land." It permitted the states to dispose of as they wished those instances of objectionable conduct, falling within the federal jurisdiction, which congress said the board could refuse to handle under its standards concerning dollar volume of the employer's business. Incidentally, in sec. 701(b) the act allowed the NLRB to delegate to regional directors many of its powers to handle representation issues. And in sec. 702 it modified slightly the voting rights of economic strikers in board conducted elections.

Reference was made above to some of the 1959 changes effected by congress in the 1947 statute's strictures against secondary boycotts. Actually, sec. 8(b)(4) in the 1947 act was difficult for both lawyers and laymen to comprehend. The changes introduced in sec. 704 of the 1959 act greatly increased the complexities always associated with secondary boycotts. The basic stricture against secondary boycott pressures remained much the same; but in the new act it was unfair for a union to force an employer to make a "hot cargo" agreement in which he agreed in advance to cease doing business with, or using the goods of, another employer if the union should have a labour dispute in the future with such other employer. Also, under the new act a violation might occur regardless of what secondary employer was involved (a substantial change from the 1947 statute) and even if the secondary pressure was achieved through appeal to the secondary employer's employees singly and not in concert—apparently except where that result was achieved indirectly through lawful picketing of the primary employer. There were other possible implications adversely affecting the privilege of unions to conduct secondary picketing; but they were not clear and would become so only during the course of litigation under sec. 8(b)(4)(A) and (B) of the 1959 amendments. Section 704 also added sec. 8(e) to the 1947 NLRA. This subsection made it an unfair labour practice for an employer and a union to enter into "hot cargo" agreements in which the employer agreed to cease doing business with, or handling the goods of, some other employer in the future. Limited allowance was made for agreements of this nature in the building and garment industries.

Also in sec. 704 of the 1959 act congress amended sec. 8(b) by adding subsection 7 which made organizational and recognition picketing unfair under certain circumstances. This new provision made it unfair for a union, unless currently certified as representative of the workers to the picketed employer, to engage in, or threaten to engage in, organizational or recognition picketing (1) where the employer had lawfully recognized some other union and a representation question could not be raised; (2) where the NLRB had conducted a valid election within the preceding 12 months; or (3) where the picketing had been conducted without the unions having filed a representation petition within a reasonable period, not to exceed 30 days, provided that picketing and other publicity for the purpose of truthfully advertising the nonunion status of

the employer would be permitted, unless an effect of such conduct would be to induce the employees of another employer not to pick up, deliver or transport any goods or perform any services at the picketed employer's place of business. In the 1960 *Curtis* case the U.S. supreme court implied that this new subsection would go far to make organizational and recognition picketing unlawful. The final amendment to the 1947 NLRA was the addition of sec. 8(f) to the statute. That amounted to a modification for the building industry of the act's provisions concerning union security. In effect, it permitted collective agreements in the absence of proof of the majority status of the contracting union. It also allowed a modified type of referral to employers of union members seeking employment, care being taken, however, that nothing in this amendment should be regarded as inconsistent with state "right to work" statutes. It is only fair to observe that all these changes in title VII were somewhat hastily drawn and hardly responded to the need that existed for a careful overhauling of all the labour relations laws, including the Railway Labor and Norris-LaGuardia acts.

5. Wartime Controls.—The manpower shortage and increased production because of World War II required the imposition of controls over practically all aspects of the nation's economy, including wages. A workable substitute for strikes became necessary when the unions pledged themselves to abstain from striking for the duration of the war. Shortly after Pearl Harbor a tripartite National War Labor board of 12 was set up consisting of 4 public members, 4 representing industry and 4 representing unions. Acting under executive authority of the president, the board evolved a technique of control over wages and over labour disputes dealing with other aspects of collective bargaining. Wage control was governed by the so-called "little steel" formula—named after the resolution of wage issues in the steel companies ranking next in size to the U.S. Steel corporation. This device was to keep wages down to 15% more than the Jan. 1941 level, with allowances for inequities and inequalities of various kinds. The War Labor board and later the National Wage Stabilization board considered and acted upon voluntary applications for wage adjustments filed jointly by employers and unions; and it processed union petitions for wage increases that were opposed by employers. Controls over other aspects of collective bargaining were developed in general policies promulgated by the board. Thus, the board proceeded on the assumption that it would not include in collective agreements developed under its jurisdiction novel provisions not already generally established before the war. There were some exceptions to this general policy. For instance, a grievance procedure with arbitration of unresolved issues as a final step was included in all agreements. But this was merely the extension of a precedent that had occurred prior to the war in a few collective bargaining contracts.

The unions pressed the War Labor board to include provisions for the closed or union shop in many agreements. But the board would not do that, except where the previous bargaining history had indicated the existence of such an arrangement. Instead it invented a modified kind of union security called maintenance of membership. Thus, every employee in a union at the time a contract was signed with such a clause had 15 days to withdraw from the union. Those who did not take advantage of this escape provision were required to remain in the union during the life of the agreement, as a condition of retaining employment.

The War Labor board had regional officers and local boards which were also on a tripartite basis. There were hearings between employers and unions before tripartite panels of three, with a public member as chairman, in which records were built up for submission with recommendations, first to the regional board and then to the national board in Washington, D.C. Much care was required by the War Labor board and its subordinate regional boards, panels and personnel not to invade the province of the National Labor Relations board which continued to deal with organizational matters and unfair labour practices of employers.

During the war, congress passed the War Labor Disputes act. Under it the government was authorized to seize plants having labour trouble serious enough to hamper the war effort. An exceedingly small percentage of manpower hours were lost during the war by strikes. Relatively few seizures had to be made by the government because of either employer or union refusals to observe the necessarily stringent wartime labour policies. Seizure of strike-bound plants became a recognized technique of government control during wars or unlimited emergencies. After Pres. Harry S. Truman seized the steel industry during the Korean War in 1952, the supreme court declared that such action must be authorized by congress and was not within the executive power, especially when an alternative procedure for dealing with such an emergency was already established in title II of the Taft-Hartley act. In any event experience revealed that, except during war, government-dictated settlements of labour disputes are likely to be unsatisfactory. During the Korean War the federal government again established a wage stabilization program and set up the National Enforcement commission to secure compliance with the Wage Stabilization board's regulations by imposing sanctions against noncomplying employers.

6. Miscellaneous Laws, Federal and State.—The foregoing account has emphasized the most important legal developments in the labour field, especially in light of modern constitutional trends. In concluding, a few others deserve brief comment. Congress in 1936 made it a crime to transport and use professional strikebreakers in interstate commerce, a practice already adequately covered in the NLRA. Previously, in 1934, congress had passed the so-called Antiracketeering act (the Hobbs act) to prevent racketeers acting in interstate commerce under the guise of labour unions from compelling payments for services not rendered. But the U.S. supreme court held that this criminal statute did not prevent members of legitimate labour unions from engaging in such conduct. In 1951, however, congress amended this act to apply to behaviour of this sort by legitimate unions. Then in 1946 congress passed the Lea act to prevent unions from compelling employers to hire unnecessary employees. The supreme court upheld the constitutionality of this statute, even though it made criminal fault depend on the ambiguous test of what an employer subjectively thought were unnecessary employees. Such attempts to make featherbedding criminal have proved unsatisfactory. That is because union workers are afraid of the speedup and also that technological improvements will deprive them of work. A more satisfactory solution would unquestionably result from collective bargaining. Some have thought that featherbedding could be stopped in the Taft-Hartley act, but that approach has not been effective as sec. 8(b)(6) of the 1947 NLRA has indicated.

Besides the Federal Employers' Liability act and its outgrowths there is the Federal Safety Appliance and Equipment act. There are also other federal statutes, mostly obsolete, dealing in one way or another with the regulation of standards of labour. In the various states, of course, there are many kinds of labour statutes. A few states have labour relations acts more or less resembling the NLRA; and many of them have anti-injunction acts modeled after the federal law. Many state acts aimed at the suppression or control of union recourse to strikes, boycotting and picketing have been declared invalid by the U.S. supreme court and are thus no longer significant. Several of the states are experimenting with statutes intended to deal with special situations, such as public-utility disputes, in the hope that these statutes will stand up when their constitutionality is tested before the U.S. supreme court.

7. International Aspects.—Developments in U.S. labour law have little or no impact on the international scene. While the immigration and naturalization program was originally centred in the U.S. department of labour, probably because of the influence of mass immigration on the labour market, its administration was relegated to the department of justice. Almost the only remaining official connection with other countries in labour matters was U.S. co-operation with the International Labour organization, devoted to the improvement of basic labour standards throughout the world. As U.S. internal labour standards are improved, it is to U.S. interest to have similar standards introduced in all other industrial countries, especially in those with whom the United States expects to compete in selling goods in the world markets. For U.S. goods cannot compete favourably in such markets if its labour costs notably exceed those of competitors in other countries. The United States has co-operated mildly in supporting this program, especially since

it became easier for federated nations like the United States to support some of the organization's conventions or treaties without precipitating the political difficulties commonly encountered in the consideration of most treaties. Possibly the lack of great interest in the International Labour organization and its program was because its affect is not directly discernible internally. (C. O. G.)

II. ENGLAND

A. Historical Introduction

British industrial legislation began almost simultaneously with the collapse of the decrepit Mercantilist code (*see* Mercantile System) and the development of *laissez-faire* attitudes. The long hours, industrial injuries and unhealthy conditions of textile factory life in the late 18th century provoked protests from northern clergymen, medical practitioners and humanitarians. Such early reformers were particularly concerned over the fate of "apprentice" children sent from orphanages and workhouses to remote rural mills, and in 1802 the first Sir Robert Peel, himself a large employer, gained an act to protect their "health and morals" by limiting them to 12 hours' daily labour.

Peel's easily evaded measure was soon made obsolete by the early 19th-century steam-powered mills, which employed urban "free" children. Consequently, prompted by Robert Owen (*q.v.*) and other philanthropists, Peel proposed in 1815 to limit all child textile workers under 18 to 12 hours. The conflicting evidence heard by a parliamentary committee in 1816 compelled him to limit his bill to cotton mills and children under 16, and to allow 12½ hours. After two committees of the house of lords had heard further evidence in 1818 and 1819, the act passed in 1819 forbade labour under the age of nine, limited children under 16 to 12 hours' labour (plus 1½ hours for meals) and applied only to the cotton industry.

Despite periodic northern agitations, little was achieved in the 1820s. The Whig J. C. Hobhouse unsuccessfully proposed an "eleven hours bill" in 1825, but succeeded in prohibiting children's nightwork. In 1829 he succeeded in getting another act passed to facilitate prosecutions of offenders. When, in 1831, he proposed to limit all children in textile works to 66 hours actual work weekly, he was thwarted by strong opposition from the manufacturers, and the final act was limited to improving previous cotton legislation.

Hobhouse's retreat was bitterly condemned by Richard Oastler (*q.v.*), a Yorkshire Tory land agent, who had been converted to the cause in 1830 by John Wood, a Bradford Tory manufacturer. After a celebrated press campaign against "Yorkshire Slavery," Oastler helped to organize a widespread movement, demanding a ten hours' day for the children. "Short-time committees" of Radical and Tory supporters were founded throughout the English and Scottish textile districts, to organize public campaigns. Wood, Oastler and John Fielden of Todmorden, a Radical manufacturer, provided substantial funds; George Stringer Bull of Bradford led a large number of sympathetic Anglican clergymen; and the Tory Michael Thomas Sadler (*q.v.*) became the parliamentary leader.

In March 1832, backed by an extensive campaign, Sadler proposed his Ten Hours bill. However, the Whig government insisted on further inquiry, and a select committee was set up, under Sadler. The committees sent 87 witnesses, including several crippled children, who attracted considerable sympathy; but the masters' case had not been heard when parliament was dissolved for the first election under the Reform act. After Sadler was defeated at Leeds, a Bradford conference sent Bull to London, to select a new leader. Bull chose the Tory Lord Ashley (*see* Shaftesbury, Anthony Ashley Cooper, 7th Earl of), who reintroduced the bill in 1833. But the government again called for an investigation, this time by a royal commission, which toured the kingdom collecting evidence in the spring. The English committees constantly harassed the investigators, but detailed information was soon collected. While strongly opposing interference with adult labour, the commissioners favoured an eight-hour day for the youngest children. However, by allowing these children to be used in relays, they put an end to the reformers' hopes of protecting adults by restricting child labour. Amid angry protests from Oastler's followers, Lord Althorp carried a measure largely based on these recommendations.

The 1833 Factory act was a major turning point, affecting cotton, woolen, worsted, hemp, flax, tow and linen mills. Children under nine were prohibited from work and those under 13 were restricted (in stages) to eight hours' labour. Daily education was to be provided. "Young persons" aged 13 to 18 were restricted to 12 hours. The act was to be enforced by four overworked factory inspectors.

After unsuccessful agitation by Owen for a universal eight-hour day, the reformers turned, under Oastler, to a bitter and violent agitation against the 1834 Poor law (*q.v.*). They were strong enough to prevent Poulett Thomson from weakening Althorp's provisions in 1836, but could not engraft "ten hours" on Fox Maule's unsuccessful bills of 1838, 1839 and 1841. Many northern supporters joined the Chartist movement (*see* Chartism), with which Oastler and his violent Tory-Radical henchman J. R. Stephens also associated.

Politically, the reformers were predominantly Tories or Radicals, members of the Church of England or of proletarian dissenting denominations. In 1841—while Oastler was in prison for debt—they united to support Tory election candidates. But Peel's new Conservative government was hostile, and in 1842 wage reductions provoked the violent Plug Plot strikes. In the following year Sir James Graham (*q.v.*) proposed a new bill, limiting children to six and one-half hours and providing a much improved education system, largely under church control.

Very strong nonconformist opposition killed Graham's bill, but in 1844 he carried an act starting the "half-time system" for children and restricting women to 12 hours. The reform was still opposed by Liberal politicians, economists and manufacturers, though several Whigs were now sympathetic; and during the debates Ashley once carried his "ten hours" clause, before the government summoned back-bench support.

While other industries demanded reduced hours—sometimes by legislation (as in mining) and sometimes by trade-union action—the factory reformers mounted a big campaign in 1846. Ashley, resigning his seat on the question of free trade, passed the leadership to Fielden, whose bill was defeated in May only by 203 votes to 193. The Anti-Corn Law league, and particularly John Bright, maintained Liberal hostility, but the Protectionists, under Lord George Bentinck, provided strong support. Another great campaign was raised, and in 1847, during an industrial depression, Fielden and the Yorkshire Protectionist William Busfeild Ferrand carried the Ten Hours bill. Although the act specifically applied to women and young persons, it had always been assumed that it would actually affect all operatives in most textile industries.

During the following years some groups of Liberal Lancashire masters evaded the intentions of the act by using the restricted operatives in relays throughout the day. The inspectors were unable to prevent the practice, and the decision in a test case (*Ryder* v. *Mills* [1850] 3 Exch. 853, *per* Parke, B.) justified it. Against northern reformers' advice, Ashley compromised by accepting the home secretary Sir George Grey's act of 1850, which added two hours weekly in return for the prohibition of relays. The reformers thus gained a set working day, but Oastler, Stephens, Ferrand and Fielden's sons continued the northern agitation for the traditional "ten hours." Lord Palmerston closed another loophole in 1853 by limiting children to the "normal day," but periodic attempts by J. M. Cobbett to restore Fielden's act were unsuccessful.

The campaigns on textile factory conditions, led primarily by Tory orators and widely supported by Anglican clergymen and working-class radicals, opened a breach in laissez-faire attitudes. Parts of their acts were applied to silk mills from 1833. In 1840 Ashley secured an inquiry into child labour in many other industries. The conditions which the commission revealed led to the Mines act of 1842 (prohibiting female and child labour underground) and an act limiting labour in printworks in 1845. Legislative interference was extended to bleaching and dyeing works in 1860, lace factories in 1861, several dangerous trades in 1864 and to many other industries in 1867, 1874 and 1878. In addition to

providing a legislative example, from the 1840s the factory movement gave an organizational model for agitations among railwaymen, bakers, shopworkers and others. And although the state remained reluctant to legislate for adult men (except in certain dangerous or unhealthful occupations), the late Victorian development of collective bargaining machinery permitted negotiated agreements in many industries. The factory movement, with its humble beginnings in the textile districts and its difficult battles against the dominant social and economic attitudes, had helped to influence major industrial changes. (J. T. WA.)

B. Protective Labour Law

In England all strictly protective laws are found in acts of parliament and in orders issued in pursuance of those acts. The acts must be read in the light of decisions of the high court, the court of appeal and the house of lords. For the law regulating the contractual relations of employer and employed, it is necessary to first examine the English common law, the principles of which have to be deduced from the judicial decisions of many centuries, and for certain purposes rules of equity also must be remembered. But these unwritten rules of law and equity have been greatly developed and overlaid by statute law, which in its turn has been interpreted by the courts.

The protective labour law of England (*i.e.*, that part of the law which requires employers of labour, under penalty, to observe certain rules for the protection of the persons they employ) is found in a multitude of statutes and orders. Their fundamental object is to secure to workers a minimum standard of safety, health and well-being. They deal (1) with industrial methods and processes and the construction and installation of workplaces affected (*e.g.*, by prescribing standards of sanitation and ventilation, measures for preventing accidents, the use of apparatus for drawing off injurious fumes or dust or even by entirely prohibiting the use of certain materials or processes); (2) they regulate the hours of work of certain classes of workers considered to be especially in need of such protection or whose occupations involve special risks from long hours of work; (3) they exclude from work in all or certain employments persons who, by reason of age, sex or physical condition, are especially liable to suffer injury to health from such work. The enactments dealing with these matters fall into several groups, dealing with (1) factories; (2) mines; (3) shops; (4) merchant ships; and (5) railways. Some acts affect more than one of these groups. For instance, a new grouping of workplaces under the term industrial undertaking was introduced into English law in order to conform to certain conventions of the International Labour organization. This expression was defined in the Employment of Women, Young Persons and Children act, 1920, as including factories, mines and railways but not shops. The act also applied to ships. Other acts cut across these divisions insofar as they affect the employment of children in any gainful employment, and the Public Health acts deal with hygiene in various kinds of workplaces.

There is no mention in this classification of measures for the protection of agricultural workers or of persons employed in office work. In England there was no special code regulating conditions of work of office workers before 1963, but the Public Health acts made it the duty of the local sanitary authority to ensure that workplaces including offices should be sufficiently ventilated, kept clean and free from noxious effluvia and should not be overcrowded. There was likewise no legislation expressly for the protection of regular agricultural workers, apart from the Agricultural Wages act (*see* below). But again, the Public Health acts intervened regarding the accommodation to be provided for occasional workers brought from the towns, whole families together, for such work as picking hops and fruit. And the Shops, Offices, and Railway Premises act, 1963, introduced a more stringent and comprehensive control of the working conditions of office workers. Provided these points are borne in mind, it will be most convenient to follow the main divisions into which English labour legislation falls.

1. Special Enactments.—1. The law relating to factories covers all manufacturing industry. It was consolidated in the Factories act, 1961, and this is therefore the enactment by which working conditions in all factories are now regulated. For a workplace to be included under the act, it was provided that manual labour had to be exercised either in the making of any article or in the altering, repairing, ornamenting, finishing, cleaning or breaking up of any article or in the adapting for sale of any article. It was further provided that the labour should be exercised "by way of trade or for purposes of gain" and that the employer of the persons employed in the factory have the right of access or control.

English factory legislation has grown in the gradual and almost haphazard fashion characteristic of many English institutions. As seen above, the early factory reformers concentrated first on removing child labour; second, on setting up a factory inspectorate, a system of government inspection of factories that was copied by many another industrial country; and third, on reducing hours of work of women and young persons. After the 1880s, as a result of medical and technical research, factory legislation also dealt with safety measures and with improving standards of health and comfort. This resulted in a code of subordinate or delegated legislation, called dangerous-trade regulations and welfare regulations, with the force of law. Such regulations apply to special classes of factories engaged in processes which give rise to special dangers (*e.g.*, the building trade) or where there are working conditions of special discomfort, as in laundries, bakehouses and sackmaking mills. Even the smallest undertakings come under the general provisions of the acts, contrary to the practice in some countries where the employment of a certain minimum number of workers is necessary in order to bring a workplace under regulation.

Further, a large number of special premises were specifically brought within the scope of the Factory acts. These include shipbuilding yards and dry docks, locomotive construction and repair, printing and bookbinding and others. Some provisions of the Factories act also apply to building operations, engineering constructions, loading, unloading and coaling ships in dock, electrical stations, docks, warehouses using mechanical power, shipbuilding and ship repairing. In each case it is necessary to refer to the special section to see which provisions apply and which do not.

2. The law relating to mines and quarries, principally the Coal Mines act of 1911, the Metalliferous Mines Regulation acts, 1872 and 1875, and the Mines Accidents (Rescue and Aid) act, 1910, has in the main been consolidated and is now contained in the Mines and Quarries act, 1954. Additional provisions are in the Coal Mines Regulation act, 1908.

3. The Shops act, 1950, only applied to retail shops, including places for selling food and drink for consumption on the premises.

4. The Merchant Shipping acts, 1894–1906, contained provisions for the protection of seamen, the most important being the consolidating act of 1894.

5. The acts concerned with employment on railways are the Railway Regulation act, 1893, the Railway Employment (Prevention of Accidents) act, 1900, and the Railways act, 1921.

These protective regulations can be most conveniently considered under four heads: health and safety; conditions for admission to work; hours of work and holidays; and administration.

2. Health and Safety.—*Factories.*—Measures to prevent injury to health from industrial conditions usually take the form of regulating the internal arrangements of the workplace. But where the use or handling of very dangerous substances is in question such measures may prove ineffective, and occasionally the drastic method of entirely excluding the dangerous element is adopted. Thus the Factories act, 1937, in compliance with the Berne convention of 1906, absolutely prohibited the use of poisonous white phosphorus in the manufacture of matches.

General provisions for protecting the health of workers in factories and for the prevention of accidents were incorporated in the Factories act, 1961.

A factory must not, while work is carried on, be so overcrowded as to cause risk of injury to the health of the employees. A factory is deemed to be thus overcrowded if the cubic space allowed for every person employed in a room is less than 400 cu.ft. Effective provision must be made for sufficient and suitable lighting in every part of a factory in which persons are working or passing.

The place of employment must be safe; staircases and floor openings must be guarded and ladders maintained in sound condition.

There are special restrictions for safeguarding dangerous machinery, young persons employed on dangerous machines, self-acting machines, new machines, fumes, explosive and inflammable dust, vessels containing dangerous liquids, cranes, hoists and lifts, steam boilers and containers, air receivers, water-sealed gasholders, poisonous substances, lead processes, lifting of heavy weights, shuttle kissing, processes dangerous to eyes, work in laundries and in underground rooms.

Normally, factories must have the certificate of the fire authority (*i.e.*, the county council or county borough council) that they have adequate fire escapes, and rules are laid down about the construction of exits, giving of fire warnings, maintaining fire fighting appliances, fire drill and keeping passageways unobstructed.

Any court of summary jurisdiction has power to prohibit the use of any dangerous ways, works or machinery in a factory, and also the use of a factory or part of a factory which is in such a condition or so constructed or placed that any process carried on there would involve risk to the workers. In the matter of welfare facilities, the employer has to provide drinking water; clear running hot and cold or warm water for washing with soap and clean towels; accommodation for outdoor clothing with drying facilities; seating for all workers (individual seats of proper construction and standard being required in sedentary work); first-aid boxes, one for each group of 150 employees, each under the supervision of a responsible person.

Factory workers are also liable to specific penalties. No worker may wilfully interfere with or misuse anything provided under the act for securing the health, safety or welfare of the workers; where anything is provided for the worker under the act, he must use it. No worker may wilfully and without reasonable cause do anything likely to endanger himself or others. In all these cases a worker is liable to be prosecuted for disobedience and to a fine of £15 in each case (or £75 if risk of bodily injury is involved).

The minister may, by order, require certain kinds of dangerous occurrence to be reported even though no physical injury is caused to any person. Notification is required in all cases of the bursting of any revolving vessel, wheel or grindstone moved by mechanical power, the breaking of rope or chain used for hoisting purposes by mechanical power, outbreaks of fire serious enough to stop work in any room for 24 hours, electrical short circuits causing 5-hour stoppage and explosions of containers of gases. A formal investigation of any accident may be directed by the minister.

Dangerous Trades.—Far more detailed rules are imposed wherever any special danger to those employed is involved or where it seems desirable to make special provision for their welfare. All medical practitioners were required to notify the chief inspector of factories of the names and addresses of all persons suffering from lead, phosphorus, arsenical or mercurial poisoning or anthrax believed to have been contracted in a factory. This list of notifiable diseases was extended to toxic jaundice, epitheliomatous and chrome ulceration, poisoning from carbon bisulfide and aniline, chronic benzene poisoning and compressed-air illness.

Further, the act (s. 76) empowered the minister to certify any particular process as dangerous and thereupon to issue regulations to obviate the dangers involved. Great progress was made during the first half of the 20th century with such regulations. Codes of regulations were established for more than 50 industries, among them chemical works, docks, wharves, foundries, cutlery, luminizing, pottery, shipbuilding and cabinetmaking.

Welfare Orders.—Trades not so ostensibly dangerous or unhealthful as to be suitable for regulation under s. 76 could be regulated by powers given to the minister by s. 62. This section authorized the issue of welfare orders, where special provision is needed for securing the welfare of the workers. These may deal with matters such as the supply of facilities for preparing and taking meals, drinking water, protective clothing, ambulances and appliances for first aid, seats in workrooms, washing facilities, accommodation for clothing and supervision of the workers. Welfare orders have been issued for about 30 industries.

Mines.—Health and safety in mines is the subject of much detailed regulation. The Mines and Quarries act, 1954, required that there be a responsible manager, officially certificated, in charge of every mine. The manager must appoint a suitable number of certified firemen, examiners and deputies, devoting their whole time to examining the state of the mine. The workmen may appoint two representatives who are or have been practical working miners to inspect the mine at least once a month. The act laid down safety provisions regarding ventilation, the use of safety lamps, the arrangement of shafts, the safety of winding apparatus, the state, arrangement and use of haulage roads, the support of roofs and sides, the fencing of machinery, the safety of boilers, the use of electricity and explosives, the prevention of coal dust, the inspection of the mine before work begins and during shifts and the withdrawal of the workmen when the conditions are dangerous. There are provisions regarding health. Sanitary conveniences must be provided above and below ground. Accommodation for drying clothes and taking baths need only be provided where a majority ascertained by a ballot of two-thirds of the workmen so desire, and then only on condition that the workmen undertake to pay half the cost of maintaining the accommodation. Provisions were also made to safeguard the men from developing fibroid phthisis from the use of drills on siliceous rock and requiring notification to the inspectors of any disease occurring in a mine and caused by the nature of the employment. Immediate notice has to be sent to the inspector and the person nominated by the workers of any accident causing loss of life, or fracture or dislocation or any other serious personal injury, or caused by explosion or by electricity or by overwinding or any special cause specified by order. Mineowners were required to make annual returns giving (among other things) particulars of all accidents occurring during the year disabling any worker from earning full wages for more than three days. The act also provided for formal investigations into the cause of any accident and gave powers for the issue of general regulations for the prevention of accidents and for provision for the "safety, health, convenience and proper discipline" of persons employed. In addition, special regulations might be put into operation in any particular mine at the instigation of the owner or a majority of the workmen.

Powers to make regulations for the maintenance of rescue and ambulance appliances and the training of rescue brigade and ambulance men are contained in the act.

Shops.—The Shops act, 1950, required employers to provide suitable ventilation, temperature, lighting, sanitary conveniences and facilities for taking meals. There had to be one seat to every three female shop assistants serving customers. These provisions were superseded by the Shops, Offices, and Railway Premises act, 1963, which in matters of health, safety and fire precautions brings shops very nearly in line with factories.

Ships.—The safety of merchant ships and the health and well-being of the crew are subjects of detailed regulation under the Merchant Shipping acts. The safety of ships is the main concern of shipping legislation and the safety of the seamen is part of this question, for particulars of which *see* SHIPPING: *International Maritime Law.* The Merchant Shipping act of 1894 dealt with the handling of complaints about deficiencies in these respects, and the act of 1906 laid down detailed requirements concerning the scale of provisions to be allowed and the inspection of provisions and water for the crew. Scales of medicines and medical stores suitable for different classes of ships and voyages are issued by the board of trade. It was provided that every foreign-going ship having at least 100 persons on board must carry a ship's doctor. The minimum accommodation to be set aside for seamen was also prescribed by law. The act of 1906 stipulated that this must amount to at least 120 cu.ft. of air space and 15 sq.ft. of floor space per man.

Railways.—The Railway Employment (Prevention of Accidents) act of 1900 empowered the board of trade, later the ministry of transport, to make rules "with the object of reducing or removing the dangers and risks incidental to railway service." The employer was bound by the Notice of Accidents act, 1894 (as amended in 1906), to give notice of accidents resulting in loss

of life or bodily injury such as to cause an employee to be absent at least one whole day from his ordinary work. This rule about notification of accidents applies also to any employment in the "construction, use, working or repair of any railway, tramroad, tramway, gas work, canal, bridge, tunnel, or other work authorized by any local or personal Act of parliament" and also to the "use or working of any traction engine or other engine or machine worked by steam in the open air."

3. Conditions of Admission to Work.—The most important part of the law excluding certain classes of persons from all or specified occupations is that fixing the minimum age at which young people may first enter employment. In addition, legal provisions excluded women of all ages or below a certain age or male young persons under 18 from particularly dangerous or unhealthy processes and also excluded persons from work by reason of their physical state. Under the Employment of Women, Young Persons and Children act, 1920, regulations governing the admission of young workers to work in all industrial undertakings and also on board seagoing ships were passed. This act purported to bring British law into conformity with two draft conventions adopted by the International Labour organization fixing at 14 years the minimum age for admission of children to industrial undertakings and to employment at sea. It excluded children under 14 from employment on vessels, other than those upon which only members of the same family are employed. The act provided that no child shall be employed in any ship except in accordance with the convention.

It was stipulated by the Factories acts that a young person could not, up to the age of 18, start employment in a factory without procuring an annual certificate of fitness issued by the appointed factory doctor (*i.e.*, a medical man appointed for this purpose by the chief inspector of factories), who must examine the young person at the factory where the employment is to be carried on. He could grant the certificate absolutely or qualified by conditions as to the work for which the examinee is suitable. The Merchant Shipping (International Conventions) act, 1925, ruled that young persons under 18 must be provided with medical certificates of fitness also for employment in any capacity in any seagoing ship registered as a British ship, including fishing boats. The act also prohibited the employment of young persons under 18 as trimmers or stokers in any ship.

There are also a number of unhealthful occupations from which young persons are excluded by Factories act regulations. Under some of these, adult women were excluded as well. In some cases the exclusion lasts only until the age of 16, instead of 18; in others girls are excluded and not boys, or until a higher age than boys. Examples of the exclusion of adult women are to be found in the regulations for manufacture of paints, casting of brass, smelting of materials containing lead, potteries, manufacture of India rubber and manufacture of electric accumulators. Women and young persons are barred from painting any part of a building with lead paint under s. 181 of the Factories act, 1961, except in special decorative work exempted by order. Apprentices in the painting trade were also allowed to work with lead paint in certain circumstances.

In addition, various regulations under the Factories act made physical fitness a condition either for starting work or for continuing in a dangerous process. For instance, periodical medical examination and suspension from work of the unfit were prescribed where the risk is that of poisoning from lead or other industrial poisons, and this applies usually to male as well as female workers. Another statutory exclusion from employment on the ground of physical unfitness was the prohibition to employ any woman in a factory or workshop for four weeks following her confinement. Women were also excluded entirely from underground work in mines, both coal mines and metalliferous mines. The Mines and Quarries act, 1954, prohibited the employment of any woman or girl or of any boy under 16 in moving railway freight cars or in lifting, carrying or moving anything so heavy as to be likely to cause them injury.

4. Hours of Work.—English law had not by the early 1960s passed beyond the stage of regulating the hours of only those persons considered to be in special need of protection from overwork, viz., women and young workers. Instances of the regulation by law of the hours of adult men are to be found in coalmines legislation and in a few dangerous occupations, where the object is protection of health from too long exposure to the dangerous element. In other countries the regulation of the hours of women and children was only a step toward the limitation of hours in general, on which subject laws existed in practically every European country.

This state of affairs may be due to the fact that the English worker was more successful than others in procuring a short working day by his own organized efforts. The English worker, in most of the well-organized trades of the country, was able to secure as part of his contract of employment a standard day of 8 hours or a standard week of 48 hours or less. Thus his normal rate of wages is payable for hours worked within that limit for ordinary work; if he works beyond the standard limits or on Sundays or holidays, he receives a higher rate of pay.

An arrangement of this sort naturally tends to make employers avoid excessive hours of work. In less well-organized trades there is the same restricting force at work wherever a wages council or an agricultural wages committee fixes overtime rates of wages as well as ordinary rates and lays down the limit of hours to which the ordinary rate will apply. But this method of fixing standard times for work must not be confused with legal provisions absolutely prohibiting work beyond certain limits.

The protection of children from overwork or injury to health on jobs while still of school age (*i.e.*, under the age of 15) is in England a matter for the law relating to education.

Factories.—The Factories act did not place restrictions on the hours of adult males, but limited the normal working hours and overtime of women and young persons. The following limits were established for normal working hours: (1) The total hours worked must not exceed 9 a day or 48 a week (44 in the case of those under 16). The period of employment must not exceed 11 hours a day and must begin and end between 7 A.M. and 8 P.M. (in the case of workers under 16, 6 P.M.) on ordinary days; 7 A.M. and 1 P.M. on Saturdays. (2) Continuous employment was restricted to not more than four and a half hours without half an hour for a meal. (3) Sunday work is prohibited. (4) Meals must be taken at the same hour by all employees and there must be no working during mealtimes.

Certain regulations were passed to protect boys over 16 employed in a number of processes such as iron, glass and paper manufacture. In occupations necessitating nightwork, a boy over 16 may be employed for not more than 6 turns a week, with at least 14 hours between each turn. He may not be employed between midnight and 6 A.M. in two consecutive weeks, nor more than 56 hours a week or 144 hours in three weeks, and no overtime may be worked. In other work, he may be employed under the shift system between 6 A.M. and 10 P.M. but for not more than 6 turns a week, and with 14 hours between each. The maximum weekly hours are 56, and no overtime may be worked. Limitations were placed also on the factory overtime employment of women and young persons over 16.

The minister was given the power to authorize the two-shift system of employment of women and young persons over 16 between 6 A.M. and 10 P.M. (6 A.M. and 2 P.M. on Saturday). It was stipulated that the average shift per day must not exceed 8 hours (in five-day-week factories, 10 hours, but not exceeding 48 hours in a week or 88 hours a fortnight), the consent of the majority of the workpeople concerned being necessary.

Certain restrictions were also placed on the hours of work and overtime of young persons outside a factory in collecting, carrying or delivering goods, carrying messages and running errands.

One of the objects of the Employment of Women, Young Persons and Children act was to put into operation the terms of the draft convention of 1919 to prohibit the nightwork of women and young persons in industrial undertakings. The act provided that no young person or woman shall be employed at night in any industrial undertaking except to the extent to which such employment is permitted in the conventions set out in the schedule to

the act. The two conventions, concerned respectively with the nightwork of women and of young persons, both defined night as "a period of at least 11 consecutive hours, including the interval between ten o'clock in the evening and five o'clock in the morning" and the employment of women and young persons is, in general, prohibited at night so defined. With regard to all the above restrictions as to hours of women and young persons, the Factories act, 1959, gave the minister power to exempt groups of employments and individual employments if in the interests of the efficiency of industry or transport. (Persons under 16 are the sole exception from this power.)

Mines.—The hours of work of all underground workers in mines coming under the Coal Mines acts were brought under regulation by the Coal Mines Regulation act of 1908, as amended in 1919 and 1926, and those of women and boys employed above ground by the Coal Mines act, 1911. The hours of work of boys below ground in metalliferous mines to which the act of 1908 did not apply were brought under regulation by the Metalliferous Mines Regulation act, 1872. The 1872 and 1911 acts have been amalgamated in and superseded by the Mines and Quarries act, 1954. The Coal Mines Regulation act, 1908, remained the principal act restricting the hours of underground workers, but the original limits of eight hours for workmen and nine and a half hours for firemen, examiners, or deputies, onsetters, pumpminders, fanmen or furnacemen were reduced to seven hours and eight hours, respectively, by the act of 1919. The rule established by these acts was that no workman shall be below ground in a mine for the purpose of his work or of going to and from his work for more than 7 hours during any consecutive 24 hours. The workmen were given the right to appoint persons at their own cost to observe the times of lowering and raising, in the same way as they might appoint checkweighers. The seven hours' period could be extended by not more than half an hour, but a register had to be kept of such extensions.

In addition to providing for exemptions in cases of emergency, the act of 1908 provided that the prescribed limit of hours below ground might be extended in any mine on not more than 60 days in any calendar year. Boys under 16 working underground in metalliferous mines not coming under the act of 1908 were not allowed to work more than 54 hours a week or 10 hours in any one day. Their period of employment was defined as beginning at the time of leaving the surface and ending at the time of returning to the surface. The hours of women and girls and boys under 16 on the surface in connection with mines under the Mines and Quarries act, 1954, are limited to 48 a week and 9 a day; and employment of such persons for more than 4½ hours without an interval of at least half an hour for a meal was prohibited. Males between 16 and 18 may not be employed for more than 8 hours in any day without intervals of 1½ hours altogether.

Shops.—In shops 44 hours was made the maximum working week for young persons (by acts which were consolidated in the Shops act, 1950) and it was required that they must, as a general rule, be allowed an interval of at least 11 consecutive hours (including the period 10 P.M. to 6 A.M.) every day. Some check, however, was put upon the hours worked by all shopworkers, men and women alike. Work was required to cease not later than 1:30 P.M. on one day a week; certain intervals for meals were prescribed; and the local authorities were empowered to issue closing orders fixing the hours for closing all or specified kinds of shops on each day of the week. On premises for the sale of refreshments, the week's work was limited to 65 hours. A certain standard of holidays and mealtimes for shop assistants employed on any premises for the sale of refreshments, where the occupier voluntarily elects to accept that limitation instead of applying the general provisions relating to the compulsory half-holiday for shop assistants, was imposed. Shops as a rule were required to be closed not later than 9 P.M. one day in the week, and 8 P.M. on the other evenings of the week, the late day being a Saturday unless the local authority fixed some other day either for all or certain shops, or for certain districts or certain periods of the year. In various cases the local authorities allow later closing hours (up to 10 P.M.) than those stated.

Where exemptions were allowed for exhibitions or during the busy seasons in holiday resorts, the local authority was given the power to attach to its order conditions limiting the hours of employment of the shop assistants affected and, in the case of seasonal exemptions in holiday resorts, to require the assistants to be given a holiday, on full pay, corresponding to the extra hours worked. For special occasions, a local authority might suspend the operation of the statutory closing hours and its own closing orders on not more than seven days in the year. The home secretary also was given power to suspend the provisions of the act and orders at Christmas and other special occasions. There are a number of transactions not prevented by the act or closing orders. These are connected with the sale of refreshments and tobacco in certain places, medicines, motor accessories and the like.

Ships.—There are no restrictions on the hours of duty on board ship in English law.

Railways.—Under the Transport act, 1947, the Transport commission was required to consult the appropriate organizations for settling by negotiation all questions relating to rates of pay, hours of duty and other conditions in the railway service.

5. Administration.—The various measures considered above, whether dealing with factories, mines, ships, railways or workplaces of various kinds under the Public Health acts, and also certain of those described in the following section, insofar as they are protective in character, all provide for means to be taken to enforce and administer the law. Thus the general penalty on employers for breach of the Factories act is £60, but for a breach which would be likely to cause personal injury (*e.g.*, failing to fence a dangerous machine) a fine of £300 can be imposed on employers and £75 on workers. The appropriate authorities are given power by the acts to appoint the necessary inspecting officers, and the latter have power to enter and inspect places affected, examine registers and so forth. Provision is also commonly made for instructing the workers in the terms of the law for their protection by requiring abstracts of the law, copies of regulations or information of various other kinds to be posted for all to see.

Employers are also required to keep registers (for instance, of persons employed, of medical examinations, of accidents or cases of ill-health) in order to facilitate inspection. Some of the acts contain interesting rules of procedure for such matters as inquiries into the causes of accidents and the issuing of regulations or orders. Provision is also made, in some cases, for proposed regulations to which exception is taken by interested persons to be submitted to arbitration. Provisions of this kind form an essential part of all protective labour law.

C. Contractual Relations

The contractual relations of employer and employed are governed by the rules of common law and equity concerning the creation and validity of contracts in general. The essential point is, therefore, that in return for whatever the one party undertakes to do under the contract, the other must undertake to give "valuable consideration." Thus, to create a valid contract of service it is only necessary for two parties intending to create a legal relationship to agree upon the services to be rendered and the remuneration to be received. The terms of the agreement need not be stated expressly. They may be merely implied by conduct. Neither writing nor even words are essential at common law, though there are statutory exceptions (*see* below). In common law, if one person does work for another without that other rejecting his services, there may be an implied contract of service with an implied undertaking to give consideration for the services rendered. "Consideration" is a very wide term. It may consist "either in some right, interest, profit, or benefit accruing to the one party, or in some forbearance, detriment, loss or responsibility given, suffered or undertaken by the other."

Apart, then, from statutory provisions, a contract of service may be entirely informal. Where disputes arise over merely implied terms in such a contract, the litigants must produce what evidence they can as to what those terms should be taken to be. It may be that a custom in the trade can be established which may be presumed to have been tacitly adopted in the absence of any express agreement to the contrary. There may be some rules of

the works or establishment to which reference may be made. The law on this subject was stated in *Carus* v. *Eastwood* (1875, 32 L.T. 855) by Justice Colin Blackburn, who said that "it would be very cogent evidence of a contract" based upon certain works rules which were in question "if a copy of them were proved to be posted in a prominent place" and brought to the workman's knowledge; and also that "a well-known custom in the district might also be sufficient to establish a contract."

It is even more usual for the individual contracts of large numbers of workmen to be based on the terms of a national or district agreement drawn up by representatives of employers' and workers' organizations. Such collective agreements in themselves are of no effect, in the sense that any individual employer could legally engage a workman on express terms differing from those of the agreement (see *Illegal Contracts,* below).

1. Termination of Contract.—There are no rules of English common law governing the duration of a contract of service or the conditions of giving notice to bring it to an end, but there are statutory provisions as to minimum period of notice (*see* below). Subject to these requirements, parties are free to arrange whatever they will on these points. If no definite arrangement is made, the implied terms must be sought as best may be.

The fact that wages are paid at certain intervals, such as weekly or monthly, is in itself strong evidence, though not necessarily conclusive, of a corresponding hiring by the week or the month. "If the reservation of weekly wages be the only circumstance from which the duration of the contract can be collected, the presumption is that it is to continue for a week only" (*R.* v. *St. Andrews,* 1828, 8 B. and C. 679). Apart from special circumstances, such as misconduct, and in the absence of any express terms to the contrary, a contract of service can only be terminated after reasonable notice. If an employer dismisses his employee without notice or without awaiting the normal termination of the contract, it is for him to prove that there were circumstances justifying instant dismissal. These circumstances are either certain voluntary acts on the part of the servant, or his incompetence. The servant may be dismissed for any act which falls within the general rule of law stated by Lord Esher in the following words: "Where a person has entered into the position of a servant, if he does anything incompatible with the due or faithful discharge of his duty to his master, the latter has a right to dismiss him." Consequently a servant may be dismissed for wilful disobedience to his master's lawful orders, but not for refusing to do work or take risks not contemplated in his contract. He may also be dismissed for habitual neglect of his duties. The betrayal of the employer's secrets is a good ground for dismissal. A servant may be dismissed at once for gross incompetence.

Similarly a servant may leave without notice if the master commits a fundamental breach of contract, *e.g.,* failure to pay him the wages due, or if the servant has been misled as to the dangers involved in the employment. The question is more important in connection with seamen. It has been held that it does not amount to desertion (involving forfeiture of wages) if a seaman leaves the ship on account of inhuman treatment or of insufficient provisions.

In the absence of any express or implied terms in the contract as to the effect of the servant's illness, an employer cannot instantly dismiss a worker for absence through illness or injury, nor is the contract brought to an end automatically when the worker for such reason ceases to carry out his part. But in the case of a contract of some length, permanent incapacity or illness for an unreasonably long time will entitle the employer to rescind the contract. If the employer does not do so, the servant is entitled to his wages during the time he cannot serve. A contract of service is dissolved by the death of either party.

2. Remedies for Breach of Contract.—For breach of contract, English law provides two remedies. The most usual one is a claim against the offending party for damages to make good the loss sustained. For cases where pecuniary compensation does not provide an adequate remedy, the court of chancery invented the equitable remedy of "specific performance"; *i.e.,* an order to the offending party requiring him to perform what he has undertaken to do.

The courts refuse to apply this remedy for a breach of a contract of personal service, although the other equitable remedy of injunction is sometimes applied to restrain a person from infringing a negative clause in the contract or to prevent him from committing a breach of faith as implied in all contracts of service. Thus no servant will be compelled to carry out a contract to serve a master, and no master will be compelled to take into or retain in his service a servant he has engaged, though either party may, in suitable circumstances, be restrained by injunction from doing something he has contracted, expressly or by implication, not to do. The usual remedy for breach of a contract of service is therefore a claim for a sum of money as damages. In assessing the amount to be awarded, the courts aim at placing the injured party as nearly as possible in the position he would have been in if no breach had been committed. If a servant is engaged on terms making him liable to be dismissed on, say, a week's or a month's notice, the measure of his loss if he is discharged on the instant is clearly the wages he would have received had he been allowed to work out the agreed term of notice plus any other loss flowing from the breach. A wrongfully dismissed servant cannot be awarded damages in respect of his wounded feelings; though, if the circumstances warranted it, he could bring an action for defamation of character against his employer. If the master after engaging a servant rescinds the contract before the service has actually begun, the servant may institute proceedings at once.

If it is the servant who unlawfully throws up the employment, the master is likewise entitled to bring an action for damages for any loss he sustains. The employer cannot retain any wages actually due to be paid when the servant breaks off the contract, but the servant cannot claim wages for a broken period in respect of which wages would have been due if it had been completed. When it is the employer who breaks off the contract, the servant, whatever the terms of payment may be, can always recover wages in respect of the service actually accomplished, by ignoring the broken contract and suing on a *quantum meruit; i.e.,* on an implied contract to be paid for work actually done, if for any reason he prefers this course.

There is no obligation on a master, in English common law, to give a servant anything of the nature of a certificate of employment or of character when the engagement comes to an end (note, however, certain statutory provisions on this subject in the Merchant Shipping act, 1894).

3. Illegal Contracts.—A contract of service, like any other contract, is illegal if it involves the doing of something which the law either expressly forbids (such as the employment of children below a statutory age limit) or merely discourages as being contrary to public policy (such as one too greatly infringing a man's liberty of action or "in restraint of trade"). The illegality may go to the root of the contract rendering it wholly void. Or, on the other hand, one or more illegal terms may be held not to vitiate the entire contract. Thus where a miner was working under an agreement by which he was paid in a manner contrary to the Coal Mines Regulation act, 1887, it was held that the contract as a whole held good in spite of this illegal stipulation. In *Pountney* v. *Turton* (1917, 10 B.W.C.C. 601), a boy was employed before reaching the age of 14 contrary to the Employment of Children act, 1903. Since his contract was wholly illegal and void, it was held that he could not recover compensation for an accident under the Workmen's Compensation act. The most important type of contract of service contrary to public policy but not involving the doing of any punishable offense is in the case of "restraint of trade." "The law of England allows a man to contract for his labour, or allows him to place himself in the service of a master, but it does not allow him to attach to his contract of service any servile incidents" (*Davies* v. *Davies,* 1887, 36 Ch. D. at p. 393). Moreover, the courts will interfere where a party is unduly fettered in his right to dispose of his labour as he wishes or his liberty of action in other respects so that he is reduced to an almost servile condition. The common law will not allow the enforcement of an agreement by which workmen bind themselves to work or masters bind themselves to employ workers only on terms decided by a majority of those affected. Thus it is impossible for

members of workers' or employers' associations to bind themselves under penalty to abide by the decisions of the majority, and no collective agreement made by such associations can ever be enforced by process of law.

An implied term in all contracts of service is that the servant shall keep faith with his master and not divulge his trade secrets or take an unfair advantage of his position and knowledge either during the service or after it has come to an end. But it is not unusual to insert in the contracts of employees in positions of some responsibility or requiring special skill, or in which they acquire special knowledge, provisions binding them not to exercise their skill or use their knowledge in competition against their former masters either in particular districts or for a certain number of years after the employment comes to an end. Any such contract is prima facie bad, as being in restraint of trade, so that the onus is on the party trying to enforce it to show that it is reasonable in the circumstances from the point of view of both parties; as a master is not entitled to bar the competition, as such, of a servant who has left, no restraint can be justified except where it may be required to prevent the servant from making improper use of his acquaintance with his master's customers or knowledge of his trade secrets. The remedy where such terms have been proved to be reasonable is usually the recovery of damages. In some cases the courts have granted injunctions to restrain a former servant from breaking a restrictive agreement of this sort.

4. Capacity to Contract.—Married women did not suffer any incapacity to bind themselves by contracts of service or freely to dispose of their wages after the passing of the Married Women's Property acts, 1882 and 1893.

Where an infant enters into a contract of service it is necessary to see whether it satisfies the general rule of law that no contract will be enforced against an infant unless it is for his benefit. Contracts to learn a trade or serve for wages are prima facie for an infant's benefit, and consequently will be enforced unless they are wholly disadvantageous to him. The mere fact that some of the terms are unfavourable does not necessarily vitiate the whole contract. It is necessary to consider whether the contract as a whole was for the advantage of the infant.

Apprenticeship is purely a voluntary matter in England and no particular formality is required for making a contract of apprenticeship. Since the term of apprenticeship is commonly for more than a year, however, such a contract must as a rule be in writing. A parent cannot bind his child as an apprentice without the child's consent and the indenture (if any) must be signed by the apprentice, not merely by the parent or guardian. The sickness or incapacity of the apprentice does not relieve the master of his obligations under the contract; *e.g.*, to provide for the apprentice and pay him wages. A contract of apprenticeship expires on the death of the master except where it is so drawn as to require the apprentice to continue to serve the master's representatives carrying on the same trade. An apprentice cannot recover any part of the premium from the representatives of his deceased master unless there is an express stipulation in the contract enabling him to do so. Regulations governing disputes between apprentices and their masters were established under the Employers and Workmen act, 1875 (*see* below). The effect of bankruptcy on a contract of apprenticeship was covered by s. 34 of the Bankruptcy act, 1914.

D. Statute Law

The general rule of common law that the parties to a contract of service are free to make what terms they will has been much modified by acts of parliament. Some of these, adopted expressly in the interests of the worker, might be more properly included under the heading of protective labour law insofar as contraventions render the employer liable to quasi-criminal prosecution. But insofar as they also give the worker a civil right of action or strengthen his position as contracting party, they may conveniently be considered from the contractual point of view.

The statutes in question either place restrictions on the nature of the consideration or on the place where wages are to be paid, or they provide means for fixing the minimum rate of wages to be paid, or require the employer to give the workers certain facilities for checking or calculating the amounts due them. Moreover, there is a special procedure provided by statute for settling contractual disputes between employer and worker.

(After World War II the sphere of state insurance was extended, and this enlarged the duties and privileges of employers and employees. The National Insurance act, 1946, and the National Insurance (Industrial Injuries) act, 1946, ensured to all workers under a contract of employment weekly allowances of fixed amounts in return for contributions from every employer and worker, these allowances being payable during (1) incapacitation from industrial injury or industrial disease; (2) sickness; (3) unemployment; (4) retirement; allowances to widows and orphans, maternity benefits and death benefits were also included. Further, the freedom of the employer to select his workers was hedged in: (1) the Disabled Persons act, 1944, obliged an employer of 20 or more persons to include a prescribed quota of disabled persons; (2) the National Service acts bound each employer to reinstate his employees on completion of their compulsory national service.)

1. Truck Acts.—The Truck act, 1831, and the Truck acts, 1887 and 1896, were adopted as a result of abuses which arose from the so-called tommy shops, owned by employers, out of which wages were paid in the form of goods or where the workers were constrained to spend their nominally cash wages, and from the habit of making oppressive deductions from wages.

The acts apply to all workmen engaged in manual labour. The act of 1896, dealing with disciplinary fines, applies such fines to shop assistants as well as to manual workers. The Truck acts made all payment of wages otherwise than in current coin of the realm illegal, null and void, and rendered illegal any contract requiring the workman to spend any part of his wages in any particular manner or at any particular shop. An employer, however, was allowed to contract with any workman to supply him with certain commodities specified in s. 23 of the 1831 act, and the Payment of Wages act, 1960, allows wages to be paid by check or money order or into a banking account, subject to prescribed conditions.

The terms of any contract authorizing the employer to impose disciplinary fines and deduct the amount from wages had to be posted where they could be easily seen and copied by the workers affected or else contained in a written contract signed by the workman. Particulars of the acts or omissions for which a fine might be imposed and the amount of the fines were required to be stated in the contract; the offense had to be likely to cause damage or loss to the employer or interruption to his business. A contract to make deductions for bad or negligent work must likewise be posted or in writing and signed, and the deduction must not exceed the actual or estimated loss borne by the employer. The amount deducted, whether as a disciplinary fine or in respect of bad work, must, moreover, be fair and reasonable. Particulars of deductions or payments for materials, tools, machinery, etc., used by the workman must also be posted or contained in a written and signed contract. They may not exceed the cost to the employer or what is a fair and reasonable rent or charge. On each occasion of a disciplinary fine or a deduction for bad work or for the use of materials, etc., the workman must be given written particulars of the reason for the deduction and its amount. The workers affected could sue for wages paid in an illegal manner or for the recovery of amounts illegally deducted from wages. In addition, employers who failed to observe the acts were made liable to prosecution and fine. Akin to the Truck acts is the Shop Clubs act, 1902, prohibiting compulsory contributions to shop clubs and shop funds save under certain conditions safeguarding the workers; the Payment of Wages in Public Houses Prohibition act, 1883; certain provisions to the same end contained in the Mines and Quarries act, 1954.

2. Merchant Shipping Acts.—The Merchant Shipping acts, 1894 and 1906, incorporated a number of sections regulating seamen's contracts and the payment of their wages. The master of any ship (except one of less than 80 tons registered tonnage exclusively employed in trading between different ports on the coast

of the United Kingdom) was made liable to a penalty if he put to sea without having entered into an agreement with the crew made in the prescribed manner.

The act of 1894 also required all seamen serving in British foreign-going ships to be formally discharged before a superintendent at the termination of the engagement and to be given a certificate of discharge. In some cases a report as to conduct, character and qualifications was required. The Merchant Shipping (International Conventions) act gave a seaman the right to wages for not more than two months if he was unemployed before the end of his engagement as a result of his ship's being wrecked.

3. Minimum Wage Laws.—Machinery for fixing legal minimum rates of wages was established in England: (1) under the Wages Councils acts, 1945–1948, consolidated in the Wages Councils act, 1959; (2) for workers in agriculture; (3) for underground workers in mines. The Wages Councils acts continued the system begun by the Trade Boards acts, 1909 and 1918, under which trade boards could be set up for any trade in which "no adequate machinery existed for the effective regulation of wages throughout the trade." The act of 1909 was the first attempt in modern times to regulate wages, although similar measures had for many years been operating in some of the Australian states. It had been adopted as a result of a popular agitation against the so-called "sweating system." The Wages Councils acts thus remained fundamentally protective in intent.

The Agricultural Wages act, 1948, is also intended to assist members of a poorly organized class of workers to secure a reasonable consideration in their contracts of service. Each agricultural wages committee was given the duty of fixing minimum time rates of wages for its district, and it also could fix minimum piecework rates and higher rates for overtime worked beyond some specified limit. These rates have to go to the Agricultural Wages board (covering England and Wales) for an order to put them into operation.

Workers in coal mines are on a different footing. The National Coal board was given, under the Coal Industry Nationalization act, 1946, the duty of consulting representative organizations to establish machinery for settling by negotiation terms and conditions of employment of workers in coal mines. Those whose wages depend on the amount of mineral hewn by them are bound to be paid by weight, and the mineral must be weighed as near to the pit mouth as is reasonably practicable (Coal Mines Regulation act, 1887, s. 12). All were given the statutory right to appoint their own representatives (checkweighers) to check the weighing of the mineral (*see* the Coal Mines Regulation act, 1887, s. 13; the Coal Mines [Check Weigher] act, 1894; and the Coal Mines [Weighing of Minerals] act, 1905). A similar right was given by the Checkweighing in Various Industries act, 1919, to workers engaged in the manufacture of iron and steel, in loading and unloading goods at docks, in quarrying chalk and limestone, in the manufacture of cement and lime, and in any other industry to which the act may be applied by regulations of the secretary of state. This act provided for the checking by a representative of the workers of the measuring as well as the weighing of material produced, handled or gotten, where the wages are paid according to measure instead of by weight.

To enable workers paid by the piece to know if the correct amount of wages is paid to them, the Factories act, 1937, required employers to give all workers in textile factories written particulars of the rate of wages applicable to the work in question and of the work given them to do. Similar provisions were extended to many other trades, under powers given to the minister of labour in the same section.

4. Contracts of Employment Act, 1963.—This act lays down minimum periods of notice of termination of employment as follows: the employer must give the worker after six months' service, one week; after two years' service, two weeks; after five years' service, four weeks. The worker must, after six months' service, give one week's notice. The act also requires employers to give written particulars to workers of the substantive terms of employment (wages, hours, length of notice, holidays, pensions) and imposes penalties for breach of this requirement. The act does not apply to seamen and dockers.

5. Settlement of Industrial Disputes.—The chief purpose of the Employers and Workmen act, 1875, was to provide a simple procedure for the settlement of disputes between a workman and his employer or an apprentice and his master. It gave to courts of summary jurisdiction, whose normal function is to deal with offenses of a criminal or quasi-criminal nature, power to hear and determine with the same powers as a county court purely civil disputes between an employer and a workman arising out of the contract of service, where the amount claimed did not exceed £10. This arrangement gave the parties very quick and cheap facilities for court action. The act also gave the courts of summary jurisdiction wide powers in dealing with disputes between masters and apprentices. The Conciliation act, 1896, and the Industrial Courts act, 1919, gave the minister of labour powers, with the consent of both parties to an industrial dispute, to refer it for conciliation or arbitration to a board or person appointed by him or to the industrial court, a standing body appointed by the minister under the 1919 act. Such action may be taken on the application of only one party to the dispute if it concerns a claim under the Terms and Conditions of Employment act, 1959, that an employer is not conforming to recognized terms of employment arrived at by arbitration or agreement between representative bodies of employers and workers. *See* also references under "Labour Law" in the Index.

(S. S.; H. Ss.)

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LABOUR PARTY (BRITISH), a reformist socialist party, closely allied with the trade unions, that was founded in 1900 and assumed its present name in 1906.

Origins.—The way was prepared for the Labour party by the Independent Labour party (I.L.P.) formed at Bradford, Yorkshire, in 1893 (*see* HARDIE, JAMES KEIR). This was not the first attempt to secure the election of working-class representatives to parliament. The Chartists had fought a number of contests in the 1840s and 1850s. In 1866 the London Working Men's association had tried to institute a national movement, and under its auspices a number of parliamentary seats were contested in the year following the Reform act of 1867, which gave votes to many urban workers. This movement took shape in the Labour Representation league of 1869; and at the general election of 1874 two miners, Alexander Macdonald and Thomas Burt, were elected as the first Labour members of parliament. The Labour Representa-

tion league, however, soon died out and the few Labour men returned to parliament allied themselves with the Liberal party. The Labour Electoral committee (association from 1887), formed by the Trades Union congress in 1886, worked for the next ten years in alliance with the Liberals. Many of the local bodies which helped form the I.L.P. had broken away from the Labour Electoral association in protest.

The I.L.P. persuaded the Trades Union congress to join the conference which set up the Labour Representation committee in Feb. 1900. Two of its candidates were returned at the general election later that year and 29 at the general election of 1906. The rapid growth of the Labour party between 1900 and 1906 was mainly due to the Taff Vale judgment of 1901 (*see* LABOUR (TRADE) UNION) which put all union funds in jeopardy by ruling that they were liable to an action for damages arising out of a trade dispute. The Trades Dispute act of 1906 reversed this decision; but the Labour party was faced in 1909 with the Osborne judgment, which pronounced all political action by trade unions to be unlawful. The two general elections of 1910 had thus to be fought without trade union funds, and the Labour party could support only a limited number of candidates. Yet, partly because of the accession of the group of miners' members of parliament, who had previously sat as "Lib-Labs," it won 40 and 42 seats respectively at these elections.

The Labour party was not constituted as an explicitly socialist party. Until 1914, despite its formal independence, it was acting as the ally of the dominant Liberal party, first at the election of 1906 and subsequently in connection with the budget of 1909, the struggle with the house of lords and the Irish question. In 1913 the Trade Union act restored to trade unions a limited freedom to take political action.

Labour During World War I.—The outbreak of war in 1914 found the party still hardly more than a group. War conditions, by greatly enhancing trade union power, increased its influence; and after playing a minor part in the first coalition government under H. H. Asquith, it was given a larger place in the Lloyd George coalition. The main body of the Labour party supported the war; but its chief socialist constituent, the I.L.P., took an anti-war line, while retaining its affiliation to the party. James Ramsay MacDonald (*q.v.*), who had become leader of the parliamentary party in 1911, resigned in 1914 because of his opposition to the war. He was succeeded by Arthur Henderson (*q.v.*), who became the chief Labour representative in the Asquith and Lloyd George coalitions. In 1917, however, Henderson left the war cabinet because of his support for the projected peace conference at Stockholm, Swed. The Labour party remained in the coalition; but working-class feeling in favour of a negotiated peace grew rapidly and Henderson, out of office, devoted himself to remodeling the Labour party as a truly national party, with a definite, though moderate, socialist program and a constituency organization throughout the country. At the general election of 1918 it secured more than 2,000,000 votes and 60 M.P.s.

Labour in Office.—During the next few years the Labour party grew rapidly and in Jan. 1924, with Liberal support, MacDonald (who had been re-elected leader in 1922) formed the first, short-lived Labour government, only to be turned out by the defection of the Liberals before the end of the year, mainly in protest against a proposed loan to the Soviet Union. The first Labour government introduced no socialist legislation, but it brought about some improvement in the international situation and showed itself capable of running the country.

In the general election of 1924 the Labour party lost more than 40 seats, largely because of the confusion attending the publication of the alleged Zinoviev letter (*see* ENGLISH HISTORY: *The 20th Century: The First Labour Government*). In 1929 MacDonald formed his second Labour government, with Labour still in a minority but the largest party—for the first time ahead of the Conservatives. This second Labour government was brought down by the onset of the world economic depression in 1931. Again, having no absolute majority, the government could carry no socialist measures; its achievements were once more in the fields of social reform and of foreign relations. Henderson made a great reputation at the foreign office, but the government showed itself helpless in dealing with the mounting unemployment and financial crisis. In Aug. 1931 its leader and a few colleagues seceded from it when the cabinet refused to endorse cuts in social benefits at the expense of the unemployed, and MacDonald formed a national coalition government with the Conservatives and Liberals. In the ensuing general election (Oct. 1931) the Labour party's strength fell from 289 to 46 and its poll by 2,000,000. The I.L.P., which had quarreled with the party earlier, fought the election separately, returning five M.P.s, all from Clydeside. All the important former ministers, except George Lansbury, who succeeded to the leadership, and Clement Attlee, were beaten; but at the next election, in 1935, its strength rose to 154.

Before and after 1935 there were serious differences within the party arising both from home policy and from the rise of fascism abroad. There was a pacifist section led by Lansbury, who resigned the leadership and was succeeded by Attlee in Oct. 1935 when it became plain that the majority of the party favoured collective security.

World War II.—In 1938 the Labour party had opposed the Munich agreement; and from the outset it gave full support to the war. Indeed in 1940 it played the leading part in overthrowing the Neville Chamberlain government and in putting the Winston Churchill coalition into power. Labour ministers, notably Attlee, Ernest Bevin and Herbert Morrison held key positions in the government from 1940 to 1945.

The Postwar Labour Government.—From 1932 onward the Labour party, spurred on by the defeat of 1931, had been busily recasting its program on more precise lines, working out detailed projects of nationalization, social security and colonial and international development. In 1937 it had published *Labour's Immediate Programme;* and this, largely revised and developed during World War II, formed the basis for *Let Us Face the Future,* its policy statement in 1945. At the general election in July 1945 Labour secured 394 seats out of 640, though it polled only 11,992,292 votes as against 9,960,809 for the Conservatives and 2,239,668 for the independent Liberals. The armed forces voted largely for the Labour party, as did also many white-collar workers and most voters in the industrial centres.

With Attlee as prime minister and Bevin as foreign secretary, the government set promptly to work to carry out its election program. During its first term of office, it nationalized the Bank of England, the coal mines, inland transport, electricity, gas, civil aviation and cable and wireless communications, and passed an act nationalizing iron and steel. It established a comprehensive system of social insurance and an all-embracing national health service. It consolidated measures for agricultural development, transformed to a peacetime basis the war controls over food supplies and rationing and undertook important projects for the economic development of the depressed areas. It also took action to implement the Education act of 1944, and was aided generally by a marked advance in its strength on the elective local authorities. It also further restricted the power of the house of lords to delay legislation passed by the commons. In foreign affairs it was faced with a difficult international situation. Despite a U.S. loan and the Marshall plan, it had, like most of western Europe, to contend with a formidable balance of payments crisis arising out of the shortage of dollars; and the deterioration of relations with the Soviet Union led to the Berlin crisis of 1948, the outbreak of the Korean War in 1950 and the need for a massive rearmament program.

In the general election of Feb. 1950 the Labour party won 315 of 625 seats and resumed office; but in Oct. 1951 it lost power to the Conservatives, who obtained 323 seats against Labour's 295. During this short parliament the party had been weakened by the resignation from the government of Aneurin Bevan and two other ministers, in protest against the budget of 1951 and the rearmament program which made it necessary. This was the beginning of the "Bevanite" dispute which dominated the internal affairs of the party until 1955. Bevan, with widespread support among the constituency parties, wanted more socialist militancy at home and less reliance upon the U.S. alliance abroad.

In Opposition.—At the election of 1955 the number of seats held by Labour fell to 277. In the general election of 1959 the Labour party won only 258, and was the first opposition since 1832 to lose three successive general elections by increasing margins. Hugh Gaitskell, who had succeeded Attlee as leader in 1955, was faced in consequence with a serious challenge to his authority. His attempt to give the party a less dogmatic "image" by rewriting its constitution was largely frustrated, and at the Scarborough conference of 1960 the majority of votes, against his strong advice, were cast in favour of unilateral nuclear disarmament. Supported by the majority of the Labour M.P.s, he refused to accept this decision and succeeded at the Blackpool conference of 1961 in reversing it. But the party remained uneasily poised between the acceptance of the limitations imposed upon a left-wing party by an affluent society and a more traditional socialist approach. Gaitskell managed to re-establish party unity, but he died in Jan. 1963. In February, Harold Wilson was elected to succeed him as leader. In the general election of Oct. 1964 the party's long term in opposition ended. Wilson formed a government but with an overall majority in the house of commons of only four. He called another general election in March 1966, in which Labour won a majority of 97.

See also references under "Labour Party (British)" in the Index.

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LABOUR TURNOVER, the movement of workers into and out of the labour force of an employer. The term includes accessions, separations and replacements. The term separations includes voluntary resignations, discharges, layoffs, and separations caused by death, disability, retirement or entrance into the armed forces.

The net increase or net decrease in a specific work force is called the net labour turnover. More useful figures are the rates of accessions and separations determined by the following formulas: $LT = \frac{A \times 100}{N}$ and $LT = \frac{S \times 100}{N}$. In these formulas LT is the index of labour turnover, N is the average number of employees in the plant during the period, A is the number of accessions and S is the number of separations. These figures indicate the extent of the movement into and out of the employer's labour force, and give a valuable estimate of the turnover situation provided that total employment in the plant has remained fairly constant throughout the period. If total employment has fluctuated widely, a better picture may be obtained by using the formula $LT = \frac{R \times 100}{N}$ in which R is the number hired during the period to replace those who were separated. This formula is less affected by changes in the labour force beyond the company's control. A still further refinement is $LT = \frac{(R - US) \times 100}{N}$ in which US is the number of unavoidable separations such as those caused by the armed forces draft, termination of temporary employment, transfers induced by the company, illness and death. If a turnover problem exists, this figure will indicate the correctible amount of labour turnover.

Labour turnover and labour mobility are closely related, and a change in labour mobility will probably result in a change in labour turnover in the same direction, although not necessarily in the same amount. Labour mobility, however, usually refers to a broader area and to the ease of movement rather than to the rate of movement. Labour turnover is usually looked upon as a problem to be solved, while labour mobility has a more favourable connotation. In a dynamic economy, some labour mobility is essential if the ideal allocation of labour resources is to be approached.

The employer's interest in maintaining a low rate of labour turnover stems from the costs involved. The expenses of recruiting and training workers, discarding products spoiled by learners and repairing damage caused to machines by inexperienced operators may be very high. Studies in specific cases in the United States have estimated the cost of replacing a salesman at more than $6,000, of an aircraft assembly worker at more than $1,000 and of a dictating machine operator at more than $700.

Employers have attempted by various ways to decrease labour turnover. Schools have been organized to train young people for jobs in accordance with their capabilities, and personnel policies have been modified to stabilize an employer's labour force. During recessions, for instance, the available work may be spread among the employees in an attempt to keep trained and experienced workers together as a group by giving everyone a share of the work instead of maintaining full-time jobs for a few. Seniority provisions, pensions and the guaranteed annual wage, where they exist, tend to reduce turnover. With the development of diversified production and the decline in the relative position of agriculture, seasonal fluctuations are no longer as important as they once were in raising labour turnover rates. (P. L. KL.)

LABOUR (TRADE) UNION. Labour unions (or trade-unions) are associations of employed persons for collective bargaining about their conditions of employment and also for the provision of benefits, legal defense and the promotion of their members' interests by bringing pressure to bear on governments and parliaments and, in certain cases, by political action. They undertake other functions besides these—for example, educational work and, in some cases, participation in the organization of industry through co-operative societies or by representation on control boards or in the management of productive operations; but their main work is in the field of collective bargaining, and in some countries the development of social security legislation has made their benefit activities less important than they formerly were.

The word "trade-union" was originally used to mean a union of local trade clubs or societies to conduct a joint movement, the words "trade club" or "trade society" being used to describe the primary units of working class combination. Trades-union meant a combination of societies covering a number of different trades (for example, carpenters, bricklayers, etc., in a building trades-union). General combinations of societies in all trades were called trades-unions or general unions. Later, as the local trade clubs amalgamated into larger bodies, the word "trade-union" came to be used in its present sense, to cover any combination of workers for collective bargaining. (G. D. H. C.)

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I. UNITED STATES

1. Early Unionism.—Unionism in the United States is as old as the nation itself. The first local unions were formed in the closing decades of the 18th century by craftsmen in such industries as carpentry, shoemaking and printing. In the 1820s the first labour movement on a scale larger than that of the local craft union appeared on the American scene in the form of city-wide federations. These federations aided each other in strikes and organizing efforts and in promoting the sale of union-made goods, and represented the labour movement in its dealings with city authorities and the general public.

Almost immediately these local bodies turned to political action, creating local labour parties in a number of areas and urging workers to exercise their newly won franchise by voting for labour candidates. They advocated such measures as the 10-hour day, free public education, abolition of imprisonment for debt, regulation of child labour, and mechanics' liens to enforce payment of wages. The parties, though short-lived, enjoyed some measure of success; they elected a few candidates to office and persuaded the more conservative parties to champion certain labour union proposals. In 1834 an effort was made to form a national trade-union organization by federating a number of the local central labour bodies. The National Trades' union achieved very little influence before it was wiped out along with most of the existing labour movement during the depression that followed the panic of 1837.

In the middle of the 19th century business expansion led to a revival of the union movement. New and improved means of transportation and communication permitted the growth of larger enterprises and stimulated the formation of national unions in a number of industries, beginning with the printers in 1850.

The National Labor union, established in 1866, sought to unite the growing labour movement. It campaigned energetically for the 8-hour day, producers' co-operatives and political action by labour. The political party that it sponsored in the 1872 election met with little response, and both the union and its political arm failed to survive the year.

During the depression-ridden 1870s the unions could make little progress, though there were important strikes against wage reductions, notably on the railroads in 1877. In the anthracite coal areas of Pennsylvania a secret labour body known as the Molly Maguires (*q.v.*) carried on a terroristic campaign against the employers before it was broken up by the arrest and conviction of its leaders.

2. Knights of Labor.—As a continuous, more or less unified movement, unionism in the United States cannot be said to have become established before 1880. By that year the Knights of Labor, organized as a secret group by Uriah S. Stephens in 1869, appeared in the open as a union of all workers, skilled and unskilled, manual, clerical and professional. During the next ten years there was unfolded one of the most dramatic and significant episodes in the history of U.S. labour. Hardly known at the beginning of the decade, the Knights, now under the leadership of Terence V. Powderly, achieved by 1886 a membership of close to 1,000,000 and an influence far transcending its size.

Much of the energy of the officers of the organization was dissipated in carrying out the ambitious economic program of the Knights, which included vast co-operative schemes and plans for the reorganization of the currency and banking system of the country. There was also inevitable conflict for jurisdiction between the Knights and the established craft unions. The Haymarket bomb episode in 1886 at Chicago brought the Knights of Labor undeservedly into disrepute and hastened its end.

3. Rise of the American Federation of Labor.—Even during the heyday of the Knights, a new central organization of U.S. labour was already forming under the leadership of Samuel Gompers and his associates. This organization, which appeared in 1886 as the American Federation of Labor (A.F. of L.) had as its precursor the Federation of Organized Trades and Labor Unions, begun in 1881. The principles on which the American Federation of Labor was founded originated in the practical experience of the leaders of this new movement. They saw in craft unionism the solidarity and permanence that they found missing in industrial unions and the "one big union" sponsored by the Knights of Labor. They observed that the best chances of continuity and strength in a movement of organized labour lay in formulating narrow and attainable economic objectives instead of embracing a large and attractive program of economic reform that the trade unionists themselves had neither the interest nor the capacity to make effective. In view, finally, of the failures of past efforts to engage in independent political action, they abandoned attempts to form a labour party and sought to achieve political influence by other means. (*See* AMERICAN FEDERATION OF LABOR–CONGRESS OF INDUSTRIAL ORGANIZATIONS.)

4. Independent Unions.—The largest group of unions independent of the American Federation of Labor before the early 1930s were the railroad brotherhoods—the unions of locomotive engineers, firemen, conductors and trainmen—with an aggregate membership of about 500,000. These railroad unions at no time affiliated with the federation. The Amalgamated Clothing Workers of America, for many years the most famous independent union, was admitted into the A.F. of L. in 1933. In 1957 the Brotherhood of Teamsters, with over 1,000,000 members, was expelled by the A.F.L.–C.I.O. and has since remained independent.

5. Analysis of Growth.—As an effective force in U.S. industry, organized labour hardly made itself felt before 1900. The decade 1890–1900, which brought a severe depression and general unemployment, was not favourable to the growth of unions. From 1900 to 1914 the total membership of U.S. unions increased from 791,000 to 2,647,000 and unionism penetrated many unorganized industries, making its most notable advances in the coal industry. Among the manufacturing industries the progress of organization was substantial but slow.

This situation changed radically after the outbreak of World War I in 1914. The rapid rise in productive activity, the steady absorption of the unemployed in face of the cessation of immigration, the further stringency in the labour market after U.S. entry into the war, the rising levels of prices and of wages and a generally favourable governmental policy during the war were all factors contributing to the strength of organized labour. The membership of unions nearly doubled between 1915 and 1920 (2,560,000 to 5,034,000), and unionism won a place for the first time in the textile industry, packing houses, machine shops, railroad shops, clothing industries and among many clerical occupations. In the iron and steel industry, however, the movement failed to make progress.

The wartime gains were not maintained in the postwar years. The liquidation of war industries, the depression of 1921 and employer opposition to organized labour caused the unions to lose 1,400,000 members by 1923. In spite of good business and employment, membership remained almost constant in the next few years. The severe depression following the stock market crash of 1929 further weakened the labour movement and left it in 1933 with fewer than 3,000,000 members. With the coming of Pres. F. D. Roosevelt's administration, however, membership rose rapidly. By 1940 it had increased to 9,000,000. World War II provided a further stimulus to unionism and by 1945 total membership stood at 15,000,000. Since 1945, union membership, which reached a peak of over 18,000,000 in 1957, has grown more slowly than the nation's labour force. In the 1960s some observers were predicting a future decline in union membership and influence.

6. Handicaps to Growth.—U.S. unions were for many years handicapped by their uncertain and unfavourable legal status. Some of the legal devices that hindered union expansion were the free use of injunctions in disputes, prohibitions against interference with interstate commerce, and the "yellow-dog" contract by means of which employers required workers to refrain from joining unions. The Clayton Anti-trust act of 1914, the Railway Labor act of 1926, and the Norris-LaGuardia Anti-injunction act of 1932 were major pro-union statutes antedating the New Deal. Virtually all of the remaining legal disabilities were swept away by the legislation supported by the Roosevelt administration.

Organized labour was also slowed in its growth by the determined opposition of employers. Sometimes this opposition took

the form of so-called "industrial militarism," a term applied to the practice of some employers of maintaining arsenals of weapons and standing armies of plant guards, and carrying on espionage. A senate investigating committee of the late 1930s headed by Sen. Robert M. La Follette, Jr., brought to light the extensive use of such anti-union methods in U.S. industry. On the other hand, some employers resisted unionism by a program of welfare capitalism, which included sponsorship of rival associations, or company unions that were easily dominated by the company management. These organizations, sometimes described as employee representation plans or works councils, were limited either to a single plant or to several plants under common ownership. Their number grew rapidly during the decade following World War I.

7. The New Deal.—During the early years of the 1929 depression, labour was too benumbed to do more than engage in a few desultory strikes, mostly under Communist leadership, but the administration of President Roosevelt ushered in a new era for organized labour. Government now stepped in directly to pave the way for unionism. New Deal labour legislation began with the National Industrial Recovery act (NIRA) passed in June 1933. Section 7(a) of NIRA gave employees the "right to organize and bargain collectively through representatives of their own choosing" and to be "free from the interference, restraint or coercion of employers of labor" in their organizing and bargaining activities. This legal protection and the desire of workers for union representation gave U.S. unions the most favourable organizing opportunity in their history (*see* LABOUR LAW: *United States*). In the period 1933–35, the United Mine Workers of America, the International Ladies' Garment Workers' union and the Amalgamated Clothing Workers of America made the most vigorous comebacks.

Before 1933 there were only a handful of permanent union members in the mass production industries. To organize these industries, the A.F. of L. chartered federal (plant-wide) locals. Yet this new opportunity soon brought a characteristic difficulty. A minority within the A.F. of L., with the support of most of these new federal locals, demanded an aggressive organizing drive and the chartering of industrial unions in the mass production industries. The craft unionists, representing a majority of the federation's membership, argued for a more cautious policy and for the preservation of established jurisdictional rights. The issue came to a head in the 1935 convention of the A.F. of L. As a result of the convention's defeat of an industrial union resolution, representatives of eight international unions announced the formation of the Committee for Industrial Organization (C.I.O.). Its purpose was "to encourage and promote (industrial union) organizations of the workers in the mass-production industries of the nation, and affiliation with the American Federation of Labor." Still refusing to compromise, the executive council of the A.F. of L. in Jan. 1936 ordered the immediate dissolution of the C.I.O. movement. This was later followed by the expulsion of ten C.I.O. unions. In May 1938 the C.I.O. was transformed into an independent federation known as the Congress of Industrial Organizations.

8. The Great Upheaval of the 1930s.—The outlawing of the C.I.O. in 1936 was overshadowed by a series of sensational C.I.O. organizing victories. The first concerted C.I.O. organizing campaign was undertaken in the steel industry, the citadel of the open shop. By June 1937 the Steel Workers' Organizing committee (S.W.O.C.) had reached agreements, practically without resort to strikes, with approximately 140 companies, including 14 United States Steel corporation subsidiaries. However, against the smaller steel companies, collectively known as "little steel," the S.W.O.C. campaign was less successful. Aided by police, national guardsmen and citizens' committees in the communities where strikes were called, "little steel" defeated the S.W.O.C. and succeeded in avoiding unionism and collective bargaining until 1941.

The tactics accompanying the drive in the auto industry differed from those in the steel industry. Where the S.W.O.C. organizing campaign was carefully planned and centrally organized, the rank and file in the auto industry often initiated strikes in spite of the restraining influence of the union leadership. The United Automobile Workers signed their first collective bargaining agreements with the General Motors corporation and the Chrysler corporation in 1937. The Ford Motor company succeeded in holding out until the summer of 1941. The United Electrical, Radio and Machine Workers of America and the Textile Workers' Organizing committee were other early C.I.O. industrial unions. Between 1937 and 1941 the C.I.O. was also able to make inroads in meat packing, shipbuilding, oil, metal mining and numerous other industries.

The organizational efforts of the C.I.O. made the newspaper headlines but the less publicized campaigns carried on by affiliates of the A.F. of L. were no less important. The A.F. of L. more than doubled its membership between 1935 and 1945. Union membership rose during this period to a total of about 15,000,000 but the bulk of union members were concentrated in a few large organizations at mid-century. About a dozen unions, each with 250,000 or more members, contained almost half the total union membership. These giants, plus 15 or 20 medium-sized unions, formed the main body of U.S. unionism.

9. National Labor Relations Act.—The upheaval of the 1930s derived its impulse more from the general political climate than from the enactment of the National Labor Relations act (or Wagner act) of 1935, which took the place of sec. 7(a) of the unconstitutional National Industrial Recovery act. Because most employers were convinced that the new law would meet with the same fate as its predecessor, it was held in virtual suspension until the courts passed upon it.

The act stipulated two methods of protecting the right of employees to bargain collectively. First, it included a list of unfair labour practices that employers were forbidden to engage in. The National Labor Relations board (NLRB) was made responsible for the prosecution and adjudication of all charges of unfair labour practices. Second, the NLRB determined which union was authorized to represent the employees in a specific labour unit and could hold elections among the workers to that end. The union selected by a majority of the employees voting was recognized as the exclusive bargaining agent for the entire unit.

The unexpected validation of the National Labor Relations act by the U.S. supreme court in the spring of 1937 was a turning point in U.S. constitutional development—a change amounting to a peaceful revolution. The court held that congress had power to regulate the labour practices of all employers whose operations affected interstate commerce. Even with this broad interpretation the act did not apply to all industry. It was estimated that about 40% of all nonagricultural workers in the country were subject primarily to state regulation. To protect these workers, several states enacted their own labour relations acts.

10. During and After World War II.—Shortly after the start of the national defense program in June 1940 the number of strikes began to increase rapidly, coinciding with a sharp rise in employment. To prevent production losses, President Roosevelt in March 1941 created the National Defense Mediation board, a tripartite body composed of representatives of labour, industry and the public. After war was declared this board was succeeded in Jan. 1942 by the National War Labor board (NWLB). It was empowered to deal with every type of dispute that "might interrupt work that contributes to the effective prosecution of the war." If the board could not gain a voluntary settlement it would act as a compulsory arbitration panel. Soon after the Japanese attack on Pearl Harbor union leaders pledged not to strike for the duration of the war. In addition to its responsibility for preventing strikes the NWLB was charged with the administration of another vital wartime measure—stabilization of wages as part of the administration's anti-inflation program. The Smith-Connally act of 1943 gave the president power to seize privately owned war plants and to operate them under government control when an actual or threatened strike or lockout involved interference with war production. (*See* LABOUR LAW: *United States.*)

11. Restrictive Labour Legislation.—The end of hostilities terminated the no-strike pledge, and in 1946, 1947 and 1949 there were numerous large-scale strikes. The unions, especially in the newly unionized industries, still had to convince employers that they had taken root. They proved it by successfully standing guard over the real wages and job control provisions, such as seniority rules and safety precautions, in the collective agreements.

To the latter they added pensions and other social insurance protections obtained by collective bargaining. Automatic cost-of-living adjustments and incremental allowances for increased productivity were also negotiated by some strong unions.

But with these determined stands in the economic arena unionism suffered a serious loss in its legal status. The 80th congress, under Republican control, enacted in 1947 the Labor-Management Relations act, popularly known as the Taft-Hartley act. It retained the Wagner act's stipulation of the rights of employees and the means for their protection, but placed a host of union activities under government surveillance. Foremost among these was the definition of certain union activities as unfair labour practices.

12. Merger of the A.F. of L. and the C.I.O.—In 1955, after prolonged negotiations, the A.F. of L. and the C.I.O. reached an agreement to join forces. The names of the two bodies were combined to form the name of the new federation, whose first president was George Meany. The merged labour movement, breaking sharply with the A.F. of L. tradition on national union autonomy, issued a series of ethical practice codes to govern the behaviour of officers of affiliated unions in financial and other matters; it likewise created enforcement machinery, with expulsion the ultimate penalty for unions that failed to conform. Nevertheless the entire labour movement found itself on the defensive, with the disclosure of serious financial irregularities in certain unions, notably the powerful Teamsters' union. The A.F. of L. also continued to be plagued with jurisdictional disputes, the most troublesome of which concerned the conflicting claims of the building trades and some of the large industrial unions. Jurisdictional disputes and an unfavourable climate of public opinion delayed the launching of large-scale organizing drives (in the south and among white-collar workers) that had been planned to follow the merger.

13. Labour and Political Action.—With the New Deal, organized political action became an important activity of the U.S. labour movement. The A.F. of L.'s traditional nonpartisan political policy had been modified somewhat by its support of Robert M. La Follette's independent candidacy in 1924, but between 1924 and 1936 labour was relatively inactive politically. In 1936, however, the C.I.O. engaged in a strenuous campaign to help reelect Roosevelt. In 1943, alarmed at the growth of conservative influence in congress, the C.I.O. created its Political Action committee under the leadership of Sidney Hillman.

The A.F. of L., far less active politically until the passage of the Taft-Hartley act, thereupon established Labor's League for Political Education as its political instrument. The railroad brotherhoods also set up similar machinery. These labour political agencies co-operated to support candidates friendly to labour, for the most part working closely with the liberal wing of the Democratic party. With the merger of the A.F. of L. and the C.I.O. in 1955, their political arms were combined into a Committee on Political Education.

14. Communism and International Labour Relations.—U.S. labour became concerned with Communist infiltration into positions of command as early as the 1920s. Fired by a sense of mission as the vanguard of the proletarian revolution, the Communists had sought to assume leadership over the labour movement and use it for political purposes.

Even before the passage of the Taft-Hartley act, which required union officers to sign an affidavit stating that they were not Communists, U.S. labour was ejecting leaders who had subordinated the interests of the trade unions to those of the Communist party. Communists had played an important role in the early stages of the C.I.O. mass-production unions because of their indefatigable zeal as organizers. However, during 1949 and 1950 the C.I.O. expelled 11 unions found to be Communist-dominated and amended its constitution to bar Communists or their consistent followers from membership on the executive board. Before this drastic purge took place the Communists had been defeated after several years' struggle in the C.I.O.'s biggest affiliate, the United Automobile Workers. By the late 1950s Communist influence in the labour movement was at its lowest point in more than 20 years and dwindling rapidly.

While U.S. labour acted to solve this crucial internal trade-union problem, it also showed novel activity on the international scene. It vigorously backed the administration's program of rebuilding western Europe and containing Communism. The culmination was the International Confederation of Free Trade Unions, formed in Dec. 1949, to ensure "collaboration between the free and democratic trade-union movements throughout the world." *See* also AMERICAN FEDERATION OF LABOR–CONGRESS OF INDUSTRIAL ORGANIZATIONS; CLOSED SHOP; LABOUR LAW; STRIKES AND LOCKOUTS. (S. PE.; J. SN.; R. J. LN.)

II. GREAT BRITAIN

1. Early History.—There is no connection between British trade-unions and medieval craft guilds, for the latter were composed of master craftsmen who owned capital and often employed journeymen and apprentices. The roots of modern trade-unions lie in the factory system that developed in England in the late 18th and early 19th centuries. The unions began as local trade clubs organized by skilled artisans whose outlook was far removed from that of ordinary manual workers. When the capitalist system had created a class division of society between employers and wage earners instead of the previous occupational divisions between trade and trade, the small exclusive trade clubs were transformed into the modern trade-union movement, the essence of which is a sense of solidarity between the manual workers of different trades.

Early attempts to organize labour for the purpose of regulating wages and conditions of employment had to contend with legal repression. Statutes dating back to the 14th and 16th centuries contained clauses forbidding the combination of workers in certain trades, and combination was prohibited by common law if held to be "in restraint of trade." But legal powers were not often used until the 18th century, when the industrial environment strengthened the motives for combination, and when for the first time organized labour was felt to be a serious threat to employers and the governing classes. As workers tried more and more to combine, sterner measures of repression were used against them. A whole series of new statutes had appeared by 1775 and the courts began to use a wider interpretation of the common-law doctrine on restraint of trade as it applied to combination. The French Revolution in 1789 heightened the fears of the governing classes and the repressive measures culminated in the Combination acts of 1799 and 1800 that expressly declared all combinations to be criminal conspiracies against the public interest. This period of severe repression continued until the Combination acts were repealed in 1824. Repeal of the Combination acts was not the result of any reduction in hostility toward the unions. It was argued that these acts tended to encourage rather than prevent combination because they fostered the belief that trade-union repression, rather than economic conditions, was responsible for low wages, and it was on the strength of this argument that repeal was obtained. Even after 1824, the position of workers involved in union activities remained precarious, for there were still various ways of penalizing and taking legal action against them.

2. Three Phases of Development.—The evolution of 19th-century trade-unionism falls into three phases: the sectional and local trade clubs up to 1850; the "old unionism" from 1850 to 1880; and the "new unionism" after 1880.

In the first phase the most spectacular attempt to convert the trade clubs into a militant national movement was Robert Owen's Grand National Consolidated Trades union of 1834. Although his followers became fired with revolutionary zeal, Owen refused to countenance appeals to class hatred. He was prepared to launch a general strike, but he insisted that it be done in the spirit of social brotherhood. After a few sporadic strikes the movement collapsed but the imprint of Owenite ideas remained, particularly the emphasis on the division of society into the "idle" and the "industrious" classes. Signs of a revival were seen in 1845 when the National Association of United Trades for the Protection of Labour was established, but this lasted for only a few years.

The next impetus came in mid-century when the "new model" unions, such as the Amalgamated Society of Engineers (1851), were set up. In retrospect this phase is best described as the "old

unionism." National in scope, these unions were exclusive and restricted entry to legally apprenticed workmen; they preferred conciliation and arbitration to the strike weapon. The leaders adopted the principle that the surest way of increasing their members' standard of living was to keep their labour as scarce as possible; accordingly craft unions, such as the Stonemasons, the Flint Glassmakers and the Lithograph Printers, sought to protect themselves by limiting the number of apprentices. They paid much attention to friendly society benefits and devoted funds to help members to emigrate on the principle that this helped to restrict the supply of their labour on the market.

A landmark in the struggle for legal recognition was reached in the Trade-Union act of 1871 which gave unions an assured legal status. There were also the beginnings of activity among the less skilled workers, the outstanding example being the founding of the National Agricultural Labourers' union by Joseph Arch in the early 1870s.

The craft unions were being slowly affected by the conflicting consequences of machine production. On the one hand, trades were being split up into small skilled operations so that skill became narrower and more specific; on the other hand, different industries became more closely interrelated. Knowledge of a machine in one industry could be applied easily to a machine in an industry making a totally different product. In many factories it became difficult to draw the line between skilled and semiskilled work. Craft rules could be maintained by boilermakers and workers in the cutlery and building trades, but technical progress in trades such as engineering, printing and textiles was too strong to be resisted.

Between 1880 and 1900 there emerged the "new unionism," the organization of the unskilled groups such as the dockers, the seamen, the gasworkers and the general and municipal workers. No longer was it a question of seeking a privileged position or offering friendly society benefits: the emphasis was now on industry-wide collective bargaining and the "standard rate." The victory of the Dockers' union, led by John Burns and Tom Mann, in the strike of 1889 was a turning point. The new unions grew in strength and agitated for an eight-hour day, a legal minimum wage and the guarantee of more regular employment. The culmination of the campaign for industrial unionism was the establishment in 1913 of the National Union of Railwaymen embracing all grades in the industry with the exception of the craft groups; *i.e.*, the Associated Society of Locomotive Engineers and Firemen and the Railway Clerks' association.

3. Shop Stewards.—An important feature of trade-union development during World War I was the rapid growth of the shop steward movement. Shop stewards were originally minor officials with little or no negotiating power. In the war economy it became impossible for full-time officials to deal with the numerous and frequent changes in workshop practice, and negotiations on these matters passed into the hands of the shop stewards. They assumed wider powers and began to champion workers' grievances that did not receive official trade-union support. After the war both employers and the official trade-unions aimed to curtail their power. The movement declined, particularly during the depression years following the war, and "unofficial" stewards disappeared. With World War II the movement began a new period of expansion, which, in contrast with the earlier phase, now received the backing of the official unions. There was no concerted attack on their status after World War II. With the growth of consultation in industry and the increased influence that the trade-unions acquired under the Labour government (1945–51), the role of shop stewards became more prominent.

4. Trends in the 20th Century.—Between 1900 and 1946 there were several changes in the legal status of unions. In the case of the *Taff Vale Railway company* v. *Amalgamated Society of Railway Servants* (1901), the court decided that a union could be sued for damages caused by its agent's actions during a strike. This decision was reversed by the Trade Disputes act of 1906.

The Trade Union act, 1913, permitted political action by unions on condition that members had the right to be exempted by "contracting out." The act stated that where a union by resolution approves the expenditure of its funds for political purposes, there must also be provision that such expenditure shall be out of a special political fund and any person joining the union can state that he does not wish to contribute to the fund, thus "contracting out" of making such payment. An act passed in 1927 after the General Strike of 1926 introduced the system of "contracting in," that is to say that a member joining a union had expressly to state that he wanted to contribute to the political fund. However, the 1927 act was repealed in 1946 when the Labour government restored the provisions of the 1913 act. A member who "contracts out" is protected by the 1913 act from being excluded from any benefits of the union; moreover, a person cannot be barred from admission to a union by not "contracting in."

Between 1910 and 1920 total union membership increased from 2,565,000 to 8,334,000. In the years immediately before World War I there were bitter industrial disputes and later the shop steward movement led to a demand for workers' control. The postwar slump in 1921 and the return to the gold standard in 1925 precipitated the greatest crisis in the history of British trade-unionism, the general strike of 1926, called in support of the miners. Its failure brought widespread disillusionment, which was intensified by the onset of the great depression in 1930; by 1933 total union membership had fallen to 4,392,000, half of what it had been in 1920. (*See* GENERAL STRIKE.)

World War II ushered in a new phase. Ernest Bevin, founder of Britain's largest union, the Transport and General Workers' union, became minister of labour in Winston Churchill's national government and was responsible for the organization of manpower in the critical years 1940–44. Trade-union policies were successfully adapted to the needs of the war effort, in contrast to what happened during World War I. A similar spirit prevailed in 1945–50 when the unions practised much restraint to help the Labour government to cope with the postwar balance of payments problem. In the 1950s and early 1960s the unions slowly adjusted their traditional outlook to the new conditions of full employment, balance of payments difficulties and an increasing emphasis on productivity.

5. Influence of Technical Changes.—At any given time the structure of trade-union rules and the character of the technology of an industry are interdependent; a change in either reacts on the other. Modern attitudes are best understood in the light of the profound impact of mass production methods. Radical adjustments were called for as was revealed during World War I when industrial processes vital to the production of munitions had to be greatly "diluted," *i.e.*, it was necessary to subdivide processes, install specialized automatic machinery, upgrade existing labour and introduce a large number of female workers. This transformation, based on the machine tool, provoked a fierce conflict between traditional trade-union attitudes and the inner logic of modern machine production.

The first phase undermined the position of the highly skilled craftsman versatile in all aspects of engineering: his field was divided among a number of specialists such as fitters, turners and patternmakers. Many-sided human skill was replaced by a number of more specialized crafts of narrow range. In the next phase the machine began to have a major impact. The centre lathe, on which the turner could conduct many types of operations, was replaced by a number of machines designed to carry out specific operations. New grades of skilled machine operators such as millers, planers and borers emerged, and the trade-unions had to reconcile the interests of these grades with those of the fully skilled fitters and turners. A third phase began with the single-purpose, semiautomatic machine. Human skill was still indispensable for setting up the job, but most of the production work was repetitive and was done by semiskilled workers who were ultimately organized by the general labour unions. The next development was the fully automatic machine run by unskilled women and juveniles, the exercise of skill being restricted to the tool room. Ultimately this trend led to automation of entire factories. Throughout this evolution there were divergences of interest between craftsmen and mass production workers that greatly influenced trade-union policies.

6. Structure.—By the early 1960s there were approximately 650 unions in Great Britain with a total membership of nearly 10,000,000. Most of the unions had less than 1,000 members but 7 had 250,000 or more. Many unions have members scattered over a number of industries. About 20% of Britain's trade-unionists are in the category of "general labour," most of them belonging to the largest union, the Transport and General Workers' union (1,224,000); another 20% are in metal manufacture, engineering, shipbuilding and electrical trades. The membership in national and local government exceeds that in mining, and that of educational, insurance, banking, finance and other professional services is not far below it. A rift between craft and industrial unionism has been avoided through the rise of large general unions drawing members from a cross section of industries and occupations, the successful organization of white-collar grades such as clerks, teachers, technicians, civil servants and supervisory staffs, and the willingness of craft unions to admit semiskilled and unskilled workers.

The central organization, the Trades Union congress (founded in 1868), has a general council elected at the annual conference. This council cannot control any individual union, but its influence has steadily increased. (For an account of the development, powers and administration of the British Trades congress, *see* TRADES UNION CONGRESS.) There is a sense in which the British trade-union movement has become, in Sir Winston Churchill's phrase, "an estate of the realm." Most public corporations have trade-union representatives and the voice of organized labour is heard on all economic and political issues. (B. TH.)

III. EUROPE

Labour unionism on the continent of Europe has traditionally differed from that of the English-speaking countries, especially in the following respects: (1) most of the continental unions have been organized into industrial or multi-industrial rather than craft structures; (2) a majority have had strong and continuing partisan political connections; (3) a great many have represented dominant religious groups; (4) most have been obliged to deal with powerful and unified associations of employers; and (5) the details of labour-management relations have been prescribed or strongly influenced by governmental or quasi-governmental agencies. These generalizations must be modified by the varying circumstances of the different countries.

1. France.—Although local unions became active in Paris and Lyons as early as the 1820s, trade-unionism had no legal status until after 1884, at which time a federation of *syndicats* was formed. This was under the leadership of Marxian socialists, and failed to attract many members. In 1893 a Fédération des Bourses du Travail (F.B.T.) was organized by a number of local labour exchanges and councils. Influenced by the doctrine of syndicalism, it held that the workers should own the local industries; it also opposed parliamentary action and advocated the general strike as the ultimate weapon useful to the working class. When the F.B.T. absorbed the older federation of *syndicats* in 1894, it provided organizational unity but created friction between the socialist and syndicalist leaders. In 1902, through amalgamation with an independent group, the F.B.T. acquired the name of Confédération Générale du Travail (C.G.T.), which survived to become a significant factor in later French history. Until 1935 the Marxists were ineffective in the syndicalist-dominated C.G.T. The C.G.T. acquired substantial strength in industrial cities, but, because it avoided the craft-union structure and was not interested in small local unions, it did practically no organizing in smaller cities or in rural areas. A political crisis occurred in France in 1934 and within two years the Popular Front movement won a general election. During the turmoil, Communist leaders gained control of the C.G.T. and gave the organization a continuing close relationship with Communist policies. Meanwhile, small groups of Catholic workers had slowly increased their membership and emerged as the Confédération Française des Travailleurs Chrétiens (C.F.T.C.) opposing both syndicalism and communism. In 1948 a forceful leader, Léon Jouhaux, split the C.G.T., forming a new Force Ouvrière, with a socialist but anti-communist orientation. The three great rival federations—C.G.T., C.F.T.C. and Force Ouvrière—consistently opposed each other in political matters but occasionally collaborated in the conduct of strikes.

Partly because of the radical leadership of the largest federation (the C.G.T.), French employers were hostile to unionism and signed very few written contracts with unions. By an act of 1950 the French ministry of labour was given some authority to require the settlement of labour-management disputes, but the power was little used until the advent of the De Gaulle government in 1958. Split into three factions, and allied with opposing political and religious organizations, French unions did not achieve the economic strength that the size of their membership would suggest. Strikes were more like political demonstrations than bargaining weapons. Even though the rank and file of the membership were not Communists, the leaders of the largest federation tended to follow a program adapted from Marx and influenced by the Communist party of the U.S.S.R. (*See* also FRANCE: *Administration and Social Conditions.*)

2. Germany.—A few small German trade-unions were founded during the revolution of 1848 but the division of the country and the strength of the monarchies kept them weak. Unions were banned completely by Bismarck from 1878 until 1890, after which the hostile imperial government prevented them from acquiring significance. Following Germany's military defeat in 1918, however, unions gained strength for a time. The Weimar government encouraged them but they lost membership during the wave of unemployment that came in the late 1920s. After Hitler and the Nazi party came to power in 1933, free unions were totally destroyed. A labour front was created out of the unions but was controlled by the Nazi party and could not be considered a labour union.

After the defeat of Nazi Germany in 1945, eastern Germany came under the influence of the U.S.S.R. and free unions were not re-established there. In western Germany, however, a vigorous trade-unionism came into being. In 1947, representatives of nearly 2,000,000 newly organized trade-unionists created the Deutscher Gewerkschaftsbund (D.G.B.), a federation made up almost entirely of industrially organized unions in the British-controlled sector. Within two years it had also spread throughout the American and French sectors. White-collar workers, chiefly in commercial employment, set up their own federation, the Deutsche Angestellten Gewerkschaft (D.A.G.). The two federations remained organizationally distinct, but the fact that one was composed of shopworkers and the other of office employees largely eliminated competition between them. Actually, unionism in the Federal Republic of Germany became strongly united, and efforts to organize separate Catholic unions had slight success.

Both the D.G.B. and the D.A.G. developed strongly centralized power. Local unions were permitted to handle their own day-to-day affairs, but the policies were determined by the union headquarters. Since the leaders feared inroads from reactionary employers on the one hand and the nearby Communist influence on the other, they maintained a goal of more democracy in government and avoided strong partisan political affiliation. By legislation that recognized labour unions as quasi-official organizations the government considerably strengthened their effective power. (*See* also GERMANY: *Administration and Social Conditions.*)

3. Italy.—Strong political and ideological forces have always dominated Italian trade-unions and have caused continual conflict between violently competing organizations. Because of the country's poverty, economic gains for labour have been so difficult to attain that unions have focused their attention upon radical reform. Both Marxist and democratic reform unions gained strength before World War I. During Mussolini's Fascist regime unions were transformed into "corporations" and were completely dominated by the ruling party, resulting in the total disappearance of free trade-unionism after 1926–28. Following World War II, a struggle of many competing leaders eventually produced three dominant labour federations. The largest became the Unione Generale Italiana Lavoratori and continued to be communist-controlled. The Catholic labour federation, unofficially supporting the political moderates, was smaller, although next in size. A So-

cialist Democratic federation, still smaller, emerged as a third competitor. Nearly all constituent unions were organized along industrial lines and operated chiefly in the larger cities. Like French unions, labour organizations in Italy have suffered from ideological divisiveness, have fought each other both in the political and economic areas and therefore have failed to achieve great power. Written contracts with employers have been rare, and few local unions have achieved substantial economic gains. (*See* ITALY: *Administration and Social Conditions.*)

4. Scandinavian Countries.—Because industrialism developed later in Scandinavia than in central Europe the labour movement assumed its modern form at a later date and had no significant impact until after 1900. In both Denmark and Norway the unions were suppressed during the German occupation of World War II. Danish unions are largely organized on a craft basis, whereas unions in Sweden and Norway are chiefly industrial. In all three countries unions are united in strong central federations, that in Denmark having the greatest centralized power. All qualified workers are eligible for union membership, and nearly all are members. Unions deal directly with strong employer associations, which have traditionally matched the unions in strength and activity. The government in each of the three countries provides a labour court that effectively settles disputes, so strikes have been rare. All three of the Scandinavian labour federations have maintained a close alliance with moderate socialist political parties and have developed considerable influence in determining national policy. Having a recognized interest in the welfare of their national economies, wage demands by unions have been customarily moderate. In Sweden the government has been the largest single employer of labour, with the result that unions have enjoyed an almost official status.

5. Communist Countries.—The U.S.S.R. and the European countries under its direct influence have not had free trade-unions since the Communist party gained control. Although Russian unions appeared briefly after the revolution of 1905, they were put down by the victorious tsarist government and never acquired permanent status. Workers were organized by trades after the 1917 revolution, but their unions were quickly absorbed into the new Bolshevik governmental machinery. Their powers were limited to the stimulation of production by individual workers, to welfare activities and to discussing with management alleged violations of the labour code, which is established by governmental decree. In Poland, Czechoslovakia and Hungary free trade-unions had been organized before these countries were conquered by Germany in World War II. With the assumption of controls by the U.S.S.R. in 1944 the unions were forced into the Soviet pattern. Although they were often called trade-unions, they were not free unions and bore no resemblance to organized labour in the non-Communist countries.

6. Other European Countries.—Belgian and Dutch labour made some progress toward unionism during the 1920–40 period but all their unions were driven underground during World War II. After political liberation in 1944, industrial labour was rapidly organized into national federations, the largest in each country having a socialist-democratic viewpoint. A Catholic trade-union federation was organized in each country, and in the Netherlands a rival Protestant federation was formed. In both countries, each labour federation was organized so that centralized control rested with the national officers. And in each country the ministry of labour had the authority to exercise considerable influence, especially in the determination of wage rates.

Switzerland, in which the growth of trade-unionism was not interrupted by World Wars I and II, developed Protestant as well as Catholic unions. The Swiss labour movement achieved both prominence and power in the industrial centres, and local unions engaged in active collective bargaining with individual employers, as well as with employer associations.

In Greece unionism was totally destroyed during World War II by the German–Italian occupation. After 1945, under British and American auspices, a number of small unions were created; although nominally free, they remained under close governmental observance.

In Spain, trade-unions began an active growth during the republic, 1931–36, but were completely suppressed thereafter by the Franco government. Some labour organizations continued to exist surreptitiously in the hope of eventual freedom.

Austrian labour unions were suppressed during the Nazi regime and during World War II. After the war, while Austria was under four-power occupation, unions grew rapidly until about two-thirds of the eligible workers were members. The Austrian Trade Union federation (Ö.G.B.) brought under central leadership the various unions representing Socialist, Catholic and Communist views, as well as a number of small independents. These diverse unions cooperated more amicably than elsewhere in Europe. (W. S. Ho.)

IV. FAR EAST

1. Australia and New Zealand.—Trade-unions in Australia and New Zealand have a long history. They were started mainly by settlers from Great Britain, including, in Australia, Chartists and others transported for political offenses. The Australian and New Zealand unions fought their earliest battles for the eight-hour day and then for the minimum wage and were the creators of the Labour parties that rose later to political power. The systems of arbitration built up in both countries at first favoured union claims but later, when a living wage had been gained, offered fewer advantages to the workers. As a result, strong left-wing opposition developed, accompanied by many strikes. Industrial unionist ideas, derived from the United States, became influential in the period before 1914 and retained some hold, especially among miners and dock workers, who were influenced also by Communism. The main body of trade-unionists, however, supported the Labour party and worked under the arbitration system. (G. D. H. C.)

In Australia and New Zealand labour courts, both federal and state, are responsible for making an annual revision, or at least review, of the national level of wages, the so-called "basic wage." Formerly the trade-unions of Australia and New Zealand aimed, through the labour courts, at a "basic wage" that was defined as "a fair and reasonable minimum wage for unskilled labourers . . . the standard appropriate to the normal needs of the average employee [his wife and two or three children], regarded as human beings living in a civilized society." After World War II the unions conceived of the basic wage as the highest wage that industry could pay, considering the economic productivity of the national economy as a whole. The previous "needs criterion" was retained only in that the unions continued to insist that the basic wage, though fixed on a productivity basis, should automatically be raised with every advance in the cost of living. But the commonwealth (federal) labour courts of Australia and New Zealand after the 1950s refused to act on this "escalator principle," apparently to aid the government to restrain inflation. From this it does not follow that the trade-unions of Australia and New Zealand are simple instruments of government wage policy. The spokesmen of the government are permitted to appear before the federal labour court only as "intervenors in the public interest"; they cannot instruct the labour court how to decide the basic wage question.

The involvement of the labour courts of Australia and New Zealand in key wage determinations nevertheless borders on government arbitration. Labour courts have jurisdiction only over unions that register under applicable conciliation and arbitration statutes (first enacted in New Zealand in 1894, in Australia in 1904). Registration does not restrain a union from resorting to the strike as a last resort, rather than to the labour court. But a union can be decertified if it strikes against the award of a labour court. Decertification opens the door to a rival union to solicit the membership of the decertified union. Moreover, a decertified union cannot use the facilities of the labour courts to bring charges against employers who use their economic power coercively against individual employees or their union representatives. Because of the benefits, most unions are registered and stay registered.

To the promise of benefit is joined the threat of penalty. The labour courts often include clauses in their awards that provide sizable financial fines on unions that strike against government awards. The force of this threat is that the government can upon

application of only one party to a labour dispute, which accepts a labour court award, make this award binding on the other party, against that second party's wish. Continuation of a strike or lock-out then constitutes punishable contempt of court. This mere possibility can nip a strike in the bud. In this sense trade-unions in Australia and New Zealand operate under compulsory government arbitration. However, the system is so flexible that the trade-unions are no more disposed to discard it than they are to laud it.

2. India and Pakistan.—The advance of trade-unionism in India and Pakistan is hampered by the lack of industrialization. A mere 2% of the labour force in each country is employed in factories. Agriculture still claims most of the labour force but is not able to employ this excessive amount of manpower fully. The resulting superabundance of labour available for employment is inimical to trade-unionism. It causes individual workers to compete ruinously for jobs and to be apathetic toward joining a union. The internal weakness of unions is further undermined by the propensity of employers to go over the heads of the unions by using many devices that range from traditional patriarchalism to company unionism. The strong residual of culture-based employer resistance recedes slowly, even though the governments of India and Pakistan have declared themselves in favour of trade-unionism. A large amount of labour legislation exists; there are government labour officials and labour courts; periodically, government-sponsored tripartite conferences are held aiming at the achievement of industrial peace.

In spite of hindrances, trade-unionism in India and Pakistan has passed through the first rudimentary stage of merely gaining existence. No longer is labour unrest to be sparked simply by disgruntled individuals, nor to be exploited by political extremists of the right or the left. Trade-union demands are planned well in advance of being presented to employers; the demands are based on careful analysis of current and prospective economic conditions. In Pakistan destructive intramural conflicts have been eliminated by mergers between separated labour federations. Unification allows organized labour to turn attention to the important task of educating the leaders of labour at all levels of leadership. Union-financed labour institutes have been established to train labour leaders who, in turn, educate the members of the unions. Thus, in many ways, the unionists of India and Pakistan are attempting to justify the claim of trade-unionism everywhere, the claim to being "the human agency in industrialization."

3. Japan.—Trade-union membership in Japan is larger than in any other nation of Asia. However, the Japanese unions resemble the large single-firm enterprise-conscious unions which are occasionally found in western nations, rather than the job-conscious trade-unions found in most western countries.

The Japanese worker usually looks first to the managers of the enterprise that employs him for his economic security and advance, rather than to his union. This practice stems in part from the lingering heritage of supporting, by personal fealty and subservience, a hierarchical social system in which personal treatment and even pay were determined by individual rank rather than according to objectively classified job performance.

The parochial nature of Japanese labour markets contributes to enterprise-consciousness in the place of job-consciousness. Japan, like other Asiatic nations, has excessive self-employment in farming and other small undertakings. This forces many persons to attempt to supplement their substandard incomes by working in a neighbouring factory. The regular, full-time employees in these factories, who plan to make industrial work a career, react to this competition by drawing close to the managers at their place of work, rather than identifying themselves with workers generally, in the industry or the nation.

Finally, the tone of Japan's official labour code seems to show the government's preference for local-plant collective bargaining over western-style industry-wide bargaining on a national scale. Two large national trade-union federations strive in this difficult environment to make industrial democracy grow—Sōhyō, the reformist General Council of Trade Unions, and Zenrō-Kaigi, the Japanese Trade Union congress, which aims more closely at powerful business unionism. (*See* JAPAN: *Administration and Social Conditions.*) (G. W. Z.)

4. China.—In China trade-unionism was a battleground of rival political tendencies from its emergence as a defined movement in the 1920s. Trade-unionism of a sort, in the form of guilds and clubs of workers in the same trade, has a long history, and the basis of modern trade-unionism is still in working groups of this type or in factory councils. More formally organized trade unions came into existence during the period after World War I, with Communists playing a leading part. After Chiang Kai-shek's coup of 1927, unions under Communist influence were suppressed, and the movement was driven largely underground. Later, the Kuomintang leaders began to organize government-sponsored unions under approved leadership, and the Communists, in addition to carrying on their own "red" unions, adopted a policy of infiltration into these "yellow" unions and of fomenting mass strikes wherever opportunity arose—as it continually did because of the vast inflationary rise in prices. The struggle for the control of the unions was resumed after 1945; and the Communists, whenever they established control of an area, set up or consolidated unions under their own control and gave them large authority in relation to privately owned undertakings. Strikes multiplied in the areas still under Nationalist control, and the Communists were able, despite repression, greatly to increase their hold on the workers throughout the country and thus to prepare the way for their victories of 1949. Under the Communist regime, Chinese unions bear little resemblance to the unions of the non-Communist world.

(G. D. H. C.)

V. INTERNATIONAL ORGANIZATIONS

The larger trade-union movements of various countries of the world have for many years maintained loose alliances through international organizations of labour, in which individual federations of unions hold membership. In 1901, the International Federation of Trade Unions, with its chief influence coming from German labour, was established. It proved to be ineffective and disappeared during World War I. In 1919 it was revived at Amsterdam, but immediately came into collision with the Red International of Labour Unions, established by the new revolutionary government of Russia. Each of these rival organizations had a brief period of expansion, but soon dwindled away and had virtually disappeared by 1939. In 1945, at a conference in London, a new organization came into being, the World Federation of Trade Unions (W.F.T.U.). The principal organizers were the British Trades Union congress, the U.S. Congress of Industrial Organizations, and the Soviet Russian Labour federation. It made a vigorous but unsuccessful attempt to reconcile the differences between the Communist and non-Communist factions. The U.S. announcement of the Marshall plan for economic aid to Europe created an irreconcilable situation, however, and, as the Communists were then in control of the leading offices, the non-Communist faction withdrew.

In 1949, in London, the non-Communist groups created the International Confederation of Free Trade Unions (I.C.F.T.U.). At the first session, 67 labour organizations of 51 nations, claiming to represent 48,000,000 workers, became "founding members." It was readily accepted by nearly all of the labour organizations of the world that were not Communist-led, and after ten years it had achieved a total affiliation of 131 organizations in 96 countries throughout both hemispheres, representing more than 56,000,000 workers.

The announced purposes of the I.C.F.T.U. were to strive for world peace and the spread of democratic institutions, an increasing standard of living for workers everywhere, a world-wide strengthening of free trade-unions, and support to colonial people in their struggle for freedom. It consistently opposed Fascist as well as Communist dictatorships, and in line with this policy gave such aid as was possible to free labour in Spain and certain Latin-American countries. It also furnished direct financial assistance to workers in Hungary and Tibet and campaigned against racialist policies in South Africa.

Lack of homogeneity among affiliates hindered the successful activity of the I.C.F.T.U. in many restricted fields, chiefly because

it could not interfere with the sovereignty of nations or the domestic activities of its affiliated unions. It found its work to be most effective in the area of international education. By 1960 it had created an International Solidarity fund of $2,000,000 to be expended in aiding workers who became victims of oppression and to promote democratic trade-unionism in economically underdeveloped countries. In furtherance of the latter program, it convened, in various parts of the world, seminars at which experienced labour leaders discussed organizational problems with labour spokesmen from the less industrialized countries.

In order to facilitate the functioning of its widespread activities, the I.C.F.T.U. established a head office in Brussels, Belg., with regional or subregional offices in many other countries. Under the leadership of one or more of these offices it conducted numerous educational conferences, maintained a residential trade-union training college in Calcutta, India, and assisted in founding an African Labour college in Kampala, Uganda. To assist inexperienced workers in areas where industrialization was in the elementary stages of growth, it sent organizers to Lebanon, Okinawa, Cyprus, Cameroons, India, Indonesia, Nigeria and elsewhere.

It has been the consistent policy of the I.C.F.T.U. to co-operate with the United Nations Educational, Scientific and Cultural organization and with the International Labour office in Geneva. It is wholly financed by contributions from its affiliates.

Meanwhile the W.F.T.U. continued to be completely dominated by the Communists. Although it claimed to represent more than 60,000,000 workers by 1960, more than one-half were in the Soviet Union, and a large part of the remainder were in Soviet satellite nations. There were also substantial affiliates in France and Italy. The W.F.T.U. adhered strictly to the Communist party line and did not co-operate with other organizations. It served more as a political instrument than as an economically oriented federation of labour.

A much smaller international organization is the International Federation of Christian Trade Unions (I.F.C.T.U.), made up largely of Catholic labour unions in France, Italy and Latin America. The I.C.F.T.U., at its founding congress in 1949, invited the affiliates of the I.F.C.T.U. to join, but the invitation was rejected. On the international scene, the I.F.C.T.U. was a comparatively ineffective organization; its influence was limited to domestic politics and to local affairs within its own membership. *See* also LATIN AMERICA: *Organized Labour.* (W. S. Ho.)

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LABRADOR (ARCTIC) **CURRENT,** a cold, low-salinity ocean current flowing south along the coast of Labrador. Originating in Baffin bay and fed by some water from the west coast of Greenland and Hudson strait, it often carries icebergs and occasionally field ice to its confluence with warm water from the Gulf stream (*q.v.*) at the southern edge of the Grand Banks off Newfoundland. There the cooling of the breezes blowing from warm water over cold produces the local fog so prevalent in spring and early summer at the height of the ice season.

During periods of poor visibility the ice, particularly the bergs and berg fragments, is hazardous to shipping. Following the sinking of the "Titanic" in 1912 by a collision with an iceberg, an international ice patrol was established to safeguard shipping near the terminus of the Labrador current. *See* SHIPPING ROUTES. (C. A. Bs.)

LABRADORITE, in mineralogy, is the name given to the range of composition in the plagioclase feldspar (*q.v.*) solid solution series having from 50% to 70% of the anorthite molecule. The colour is commonly gray, brown to black and, in one of its main occurrences, has a characteristic iridescence of blues, greens and reds on cleavage faces, especially when wet. This iridescence is the result of optical interference from minute inclusions in the mineral. On coarse-grained specimens, a series of parallel striations from repeated twinning is easily seen on certain surfaces.

The rock composed mainly of plagioclase feldspar called anorthosite is usually composed of this iridescent labradorite wherein the individual crystals measure from a fraction of an inch up to several feet in length. Anorthosite occurs in many folded mountain regions throughout the world. Anorthosites are remarkable in their uniformity in appearance and restricted range of composition for the plagioclase. Labradorite without the iridescence is a major constituent in many igneous gabbros, norites and dolerites and in many volcanic basalts. Olivine, pyroxene and hornblende (amphibole) occur as minor constituents in anorthosite and as major constituents in the other rocks containing labradorite. Iron and titanium oxides are also commonly present. For some reason, labradorite is one of the most common ranges of composition for the plagioclase series. Iridescent labradorite was originally described from the coast of Labrador and is sometimes used as an ornamental building stone. (G. W. DEV.)

LABRADOR TEA (*Ledum groenlandicum*), the popular name for a small evergreen shrub of the heath family (Ericaceae), growing in bogs and swamps in Greenland, Canada and northern parts of the United States. The leaves are tough, densely covered with brown wool on the underface, fragrant when crushed and have been used as a substitute for tea.

LABRADOR-UNGAVA, the great peninsula (the Labrador peninsula) forming the northeast section of the North American mainland, which has an area of approximately 625,000 sq.mi., is bounded on the west by James and Hudson bays, on the north by Hudson strait and Ungava bay and on the east and south by the Atlantic ocean and the Gulf of St. Lawrence, respectively. The southwest boundary is difficult to define, the best limit being an arbitrary line connecting the mouths of the Rupert river, in James bay, and the Saguenay river on the Gulf of St. Lawrence.

Politically Labrador-Ungava embraces the "Coast of Labrador," a portion of the Canadian province of Newfoundland, and a large section of Quebec province. North of the Eastmain river, northern Quebec was initially the old Ungava district of the Northwest Territories, awarded to Quebec in 1912 by the Boundaries Extension act. This area is sometimes called Ungava or, alternatively, Nouveau Quebec, but the term Labrador-Ungava is considered preferable for the entire peninsula.

PHYSICAL GEOGRAPHY

Relief.—The peninsula, which lies between latitudes 48° and 62° 50′ N., and longitudes 55° and 80° W., may be likened to an immense saucer tilted down toward the northwest. The southern rim, overlooking the St. Lawrence, forms the massive Laurentide escarpment which rises abruptly from the narrow coastal plain to heights exceeding 3,500 ft.

From the escarpment's crest a vast plateau, with countless lakes, bogs and low hills, slopes gradually northwestward. This "lake plateau," with an average altitude of about 2,000 ft. in the south, 1,600 ft. in the centre and below 1,000 ft. in the north and west, slopes gradually beneath Ungava and Hudson bays. In the extreme northwest, along Hudson strait, an upwarping of the land mass has produced a local highland block rising to more than 2,000 ft.

The highland rim of the south continues along the Atlantic coast, culminating northward in three mountain groups. The Kiglapait ("Dog-teeth") mountains lie north of the Atlantic fishing village of Nain, Nfd., with peaks over 2,500 ft. The Kaumajet ("Shining Tops") project seaward to form Cape Mugford south of Hebron, the highest summit, Mount Brave, exceeding 4,000 ft. The northern group, the Torngat ("home of the spirits"), extend along the coast for 125 mi. with summits attaining 5,500 ft. The mountains, deeply eroded by rivers and glaciers, form a fiord landscape of great beauty. They rise so abruptly from the sea that early travelers estimated their height at 7,000 to 10,000 ft.

The Atlantic watershed of Labrador-Ungava, which forms much of the boundary between Newfoundland and Quebec, is extremely irregular. In the north it lies between 10 and 100 mi. from the coast but at latitude 55° N., north of Hamilton inlet, it sweeps westward to include the great basin of the Hamilton-Ashuanipi and Naskaupi rivers, which drain into Lake Melville. The south shore of the lake rises abruptly for 4,000 ft. to form the uplifted block of the Mealy mountains.

On the central plateau practically 20% of the surface area is water. The rivers are irregular and flow haphazardly from lake to lake. All the great rivers, such as the George, Eastmain, Whale, Fort George and Kaniapiskau-Koksoak, originate on the plateau. Hamilton river, perhaps the best known, exceeds 200 mi. in length and at Grand falls, 150 mi. from its mouth, descends abruptly 302 ft. from the plateau to plunge into a deep gorge.

Geology.—The entire peninsula forms part of the Canadian shield, comprising some of the world's oldest rocks—the Pre-Cambrian, divisible into two groups, the Archaean and the Proterozoic. The Archaean rocks cover by far the largest area and are primarily metamorphosed igneous and sedimentary rocks cut by younger dykes and sills.

Following the Archaean, local down warping allowed the penetration of arms of the sea, particularly in a narrow zone running south-southeast from the west side of Ungava bay. In these waters great thicknesses of Proterozoic sediments, eroded from the Archaean mountains, were laid down and later folded and crushed to form the Labrador range. Later erosion removed all but the roots of these mountains, which remain as a zone of parallel ridges running for more than 400 mi. from south of Schefferville to Ungava bay and forming what is known as the "Labrador trough," important for its iron deposits. Sediments of comparable age and composition border the Richmond gulf coast and form the Belcher Islands. Another narrow zone, known as the "Nickel belt," runs from Cape Smith eastward to Ungava bay. The Proterozoic rocks are relatively little-altered limestones, shales, quartzites and ironstones, in places intercalated with numerous lava flows.

Glaciation.—Labrador-Ungava probably was glaciated on four or more occasions although, except in the northeast, only evidence of the final Ice Age has been found. The peninsula formed one of the major centres of ice accumulation and dispersal in North America, the entire area, including the Torngat mountains, at some time being buried beneath an ice sheet which exceeded 8,000 ft. in thickness in the interior. During the last Ice Age many of the high coastal mountains, and even sheltered lowland areas, remained ice-free. The final melting took place as little as 6,000 years ago, some of the last masses to melt being situated 20–30 mi. north of Schefferville, although even today small cirque glaciers occur in the Torngat mountains.

Climate.—Its situation on the northeast seaboard of the continent, high altitude and proximity to the cold Labrador current give Labrador-Ungava its severe climate. Winters are long and cold, with temperatures falling to −50° F. over wide areas. Heavy snowfall characterizes the Laurentide escarpment, but northward snowfall becomes moderate and, in the north, slight. Since the land is tilted up toward the south this offsets the effects of decreasing latitude and the lake plateau experiences a remarkable uniformity of climate, especially in winter.

Spring is late and short, usually beginning in May, although ice often remains on the lakes until well into June, and much longer farther north. Patches of snow persist sometimes throughout the summer on the lake plateau, while the frost-free period is as little as 75 days and frosts may occur any month of the year. Mild cloudy summers are typical, with July and August mean temperatures in the low 50s, although temperatures occasionally rise to 70° and even 85° F. Mean annual precipitation is of the order of 20 to 30 in. The mean annual temperature is about 24° F., being lower toward the north and much higher on the southern coast. Snow usually falls in September and remains on the ground from mid-October onward. The strong northwest wind sweeps the ridges snow free in winter and increases the already appreciable hazard of frostbite. The northern sections are underlain by permafrost with isolated patches occurring as far south as latitude 53° N.

Vegetation.—The flora, controlled largely by climate, may be divided into three great east-west zones. The northern zone of arctic tundra lies north of the tree line which runs across the base of the Ungava peninsula from Hudson bay to Fort Chimo before swinging southeastward to approach the coast north of Nain. The tundra is characterized by a mat of lichens and mosses with small arctic-alpine flowering plants and, in sheltered places, by dwarf birch and willow. Arms of tundra penetrate along the ridges far south of the tree line, and hilltops in latitude 53° N. rise above the trees. This broad area of intermingled tundra and northern spruce forest grades into the second zone, the subarctic lichen woodland, characterized by widely spaced white and black spruce with a ground mass of luxuriant lichens and mosses. Tamarack, balsam fir, birch, willow, alder, Labrador tea and numerous berry-bearing shrubs occur in many places in association with the spruce.

South of latitude 52° N. closed-crown forest prevails, forming a dense, almost inpenetrable growth of evergreens, primarily spruce, with balsam fir, birch and additional boreal species increasing in importance farther south. This forms the northern part of the boreal forest zone of eastern Canada. The wind-swept outer Atlantic coast carries a fringe of tundra south to Battle Harbour. This barren, rocky coast led early explorers to grossly underestimate the luxuriance of Labrador-Ungava's flora.

Animals.—Best known of Labrador-Ungava animal life is the barren-ground caribou, huge herds of which roamed the tundra and lichen-spruce areas until the 1910s, although subsequent rapid decline threatens total extinction. The wolf has been reduced in numbers with the reduction of caribou, its chief victim. Lemming, mice, squirrel, hare and porcupine are found, while the beaver, fox, mink, marten and ermine made the peninsula famous for its fur produce. Marine mammals include seal, whale and polar bear. Inland the black bear is very numerous.

Birds, especially sea birds and waterfowl, are very numerous in summer. Birds of prey include the snowy owl, rough-legged hawk, bald eagle and golden eagle. Perhaps the ptarmigan is the most characteristic of the Labrador-Ungava birds, occurring in large numbers and turning white in winter. The raven and Canada jay also stay through the winter. Many small species also frequent the area.

Fresh-water fish include varieties of trout, specimens up to 30 lb. having been caught. The landlocked salmon (ouananiche or lake Atlantic salmon; *Salmo salar*), pike and arctic char are found over wide areas. Salmon, sea trout and cod occur primarily along the Atlantic coast, the latter long forming the main economic staple of the area, although by the 1960s reduced in importance.

Mosquitoes and black flies make life almost unbearable on warm still days. The black fly is rarely found north of the tree line, but the mosquito persists to the northernmost tip of the peninsula.

ECONOMY

Until the 1950s animal and plant life of land and sea formed the basis of the economy—principally codfishing and sealing along the Atlantic coast and fur trapping in the interior. These pursuits were the main attractions to the early white settlers. Subsistence hunting and fishing originally sustained both Indians and Eskimos until trapping was added to their way of life. Although vast forests cover much of the southern half of the peninsula, slow growth, the small size of trees and poor accessibility render this asset of limited value. Only in the Lake Melville area and farther south is lumbering considered practical.

Agriculture is impossible in the normal sense, except bordering the Gulf of St. Lawrence, although cultivation under glass is feasible on the plateau near mining settlements. An experimental farm is operated at Fort Chimo by the federal department of agriculture, and sheep farming is practised by the local Eskimos.

Minerals provide the economic foundation of Labrador-Ungava. Although discoveries were made late in the 19th century, the great iron ore deposits of the interior were not mined until 1954; the industry resulted in the mushroom growth of Schefferville (Knob lake), where 400,000,000 tons of ore has been proven, and of Sept-Iles (Seven Islands), its port, to which it is connected by 365 mi. of railway. Ore is shipped from April until November, when it begins to freeze in the trucks. The ore in the Lake Wabush area is 35% iron compared with 55% at Schefferville so beneficiating plants are needed. Ore shipments from the Mt. Wright area, 140 mi. by railway from Shelter bay, west of Sept-Iles, began in 1961. Iron ore from western Ungava bay can be ferried during the short summer navigation period to a port in southwest Greenland, open all year.

The extensive development of mining, including copper, in the extreme southwest in the Chibougamau area, forms part of the main industrial and mining area of Quebec province, while extensive mineral exploration is centred on the Nickel belt west of Ungava bay.

Hydroelectrical development, focusing mainly on Grand falls with a potential of 4,000,000 h.p., and smaller undertakings near the new mining towns, is also of great importance. A new 120,000 h.p. development at Twin falls on the Unknown river began operation in 1961. There was extensive development of mineral exploration in the 1950s. Showings of nickel, copper, gold and uranium-bearing ores have been discovered in various parts of the peninsula.

POPULATION

Eskimos.—The principal coastal population, excluding the gulf coast and the Atlantic coast south of Hopedale, is comprised of small groups of Eskimos, who are part of an almost circumpolar people of northeast Asian origin (*see* ESKIMO). The Eskimo once extended to Newfoundland but, with the coming of the Europeans, their economy gradually declined. Only the efforts of the Moravian Brethren and Grenfell missions on the Atlantic coast, and government assistance in the 20th century have maintained them as a distinct group. Dependent originally upon seal hunting and fishing, their economy has been gradually disrupted by their growing tastes for European food and clothes, the tendency to group themselves in settlements about the churches and trading posts, and by participation in a monetary economy. Disease and liquor, acquired from the whites, and the hard bargaining of the trading companies accentuated their decline, which reached a crisis in 1918 with the "Spanish influenza" epidemic. Their numbers increased steadily after that, although the northern settlements of Port Burwell, Nachvak, Ramah, Zoar, Okak, Nutak and Hebron have been abandoned. In 1951 the Eskimos numbered about 2,600, only some 600 of them living on the Atlantic coast. The development of defense installations and mineral exploration have provided work for an increasing number at Hopedale, Saglek, Fort Chimo, Payne Bay and Great Whale but their virtual extinction as a distinct racial group in the region is a serious possibility.

Indians.—Traditionally hostile or indifferent to the Eskimo, the dwellers of the interior are of Algonkian linguistic stock. They are divisible into two main groups, the Montagnais of the south and west, and the Naskapi of the northeast.

The Montagnais originally lived nomadically by hunting and fishing but, after contact with the whites and their conversion to the Roman Catholic faith in the 19th century, trapping was added to their economy. Annual visits to the gulf coast to sell their furs and visit their priests became common and many are becoming gradually assimilated into the white way of life.

The Naskapi bands originally centred on Indian House lake on the George river, where they assembled in late summer for hunting caribou. They suffered great hardship with the caribou's decline, and even in times of comparative plenty, a change in the caribou's migratory routes brought near starvation. The bands finally broke up in the 1920s, one group settling at Davis inlet, another at the Hudson's Bay company's post of Fort Mackenzie on the Kaniapiskau river. This second group later moved to Fort Chimo and in 1956 to Schefferville, where they live adjacent to the Montagnais group, dependent upon government assistance, sporadic hunting and employment in the towns and mines. The Naskapi are one of the last of the Canadian Indian groups to maintain their traditional way of life and continue to speak their native tongue.

Whites.—Until the development of iron mining the white population was principally coastal, concentrated in the French settlements of the St. Lawrence area and the Scottish and English settlements of the south Atlantic coast. In many cases the lot of the "liveyers" (those who live here), in contrast to that of the seasonal fishermen and whalers, was little better than that of the Eskimo, and they subsisted by fishing, hunting and trapping. They became the main objective of the mission established in 1892 by Sir Wilfred Thomason Grenfell (*q.v.*). Better school and hospital services and the growth of economic opportunity did much to improve their conditions and to compensate for the 20th-century decline of the codfisheries. Construction of Goose Bay airport during World War II; maintained both as a U.S. base and a civilian airport, proved a lasting influence in the Lake Melville area. The development of hydroelectric resources at Grand falls by the British Newfoundland corporation, and the possibility of lumbering, may see continued improvement for these settlers.

The rapid growth of the white population attendant upon the development of Sept-Iles and Schefferville (Burnt Creek) brought an entirely new and heterogeneous group into Labrador-Ungava, originating primarily in English- and French-speaking Canada, but including appreciable numbers of immigrants from Europe, Africa and Australia. The population of Schefferville (1956) 1,632, was 3,178 in 1961. The speed of growth was accentuated by the addition of retail stores, construction and service companies and the establishment of the base for the maintenance of the eastern section of the mid-Canada defense line. Daily air service is maintained between Schefferville and Sept-Iles, Quebec and Montreal. A theatre, hotel, restaurant, Roman Catholic cathedral, two Protestant churches and three schools are some of Schefferville's conveniences. The population of Sept-Iles was 5,592 in 1956 and 14,196 in 1961.

HISTORY

The Labrador coast probably was the first section of the new world to be discovered. In A.D. 986 the Norseman Bjarni Herjolfsson was on his way to Greenland when, driven off route by a storm, he touched land somewhere on the Atlantic coast. This discovery led Leif Ericsson to organize several expeditions from Greenland about A.D. 1000 to colonize parts of the new land, and it is certain that settlers wintered over and came into contact with the aborigines.

The Greenland colonies declined and the early discoveries faded from memory except perhaps in north European ports, for there is evidence of a pre-Columbian voyage by Jon Scolp and J. V. Corte-Real about 1472–73. John Cabot (1497) and Gaspar Côrte-Real (1500) are the accredited discoverers of Newfoundland and

the Labrador coast, followed in 1534–41 by Jacques Cartier. In the 16th century many famous explorers, including Martin Frobisher, Thomas Button, Henry Hudson and John Davis were associated with the Atlantic coast but their main objective was the Northwest passage; the opening of Hudson's and Davis' straits resulted in the subsequent neglect of Labrador-Ungava, except by Basque, Portuguese and English fishermen. The 17th century witnessed the earliest settlements by fishermen, and at its close Maj. George Cartwright from England sponsored settlement on the southeast coast.

James Cook, in 1763–67, was responsible for the first reliable charting of the east coast, but the interior remained virtually unknown until the completion of the travels of John Maclean (1825–50), factor of the Hudson's Bay company and discoverer of Grand falls, and of the Canadian government geologist A. P. Low in the 1890s. The latter's spectacular canoe journeys place him in the front rank of Canadian explorers. Even by 1900 only a rough sketch map of the interior was available and large areas remained unknown until the development of mapping from aerial photography after 1945. More recent travelers who deserve recognition as primary explorers include A. S. Packard, Dillon Wallace, Mrs. Leonidas Hubbard, W. B. Cabot, Clive Todd, E. P. Wheeler 2nd, and the handful of pioneer bush pilots of the 1920s and 1930s who first opened up the interior for mineral exploration.

For political information, *see* NEWFOUNDLAND; *see* also QUEBEC; UNGAVA; NORTHWEST TERRITORIES.

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LABRIOLA, ANTONIO (1843–1904), Italian philosopher who systematized Marxist socialism in his country and became the acknowledged authority there on Karl Marx's writings, was born at Cassino near Naples on July 2, 1843. He was a pupil of the Hegelian philosopher Bertrando Spaventa and became a professor at Rome university in 1874. It was not long before he showed himself to be perhaps the most powerful intellect of the time in Italian academic circles. He was above all a great teacher, a man of many-sided interests and endowed with a strongly independent and original mind. This independence was first shown in his criticism of Hegelianism and his impatience with the positivism of Herbert Spencer, these being the two current orthodoxies of the day. He also believed strongly that philosophy was not just abstract metaphysics but should be closely bound up with ordinary life. About 1885, moved by the corruption of Italian politics, he renounced his early political conservatism and became a radical. In 1889 he gave a revolutionary course of lectures on the philosophy of history, expounding orthodox Marxism for the first time in Italy, where hitherto only the adulterated version sponsored by Achille Loria had been known. Labriola's lectures on the philosophy of history were henceforward devoted to the analysis and elaboration of historical materialism. People of many diverse political opinions were influenced strongly by him, and he may be said to have profoundly altered the Italian intellectual scene. His most famous pupil was Benedetto Croce. He died in Rome on Feb. 12, 1904.

See Luigi dal Pane, *Antonio Labriola: la vita e il pensiero* (1935). (D. M. SH.)

LA BRUYÈRE, JEAN DE (1645–1696), French moralist known for one work, *Les Caractères ou les moeurs de ce siècle,* which puts him in the front rank of French writers. He was born in Paris, where he was baptized on Aug. 17, 1645. His father had a fiscal post in the Hôtel de Ville, his mother belonged to a legal family and his forebears are said to have supported the League in the religious wars of the 16th century. Proud of his common stock, he used to sign his name in one word, Delabruyère. After studying law at Orléans, La Bruyère in 1673 bought an office in the revenue department at Caen, but soon moved to Rouen and then back to Paris. It is said to have been on Bossuet's recommendation that the great Condé in 1684 appointed him as one of four tutors to his grandson Louis, duc de Bourbon (1668–1710). La Bruyère's tutorial duties ended in 1686, but he was retained as member of the Condé household and put in charge of its library at Chantilly. His years in the service of the Condés were probably unhappy. He was a constant butt because of his ungainly figure, morose manner and biting tongue, and the bitterness of his book reflects the inferiority of his social position. Yet he had devoted friends, and the duc de Saint-Simon, no flatterer of the middle class, made a point of describing him as honourable, lovable, unpretentious and unselfseeking.

La Bruyère is said to have been working for ten years on his masterpiece, and the fact that he published it as an appendage to a translation of Theophrastus (in fact of Isaac Casaubon's Latin version) suggests he was uncertain of its reception. The book appeared in 1688, under the title *Les Caractères de Théophraste, traduits du grec, avec les Caractères ou les moeurs de ce siècle,* and made the fortune of the publisher, Estienne Michallet, to whose little daughter La Bruyère is said to have offered the profits. Of the eight editions published by Michallet in the author's lifetime the first three (all 1688) contained 420 reflections (divided into 16 chapters), but the fourth (1689) contained 344 more, which La Bruyère may be supposed to have withheld from the earlier editions as they can hardly have all been written in the interval. The topical allusions in the book made La Bruyère's election to the Académie Française difficult, and there was talk of political pressure applied in his favour when he was eventually elected in 1693 (barbed allusions have been read into the speech of welcome and into his reply). La Bruyère died at Versailles in the night of May 10–11, 1696. Shortly afterward Michallet brought out the ninth authorized edition of *Les Caractères* (1696). Nine dialogues by La Bruyère on quietism were edited by L. Ellies Dupin (1699).

Les Caractères.—The title of La Bruyère's masterpiece is frequently misunderstood as referring to social types. But there were comparatively few portraits at first: the idea seems rather to have been to make pungent reflections on the "characteristics" or manners of the time. This was the plan of Theophrastus: to define qualities, such as dissimulation, flattery or rusticity, and then to give instances of their occurrence in actual people. It is piquant to find one of the most original books in French opening with a disclaimer of any originality save that of presenting a true picture of the times, the sole utility of which is to reform manners. The first chapter, "Des ouvrages de l'esprit," opening with the resounding *"Tout est dit et l'on vient trop tard"* ("All has been said and we come too late"), reads like a literary introduction concocted after the rest had been written, just as the last, "Des esprits forts" (on freethinkers), suggests an attempt to establish religious orthodoxy. The remaining 14 chapters contain epigrams and sketches grouped as follows: "Du mérite personnel," "Des femmes," "Du coeur," "De la société et de la conversation," "Des biens de fortune," "De la ville," "De la cour," "Des grands," "Du souverain, et de la république," "Des jugements," "De la mode," "De quelques usages" and "De la chaire."

The main ingredient is satire, remorselessly exposing the falsity inseparable from court or social life, the power of money in a demoralized society, the tyranny of social custom, the perils of aristocratic idleness and the fads and fashions by which men sought distraction. The bizarre nature of these (the passion for tulips, for birds, for gadgets) made for quick popularity, and as readers began putting real names to the personages of the sketches, "keys" to the book were demanded, and several still exist, some in manuscript, some in print. The author denied authority to all these keys, claiming that no portrait was that of a single individual but that he took features from several people and compounded them to make a likely character. The most famous portraits indeed can be shown to have been generalized. Ménalque, for example, may have been modeled on the absent-minded duc de Brancas, but includes features belonging to other cases and seems to attempt the moral anatomy of absence of mind. The same classical tendency is seen in the mordant descriptions from which any human touch has been withheld, until the last phrase.

Yet the classical attitude is allied in this book to a new spirit. La Bruyère is ready to include elements omitted from the classical synthesis and introduces disturbing social phenomena, such as the condition of the common people. He declares that he would, if given the choice, "opt" to live in their penury rather than with the idle great. But he is no revolutionary, except in technique. His device of suggesting attitudes through surroundings makes his material seem more new than it is. People are described by their dress, actions, speech, without comment. The fop bows to people who are there and to people who are not; you have to look very carefully at the dandy to discover his sex; the statesman is defined as a chameleon by an immense list of balanced and contradictory activities (this last example, as Albert Sorel pointed out, could be read as a manual of 17th-century diplomacy). By contrast with the mass of detail, La Bruyère's occasional global judgment is the more impressive, as on the popularity of executions: *"vaine, maligne, inhumaine curiosité."*

The glory of the work is its style. The epigrams stand comparison with the best: for instance *"La cour ne rend pas content, elle empêche qu'on le soit ailleurs"* ("Life at court does not make men happy, it prevents their being happy elsewhere"). The satire is constantly sharpened by variety of presentation. The queer detail, exclamation, dialogue, catalogue, all these means are employed and all suggest, but never express, scorn or distaste.

La Bruyère allows his general impression to emerge from a cascade of telegraphically listed details or from a series of apparently disconnected observations. His enemies reproached him with disregarding the connectives of speech: this is his triumph, and gives him effects of shock and speed which were new to French prose. His Phédon loses sleep, is uneasy in company, sits on the edge of chairs, walks furtively: *il est pauvre.* These hammer blows have their full satiric effect following on a paragraph of exactly similar structure, about Giton, who walks jauntily, flaunts his handkerchief, snores and spits in public, interrupts, reproves, spreads himself: *il est riche.*

There are editions of the La Bruyère's works by G. Servois, new printing, 6 vol. (1922), in the Grands Écrivains de France series; and by Julien Benda (1951) in the Pléïade series.

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(W. G. ME.)

LABUAN, an island 6 mi. off the northwest coast of Borneo, in latitude 5° 16′ N., longitude 115° 15′ E., 725 mi. from Singapore. Area 38 sq.mi. At one time part of the Straits Settlements, Labuan was transferred to North Borneo (now Sabah) in 1946. The settlement, with a population of 14,904 (1960), predominantly Malay and Chinese, includes seven smaller islands. Victoria, the capital city, with a population (1960) of 3,213, is located on the southeast side of the main island. Victoria harbour is an excellent anchorage, well sheltered in both the northeast and southwest monsoons. The climate is hot and humid with heavy rainfall, averaging 134 in. a year; the original thick forest cover of the island has been superseded by secondary growth. Excepting a few snakes and lizards, there are no wild animals on the island. Birds of interest include the megapodes, which lay their eggs in a mound constructed by themselves, and the beautiful black and white pigeon which, unlike the megapode, does not also frequent the mainland. A small breed of native cattle thrives on an extensive plain.

Main crops in order of importance are coconuts, rubber and rice. Sago, oranges, mangoes, bananas and pineapples are also grown. Formerly coal deposits were worked, but by the 1960s stocks were no longer available in any appreciable quantity.

Labuan is a free port and the transshipment port for Brunei and the Seria oil field. There are direct shipments to and from the United Kingdom and Australia as well as weekly passenger and cargo services to Singapore and Borneo ports. The main imports are rice, rubber, copra, sago, sugar and piece goods. An international airport is located on Labuan from which air service is provided to Australia, Hong Kong, Manila and Singapore and to local airports on Sarawak, Brunei and Sabah. Electricity is supplied on Labuan. There are cold storage, an ice plant, a meteorological station and a radio station. There are 41 mi. of roads.

In 1775 the East India company attempted to establish a trading station on Labuan. The venture failed, and the island was wholly abandoned except for the occasional visits of pirates. In 1846, through the efforts of Sir James Brooke, afterward first raja of Sarawak, and Adm. Sir Henry Keppel, the island was ceded by the sultan of Brunei to Great Britain. It then served both as a naval station where ships could be refitted and crews exercised, and as a place where stores and merchandise, necessary for carrying on trade with Brunei, might be kept. The naval objectives were the suppression of piracy and unlawful traffic. Labuan became a crown colony in 1848 and remained so for 40 years. A garrison of imperial troops was stationed there until 1871.

The colony was assisted by grants-in-aid until 1869, at which time it became nominally self-supporting, but in the following years financial difficulties increased, and in 1889 its administration was handed over to the British North Borneo company, whose chief officer became governor. This arrangement proved unsatisfactory, however, and in 1906 the governor of the Straits Settlements was appointed also governor of Labuan, the island still remaining a separate colony. In 1907 it was annexed to the Straits Settlements and declared part of Singapore, and in 1912 it was constituted a separate settlement. In 1942, during World War II, Labuan was occupied by the Japanese. After 1946 a town board, with an unofficial majority and considerable power, assumed a portion of the responsibility for local government on Labuan, in keeping with a general policy of establishing representative local government throughout North Borneo. (S. L. ST.)

LABURNUM is a genus of trees and shrubs whose butterflylike flowers obviously relate it to the subfamily Papilionoideae of the pea family (Leguminosae; *q.v.*). The leaves are composed of three leaflets, and the flowers, resembling those of *Genista* (broom), are disposed in hanging clusters. The pods (legumes) are slender and compressed. *Laburnum anagyroides* (golden chain), native to southern Europe, is cultivated as an ornamental. The leaves have elongate stalks, and the bright yellow flowers hang in pendulous racemes up to a foot in length.

ROCHE

HYBRID LABURNUM (L. WATERERI)

An interesting form (chimera) that developed from a graft between *L. anagyroides* and *Cytisus purpureus* was formerly known as *L. adami.* It originated at Vitry, near Paris, about 1826, and in habit and foliage is usually similar to *L. anagyroides,* but its flowers are mostly dull purplish, rarely yellow, although sometimes bearing a few branches with the flowers and leaves of *C. purpureus.* This bigeneric hybrid is known as *Laburnocytisus* and is propagated by being grafted on seedling stocks of *Laburnum.*

All parts of laburnums are poisonous, especially the seeds. The roots taste like licorice, which is a member of the same family. Occasionally it has proved fatal to cattle, though hares and rabbits are unharmed. The wood of laburnums has a striking greenish-brown or reddish-brown hue and takes a good polish. It is ideal for cabinet-making and inlay. It was at one time the most prized timber in Scotland. (J. D. DR.)

LABYRINTH, the name given by the Greeks and Romans to buildings, entirely or partly subterranean, containing a number of chambers and intricate passages, which rendered egress difficult. The word is considered by some to be of Egyptian origin, others connect it with Greek, Lydian or Carian words.

Pliny mentions the following as the four famous labyrinths of antiquity:

VIEW FROM ABOVE

PLAN

PHOTOGRAPH, BY PERMISSION OF CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE, CROWN COPYRIGHT

MAZE IN THE GARDENS AT HAMPTON COURT PALACE

1. The Egyptian, of which a description is given by Herodotus and Strabo, was situated to the east of the Lake of Moeris, opposite the ancient site of Arsinoë or Crocodilopolis. According to Egyptologists, the word means "the temple at the entrance of the lake." According to Herodotus, the entire building, surrounded by a single wall, contained 12 courts and 3,000 chambers, 1,500 above and 1,500 below ground. The roofs were wholly of stone, and the walls covered with sculpture. On one side stood a pyramid 40 orgyiae or about 243 ft. high. Herodotus himself went through the upper chambers, but was not permitted to visit those underground, which he was told contained the tombs of the kings who had built the labyrinth, and of the sacred crocodiles. Other ancient authorities considered that it was built as a place of meeting for the Egyptian nomes or political divisions; but it is more likely that it was intended for sepulchral purposes. It was the work of Amenemhet III, of the 12th dynasty, who reigned from *c.* 1842 to 1797 B.C. It was first located by the Egyptologist Karl R. Lepsius to the north of Hawara in the Fayum, and in 1888 Flinders Petrie discovered its foundation, the extent of which is about 1,000 ft. long by 800 ft. wide.

2. The Cretan, said to have been built by Daedalus on the plan of the Egyptian, is famous for its connection with the legend of the Minotaur. It is doubtful whether it ever had any real existence. By the older writers it was placed near Knossos, and it is represented on coins, but nothing corresponding to it has been found during recent excavations, unless the royal palace was intended. Later writers, such as Claudian, place it near Gortyna, but some winding passages and chambers close to that place are, in reality, ancient quarries.

3. The Lemnian was similar in construction to the Egyptian with 150 columns.

4. The Italian was a highly intricate series of chambers in the lower part of the tomb of Porsena at Clusium. This tomb is said to be recognizable in the mound named Poggio Gajella, near Chiusi.

Lastly, Pliny applies the word to a rude drawing on the ground or pavement.

During the middle ages a maze or labyrinth was frequently indicated on the floors of French cathedrals, and the names of the architects were often incorporated in its design. That at Amiens (destroyed in the 19th century but replaced by a copy) contained a verse in which the name of the builders appeared. In the centre were placed figures of the bishop and the three architects, inlaid in white marble. No satisfactory explanation of the existence of these medieval mazes has yet been given.

In gardening, a labyrinth or maze means an intricate network of pathways enclosed by hedges or plantations of which it is difficult to find the centre or exit. It is a remnant of the old geometrical style of gardening. The more common kind consists of walks, formerly called alleys, kept to an equal width by parallel hedges, which should be too close and thick for the eye readily to penetrate them. The task is to get to the centre, marked in some conspicuous way, then to return; but even those who know the key are apt to be perplexed. Sometimes the design consists of alleys only, such as one published in 1706 by London and Wise. Of a more pretentious character was a design published by Switzer in 1742 showing "six different entrances, whereof there is but one that leads to the centre, and that is attended with some difficulties and a great many stops."

The maze in the gardens at Hampton Court palace, which is considered one of the finest examples in England, was planted in the reign of William III. It is constructed on the hedge and alley system, and was, it is believed, planted with hornbeam, replaced by hollies, yews, etc. The key to the centre is to go left on entering, then, on the first two occasions when there is an option, go right, but thereafter go left.

The maze in the gardens at Somerleyton hall, near Lowestoft, was designed by John Thomas; the yew hedges were planted about 1880. There was a labyrinth at Theobald's park near Cheshunt, when this place passed from the earl of Salisbury into the possession of James I. An 18th-century one is said to have existed at Wimbledon house, the seat of Earl Spencer.

LABYRINTHODONTIA, an extinct order or superorder of Amphibia. The dominant amphibians of the late Paleozoic and Triassic, labyrinthodonts first appeared in the late Devonian. They may well have included the ancestors of all land vertebrates, and certain of them closely approached the reptiles in structure. Many were as large as alligators, but some as small as salamanders. By the Permian certain genera had become terrestrial, but both early members of the group and late degenerate forms were aquatic. The body was generally shaped like that of a newt or stoutly built lizard, with the limbs short. The large skull was solidly roofed (hence the term Stegocephalia often applied to these forms and other early amphibian types). The vertebrae, in contrast to those of most land vertebrates, had two parts in each centrum—anteriorly an intercentrum, typically crescentic, and, behind this, small paired pleurocentra. The oldest Devonian labyrinthodonts, the Ichthyostegalia, resembled the ancestral crossopterygian fishes in many ways. Prominent in the Carboniferous and Permian were the Rhachitomi, such as *Eryops*. In the aquatic degenerate Triassic Stereospondyli the limbs were tiny, and the skull and body flattened; the pleurocentra were lost and the intercentrum formed a complete ring-shaped centrum. In another group of Carboniferous and Permian labyrinthodonts, leading to *Seymouria* and other forms transitional to reptiles, the pleurocentra were enlarged and fused to form a true centrum of reptilian type. In an aquatic side branch of this group, the Embolomeri, both intercentrum and pleurocentra formed complete rings. *See* AMPHIBIA. (A. S. RR.)

LABYRINTH ORGAN, the internal ear, composed of a vestibule, semicircular canals and cochlea. *See* EAR, ANATOMY OF; EQUILIBRIUM, ANIMAL; HEARING.

LAC is a sticky resinous product secreted by the tiny lac insect (*Laccifer lacca*), a species of scale insect, and deposited on the twigs and young branches of several varieties of soapberry and acacia trees and particularly on the sacred fig (*Ficus religiosa*) in India, Thailand, Burma and other parts of southeast Asia. It is harvested mainly for the production of shellac and lac dye, a red dye widely used in India and other Asian countries. Shellac and other forms of lac are the only commercial resins of animal origin.

Lac products, which were first used as a plastic and decorative material by the original Aryan settlers in India *c.* 1200 B.C., became commercially important in Europe during the 17th century after the East India Co. introduced lac dye and, later, shellac. Eventually lac products came to be used in most of the industrialized countries of the world; more than 50,000,000 lb. of lac are collected and used each year.

Shellac, the main product of lac, can be molded into electrical insulators, buttons and many other small articles. It is used as an ingredient in abrasives, sealing wax, phonograph records, hair stiffeners, cake glazes and numerous other items. Alcohol solutions of shellac are used as a varnish for priming and finishing furniture, floors and other wood articles, and as an intermediate in nitrocellulose lacquers. Alkali emulsions are used to make self-polishing waxes, stiffeners for felt hats, cements, sealers and similar items.

The word lac comes from the Persian word *lak* and the Hindu word *lakh*, both of which mean "hundred thousand," indicating the vast numbers of the minute insects required to produce lac. It is estimated, for example, that 17,000 to 90,000 insects are needed to produce one pound of shellac.

The tiny larvae of the lac insect swarm on or are manually fastened to young shoots, where they pierce the thin tree bark with their long beaks and feed upon the sap. The insects exude onto the twig a secretion that forms a continuous, hard resinous layer honeycombed with small cavities. The females, which comprise the bulk of the insects, never escape from this encrustation. After being fertilized, each female increases many times in size as she becomes a comparatively huge abdominal incubator, finally taking on the appearance of a smooth, shiny crimson sac with a beak stuck into the bark. After hatching their young, the females die. Generally there are two such life cycles each year. The host trees influence the quality of the lac, as well as the life cycle of the insect.

The maximum yield of resin and dye is obtained by gathering twigs with their living inhabitants in June and November. The crude substance thus obtained is called stick-lac. The lac resin is composed largely of a mixture of several intermediate esters of various polyhydroxy carboxylic acids, insoluble yellow dyes and a water-soluble red dye. Chemically, the red dye (laccaic acid, $C_{20}H_{14}O_{11}$) is a complex hydroxyanthraquinone derivative that is related to the carminic acid found in cochineal. The lac dye is obtained from ground stick-lac by extraction with hot water or hot sodium carbonate solution.

The resin, freed from the lac dye, is known as seed-lac. After the seed-lac is melted, strained through canvas, spread, cooled and flaked, it becomes the shellac of commerce. Shellac is a purified product and varies in colour from dark amber to almost black. The palest, orange lac, is the most valuable. Shellac may be bleached; it is then called white shellac. (P. He.)

LACAILLE, NICOLAS LOUIS DE (1713–1762), French astronomer and geodesist who mapped the constellations in the southern hemisphere, was born at Rumigny in the Ardennes on May 15, 1713. He was destined for the church, but his scientific interests took him to the Paris observatory, where he won the approval of Jacques Cassini who found employment for him. In 1739 he was appointed professor of mathematics in the Collège Mazarin, Paris, and two years later was admitted to the Académie des Sciences. His early surveying was done in western France, and he played a leading part in the accurate measurement of an arc of the meridian. At the Collège Mazarin he had a small observatory, and his work was such that he was authorized to make an expedition to south Africa. In 1677 Halley had observed the positions of more than 300 stars in the far south, and since then no more work of this kind had been done. In two years (1751–53) Lacaille, using a small transit instrument at Cape Town, determined the position of nearly 10,000 stars. He laid down and named the southern constellations in nearly their modern form, and many stars are still referred to by their numbers in his catalogue. His southern observations of the moon, Venus and Mars, in conjunction with similar observations made in the northern hemisphere, led to the working out of more accurate values for the distances of these bodies. Before he returned from the Cape he found time to measure the first arc of the meridian in south Africa. The length he determined did not agree with that expected from observations in the northern hemisphere. The same arc was measured nearly a century later by T. Maclear, his majesty's astronomer at the Cape. The new measurements confirmed the original ones, and the anomalous results are attributed to irregularities in the direction of the plumb line. After his return to France, Lacaille laboured alone at the reduction of his observations, and this appeared to hasten his death which occurred in Paris on March 21, 1762. His *Caelum Australe Stelliferum* was published in 1763. (J. Jn.)

LACAITA, SIR JAMES (Giacomo) (1813–1895), Italian politician and man of letters best known for his part in the diplomatic maneuvers occasioned by Garibaldi's famous expedition in 1860, was born on Oct. 4, 1813, at Manduria in southern Italy. He supplied Gladstone with information in 1850–51 on Bourbon misrule in Naples and after the publication of Gladstone's letters to Lord Aberdeen on this subject was obliged to leave Italy. He settled first in Edinburgh, where he married Maria Carmichael, and then in London, where he was professor of Italian (1853–56) at Queen's college. He accompanied Lord Minto to Italy in 1856, and he went as secretary to Gladstone to the Ionian islands in 1858. For this service Lacaita was knighted in 1859. In 1860 when Napoleon III had agreed, if Britain would co-operate, to send a squadron to prevent Garibaldi from crossing from Sicily to Calabria, Cavour's minister in London, taking advantage of Lacaita's friendship with Lord John Russell, the foreign secretary, sent him to sound out the British statesman. Lacaita later claimed that at this interview he dissuaded Russell from joining Napoleon and so made possible Garibaldi's success. But in fact Russell had no intention of co-operating with France. Lacaita returned to Naples after the overthrow of the Bourbons and was elected deputy for Bitonto in 1861. In 1876 he was created senator. He died Jan. 4, 1895, at Posilipo, near Naples. (D. E. D. B.)

LA CALPRENÈDE, GAUTIER DE COSTES, Seigneur de (*c.* 1610–1663), French playwright and the author of romantic historical novels, was born at Salignac (Dordogne). After studying at Toulouse, he entered the regiment of the guards and campaigned in Germany. Pursuing at the same time his military and literary careers, he wrote between 1635 and 1641 two tragicomedies and seven tragedies, three based on episodes of English history. *Le Comte d'Essex* (1638) in particular had great success. In 1642 he began a series of novels: *Cassandre,* 10 volumes (1642–45); *Cléopatre,* 12 volumes (1647); and *Faramond,* 12 volumes (1661–70), of which the last 5 volumes were completed after his death by Pierre d'Ortigue de Vaumorière. These novels glorifying love and war found immediate favour among the generation of the Fronde and continued to be popular to the end of the 18th century. They brought considerable wealth to their author. La Calprenède died in 1663.

See E. Seillière, *Le Romancier du Grand Condé, Gautier de Coste, Sieur de la Calprenède* (1921). (F. E. Su.)

LACANDONES, an Indian group of the Maya-Quiché linguistic stock inhabiting the lagoons and tributary streams of the Usamacinta river in Chiapas, Mex. The language is a dialectal variant of the Maya of Yucatan. In the 1960s the population totaled less than 200 persons living in small family groups scattered throughout an extensive forest area. The 16th-century Lacandon population is estimated at about 4,000. They tenaciously resisted the Spaniards and were never conquered. Their most famous stronghold, situated in the middle of a lake, was called *Lacam-tun* ("large rock"), the source of the name Lacandon.

The Lacandones constituted the poorest, most backward and isolated Indian group of Mexico in the mid-1960s. They cultivate small quantities of corn, peppers, beans and tobacco, and also hunt and fish. Their social system, based on totemic patrilineal clans, still retains important traces of the ancient Mayan system; religious life likewise involves homage to old gods and pilgrimages to sacred places in ancient ceremonial centres. Archaeologically the Lacandon region is of great importance since almost 200 ancient sites have been discovered in the area. Some of these date between the 6th and 8th century A.D. and include well-preserved

buildings with altars, wall paintings and steles with hieroglyphic inscriptions. Of special importance is Bonampak, where the painted wall murals are preserved and represent the highest level of Maya pictorial art thus far discovered (*see* MAYA INDIANS).

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LACCADIVE, MINICOY AND AMINDIVI ISLANDS, a group of coral reefs and islands in the Arabian sea, between 10° and 12° 20′ N. and 71° 40′ and 74° E., 100–250 mi. off the southwest coast of India. The name Laccadives (*laksha divi,* "hundred thousand isles") was that given by the people of the Malabar coast, and was probably meant to include the Maldives. There are 17 separate reefs but only 14 islands with a total area of 11 sq.mi.; ten of the islands are inhabited. Formerly, the group was attached to Madras state of India, the northern portion, known as the Amindivi Islands, being within the South Kanara district and the remainder within the Malabar district. In 1956 the Laccadive, Minicoy and Amindivi Islands became a centrally administered territory of the Republic of India. The Amindivi are the northern islands of the group. Minicoy (Minikoi) lies between the Laccadives and Maldives (*q.v.*). Munyal, Coradive and Sesostris are submerged banks lying north of the islands. Most of them have emerged from the eastern and protected side of the reef, the western being completely exposed to the southwest monsoon. The islands are small, none exceeding a mile in breadth, and of the total area of about 6,890 ac., about 5,500 ac. are occupied by coconut plantations. The soil is light coral sand, beneath which, a few feet down, lies a stratum of coral stretching over the whole of the islands, generally a foot to a foot and a half in thickness. It has been wholly excavated in the principal islands, the underlying damp sand being made available for growing cereals. These excavations—a work of vast labour—were made at a remote period, and according to the native tradition by giants.

Coarse grain, pulse, bananas and vegetables are cultivated; coconuts grow abundantly and occupy most of the remainder of the land. For rice the inhabitants must depend upon the mainland.

In 1961 the population was 24,108. The people are Moplahs, *i.e.,* of mixed Hindu and Arab descent, and are Muslims. The language spoken is Malayalam (but written in the Arabic character) except in Minicoy, where Mahl (akin to old Sinhalese) is spoken. The chief industry is the manufacture of coir, largely employing women. The islanders also are occupied with boatbuilding and trade with the mainland. As the frequent coral reefs in the vicinity of the islands make navigation dangerous, commerce is carried on in native vessels manned by skilled sailors. The administrative centre is Kozhikode in Kerala on the mainland of India.

Albiruni (*c.* 1030) divides the whole archipelago (Dibajat) into the Divah Kuzah or Cowrie Islands (the Maldives) and the Divah Kanbar or Coir Islands (the Laccadives). The islanders were converted to Islam by an Arab apostle named Mumba Mulyaka, whose grave at Androth still gives a peculiar sanctity to that island. The kazi of Androth was in 1847 still a member of his family, and was said to be the 22nd who had held the office in direct line from the saint. The Portuguese discovered the Laccadives in May 1498 and built forts upon them, but about 1545 the natives rose against them. The islands subsequently became a suzerainty of the raja of Cannanore, and after the peace of Seringapatam in 1792 the southern group was permitted to remain under the management of the Moplah chief at a yearly tribute. Since this was often in arrears the islands were sequestrated by the British in 1877.

(L. D. S.)

LACCOLITH, in geology, the name given by G. K. Gilbert to intrusive masses of igneous rock possessing a cakelike form (from Gr. *Lakkos,* "cistern," and *Lithos,* "stone"), first described from the Henry mountains of southern Utah. Their characteristic is that they have spread out along the bedding planes of the strata, but are not so broad and thin as the sheets or intrusive sills which, consisting usually of basic rocks, have spread over immense distances without attaining much thickness (*see* SILL). Laccoliths cover a comparatively small area and have greater thickness. Typically they have a domed upper surface while their base is flat. In the Henry mountains they are one to five miles in diameter and range to 5,000 ft. in thickness. The cause of their peculiar shape appears to be the viscosity of the rock injected, which is usually of intermediate character and comparatively rich in alkalis, belonging to the trachytes and similar lithological types. These are much less fluid than the basalts, and the latter in consequence spread out much more readily along the bedding planes, forming thin flat-topped sills. At each side the laccoliths thin out rapidly so that their upper surface slopes steeply to the margins. The strata above them which have been uplifted and bent are cracked in many places by extension, and as the igneous materials well into the fissures a large number of dikes is produced. At the base of the laccolith, on the other hand, the strata are flat and dikes are rare, though there must be a conduit up which the magma has flowed into it. The rocks around are often much affected by contact alteration, and great masses of them have in places sunk into the laccolith, where they may be partly melted and absorbed, with resulting changes in physical and chemical composition (*see* also METAMORPHISM).

Gilbert found that these laccoliths were filled at depths of 7,000 to 10,000 ft. and did not reach the surface to give rise to volcanoes. From the effects on the drainage of the country it seemed probable that above the laccoliths the strata swelled up in flattish eminences. Often they occur side by side in groups belonging to a single period, though all the members of each group are not strictly of the same age. One may be formed on the side of an earlier one, and compound laccoliths also occur. When exposed by erosion they give rise to hills, and their appearance varies somewhat with the stage of development.

In western South America similar laccoliths occur in considerable numbers and present some diversity of types. Some have one steep side, the other gently inclined; others are split into a number of sheets spreading outward through the rocks around. In Britain and elsewhere the term is used for a variety of intrusive masses not strictly identical in character with those of the Henry mountains. Some of these rest on a curved floor (the gabbro masses of the Cuillin hills in Skye); others are injected along a flattish plane of unconformability where rock rests on upturned and eroded edges of an older series, as in the felsite mass of the Black hill in the Pentlands, which followed the line between the Silurian and the Devonian, forcing the rocks upward without much spreading laterally (*see* also BATHOLITH).

(J. S. F.; X.)

LACE, an ornamental, openwork fabric formed by looping, interlacing, braiding (plaiting) or twisting threads. The dividing line between lace and embroidery (*q.v.*), which is an ornamentation added to an already completed fabric, is not easy to draw precisely; a number of laces, such as tambour work, Carrickmacross, *filet* and buratto, can be called forms of embroidery upon a more or less open fabric. On the other hand, fancy knitting, however much an ornamental openwork fabric, is not usually thought of as lace, though in some museums it is so classified. Openwork fabrics made on a loom (for example, brocaded gauze) are not considered lace.

Before 1800 the threads of lace were usually linen; after that date cotton was commoner. Silk and metal thread and occasionally such other materials as wool, aloe fibre and hair of various kinds were also used. For a long time all lace was made entirely by hand. Lacemaking machines began to be developed late in the 18th century and practical models appeared early in the 19th century; the Victorian attitude to their product is expressed in Florence Nightingale's remark that "no gentlewoman ever wears anything but real lace." By about 1920, however, rising labour costs had brought the handmade lace industry to a virtual end, and the machine-made product was universally accepted.

HANDMADE LACE

TECHNIQUES

Major Techniques.—Almost all laces that have some claim to be called works of art are made in one of two techniques, needle-

point lace and bobbin lace (also called pillow, or bone, lace). For needlepoint lace, the design is drawn on a piece of parchment or thick paper, cloth-backed. An outlining thread stitched (couched) onto this serves as a supporting framework, and the lace is worked with a needle and a single thread in a succession of buttonhole stitches in varying degrees of tightness, and in straight lines that support further stitches. The needle never penetrates the backing. When the work is finished, a knife is passed between the two layers of backing to cut the couching thread and the lace is lifted off the pattern.

Bobbin lace is made with a number of threads, each fastened to a spool (bobbin) shaped to fit the hand. A pattern is drawn on parchment or paper, and holes are pricked to indicate where pins will be placed to keep the threads in position while the lace is being made. The parchment is placed on a pillow or cushion, and the threads, with the bobbins hanging on them, are attached. The lace is worked with each hand holding a pair of bobbins, which are moved from side to side ("thrown") to form a twist, a braid or a clothlike fabric called *toilé*. (The word is also applied to the solid parts of needlepoint lace.)

There are two main types of bobbin lace. One type is straight lace (*à fil continu*), made on a stationary pillow and worked in one direction; sometimes all the bobbins that will be needed are attached when the lace is begun, and it is always worked as a single piece, pattern and ground (if any) together. The width of a straight lace is limited by the size of the pillow, though in some types these narrow lengths can be joined afterward to make large articles; in a very fine piece, 200 or 300 bobbins may be needed for a strip two inches wide, and a Valenciennes lappet of the highest quality required about 1,200.

The second main type of bobbin lace is free lace (*à pièces rapportées*), made on a movable pillow that is turned to follow the curves of the pattern. After the pattern is worked the sections are fastened together by the tie bars (*brides*), or are supported by a mesh ground (*réseau*) or a net backing. In free bobbin lace in which a ground has been added, some threads of the *réseau,* carried over parts of the pattern, may be seen on the reverse side.

Needlepoint lace is a very difficult technique and has seldom been used in folk art or, except at the beginning of its history, by amateurs. Bobbin lace in its simpler forms is a widespread craft and amateur pastime, but the more elaborate types require the highest degree of skill. In the 19th century lacemaking apprenticeship for Belgian girls began at the age of six or seven years.

Minor Techniques.—There are a number of minor techniques of lacemaking, including the following:

Drawnwork (*punto tirato*) has three variant forms. In *tela sfilata* certain threads, either warp or weft, are drawn from a woven fabric, usually linen, and the remaining threads are used as a foundation for needlework stitches. In *fili tirati e ripresi* counted warp and weft threads are drawn from the entire length and breadth of a piece of fabric and the remaining threads are overworked to form an open background, the design being put in with a needle. In *fili tirati tela lasciata* (literally, threads drawn, cloth left) some warp and weft threads are drawn from the part that is to form the background, while in the parts that are to be the pattern the fabric is left intact; the remaining threads of the ground are then overworked.

In cutwork (*punto tagliato*) the threads from portions of a woven fabric are entirely, or almost entirely, cut away, leaving open spaces which have been embroidered round the edges; these are then filled in with patterns in needlepoint lace. Another type, called *intagliatela,* is similar to *fili tirati tela lasciata* in that the design consists of portions of fabric, but the background is entirely cut away and the elements of the pattern are supported by needle-made *brides* or mounted on a net.

Network (*filet*) is embroidery on a knotted net, made like a fish net, or on a machine net. Buratto is a form of network, but with a gauze, or leno weave, ground.

Circular lace is a net worked with a needle over a cardboard pattern or spool.

Knotted lace (macramé, *punto a groppo, punto avorio*) is made by knotting threads into patterns, a technique frequently used on the fringes formed by the warp ends of woven fabrics.

Crochet is a looped fabric made with a hook; tatting is a knotted fabric made with a shuttle. For these two techniques *see* NEEDLEWORK.

Tape lace is made by twisting a bobbin- or machine-made tape to form the pattern, which is supported by a needlepoint *réseau,* by *brides,* or by a machine net.

Some very beautiful laces have been made in drawnwork, cutwork and network, but most of the laces in minor techniques can best be described as fancy work.

HISTORY

Forerunners of Lace.—Fish nets were made in prehistoric times and the gauze weave was known in ancient Egypt, but the first ornamented openwork fabrics yet discovered are hair nets and bags found in Egyptian burial grounds dating from the 4th or 5th century A.D. Drawnwork and cutwork decoration is also found on the embroideries in these tombs, as well as on later Arabic borders made in Egypt. In pre-Columbian Peru openwork fabrics were made with free loop stitches similar to knitting. Some examples of drawnwork and network in coloured silks and linen made during the middle ages in Europe have survived, and passementerie, braidwork in gold and silver as well as fibre threads, is recorded as a trade in Paris in the 13th century. Fully developed lace, however, does not appear before the Renaissance, and, although some of the simpler techniques may have originated in the near east, the art of lace is a European achievement.

16th Century.—Some late-15th-century Italian and Flemish paintings show elaborate hemstitching and narrow lacelike insertions at the seams of linen garments and cushions, which represent the beginning of needlepoint lace. The first bobbin lace is not so well documented, but bobbins had been used for making passements and their adaption for use with linen threads probably took place early in the 16th century. Bobbin lace was not likely to have been much made before this time, when brass pins became abundant and cheap. (The name "bone lace" is thought to refer to the use of fish bones instead of pins at an early period.) By 1550 both the main kinds of lace and a great deal of cutwork, drawnwork and *filet* were being made, chiefly in white linen. This sudden rise of a new craft was certainly connected with improvements in soap, making it possible to wash linen garments with less danger of damage to their ornamentation. The use of white thread almost exclusively was due in part to the fact that it was not easy to dye linen with fast colours, but a more significant reason is to be found in the change of artistic ideals as the middle ages gave way to the Renaissance. Form became more important than colour; instead of intricate effects of limitless expansion, designers stressed clarity, symmetry and stability. In the decorative arts, the new spirit was most noticeably expressed in sharp distinctions between pattern, background and frame. No minor art form embodied Renaissance ideals more fully than lace; Moriz Dreger, the most prominent art historian who has written on lace, called it "the truest child of the Renaissance."

The development of lace in the 16th century is documented in surviving laces which, however, are very rarely dated; paintings in which lace appears; and lace and embroidery pattern books, which have been analyzed by Arthur Lotz in a volume fundamental to the study of early lace (see *Bibliography*). The first books from the 1520s were German and contained embroidery patterns only; some were still medieval in style but many were counted-thread patterns that could be used also for network. Italian books (all, at first, Venetian) followed the German ones closely and gave network designs, in Renaissance style, through the 1530s. In 1542 the first book of patterns for cutwork, the immediate forerunner of needlepoint lace, was published. Only eight years later a book appeared with designs described as for *punti tagliati a fogliami* ("cutworks with leaves")—wide rectangular background nets, which would have been made from remaining warp and weft threads in the cutwork, and scrolling foliage designs and unsupported zigzag edgings that would have had to be carried out in what was, in effect, needlepoint. From this to a lace made with-

Queen Elizabeth I, wearing a dress with ruff and cuffs of needlepoint lace, reticella and *punto in aria;* detail from a portrait by an unknown artist, about 1588, in the National Portrait gallery, London

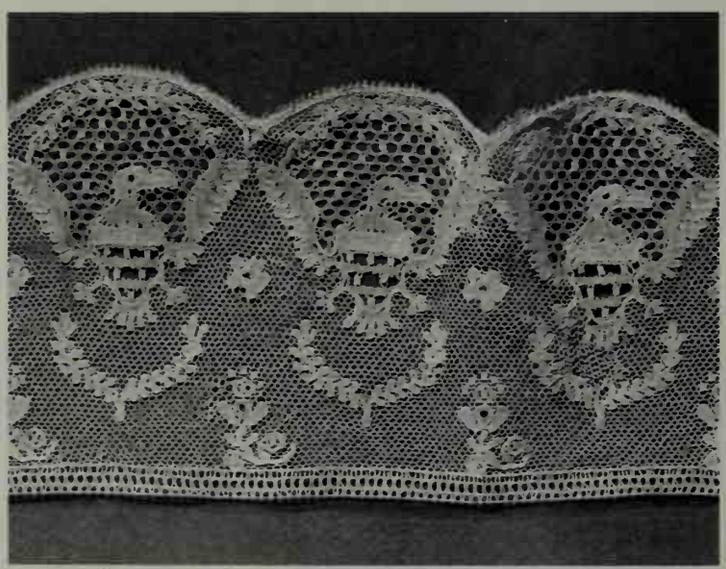
The empress Maria Theresa of Austria wearing dress of bobbin lace presented by the states of Flanders in 1743. Detail from portrait by or after Martin von Meytens; in Schönbrunn, near Vienna

BY COURTESY OF (TOP) NATIONAL PORTRAIT GALLERY, LONDON, PHOTOGRAPHED ESPECIALLY FOR ENCYCLOPÆDIA BRITANNICA BY JOHN R. FREEMAN & SON, (BOTTOM) SCHÖNBRUNN, PHOTOGRAPHED ESPECIALLY FOR ENCYCLOPÆDIA BRITANNICA BY ERICH LESSING—MAGNUM

LACE

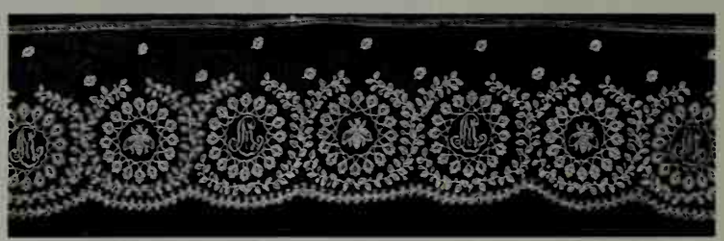
Flounce of Flemish lace, about 1708, made for presentation to Elizabeth of Brunswick, wife of Charles III of Spain, on her entry into Brussels. Intertwined initials C and E, portrait medallions, and crown are significant motifs

Venetian needlepoint in high relief, 17th–18th century. The technique, which is characterized by details worked in high relief and often edged with loops, is usually known by its French designation, *gros point de Venise*



Bobbin lace, Mechlin type, of American workmanship, possibly made at Ipswich, Mass. The arms closely resemble those of the Washington family

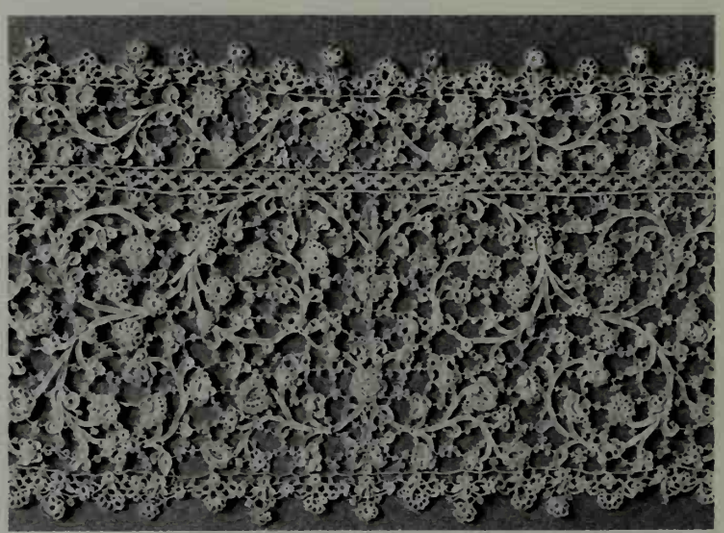
Bobbin lace, so-called *point d'Angleterre*, 18th century, showing Diana and her dogs. Rendered in a technique called *à pièces rapportées* in which the pattern is worked separately from the mesh



Brussels needlepoint, applied on handmade net. The initials, which form a prominent element of design, are those of the empress Marie Louise, wife of Napoleon I; they alternate with the Napoleonic emblem, the bee

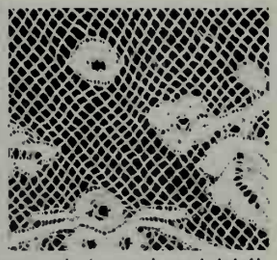
Modern fine copy of Italian needlepoint worked in *punto avorio* in an 18th-century pattern

Bobbin lace, Mechlin, 18th century. The lace of Mechlin developed a distinct character, having a hexagonal ground and an outlining thread

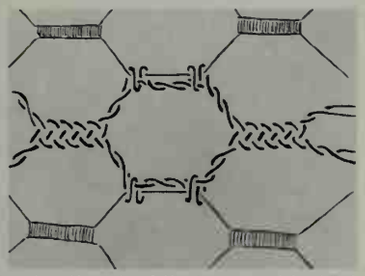


Needlepoint lace, Venetian rosepoint, 17th and early 18th centuries. This delicate lacework is characterized by its exquisite technique and evenly distributed accentuation

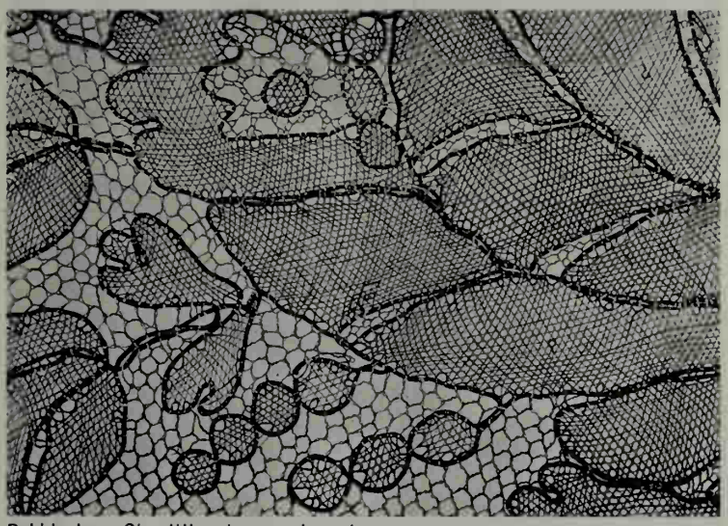
BY COURTESY OF (CENTRE RIGHT UPPER AND LOWER, BOTTOM LEFT UPPER AND LOWER) THE METROPOLITAN MUSEUM OF ART, (TOP LEFT) THE METROPOLITAN MUSEUM OF ART, GIFT OF HAMILTON W. CARY, 1906, IN MEMORY OF MRS. CARY, (TOP RIGHT) THE METROPOLITAN MUSEUM OF ART, BEQUEST OF MARGARET E. ZIMMERMAN, 1919, (CENTRE LEFT) THE METROPOLITAN MUSEUM OF ART, GIFT OF MRS. WILLIAM S. CARTER, 1925, (BOTTOM RIGHT) THE METROPOLITAN MUSEUM OF ART, ANONYMOUS GIFT, 1879



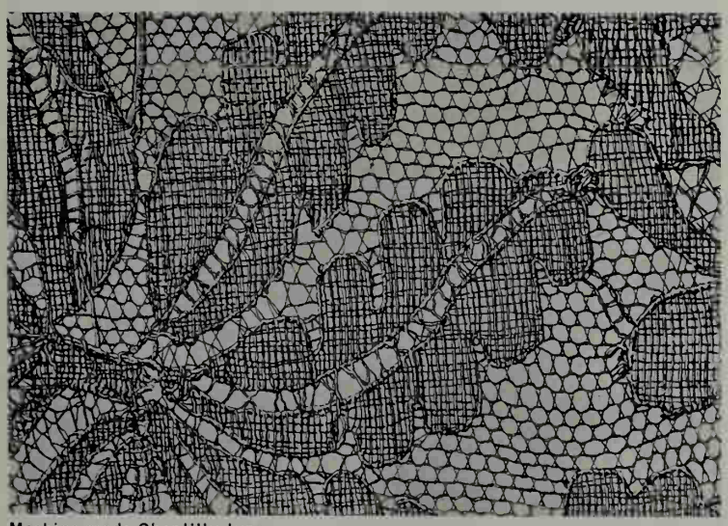
Bobbin lace, Valenciennes, 19th century, with square mesh (*see* enlarged detail, right) called *maille carré*. The technique is *à fil continu*



Detail of Brussels *point d'Angleterre*, showing threads of the hexagonal braided mesh (*drochel*), carried behind the pattern as in *point de Milan*. (Right) Drawing by Mme Paulis of Brussels, showing method of joining the narrow strips of *drochel*, or *vrai réseau*

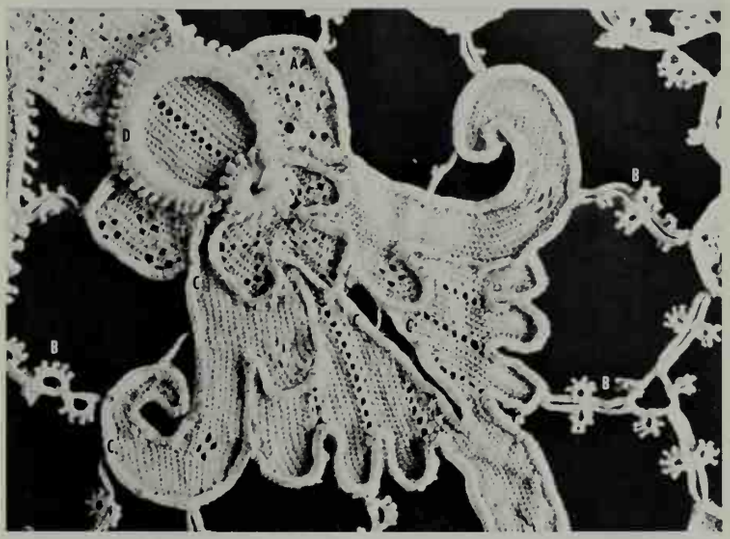


Bobbin lace, Chantilly, shown enlarged



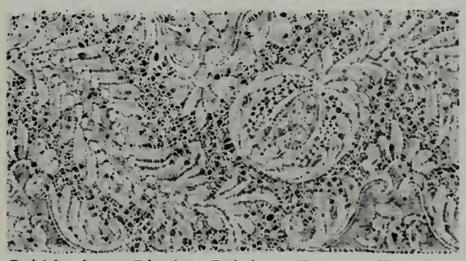
Machine-made Chantilly type

Machine-made Venetian point type



Venetian needlepoint, enlarged. 17th century. (A) Ornamental stitches, *jours* or *modes*, (B) tie bars or *brides*, (C) cordonnet, (D) high relief work

Bobbin lace, Valenciennes, 18th century, with round mesh (*see* enlarged detail, right) called *maille ronde*. The technique is *à fil continu*



Bobbin lace, Binche, Belgian, the so-called Old Valenciennes, with *fond de neige* or "snow ground," 17th–18th century. *À fil continu* technique. (Right) Enlarged detail of Binche lace

BY COURTESY OF (SECOND ROW CENTRE) MME L. PAULIS, (OTHERS) THE METROPOLITAN MUSEUM OF ART

LACE

"The Lacemaker," by Jan Vermeer, showing a girl making bobbin lace on a pillow; in the Louvre, Paris

Needlepoint lace, *point de France*, in the boy's scarf ends and in girl's headdress, cuffs and apron. Detail from the portrait of Prince James Stuart and his sister by N. de Largillière; in the National Portrait gallery, London

Scarf and sleeve ruffles of bobbin lace with a fancy ground. Detail from Allan Ramsay's portrait of his wife; in the National Gallery of Scotland, Edinburgh

BY COURTESY OF (TOP) THE LOUVRE, PHOTOGRAPHED BY THE ART REFERENCE BUREAU, (CENTRE) NATIONAL PORTRAIT GALLERY, LONDON, PHOTOGRAPHED ESPECIALLY FOR ENCYCLOPÆDIA BRITANNICA BY JOHN R. FREEMAN & CO., (BOTTOM) NATIONAL GALLERIES OF SCOTLAND, PHOTOGRAPHED BY T. SCOTT

out any fabric ground at all was a very short step, and the name for this new technique, *punto in aria* ("stitch in the air"), appeared for the first time on the title page of a book of 1554. In the next edition, two years later, there is an engraving of women making needlepoint lace.

The beginnings of bobbin lace are less easily followed in the pattern books, but a book published in Zürich about 1561 says that the craft had been brought to that city in 1536. The first Italian book with bobbin lace patterns is dated 1557. The laces shown in these and later Italian books are mostly small, simple insertions and edgings, not comparable to the splendid cutwork and needlepoint laces that were made in Italy at the same time. This fact lends support to a contention that, despite the absence of pattern books, bobbin lace was invented in Flanders. Certainly by the end of the century Flemish workers were expert in this technique, as evidenced by a famous coverlet, now in the Brussels museum, made for the archduke Albert of Austria and Isabella in 1599.

In Italy the scroll patterns of *punto a fogliami* and the floral forms of *punto in aria* could have led uninterruptedly into the style of the 17th century, but a very different type of lace appeared in a pattern book published by an Italian in Paris in 1587. In this lace, known as reticella or reticello, the patterns are based on squares filled with circles and other geometrical figures. Reticella soon became the dominant form everywhere. It appeared on French portraits as early as about 1560 and prevailed in northern Europe until well into the 17th century; this was the lace worn by Queen Elizabeth and her contemporaries on their huge ruffs. The majority of reticella designs are static, but one type with marked diagonals within the squares may possibly reflect the influence of Mannerism. Reticella designs permit the most extreme form of cutwork, in which all the fabric is cut away except a single warp and weft thread in each square. Such was the popularity of the style that it was imitated even in bobbin lace, pattern books of 1605 and 1616 showing designs for it.

The extant 16th-century bobbin and needlepoint laces are usually fairly narrow insertions and edgings, the latter often with deep jags or points and intended for ruffs, collars and cuffs. Large covers of cutwork and network are known, as well as altar cloths and frontals, valances and hangings of network. A very few lace collars and cuffs of this era have survived.

17th Century.—By 1600 lace, which had begun as a modest ornament for underlinen, was a fabric of the utmost luxury and an important article of commerce. The last of the Italian pattern books appeared, none known later than 1641, with large-scale floral and foliage designs; lace in its developed forms was too difficult for amateurs, and professional makers, of course, did not publish their designs. Great quantities of lace were worn by both men and women and much information, such as names given to different kinds of lace, can be gained from the sumptuary edicts of the period. Individual styles of countries and even cities became more clearly differentiated. The dominant technique remained needlepoint, which can produce a massive fabric with the solidity that was one of the artistic ideals of the time.

Lace in the forms already listed has survived from this century, as have large flounces, often more than two feet wide, which were probably worn as trimmings on the lower part of albs, rochets and other such specialized liturgical vestments. The long, jagged points of earlier ruffs gradually gave way to broad, rounded scallops, and eventually the ruff was replaced by a falling collar with straight edges; toward the end of the century the collars were replaced by scarves with lace ends, worn chiefly by men. This evolution can be followed in portraits and in the lace edgings and a few complete collars that have survived. Lace chalice veils and some complete vestments and altar frontals have also survived.

The chief lace centres of the 17th century were Italy, Flanders and France. Though the number of pattern books published there had always made Venice seem the chief Italian lace centre, it was only after 1650 that a specifically Venetian type of lace appeared. This is the famous *gros point de Venise,* a needlepoint lace with such high relief that it approaches sculpture; in fact, accurate representations of it can be seen on 17th-century marble busts, and one of Grinling Gibbons' tours-de-force is a Venetian-point cravat in wood, once owned (and occasionally worn) by Horace Walpole (now in the Victoria and Albert museum, London). The design of Venetian *gros point* has great scrolls of abstract foliage, and a flounce of this lace is as fine an example of the baroque style as can be found in any minor art. The earliest pieces were so designed that the scrolls of the pattern supported each other and few or no *brides* were needed; later, *brides* increased in number and became more elaborate, with more and more complicated ornamental loops (*picots*). A similar lace, of which less has survived, is called *point plat de Venise,* since it was designed without relief.

Genoa is listed in 17th-century sources as a lacemaking centre and the name "Genoese" is given to a straight bobbin lace distinguished by small compact ovals in the stitching, called wheat grains (*points d'esprit*); the patterns are imitations of those of reticella and *punto in aria.* The lace believed to have been made in Milan is a free bobbin lace, which, in the 17th century, used large-scale baroque foliage scrolls with an increasing number of *brides.*

Flemish 17th-century lace cannot be assigned to individual towns, though it is known to have been made in the same centres that later produced distinctive varieties. Cutwork and needlepoint lace are recorded, but bobbin lace was far more important. Reticella designs were superseded by baroque foliage, which, after 1650, began to be supported by so many *brides,* sometimes with *picots,* that something approaching a *réseau* was created. Flemish free bobbin lace is often very similar to the Milanese and sometimes only to be distinguished by the greater fineness of the thread and the greater density of the design.

In France lacemaking, especially *filet* and cutwork, had been a popular amateur activity from the mid-16th century, but the establishment of the industry on a large scale was due to Louis XIV's great minister, Jean Baptiste Colbert. In 1665 he brought lacemakers from Venice and Flanders to teach their crafts in seven French towns, ordered that the product be called *point de France,* forbade lacemaking elsewhere in the country and prohibited lace importation. Not all seven centres were successful, and French bobbin laces could not compete with those of Flanders, but needlepoint lace quickly developed into one of the most beautiful types ever made. After a period of imitating Italian models, the influence of the Louis XIV style and its designers, especially Jean Bérain, began to be felt. Very little relief was used and the designs were built around a succession of verticals instead of baroque scrolls; the lace became much lighter and airier, with ornamental *brides* proliferating into a nearly regular *réseau* (*à grandes brides picotées*). The name *point de Sedan* is given to a form of flat, or almost flat, *point de France,* with fuller, denser and more swirling forms and a primitive *réseau,* but whether it was actually made in Sedan (one of the seven lace towns) is uncertain.

Lace was made in several other European countries in the 17th century, but the products were much less important than those of Italy, Flanders and France. A lace of gold and silver thread, whipped over with coloured silks in a technique similar to the embroidery called *or noué,* is known as *punto di Spagna vero;* the motifs are outlined by a series of small *picots* in metal thread. An imitation of this, in *intagliatela,* with the pattern in cut linen edged with metal and silk threads, is called *punto di Spagna falso.* Both types were probably made in Spain and elsewhere. Forms of bobbin and needlepoint lace with heavy outlining threads are often considered to be Spanish. Spanish black lace is recorded as early as 1562, but the dye damaged the thread and scarcely any black lace earlier than 1800 has survived. German bobbin lace of the 17th century is known. English needlepoint lace of the same period (frequently found on samplers) is usually of the reticella type but occasionally shows remarkably naturalistic flowers and leaves or human figures and animals similar to those on the contemporary stump work embroidery. Bobbin lacemaking was introduced into England by Protestant refugees from Flanders; importation of foreign laces was forbidden by several edicts in this century and it is probable that much of the lace shown in English portraits of the period is English-made. A rather coarse straight

bobbin lace with very little *réseau,* in patterns resembling brains (or, as sometimes described, chrysanthemums), is called Dutch but is believed to have been made in Flanders for the Dutch market. The many paintings of lacemakers by Dutch artists, such as the famous Vermeer in the Louvre, indicate, however, that some lace was made in the Netherlands.

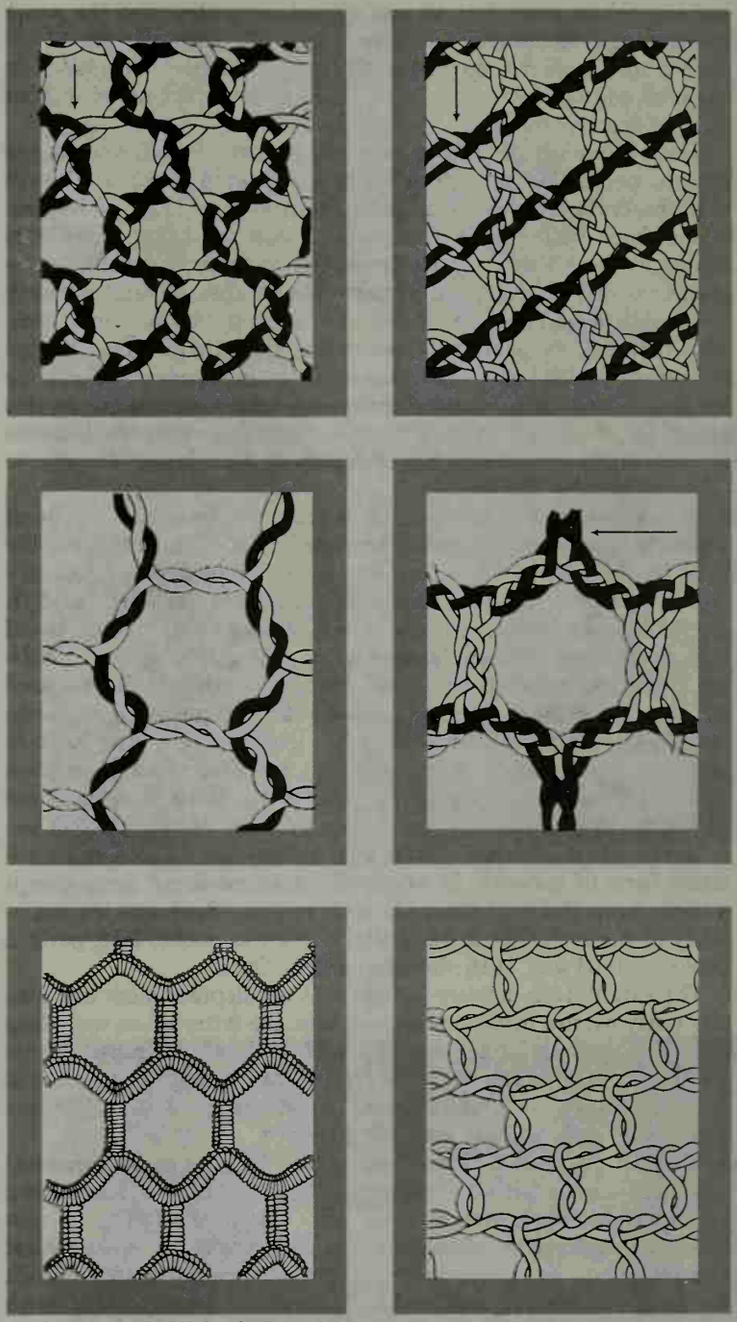
18th Century.—The change from the baroque to the rococo style had great effect on lace as on all the arts. In every form, a *réseau* was developed, the patterns became continually lighter and sparser and the bobbin technique, eminently suited to making an airy, lissom fabric, came into its own. All the characteristics of rococo, particularly its asymmetry, were exploited in lace to great advantage. The succeeding 18th-century style, the classical revival, did not lend itself to such happy results. Only very occasionally was lace successfully designed in this style; the typical late-18th-century lace is frequently merely a wide expanse of *réseau* with a scattering of trivial motifs.

Insertions, edgings and flounces continued to be made and have survived in quantity; flounces were used on dressing tables and other furniture, even bathtubs, as well as on costumes. Women's headdresses are very occasionally found complete, and a great number of components survive, chiefly lappets (made in pairs, 3 to 5 in. wide and about 20 in. long) and cap crowns. Sleeve ruffles (*engageantes*) and large covers in free bobbin lace are occasionally found. Chalice covers are known; benedictional and baptismal veils with religious subjects are very rare, as are lace fans. Dresses, such as a famous one made for the empress Maria Theresa, are known from portraits and documents but have not survived except as fragments. There are some costume accessories, such as small triangular veils, dating from the end of the century, and some Hebrew ritual lace in silk is extant. Much 18th-century lace was altered at a later period for use in other pieces. Only when the design has obviously been skilfully composed to fit the exact shape can it be supposed that the piece was originally made in that form.

The chief lace-producing countries remained the same as in the preceding century, though Italy was of less importance than France. The taste of Paris influenced all the minor arts throughout Europe, but the city was not an outstanding lace centre. Of the towns selected by Colbert, only Alençon and Argentan (20 mi. apart) remained important, manufacturing needlepoint laces that go under their names. In the *toilés,* open spaces (*jours*) are filled with an amazing variety of little patterns (*modes*); more than 20 names for such fillings are recorded for Alençon. Sometimes the complicated pattern of a *mode* is used for the entire *réseau;* a variety with little dots in hexagons is known as argentella. Raised outlines (cordonnets) are made with a thread, or hair, overcast with buttonhole stitches.

Bobbin lace was made in many parts of France in the 18th century but was comparatively unimportant. Some 18th-century examples exist of the laces that became much more common in the following century, such as Chantilly, Arras and Lille; the Lille *réseau* is the simplest bobbin ground. The town of Valenciennes became French in 1677, but the bobbin lace of that name was made in other parts of Flanders and is generally considered Flemish.

In the 18th century Brussels made the finest bobbin laces, at first with *brides picotées* but by mid-century almost always with the typical Brussels ground, called *vrai réseau* or *drochel.* The lace is in the free technique and the *réseau* was worked in narrow strips, joined together. The joins can sometimes be seen as shadowy lines. The *toilé* sections have raised portions as outlines or as leaf veins, etc., made with the bobbins—an accomplishment possible in a free, but not in a straight, bobbin lace. These lovely laces, which frequently show *chinoiserie* or other figures, ships, buildings, hunting scenes, animals, birds and every kind of rococo ornament, go under the name of *points d'Angleterre.* (Belgian scholars have also claimed this name for a needlepoint lace of the highest quality, usually known as *point de Venise à réseau,* Venetian needlepoint lace with a ground. A further source of confusion is that, in the 19th century, a Belgian bobbin lace with a needlepoint ground was also called *point d'Angleterre.*) Other free



ALL EXCEPT MIDDLE LEFT BY COURTESY OF THE COOPER UNION MUSEUM

DIAGRAMS OF LACE GROUNDS (UPPER LEFT) MECHLIN, BOBBIN LACE; (UPPER RIGHT) POINT DE PARIS, BOBBIN LACE; (MIDDLE LEFT) LILLE, BOBBIN LACE; (MIDDLE RIGHT) 18TH-CENTURY VALENCIENNES, BOBBIN LACE; (LOWER LEFT) ARGENTAN, NEEDLEPOINT LACE; (LOWER RIGHT) ALENÇON, NEEDLEPOINT LACE

bobbin laces of a simpler character, without raised portions, were made outside Brussels and are known as Brabant laces.

Several kinds of straight bobbin lace were made in Flanders, each designated by the name of the town where it probably originated. Mechlin is an 18th-century lace that has a cordonnet, usually somewhat shiny, round the design; the *réseau* is usually six-sided. A much cruder lace, Antwerp or *pottekant* (so called from the pot of flowers in the design), has a cordonnet like Mechlin, but usually a simpler *réseau,* called *fond Chant* or *point de Paris.* It is hardly to be distinguished from 18th-century Chantilly. Binche and Valenciennes have no cordonnet and no relief; Binche (as usually identified) uses an elaborate ground called *fond de neige* and the patterns are often hazy and indistinct, while Valenciennes has very clear, sharp designs and a *réseau* that is at first six-sided or nearly circular (*fond rond*) but in the 19th century was changed to the familiar square or diamond (*fond carré*). Each side of the mesh is braided. Valenciennes was the most difficult of the bobbin laces (threads were neither cut nor added during its manufacture), and the finest specimens can have a hundred

threads to a square centimetre. A lappet might occupy the maker for ten months, with a 15-hour working day. Other *réseaux* as well as the typical ones are often found. An extremely fine drawnwork, imitating contemporary bobbin lace, is called *point de Dinant.*

In Italy, Venetian needlepoint lace became very much lighter at the end of the 17th century, and then, or early in the 18th century, took on the form known as rose point (rosaline). This is not to be confused with 19th-century Brussels rose point, which has representations of roses in the design; the Venetian lace has raised flower forms, quite unrealistic, and little flowery *picots* on the *brides,* but in no way imitates actual roses. Sometimes tiny figures, such as mermaids or lions, sport among the delicate floral trails, but the design becomes more and more diffuse and is often lost in the proliferation of ornament. French needlepoint laces eventually drove the Venetian off the market; Rosalba Carriera, the portrait painter, had to abandon her first activity, lace designing, because it was no longer profitable. Lacemaking continued, however, on the Venetian island of Burano, where a needlepoint lace made in the 18th century can be identified by the cloudy appearance of the ground, the result of a *réseau* worked in unevenly spun thread; relief is given by a heavy cordonnet overcast with sparse buttonhole stitches; designs are imitated from those of Alençon. Bobbin lace continued to be made in Genoa and Milan; the Milanese laces frequently show figures of men and animals. A free bobbin lace was made in Devonshire in England during this century but it is not easy to distinguish it from Brussels work. Some authorities claim that some *points d'Angleterre* were actually produced there. An unusually dense needlepoint lace, superficially resembling a woven fabric with a pattern of tiny holes, was made chiefly as insertions for babies' caps; it is called hollie point. In several eastern and midland counties, simple straight bobbin laces were made, usually with the Lille *réseau.* These were also produced at Ipswich, Mass.; a post-Revolutionary example with the American eagle, on a Mechlin ground, has been tentatively identified. Similar laces are known from Germany, but the finest 18th-century work in this country was *point de Dresde,* drawnwork similar to that of Dinant; it is also described as an embroidery on very delicate fabric (mull or batiste), the openings being made by pulling threads together rather than by removing them. The designs imitate contemporary bobbin and needlepoint lace. *Point de Dresde* was also made in Denmark.

19th Century.—The French Revolution and the Industrial Revolution led to great changes in the character of lace. The French and Flemish industries were almost destroyed in the 1790s, and, when they revived, lace was no longer being worn by men except on ecclesiastical vestments. (Even on these, it began to be liked less when, in the course of the century, a return to medieval styles became popular.) This change was fatal to the art of lacemaking; some books on lace do not include 19th-century products, except for a few unusual pieces. The use of machine net for free bobbin lace became general soon after 1800, making it considerably less expensive. Women's fashions did not call for much lace during the early part of the century, but when the mode changed, about 1840, enormous quantities of it were readily made. Cotton, a cheaper and less satisfactory material, replaced linen. The natural result of these changes was loss of quality. The design, like that of all decorative products in the 19th century, also deteriorated. Continual efforts were made to restore "good taste" but the result was most often merely an imitation of some earlier design.

Victorian designs can also be masterpieces of exact realism, the intent being to astound the viewer with a triumph over technical difficulties. A needlepoint lace shawl in coloured silks, made for the empress Eugénie and now in the Metropolitan Museum of Art, New York city, presents masses of varied flowers looking real enough to be picked. New lace centres were started, and old ones revived, by the efforts of charitable and art-conscious ladies in many countries, and peasant work, formerly made for local consumption only, entered the world market. Certain forms of lace, usually rather crude, were also much made by amateurs. The result of all this activity, especially during the second half of the century, was a vast accumulation of lace of various quality, from the tiny edgings known as baby lace to huge shawls. It is impossible to describe briefly all the varieties of 19th-century lace. Identical types were produced in widely separated centres; their names varied from country to country and often had no connection with the actual place of origin; for example, "Irish" lace was made in Brittany and Burano.

Many different articles of dress and household use were made of lace, though not every type could be used for making every article. Frequently older lace was cut up to form new pieces; it was often dipped in tea or coffee to give it an antique, yellowish appearance.

In Belgium the *vrai réseau* of Brussels was soon superseded by machine net, but a new, extremely delicate ground of single-thread buttonhole stitches was developed for needlepoint lace and used in making *point de gaze;* from the frequent use of roses in the designs, this lace is called Brussels rose point. Needlepoint and bobbin lace were often combined, small *jours* and *brides,* or a *réseau,* being added by needle to a free bobbin lace; the product was often called *point d'Angleterre.* A free bobbin lace without a ground was known as Duchesse, and bobbin or needlepoint patterns applied on machine net, as Brussels application. Early in the century, free bobbin lace designs were sometimes applied on a *vrai réseau* ground, an expensive process occasionally found later on laces made for royalty. Machine net embroidered in chain stitch with a crochet hook is tambour work; when a needle was used, the product is *broderie à l'aiguille.* Mechlin was not much made after the early years of the century, but Valenciennes is frequently found. A great deal of 19th-century Venetian needlepoint lace was made in Belgium.

In France needlepoint lace continued to be made at Alençon, some mid-century copies in linen of 18th-century pieces being difficult to distinguish from the originals. The black silk bobbin lace called Chantilly was made chiefly in Bayeux; another silk lace was blonde, a name given to both a cream-coloured and a black variety. Chantilly and blonde were made in strips a few inches wide which were joined to make large articles such as shawls and mantillas. Bobbin laces of simple types were made in Normandy, Le Puy, Lille, Arras, Bailleul and elsewhere. A lace called Cluny, after the museum in Paris not the town, purported to be medieval in style; it copied reticella and *punto in aria* designs and resembled Genoese. Embroidered net, called *dentelle de Luneville,* was made at Lier.

In Italy lacemaking at Burano was revived in the last quarter of the century; great quantities of needlepoint lace of Italian and Flemish types were produced. Nearby, at Pellestrina, bobbin laces were made; other centres, chiefly for peasant work, were Cantu, the Abruzzi and Liguria. Maltese lace was imitated from that of Genoa and made in black and white silk.

In England the Devonshire lace industry, centring upon Honiton, was also revived in the latter part of the century, making a free bobbin lace, either without a ground or applied on machine net. The finest pieces have a fresh, easy naturalism that can be very attractive, but generally the designs are somewhat incoherent and have a less professional look than the similar Belgian laces. Straight bobbin laces were made, usually in very narrow widths, in the eastern and midland counties; for the most part they closely resembled the products of Lille.

The chief 19th-century Irish lace was crochet, but tambour work and embroidered net were made at Limerick, Venetian-type needlepoint at Youghal and Innishmacsaint, and a form of *intagliatela* in cambric on machine net (application) or joined by *brides* (guipure) at Carrickmacross.

Most other countries in Europe produced some form of lace during the 19th century. Blonde and many other bobbin laces were made in Spain, but most mantillas, in black blonde and Chantilly, were imported from France. Netted wheel patterns (*punto de Cataluña*) are typically Spanish. Russian peasant lace is distinguished by its use of red and blue. A type with coarse, winding, tapelike patterns is a free bobbin lace; a coloured thread often runs through the otherwise white twists of the vermiculated design. Danish bobbin lace (similar to Mechlin) is called Tonder. Out-

side Europe, a coloured silk knotted lace called *oyah* was made in the form of flowery edgings in Turkey and elsewhere in the Levant, and a lace with wheel patterns (*nanduti*), like those of Spain, in Tenerife, Paraguay, Brazil and elsewhere in South America. The introduction of lacemaking into the far east, especially in China, took place late in the 19th century.

20th Century.—Handmade lace continued to be produced in large quantities until World War I, despite increasing competition from machine-made varieties. There were some attempts, especially in Vienna, to reflect the styles of the new century, such as *art nouveau*, but for the most part the Victorian designs persisted. Vast quantities of bobbin, needlepoint and *filet* lace were made in China for export to Europe and America. But by 1920 the industry was dying everywhere. In the second half of the 20th century lace was still being made at such centres as Burano and Bruges, but chiefly as souvenirs for tourists. It seemed unlikely that lacemaking would ever again be anything more than a pastime for skilled amateur needlewomen.

Lace Collecting

Identification.—A few suggestions can be given for distinguishing handmade from machine-made lace, but study of actual specimens is recommended. A useful article is the "Key of Lace," in *Lace and Lace-Making* by Marian Powys (1953); this illustrates many minor 19th-century laces, including machine-made examples, often omitted by writers on lace. Machine net is similar to the Lille *réseau*, but more regular. In bobbin laces, the most revealing portions are the *toilés*, as neither the bobbinet-jacquard (Pusher) machine, the Nottingham lace-curtain machine nor the Leavers machine can reproduce the plain cloth weave (tabby) of a genuine bobbin *toilé;* the Pusher *toilés* are made up of meshes like those of the ground but denser, the Nottingham and Leavers *toilés* are ridged or ribbed, like a stocking. These machines are, in fact, variants of knitting machines, which were being used to imitate lace as early as 1769. Any resemblance to a knitted fabric, therefore, tends to class lace as machine-made (unless it is in fact a piece of fancy hand knitting).

The Barmen, or circular, machine can reproduce the *toilé* of a straight bobbin lace such as Valenciennes; in fact, Barmen laces can only be distinguished from handmade laces by minute differences, visible under a magnifying glass, in the braids of the *réseau*, but they can be made only in narrow widths. When a *picot* edge is easily detachable, the lace is machine-made, as are, probably, very large pieces of lace with elaborate pictures in late-19th-century style. Free bobbin laces, such as Duchesse, are imitated on the Schiffli embroidery machine, but again the *toilé* has a stockinglike character. Some needlepoint laces and crochet are also copied on this machine and on the Swiss hand-embroidery machine, in what is known as burnt-out, or etched, lace; this is an embroidery with the ground removed. The stitches are the same as those of handwork and only a coarse, mechanical appearance differentiates the work from the genuine article. Lace with a *réseau* is seldom copied on these machines and *point de gaze* is not attempted. In general, the machine laces most commonly found are imitations of Chantilly, sometimes with the outlining thread put in by hand ("needle-run") or added with a hand-operated machine ("hand-run"); blonde; Duchesse; Venetian points; *points de France;* reticella; crochet; and small straight bobbin laces such as Valenciennes. The patterns are mostly of 19th-century types. The wool Chantilly shawls called llama laces were made on a Pusher machine.

Value.—Almost all the lace now in private hands dates from the 19th century; the types most often found are Brussels rose point, Venetian point of various types, Brussels applications, Duchesse, Cluny, Chantilly, Valenciennes, blonde, llama lace and crochet. Except for very extraordinary pieces, none of this has any great monetary value. The tradition persists that handmade lace is a costly fabric, as indeed it is in terms of the man-hours required to learn the skill and to make the lace; the lace buyer will pay high prices but the lace seller cannot expect them. Even owners of lace made in the 18th century and earlier may not easily find a purchaser, as lace collecting is no longer practised on the same scale as in the early 20th century, and museums with lace collections have usually acquired what they need by gift or bequest.

Collections and Literature.—Most museums with textile departments own laces. Outstanding collections are those of the Musées Royaux, Brussels; the Victoria and Albert museum, London; the Metropolitan museum and the Cooper Union museum, New York city; and the Musée des Arts Décoratifs, Paris. The literature on lace is extensive though much of it is unscholarly. Of the earlier books the best are Moriz Dreger, *Entwicklungsgeschichte der Spitze* (1910), and Marie Schuette, *Alte Spitzen* (1926). Later works are listed in the bibliography. (E. A. Sn.)

MACHINE-MADE LACE

Machine-made lace is a British invention. The Leavers machine produces a lace with a structure closely resembling the pillow or bobbin laces of the past. But although the modern lace industry was founded in the English midlands and has flourished there ever since, the same kind of lace is made in other countries (*e.g.*, France and the United States) which have imported Leavers machines. In Britain it is called British Leavers lace; in France, *dentelles de Calais;* it is known by a variety of names elsewhere.

The first attempts at mechanization employed an adaptation of the knitting frame. "Point nets" and "warp laces" first made their appearance in the last quarter of the 18th century in Nottingham, which already specialized in silk and cotton knitwear. The operation of the warp lace and point net machines was based on the principle of passing loops through and over each other and did not prove wholly satisfactory.

An entirely original method was devised by John Heathcoat in 1809. His machine simulated the movements of the bobbins in the hands of the pillow-lace worker and produced a simple hexagonal-holed net which was essentially a true lace; within five years bobbin net had virtually superseded point net. Bobbin net is now made on vastly enlarged and improved machines in great quantities and in a wide range of colours, with Nottingham still the main centre.

Most bobbin net for dress use is of nylon and is given a flame-resistant finish. The pure silk product, properly known as tulle, is widely used for veiling. Rayon and cotton bobbin nets are also made both for general and specific purposes; the latter is used for mosquito and sandfly curtaining. Cotton and nylon bobbin nets are often machine-embroidered. *Point d'ésprit* is a bobbin net with small spots spaced out at regular intervals, and some fancy nets incorporate a pattern produced by the jacquard mechanism.

The Leavers Machine.—Heathcoat had solved the problem of making net by machine, but it remained for a group of other young midland artisans to find a way of manufacturing a true patterned lace. A machine patented by John Leavers in 1813 embodied the most practical features of these experiments and so produced laces almost identical in structure with those made formerly on the pillow. In its modern form the Leavers machine can give designs far beyond the scope of even the cleverest hand worker.

The Leavers machine is large (up to 222 in. across and weighing nearly two tons) and complex. The technique consists of intertwining three sets of threads (technically known as warp, beam and bobbin). Two sets are positioned vertically, one behind the other, rather like two harps with strings of equal length placed back to back. Each set of threads can be moved sideways, left or right, for varying distances. As in most other branches of the textile industry the movements of the machine are controlled by the jacquard device (*see* Weaving).

The third set of threads is carried on bobbins suspended from a bar across the front of the machine. These swing backward and forward simultaneously, pendulum fashion, between the upright threads, paying out the thread as they go. Each bobbin is placed in a thin flat metal carriage shaped something like a swing boat and consists of a pair of small metal disks riveted together at the centre, and takes up to 150 yd. of yarn.

As the two sets of upright threads are constantly changing their position in relation to each other, every bobbin swings back between a different pair of vertical threads from those it passed on

its outward journey. Thus the threads are twisted—one might almost say tied—together. There may be from 8 to 32 bobbins to each inch across the width of the machine; the more bobbins used the finer is the lace. The "point number," equal to half the number of bobbins per inch, indicates the gauge. Thus 16-point, the finest lace made, has 32 bobbins per inch.

Yarns.—Much Leavers lace is made from nylon, in filament and bulked form, and from other man-made fibres. When cotton is used it is generally given a drip-dry, non-iron finish. Wool lace is often chosen for wearing in cool climates, and pure silk, rarely used alone, adds its lustre and delicacy to many designs. Metallic threads add sparkle and sometimes the design of a finished lace is embroidered with chenille, bourdon cord, ribbon, etc., by means of a single-needle, hand-guided machine.

Leavers Lace.—A Leavers lace pattern may include many subtle graduations from filmiest open mesh to solidly defined motifs, often outlined with a heavier thread. The lace may be composed of one kind of yarn in varying weights or of several different yarns. Light and shade are provided by variously sized and shaped holes and by changes in the kind of threads used and the direction in which they lie in relation to each other. Most laces have two ready-finished edges and many have a raised texture, giving them a three-dimensional appearance. Leavers lace falls into two main groups: wide designs for dress purposes and trimming laces up to ten inches across.

Wide Dress Laces.—Wide laces are made either as flouncings or allover designs. Flouncings always have at least one scalloped edge, are generally just under one yard wide and are sold in unit lengths of between 4½ and 6 yd. Allover designs can be bought in continuous lengths and the pattern extends to the edges, but, like all good Leavers laces, they will not fray.

Many dress laces are in the Chantilly tradition, with a fine background mesh of tiny regular holes surrounding isolated floral motifs carried out in heavier thread for clearer definition. The ground is generally of pure silk or nylon yarn. Such designs are known as clipped laces because, when they come off the machine, connecting threads (called floats) lying across the surface and joining the motifs to each other at many points have to be clipped away.

Some allover designs, known as suiting laces, are of firm texture and made from heavier yarns. They are easy to cut and sew and, mounted over woven fabrics, make up well into semitailored dresses, jackets and coats, etc.

Trimming Laces.—Narrow laces are made as a wide lace containing parallel bands united by connecting threads which remain in place throughout the dyeing, finishing and other end processes and are not withdrawn until the lace is ready for winding on to cards. They can also be made as parts of a wide breadth and then cut apart. This is usual when the lace has deep indentations.

Trimming laces are made in recognized shapes and styles. Edgings have one straight edge and one fancy or scalloped border; or smaller scallops may take the place of the straight edge. Insertions are bandlike laces with straight edges. Galloons are also bandlike but with identical scalloping along both borders so that the lace is symmetrical about a centre line. All three may have ribbon-hole slots or be sold with ribbon already inserted. Cutout designs are also made with deep indentations, making them suitable for appliqué trimming, and they may be of very intricate shape.

Distribution.—Leavers lace is stocked by the manufacturer in the so-called "brown state" (comparable to "the gray" in the cotton industry). It is then dyed to any fashion shade according to the requirements of the finishers who sell it to wholesalers, retailers and clothing manufacturers. Nottingham is the centre for salesrooms and offices but many finishers have branch offices in other parts of the country and agents throughout the world.

Embroidered Laces.—The simplest type of embroidered lace consists of bobbin net on which a design is worked by a single-needle power-driven machine guided by hand. This is how most decorated wedding, communion and other veils are made. More intricate embroideries are worked on multineedle machines such as the Schiffli, which was a Swiss invention. The name derives from the Swiss-German name for boat and refers to the tiny shuttles which play an important part in the embroidery process. The majority of Schiffli laces are produced in Switzerland and Austria, but they are also made in Britain, Germany, the United States and elsewhere.

The design is produced on a ready-prepared textile, which may be a bobbin net, a woven fabric or a soluble cloth. The net or fabric is stretched vertically between rollers, slowly unwinding from the lower and being wound on to the upper one. A number of needles, their spacing determined by the closeness or openness of the pattern, are fixed across the front of the machine and each works its own design or part of a design simultaneously with its fellows. The principle is that of the lock stitch of a domestic sewing machine, in which the needle penetrates the fabric and a loop is caught at the back before the needle returns. As in the domestic sewing machine, it is the fabric or net which changes its direction to make each stitch, and not the needle, which travels backward and forward in a straight and unvarying path. Narrow laces are made in breadths and later clipped apart.

Embroidered net is the most "lacy" type of embroidery thus made. It comes in dress widths, separate motifs and the usual edgings, galloons and insertions. It is used in large quantities in the corsetry trade and for handkerchief "frames," etc.

The Schiffli machine is also used to work designs on cotton (*e.g., broderie anglaise,* characterized by eyelet holes forming part of the design) and other textiles such as nylon or linen.

Guipure lace is similarly made on a woven fabric, but the fabric is afterward dissolved away, leaving the embroidery intact as the complete lace. Guipure is characterized by its firm texture, which has been likened to the finest carved ivory, and by the absence of any background mesh, the parts of the design being linked to each other by bars or "legs." Most guipure lace is of cotton (although other fibres can be used) on a thin silk fabric that is subsequently etched away by a lye solution, which attacks animal fibres so that only the embroidered cotton areas remain. (M. E. DA.)

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LACEBARK TREE (*Lagetta lintearia*), a native of Jamaica, where it is called lagetto, has the inner bark consisting of numerous concentric layers of interlacing fibres with pentagonal meshes. These sheets, when stretched, resemble lacework. Collars and other articles of apparel have been made of the fibre, which has also been used in the manufacture of whips and various ornaments. The tree belongs to the family Thymelaeaceae, and is known in conservatories.

The New Zealand *Hoheria* species are called lacebark or ribbonwood. In China *Pinus bungeana* is the lacebark pine.

LACEDAEMON: *see* SPARTA.

LACÉPÈDE, BERNARD GERMAIN ÉTIENNE DE-LAVILLE, COMTE DE (1756–1825), French naturalist and writer, was born at Agen on Dec. 26, 1756. His leisure was devoted to music, and in 1781–85 he brought out his *Poétique de la musique.* Meantime he wrote *Essai sur l'électricité* (1781) and *Physique générale et particulière* (1782–84), which led to an appointment in the Jardin du Roi with the opportunity to continue his *Histoire naturelle* in the *Histoire des quadrupèdes ovipares et*

des serpents (2 vol., 1788–89) and *Histoire naturelle des reptiles* (1789). After the Revolution he returned to the study of reptiles and fishes. Turning to politics in 1798, he rose to a distinguished career in the service of the state. He died at Épinay-sur-Seine on Oct. 6, 1825.

Besides the above works, *Lacépède* wrote *Histoire des cétacés* (1804) and *Histoire générale physique et civile de l'Europe* (18 vol., 1826). (K. P. S.)

LACEWING FLY (LACEWING), the name usually given to neuropterous insects of the families Hemerobiidae (brown lacewings) and Chrysopidae (green lacewings), with long delicate antennae, slender bodies and two pairs of similar richly veined wings. They are world-wide in distribution. The larvae, often called aphis lions, have prominent suctorial jaws and well-developed legs: they prey upon aphids and other soft-bodied insects, from which they drain the juices. The brown lacewings have eggs devoid of stalks and larvae naked. The green lacewings or golden-eye flies lay their eggs at the tips of stalks formed of hardened secretion; their larvae often cover themselves with the empty skins of their prey. *See* NEUROPTERA; INSECT.

LACHAISE, GASTON (1882–1935), French-U.S. sculptor, whose massive but delicately balanced nudes are well known, was born in Paris, on March 19, 1882, the son of a cabinetmaker. Lachaise entered a fine craft school at 13, was thoroughly trained in many techniques and went to the École des Beaux-Arts in 1898. He designed *art nouveau* objects for the glass master René Lalique. His future wife, an American, persuaded him to emigrate to Boston. There he worked for H. H. Kitson, an academic monument sculptor, for six years, establishing a studio in New York in 1912. In New York he commenced his famous "Standing Woman," bronze casts of which were acquired by many American museums. He was a brilliant portraitist (John Marin, Marianne Moore, E. E. Cummings). His final figures were hugely developed human fantasies. A large retrospective show was held at the Museum of Modern Art in New York city just before his death, on Oct. 18, 1935.

See Albert E. Gallatin, *Gaston Lachaise* (1924); Lincoln Kirstein, *Gaston Lachaise* (1953). (L. E. K.)

LA CHALOTAIS, LOUIS RENÉ DE CARADEUC DE (1701–1785), a magistrate whose leadership of the Bretons in their resistance to the central government had far-reaching consequences in France under Louis XV, was born at Rennes on March 6, 1701. He became *avocat-général* in the Breton *parlement* at Rennes in 1730 and *procureur-général* in 1752. He first attracted public attention by his violent attacks on the Jesuits, whose monopoly of secondary education in France and political influence he assailed in his *Comptes rendus des constitutions des Jésuites,* published in 1761. His prominence as an anti-Jesuit won him the admiration of the *philosophes* and the patronage of the duc de Choiseul and Madame de Pompadour, who encouraged his political ambitions. It was also at the root of his personal quarrel with the governor of Brittany, the duc d'Aiguillon. This hostility was increased when Aiguillon endeavoured to deprive him of the right of transferring his office at death to his son. In 1763 La Chalotais led the opposition of the Breton *parlement* to the cost of the road system constructed by Aiguillon for purposes of military defense in the Seven Years' War. In 1764 he encouraged the resistance of the provincial estates of Brittany to the duties imposed by the central government without their prior consent. He also was suspected of having written insulting anonymous letters threatening the king, addressed to the secretary of state. When in 1765 the majority of the Breton magistrates defied the government by resigning office and other provincial *parlements* espoused their cause, La Chalotais was arrested and imprisoned. The agitation led to the recall of Aiguillon and his prosecution by the *parlement* of Paris. The main significance of this protracted struggle between Brittany and the central government was that in 1771 the chancellor René de Maupeou introduced important judicial reforms that temporarily destroyed the political powers of the *parlements* and rendered such interference with local administration impossible. La Chalotais was pardoned in 1774 and died at Rennes on July 12, 1785.

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LA CHAUSSÉE, PIERRE CLAUDE NIVELLE DE (1692–1754), French dramatist, creator of the *comédie larmoyante,* was born in Paris in 1692 and died there on March 14, 1754. His first play, *La Fausse antipathie*, produced in 1733, was an unexpected success, and within the following 20 years he produced a score of comedies, of which the best-known are *Le Préjugé à la mode* (1735), *Mélanide* (1741), *L'École des mères* (1744) and *La Gouvernante* (1747). Their success created a new kind of play, a first form of the *drame bourgeois* that was to become popular in England and Germany. This is known as the *comédie larmoyante* and is almost demonstrably La Chaussée's invention. The epithet is deceptive, as the plays were actually neither pathetic nor tearful but induced feelings of pity instead of the ridicule and mockery which were a part of traditional French comedy. As a person La Chaussée is insignificant, but he is an important name in the history of French taste.

See G. Lanson, *La Chaussée et la comédie larmoyante,* rev. ed. (1903); and for data concerning the plays, dates of performance, mss., etc., C. D. Brenner, *A Bibliographical List of Plays in the French Language, 1700–1789* (1947). (W. G. ME.)

LACHES (*c.* 475–418 B.C.), a rich Athenian aristocrat who played a leading part in the first phase of the Peloponnesian War. He was an associate of Socrates and a conservative, following Nicias (*q.v.*). Elected general in 427, he was one of two commanders sent with 20 ships to support Athenian interests in Sicily. His mission was not effective; he was replaced at the end of 426 and, when he returned to Athens, prosecuted by Cleon (Aristophanes satirized the trial in *The Wasps*). Temporarily eclipsed, he gained politically by the Athenian defeats of 424 at Megara and at Delium, and moved the decree which brought the year's armistice in 423. When the death of Cleon (422) made peace with Sparta possible, Laches with Nicias served on the commission which negotiated terms. In the following period he supported Nicias' attempts to preserve the peace, but could not prevent the dangerous alliance of Athens with Argos and Mantinea. He died in command of the Athenian force when this alliance was broken up at the battle of Mantinea (418), executing a policy which he had always opposed. A dialogue of Plato's, on bravery, is known by his name (*see* PLATO: *The Dialogues*). (R. ME.)

LACHINE, a city in Jacques Cartier county, Que., Can., about 8 mi. W. of Montreal, on the south shore of Montreal Island facing Lake St. Louis and at the upper end of the Lachine canal around the Lachine rapids. A part of metropolitan Montreal, the population in 1966 was 42,367. The site was the former seigneury of René Robert Cavelier, sieur de la Salle, which had been nicknamed "La Chine" because of La Salle's explorations in search of a westward passage to China. Settlement began about 1675. In 1689 it was the scene of an Iroquois massacre of soldiers and settlers. Historically, Lachine was the terminus of the inland water route for the fur traffic coming down to Montreal. The Lachine canal, first constructed in 1821–24 to bypass the rapids and enlarged several times, was 8 mi. long and had 5 locks and a minimum depth of 14 ft. The St. Lawrence seaway bypasses the Lachine rapids by an 18-mi. canal from Montreal harbour to Lake St. Louis. This canal has 2 locks, St. Lambert opposite Montreal and Côte Ste. Catherine 8½ mi. upstream, and a minimum depth of 27 ft. During and after World War II the western half of the city developed as a residential suburb. Major industries include engine and machine building and electrical appliance manufacture. (M. C. BA.)

LACHISH, one of the most important towns of ancient Judah, destroyed by Joshua, fortified by Rehoboam, and the last fortified town of Judah to resist the army of Nebuchadrezzar before the final siege of Jerusalem. In 1890 it was erroneously identified by Sir Flinders Petrie with Tell el-Hesi, which he and F. J. Bliss partly excavated. William F. Albright then identified it in 1926 with Tell ed-Duweir, a very much larger mound in the low hill country of Judah (in the republic of Israel in the 1960s) where surface indications agreed perfectly with biblical references to Lachish. It is also located where Eusebius of Caesarea (*q.v.*)

placed the 4th century (A.D.) village, "in the seventh mile from Eleutheropolis (Beit Jibrin) to the Southern Province."

Excavations were undertaken at Tell ed-Duweir in 1932–38 by the Wellcome-Marston expedition, directed by J. L. Starkey and after his death in 1938 by C. H. Inge. Only a fraction of the large mound was actually dug, since most of the effort was devoted to clearing the terrain in preparation for a much longer period of excavation than was actually completed. Lachish had been occupied by a town since about 3200 B.C., if not earlier. Chalcolithic and early Bronze Age settlements were followed by a strong Hyksos (*q.v.*) fortress in the 17th–16th centuries B.C. (*see* ARCHAEOLOGY: *Egypt and Western Asia: East Mediterranean Littoral*). After the Egyptian conquest in the third quarter of the 16th century, Lachish became the capital of a vassal Canaanite city-state, well known from the Amarna clay tablets of the 14th century (*see* TELL EL-AMARNA). In the remains of a small temple built in the Hyksos dry moat were found two short vase inscriptions of the 13th century B.C. in alphabetic characters of the time of Moses; they are intermediate in form between the proto-Sinaitic characters (*c.* 1500 B.C.) and Hebrew-Phoenician letters of the Solomonic period. A hieratic Egyptian memorandum on a bowl found in the ashes from the destruction of Lachish by the Israelites appears to date this event about 1230–20 B.C.

The most significant discovery from the Israelite occupation, which so far can be traced back only to the 10th century B.C., is a group of 21 ostraca (letters and memoranda written in ink on potsherds). All were written in the early 6th century B.C. in good classical Hebrew with close resemblance to the prose of Jeremiah; most belong to an official correspondence from 589–588. The letters shed important light on Hebrew style, spelling and epistolary usage of that time, and indicate the state of the country just before the end of the kingdom of Judah.

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(W. F. A.)

LACHLAN, a river, the chief tributary of the Murrumbidgee (*q.v.*), New South Wales, Austr., is a perennial stream about 900 mi. long, and is used to some extent, in its middle course, for irrigation. After leaving the Eastern Highlands, the valley widens out on the "Western Slopes," and there (between Forbes and Cowra) the alluvial flats are devoted to lucerne, hay and vegetables; wheat and fat lambs are raised on the uplands. The Lachlan and its northern neighbour the Macquarie were the first of the interior rivers of Australia to be explored (1815–17).

(O. H. K. S.)

LACHMANN, KARL KONRAD FRIEDRICH WILHELM (1793–1851), German philologist and critic, a founder of modern textual criticism, was born at Brunswick on March 4, 1793. After studying at Leipzig and Göttingen he joined the Prussian army in 1815. His life was spent in the study of philology, especially Old and Middle High German, and from 1825 he was professor of philology at Berlin.

Lachmann laid down the rules of textual criticism and elucidated the phonetic and metrical principles of Middle High German in early works of 1816 and 1817 by a method more scholarly than had been used by his predecessors. His rigorous method is still clearer in a number of other works in the same field published between 1820 and 1836, one of which, *Der Nibelunge Not und die Klage,* reached an 11th edition in 1892. He then turned to classical studies. Lachmann's *Betrachtungen über Homers Ilias,* first published in the *Abhandlungen* of the Berlin academy in 1837 and 1841, in which he sought to show that the *Iliad* consists of 16 independent "lays" variously enlarged and interpolated, has had considerable influence on modern Homeric criticism, although his views are no longer accepted. His smaller edition of the New Testament appeared in 1831 (3rd ed. 1846); the larger, in two volumes, 1842–50. Besides *Propertius* (1816), Lachmann edited *Catullus* (1829); *Tibullus* (1829); *Genesius* (1834); *Terentianus Maurus* (1836); *Babrius* (1845); *Avianus* (1845); *Gaius* (1841–42); the *Agrimensores Romani* (1848–52); *Lucilius* (edited after his death by Vahlen, 1876); and *Lucretius* (1850). The last, which was the main occupation of the closing years of his life, from 1845, was perhaps his greatest achievement, and has been characterized by H. A. J. Munro as "a work which will be a landmark for scholars as long as the Latin language continues to be studied." Lachmann also translated *Macbeth* (1829).

Lachmann enunciated a statement of the lengthening of vowels in Latin standing before a voiced consonant that is assimilated to a following breathed consonant, that is, *ăgo* but *āctus,* that still goes by his name. Though its main tenet is correct, it still is the subject of argument. He died on March 13, 1851, at Berlin.

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(J. WH.)

LACKAWANNA, a city of Erie county, western New York, U.S., on Lake Erie, south of, and adjoining, the city of Buffalo (*q.v.*), and a part of the Buffalo standard metropolitan statistical area. In this major steel centre is one of the largest steel plants in the U.S., with a rated annual capacity of 6,200,000 tons. Operating its own ship canal, locks, bridges and storage areas, the steel company employs, at its peak, 20,000 workers. In the city is the basilica of Our Lady of Victory, a Roman Catholic national shrine, and its associated institutions. Until 1900 permanent settlers came mainly from the New England states. The rapidly growing community, originally known as Limestone Hill, separated from the town of West Seneca, and was incorporated in 1909 as the city of Lackawanna, named for the original steel plant. In the latter part of the 20th century more than 50 nationalities were represented in the population.

For comparative population figures *see* table in NEW YORK: *Population.*

(A. G. SE.)

LA CLOCHE, JAMES DE ("PRINCE JAMES STUART") (1644?–1669?), a pretender to the distinction of being the eldest natural son of Charles II of Great Britain. His claim, although virtually unknown to contemporaries, was seriously canvassed by Lord Acton in 1862 in an article entitled "The Secret History of Charles II" in the *Home and Foreign Review,* based on information found by Father Boero in the Jesuit archives at Rome. An entry in the register of the Jesuit house of novices indicated that a man calling himself Jacobus de la Cloche, "from the island of Jersey, aged 24," arrived there on April 11, 1668. He brought two letters from Charles II, dated Sept. 25, 1665, and Feb. 7, 1667, acknowledging De La Cloche de Bourg du Jersey as his natural son, a certificate from Queen Christina of Sweden, stating that he had been received into the Roman Catholic Church on July 29, 1667, and two letters from Charles II to the general of the Jesuit order, Father Oliva, asking that James be ordained as a priest and sent to England to receive Charles secretly into the Catholic Church. Even less plausible than these letters is one, dated Aug. 4, 1668, addressed by Charles to "Le Prince Stuart," a solecism in itself. It suggested that James could hope for titles higher than duke of Monmouth (*i.e.,* prince of Wales) and that, if Charles and his brother should die childless, "the kingdoms belong to you and parliament cannot lawfully oppose it, unless on the grounds that being a Catholic excludes you, since liberty of conscience is not yet established and as at present they can elect only Protestant kings." The mistaken assumptions that the English crown was elective, that Roman Catholics were barred from its inheritance and that there were no nearer heirs, all demonstrate that it is a forgery.

Far from being a serious claim to the throne, its immediate object must have been the shabbier one of extracting money from the Jesuit order, which was to finance De la Cloche's journey to England. In this it was successful and he appears to have returned with further requests for loans. Beyond this nothing more is known of him, although in Jan. 1669 an adventurer calling himself Prince James Stuart appeared in Naples, where he was arrested.

On inquiry from the viceroy, Charles II disowned him.

The fact, unknown to Acton, that a possible object of Charles's favours on Jersey, Margaret Carteret, married one Jean de la Cloche in 1656, gave a further lease of life to the theory in A. S. Barnes' *The Man of the Mask,* (1908), but it was abandoned in the 2nd edition (1912). The career of James de la Cloche testifies less to the fruit than to the reputation of Charles II's promiscuity.

(H. G. Ro.)

LACLOS, PIERRE AMBROISE FRANÇOIS CHODERLOS DE (1741–1803), French writer and soldier, whose novel, *Les Liaisons dangereuses,* achieved recognition as one of the great works of French realism, was born on Oct. 18, 1741, at Amiens. He chose an army career and in 1759 entered the Artillery school. Unrewarding service in garrison towns diverted his ambitions to writing. *Les Liaisons dangereuses* (1782; Eng. trans., *Dangerous Acquaintances,* R. Aldington, 1924) was a *succès de scandale.* His *De l'Éducation des femmes* (1785) is important only for the light it throws on certain aspects of the novel. The *Lettre à MM. de l'Académie française sur l'éloge de M. le Maréchal de Vauban* (1786), with its uninhibited criticism of a sacrosanct figure, caused his dismissal from the army. He took service with the duc d'Orléans and in 1790 became a member of the Jacobin club. He was arrested in 1793, released, rearrested and finally set free in 1794. Napoleon promoted him general of artillery in 1800 and he served in the campaigns of the Rhine and Italy. He died on Sept. 13, 1803, at Taranto.

Laclos' expressed intention in writing *Les Liaisons* was to expose libertinage: the heartless game of seduction with which the decadent aristocracy of the late 18th century relieved its boredom. This moral purpose is in some degree attenuated by the mastery with which the novel is composed. Instead of being horrified by the depravity of Valmont and the marquise de Merteuil the reader is dazzled by the mathematical precision which co-ordinates each phase of the intrigue. Laclos took over the form of the letter-novel made famous by Samuel Richardson and his verbal brilliance made of each letter a perfect transcript of the character behind it. So relentless is this skill that Cécile de Volanges remains inescapably the foolish creature for whom it is difficult to arouse any emotional concern; even Mme de Tourvel, though she represents Laclos' ideal of the "natural woman," seems vitiated with a Rousseauist sentiment so entirely in character that she becomes a predestined victim. The retribution which overtakes the seducers does not dispel the novel's ambiguity and compelling power.

See E. L. Dard, *Le Général Choderlos de Laclos, auteur des Liaisons Dangereuses* (1936); R. Vailland, *Laclos par lui-même* (1953).

(H. G. Wh.)

LA CONDAMINE, CHARLES MARIE DE (1701–1774), French naturalist, mathematician and explorer, was born at Paris on Jan. 28, 1701, and was trained for the army, abandoning this career in 1730 for the study of science. With Louis Godin and Pierre Bouguer he joined the expedition sent to Peru in 1735 to determine the length of a degree of the meridian in the neighbourhood of the equator, and at Quito he virtually assumed charge of the expedition. Separating finally from the rest of the party, in 1743 he made his way from Quito down the Amazon to Cayenne, accomplishing the first scientific exploration of the Amazon. His account of this expedition with a map of the Amazon was published in 1745, and the journal of his voyage to South America appeared in 1751. He visited Italy in 1757 to determine the length of a Roman foot, and died at Paris on Feb. 4, 1774. (H. M.-Ws.)

LACONIA, the ancient name of the southeastern district of the Peloponnese of which Sparta was the capital. The modern *nomos* (department) of Lakonia has a population (1961) of 118,661 and an area of 3,596 sq.km. (1,388 sq.mi.). It consists of three well-marked zones running north and south: (1) the valley of the Eurotas (modern Evrotas), which occupies the centre and is bounded west by (2) the chain of Taygetus (modern Taiyetos, 7,887 ft.) running from the Arcadian mountains on the north to the promontory of Taenarum (Cape Matapan, mod. Tainaron); and (3), the eastern portion, a more broken range of hill country which rises in Mt. Parnon to 6,348 ft. and terminates in Cape Malea. The Taygetus range is well watered and in ancient times had forests which afforded excellent hunting. Iron mines and quarries of the famous rosso antico of Taenarum, as well as an inferior bluish marble, were located there. Green porphyry (*lapis Lacedaemonius*) was quarried at Croceae (modern Krokeai). Far poorer are the slopes of Parnon, for the most part barren limestone. The Eurotas valley, however, is fertile and produces maize, olives, oranges and mulberries. Laconia has no large rivers except the Eurotas and its largest tributary the Oenus (modern Kelefina). The coast, especially on the east, is rugged with few good harbours. The island of Cythera lies south of Cape Malea. Important towns, besides Sparta and Gythium (*qq.v.*), were Bryseae, Amyclae and Pharis in the Eurotas plain; Pellana and Belbina in the upper Eurotas valley; Sellasia on the Oenus; Caryae toward the Arcadian frontier; Prasiae, Zarax and Epidaurus Limera on the east coast; Geronthrae on the slopes of Parnon; Boeae, Asopus, Helos, Las and Teuthrone round the Laconian gulf; and Hippola, Messa and Oetylus along the Messenian gulf.

Neolithic sites are concentrated in the Eurotas valley but in the Early and Middle Bronze Ages signs of occupation are found in the Malea peninsula and elsewhere. In the Mycenaean period (1400–1200 B.C.) settlements become more numerous and prosperous and in Homer Laconia is a powerful kingdom, ruled by Menelaus whose palace was perhaps at Therapne, southeast of Sparta. After the Dorian invasion (*c.* 1100 B.C.) Sparta gradually began to emerge as the leading power in the Eurotas valley. In the course of the 6th century it annexed the eastern strip and Cythera, which had previously been subject to Dorian Argos (*q.v.*). Throughout Laconia the bulk of the pre-Dorian population was reduced to slavery—these were the helots (*q.v.*)—but other communities (perhaps chiefly Dorian) were given the status of perioeci (*q.v.*). Throughout the classical period the history of Laconia is that of its capital, Sparta.

In 195 B.C. the perioecic towns on the coast were freed by Rome and became members of the Achaean league. Subsequently Laconia as a whole came under Achaean domination and during the 2nd century B.C. the various cities formed themselves into a league called the "Confederation of the Lacedaemonians." Augustus revised the composition and status of the league, changing its name to that of the "Free Laconians." Of the original 24 cities only 18 remained by the time of Hadrian. In A.D. 395 Goths under Alaric devastated Laconia, and later it was overrun by Slavs. Throughout the middle ages it was the scene of struggles between Slavs, Byzantines, Franks, Turks and Venetians, the memorials of which are the fortresses of Mistra (Mistras) near Sparta, Yeraki (anc. Geronthrae) and Monemvasia, "the Gibraltar of Greece," on the east coast and Passava near Gythium. In the war of independence a prominent part was played by the Maniates or Mainotes, the inhabitants of the rugged peninsula formed by the southern part of Taygetus who had maintained virtual independence of the Turks and until modern times retained many medieval customs, living in fortified towers and practising blood feud and marriage by capture.

Apart from Sparta, Gythium and Vaphio, the most important archaeological work has been the systematic survey of Laconia begun by the British School at Athens in 1904 and continued intermittently. There have been few excavations; the Apollo sanctuary at Amyclae was dug by C. Tsountas in 1890 and by the German school intermittently between 1904 and 1925. The acropolis at Geronthrae, a shrine at Angelona, the sanctuary of Ino-Pasiphae at Thalamae, the Menelaeon at Therapne and various Late Bronze Age tombs (*e.g.,* at Kampos) have been investigated. Between 1959 and 1963 the school excavated at Ayios Stefanos in the Eurotas valley. *See* also Greece.

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LACONIA, a city in the lake region of central New Hampshire, U.S., the seat of Belknap county. It borders four lakes and from the city the White mountains and the Belknap mountain range are seen. In 1652 this region was marked by the Massachu-

setts Bay colony as its northern boundary. Indian artifacts found near the boundary marker are displayed in the Laconia public library. Laconia received a town charter in 1855 and became a city in 1893. The first cotton mill in the U.S. (chartered July 1, 1811) was located there. Socks for the Union army in the American Civil War were made in mills on the Winnipesaukee river which flows through the city. It once was noted for the manufacture of passenger cars for the New York city and Boston subways. Industries include knitting machinery, latch needles, wood handles, skis, plywood, hosiery, shoes, malleable iron castings, boxes, doll clothing and electric relays. The state school for mental defectives is located there.

The office of the supervisor of the White Mountain National forest is in Laconia. The Belknap Mountain Recreation centre is nearby. The state maintains a fish hatchery nearby. For comparative population figures *see* table in NEW HAMPSHIRE: *Population.* (E. J. GA.)

LACORDAIRE, (JEAN BAPTISTE) HENRI (1802–1861), French Dominican preacher and outstanding ecclesiastic among the enlightened leaders of the Catholic revolt in France against the skepticism of Voltaire and the idealistic socialism of Saint-Simon, was born at Récey-sur-Ource, Côte-d'Or, on May 12, 1802. After practising as an advocate, he entered the seminary of St. Sulpice in 1824, moved in particular by the *Essai sur l'indifférence en matière de religion* of H. F. R. de Lamennais (*q.v.*). He was ordained three years later. In 1830 he joined the small band of enthusiastic young men, both clerical and lay, who collaborated under the direction of Lamennais in the production of *L'Avenir,* an exaggeratedly liberal journal which was suppressed when Lamennais's doctrines were condemned in the encyclical *Mirari Vos* (1832).

Unlike Lamennais, Lacordaire readily accepted its cessation, believing that social regeneration must flow from an intelligent religious regeneration. He therefore began that course of Christian *conférences* (lectures) which attracted in rapidly growing numbers the largely de-Christianized intellectuals of Paris, first to the Collège Stanislas (1834) and later to Notre Dame (1835). He expounded the need of a new liberalism in the idiom of a contemporary France emergent from the Revolution. His own liberalism eventually won the approval of the first Vatican council because it derived from a profound spirituality which was not merely theoretical but personal.

In the Dominicans, as an order devoted especially to preaching and education, Lacordaire saw a perfect means of pursuing his own high endeavours and at the same time the necessary safeguard of the orthodoxy of these endeavours. Therefore, as a first step toward re-establishing the Dominican order in France (where it had been suppressed at the time of the Revolution), and by its means to further the re-Christianizing of France not only in the purely religious sphere but also in the spheres of education, politics and social reform, he joined the order at Rome in 1838. His return to Paris four years later to resume his preaching in Notre Dame won renewed public, and consequently official, recognition in his country for religious orders in general. As prior provincial from 1850 to 1854 he did much to make the Dominicans a religious and educational power in France. In 1854 he retired to Sorèze, where he established a specifically educational section of the order. Lacordaire was elected to the Academy in 1860 and died at Sorèze on Nov. 21, 1861.

Lacordaire was an unswerving protagonist for that freedom which he was convinced could result only from a comprehension and acceptance of total Christian truth; hence his appreciation, for example, of Daniel O'Connell (*q.v.*), manifested in one of the most notable of his renowned funeral orations; hence too his professedly republican leanings, proclaimed (to the disapproval of local ecclesiastical authority) when he was elected briefly to the national assembly. Though his immediate appeal was to the intellectuals, his purpose was the social and educational as well as spiritual betterment of the masses; hence his close friendship with A. F. Ozanam and C. F. R. de Montalembert (*qq.v.*).

Lacordaire made an effective and lasting contribution to the intellectual and religious reorientation of France, primarily through the influence of his spoken word and his own personality, but also by the practical steps he took to extend and perpetuate that contribution by the re-establishment there of the Dominicans. His enduring monument is in the written text of his *conférences.*

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LA CORDILLERA: *see* CORDILLERA, LA (department).

LACQ, a village in the Béarn district of the Basses-Pyrénées *département* in southwest France, lies 25 km. (16 mi.) N.W. of Pau by road. Pop. (1962) 319. It is the centre of an industrial complex exploiting reserves of natural gas estimated at 250,000,000,000 cu.m., discovered in 1951 and developed by the Societé Nationale des Pétroles d'Aquitaine, 52% of whose capital is held by the government. About 4,700,000,000 cu.m. of purified methane are distributed annually from a vast underground storage reservoir at Lussagnet, 35 mi. N.W., through a pipeline network to Paris, Lyons, Toulouse, Bordeaux, Nantes and other centres for factory use, electricity production and domestic consumption. Treatment of hydrogen sulfide in the natural gas yields about 1,400,000 tons of sulfur annually, thus making Lacq the world's largest sulfur producer. Sulfur is exported through Bayonne, about 50 mi. W. Other by-products include gasoline, propane, butane, ethylene, benzine, cyclohexane, styrene and polystyrene.

A gas-fired power station at Artix, 1 mi. S.E., generates electricity for an aluminum plant of 90,000 tons annual capacity at Noguères, 2 mi. S.E. of Lacq. At Pardies, 2½ mi. S.E. of Lacq, chemical plants produce ammonia, acetylene, methanol, fertilizers and plastics. To meet the needs of the Lacq workers and executives the town of Mourenx-la-Neuve was built 6 mi. S. of Lacq, with high apartment blocks, schools, shopping precincts and playgrounds providing for a community of 12,000 inhabitants. (E. V. F.)

LACQUER (LACKER), a general term for coloured and frequently opaque varnishes applied to certain metallic objects and to wood. The term is derived from lac (*q.v.*), which is the basis of some lacquers. (This article deals with artistic lacquer ware; for a discussion of lacquers used as protective or decorative coatings, *see* VARNISH. *See* also JAPANNING.)

The lacquer of the far east, China, Japan and Korea must not be confused with other substances to which the term is generally applied; for instance, the lac of Burma, which is the gummy deposit of an insect, *Coccus lacca,* and the various solutions of gums or resin in turpentine of which European imitations of eastern lacquer have been and are concocted.

TECHNIQUE

Raw Materials.—Lacquer, as used in China and Japan, is a natural product, the sap of a tree, *Rhus vernicifera;* subject to the removal of impurities and excess water, it can be used in its natural state, though it was frequently adulterated. The tree, which is indigenous to China, and has certainly been cultivated in Japan at least since the 6th century A.D., is tapped at about the age of ten years, lateral incisions being made in the bark and the running sap collected during the months of June to September. Branches of a diameter of one inch or more are also tapped, the bark having first been removed. Smaller branches are cut off, soaked in water for ten days, and the sap collected, producing a lacquer (*seshime*) of particular quality, used for special purposes. These processes kill the tree, but the wood, when of sufficient size, is of some use for carpentry. From the roots five or six shoots spring up, which become available for the production of lacquer after about six years, and the operation can be thus continued for a considerable length of time before the growth is exhausted. The Chinese and Japanese methods are practically identical in this respect, but the cultivation of the tree does not seem to have been so systematic in China as in Japan.

The sap is white or grayish in colour and about the consistency of treacle. On exposure to the air it turns yellow-brown and then

black. It is strained through hempen cloth to remove physical impurities, after being pounded and stirred in shallow wooden tubs to give it uniform liquidity. It is then slightly heated over a slow fire or in hot sunshine and stirred again to evaporate excess moisture, and stored in airtight vessels. The characteristic constituent of lacquer is termed by chemists urushiol (from the Japanese name of lacquer, *urushi*), and its formula has been stated as $C_{14}H_{18}O_2$. Japanese lacquer is said by K. Mijama to contain from 64% to 77.6% of urushiol as compared with an average of 55.84% for Chinese; the difference being due, probably, to inferior methods of cultivation and extraction, and perhaps in some cases to climatic differences. Lacquer is a slightly irritant poison, but workers in the industry soon become immune.

The basis of lacquer ware, both in Japan and in China, is almost always wood, although it was also occasionally applied to porcelain and brass and white metal alloys. In some instances, objects were carved out of solid lacquer. The wood used, generally a sort of pine having a soft and even grain, was worked to an astonishing thinness. The processes that follow are the result of extraordinary qualities of lacquer itself, which, on exposure to air, takes on an extreme but not brittle hardness, and is capable of receiving a brilliant polish of such a nature as to rival even the surface of highly glazed porcelain. Moreover, it has the peculiar characteristic of attaining its maximum hardness in the presence of moisture. The Japanese, therefore, place the object, to secure this result, in a damp box or chamber after each application of lacquer to the basic material (wood, etc.). The Chinese are said (in an account of the industry dating from A.D. 1621–28) to use a "cave" in the ground for this purpose, and to place the objects therein at night in order to take advantage of the cool night air. It may, indeed, be said that lacquer dries in a moist atmosphere.

Procedure.—The joiner's work having been completed, and all knots or projections having been most carefully smoothed away, cracks and joints are luted with a mixture of rice paste and *seshime* lacquer, until an absolutely even surface is obtained. It is then given a thin coat of *seshime* lacquer to fill up the pores of the wood and to provide a basis for succeeding operations; in the case of fine lacquer, possibly as many as 20 or 30 or even more, of each of which the following may be taken as typical. On the basis, as above described, is laid a coat of lacquer composition which is allowed to harden, and ground smooth with whetstone. Next comes a further coat of finer composition, in which is mixed some burnt clay, which is again ground, and laid aside to harden for at least 12 hours. On this is fixed a coat of hempen cloth (or, rarely in Japan but more often in China, paper) by means of an adhesive paste of wheat or rice flour and lacquer, which needs 24 hours at least to dry. The cloth is smoothed with a knife, and then receives several successive coats of lacquer composition, each demanding the delay necessary for hardening. On this is laid very hard lacquer, requiring a much longer drying interval, afterward being ground to a fine surface. Succeeding coats of lacquer of varying quality are now laid on, dried and polished.

This preliminary work, requiring for artistic lacquer at least 18 days, produces the surface on which the artist in lacquer begins his task of decoration. A large number of processes were at his command, especially in Japan, but the design was first generally made on paper with lacquer and transferred to the object while still wet, or drawn on it direct with a thin paste of white lead or colour. In carrying it out he made use of gold or silver dust applied through a quill or bamboo tube, or through a sieve to secure equal distribution. Larger fragments of the precious metals (*hirame* or *kirikane*) were applied separately by hand, with the aid of a small, pointed tool. In one typical instance approximately 500 squares of thin gold foil were thus inserted, within one square inch. These decorative processes each entailed prolonged hardening periods and meticulous polishing. Relief was obtained by modeling with a putty consisting of a mixture of lacquer with fine charcoal, white lead, lampblack, etc., camphor being added to make it work easily. Lacquer was sometimes engraved, both in China and Japan.

Carved Lacquer.—The carved lacquer of China (*tiao ch'i*), which was imitated but never equaled in Japan (as the Chinese have never reached the perfection of the Japanese gold lacquer ware), needs particular notice. In this, the lacquer was built up in the method described above, but to a considerable thickness; when several colours were used, successive layers of each colour, of uniform thickness, were arranged in the order in which they were to predominate. When the whole mass was complete and homogeneous, it was cut back from the surface, so as to expose each colour as required by the design. The carving was done with a V-shaped tool kept very sharp, and when the lacquer was cold and hard. The cutting was done with amazing precision—no correction of faults was possible, for each layer had to be exactly and accurately reached, and the final result precisely foreseen and allowed for from the beginning of the work. The red lacquer (*tan sha*), so well known and justly appreciated, was coloured with cinnabar (red mercuric sulfide). Other colours which were employed include a deep and a lighter olive-green, buff, brown, black and aubergine.

In Japanese lacquer, the following are the chief processes used: *nashiji* (pear skin), small flakes of gold or silver sunk to various depths in the lacquer; *fundame,* fine gold or silver powder worked to a flat, dull surface; *hirame,* small, irregularly shaped pieces of sheet gold or silver placed on the surface; *togidashi,* the design built up to the surface in gold, silver and colours with many coats of lacquer and then polished down to show them; *takamakiye,* decoration in bold relief; *hiramakiye,* decoration in low relief; *rōiro,* polished black; *chinkinbori,* engraved lacquer; *kirikane,* square dice of sheet gold or silver, inserted separately on the surface; *raden,* inlaid shell and metal. From the earliest recorded times shell was used in the adornment of lacquer in China as well as in Japan, being inlaid on the surface in patterns, as well as in small squares like *kirikane* and dust. For this purpose various shells were used, mother-of-pearl for larger work and that of nautilus, pear shell, sea-ear (*Haliotis,* Jap. *Awabi*) and *Turbo cornutus* (Jap. *Sazaye*). For a very charming form, called *laque burgautée,* the shell of the sea-ear, of iridescent blue and green, was employed in combination with gold and silver and delicately engraved, as early as the Ming period (A.D. 1368–1644) and also in Japan. Chinese lacquer was also inlaid with hard stones such as jade, malachite, etc., as well as coral, soapstone, ivory, porcelain and other decorative substances.

CHINESE LACQUER

The use of lacquer in China goes back traditionally to legendary times. A late Ming manuscript, the *Hsui-shih-lu,* states that it was first employed for writing on bamboo slips, then for utensils for food, made of black lacquer, and subsequently for vessels for ceremonial use, of black with red interiors. During the Chou dynasty (1122–249 B.C.) it served for the decoration of carriages, harnesses, bows and arrows, etc., and was the subject of official regulations, being accepted also in payment of taxes. At this time, gold and colours are said to have come into use. About the 2nd century B.C. buildings were decorated with lacquer, and musical instruments are similarly described. Under the Han dynasty (202 B.C.–A.D. 221) further development took place, and pot covers of paper, covered with lacquer, were found in 1910 by Ryūzo Torii near Port Arthur which are definitely attributed to this period.

Of the lacquer of the T'ang dynasty more reliable information is available, for the collections still preserved in the Horyuji temple in Japan, founded A.D. 607, and those collected by the Japanese emperor, Shōmu (A.D. 724–749), deposited after his death by his widow in the Imperial treasury (Shōsō-in) at Nara, contain many objects to which must be given a Chinese origin; in particular, musical instruments with inlay of cutout figures of gold and silver inserted on the surface, covered with lacquer, which was then rubbed down until the metal ornaments were again brought to view.

Under the Sung dynasty (A.D. 960–1279), the industry further developed and the use of gold and silver lacquer in the utensils made for the palace is particularly recorded. S. W. Bushell considered that all branches of lacquer work now carried on in China can be traced as far back at least as the Sung dynasty and that the chief seat of manufacture at that period was Chia-hsing Fu, between Hangchow and Soochow—the latter city being also an im-

portant centre of the industry. A lacquer box of the early Sung period, probably once of rhinoceros horn colour, black and red, with gold dust and silver wire, is one of the very few known examples of the period. Toward the close of the period (*c.* A.D. 1220) it is stated that lacquer wares were exported from Fukien to Java, India, Persia, Japan, Mecca and other places. Chinese writers record the existence of carved red lacquer during the time of the Yüan dynasty (A.D. 1280–1368) as well as of pierced ware and that inlaid with shell.

Of the state of the industry under the Ming dynasty (A.D. 1368–1644) there are contemporary Chinese descriptions; for instance, the *Koku yao lun,* published during the reign of the first Ming emperor, and the *Ch'ing pi ts'ang* of A.D. 1595. The *Hsui shih lu* dates from A.D. 1621–28 and from these a good account of the progress of the art can be realized. These records indicate that there were, in the early years of the dynasty, special factories of carved red lacquer at Ta-li in Yünnan, which also produced spurious imitations. Nanking was noted for work of the same kind of high quality and for gold lacquer with pictures, as also were Peking and Ning-kuo Fu in Kiangnan. Inlay of mother-of-pearl is also mentioned. The excellence of the carved lacquer made during the reigns of Yung Lo (A.D 1403–24) and Hsiian-Tê (A.D. 1426–35) is also recorded; and also that encrusted with shell, inlaid with sheet gold and silver, and flecked with powdered gold. Examples of carved lacquer are extant which can reasonably be attributed to this period. They are bold in design and free from the superabundance of small detail which characterized later productions; the colour also is generally deeper and richer than that of the 18th-century pieces. The Victoria and Albert museum, London, has several good examples of the period. Toward the end of the Ming dynasty, a factory was established at Peking, but fell into disuse during the troubles accompanying the fall of the Ming emperor.

The first and, perhaps, the greatest of the Manchu emperors, K'ang-Hsi (A.D. 1662–1722), revived it in A.D. 1680, when he established, in the precincts of the palace at Peking, a series of 27 workshops for artistic handicrafts. Carved lacquer was, however, also made at Canton, Tongking, Soochow and Foochow; and the Jesuit father Louis le Comte, who arrived in China in 1687, gave a good account of the flourishing state of the industry at that time. In this connection it is worth noting that the period of K'ang-Hsi was that which saw the first considerable importation of lacquer ware (and other objects of industrial art) into Europe. The consequent development of imitation lacquer applied to furniture, etc., which, during the reigns of William and Mary and Anne, had so extended a vogue, was one of the conspicuous features of the *Chinoiserie* craze of that time. A screen is still in existence made by command of K'ang-Hsi for presentation to the emperor Leopold I, whose badge, the double-headed eagle, is incorporated in the design. Carved lacquer of this period hardly attains to the rich colour of that of the Ming period, nor to the breadth and simplicity of design of the latter—though these qualities are far from negligible.

In technique the K'ang-Hsi ware shows an advance and is generally free from the small cracks too often found to have developed in the Ming products. The perfection of this quality, apart from other considerations, is found in the lacquer ware of Ch'ien-Lung (A.D. 1736–96), a devoted admirer of this branch of industrial art, who employed it on a large scale for the furniture and fittings of his palaces, for ceremonial and commemorative gifts and other purposes. The workmanship of objects made under his auspices is brilliant in the extreme, and ranks with the finest products of a nation whose mere craftsmanship has been almost unrivaled. But the colour is hard compared with earlier work, and the design tends rather to a somewhat stereotyped formalism.

Still, the 18th century can hardly be called a period of decadence in the industrial arts of China—the superb execution of its productions, a characteristic which will always, and justly, command admiration, redeems it from adverse criticism. The downward course began in the 19th century, with loss of originality and a falling off, due to adulteration, in the quality of the material. What was left of the imperial factories was burnt in 1869, and though carved red lacquer was made after that date, the industry had already ceased to have artistic importance.

Lacquer in Gold and Colours.—Lacquer artists in China, curiously enough, never developed the use of gold lacquer to anything like the extent or to the high standard of merit attained by the Japanese, though, rarely, specimens can be found of fine quality. For the most part, gold was used as a simple, flat decoration, especially on a ground of black as in the screens and boxes, frequently of considerable decorative value, made at Canton and other ports in touch with foreign trade and largely exported by European merchants, especially at the beginning of the 19th century. On the other hand, the Chinese used to advantage a wider range of colour than was generally employed in Japan; and brilliant hues of green, red, brown, cream, purple and other tints are found on objects dating from the later years of the Ming period onward.

Screens, too, were often thus decorated most effectively, and sometimes enriched with applied hard stones, shell or porcelain. The most effective form of this typically far eastern article of furniture is provided by the so-called Coromandel work, in which the design is first cut out in intaglio and then completed with varied colour or gold. Such screens, which are sometimes of considerable size—as much as 20 ft. in width and 8 ft. in height, and with 12 leaves—were largely imported into western Europe at the end of the 17th and early years of the 18th century, by East India merchants whose headquarters (French and English) were either on the Coromandel coast or (Dutch) at Bantam in Java—the latter place also providing a name often used by old writers. These imported screens were remorselessly cut up to make cabinets and other articles of furniture, in which form their remains are by no means rare at the present day.

Laque Burgautée.—One of the most delicate and charming manifestations of the Chinese lacquerer's art is that called *laque burgautée,* of which the technique has already been described. The effects of colour produced by the use of iridescent shell, sometimes engraved, and occasionally in combination with gold and silver, are exquisite. This work is generally on a small scale, and though temple utensils and other articles of fair size are to be found, as well as miniature table screens and vases, a favourite production took the form of little wine cups, originally in sets of five and lined with silver. This branch of art dates certainly from the Ming dynasty, and its qualities merit a good deal of attention.

Subjects of Decoration.—Chinese ornament as applied to lacquer ware (as to other of the industrial arts) is almost entirely symbolical and the subject pieces generally derived from legends of the Buddhist, Taoist and Confucian personages. The more usual of the former are the "Eight Buddhist Emblems of Happy Augury," the "Eight Musical Instruments," and the "Eight Precious Things" (Taoist). The "Hundred Antiques" appear on Coromandel screens and other large works. Among figure subjects may be mentioned representations of Shou Lao, a deification of Lao-Tzu, the founder of the Taoist philosophy, the "Eight Taoist Immortals," the "Sages of the Bamboo Grove" and those of the wine cup. Children at games are much favoured, and landscapes with pavilions, trees, mountains, lakes and formal gardens. Among animals the mythical dragon—if with five claws, peculiar to the emperor—and phoenix or *feng-huang* associated with the empress. The long-tailed tortoise, unicorn (*Ch'i-lin*), lion, crane, bat, butterfly and fish are frequently seen, all being symbolical of long life, good fortune, happiness, etc. The peach, pine, bamboo, peony, lotus and chrysanthemum are the chief motifs selected from the vegetable kingdom. Of abstract pattern the meander or key pattern and swastika are the chief. The forms of vessels resemble, as a rule, those either of porcelain or bronzes.

JAPANESE LACQUER

The earliest definite record of the existence of a lacquer industry in Japan consists in an allusion in the *Nihongi* ("Chronicles of Japan") to a high court official who was probably in control of it in the year A.D. 587. This implies some development already achieved; and during the following two or three centuries it is certain that the cultivation of the lacquer tree and the use of the

material were fostered and controlled by a government department. Lacquer, for instance, was accepted in some districts in payment of taxes. But the history of the art, so far as concerns definite evidence still extant, begins with the 8th century, and the specimens to which reference may be made are those still preserved at Nara and in the Horyuji temple referred to above. Although a number of these are of Chinese origin, the collections include treasures that must be given an authentic Japanese origin. Among those may be mentioned the sword scabbard of the emperor Shōmu (A.D. 724–749), in gold on black lacquer, and others decorated with leaves of gold and silver inlaid in lacquer.

The emperor Kwammu (A.D. 781–806) removed the capital from Nara to a new city, Heiankyō—the modern Kyōto; and an increased luxury in the style of living brought about further developments in the art, especially in the use of gold lacquer, due largely to the spread of Buddhistic influence. This period, however, saw the beginnings of a Japanese national style as distinct from the Chinese methods and manner, imported by Buddhist missionaries. Lacquer was used at this time in the decoration of important buildings; and inlay of shell also became popular. The organization of the industry was extended, and as early as A.D. 905 sumptuary edicts began to be issued regulating the dimensions and quantities of material to be used in the domestic utensils—chiefly of black or red polished lacquer—which now began to come into general use. From this time, it is no exaggeration to say that, to a considerable extent, lacquer filled the place occupied in China by ceramic wares. A remarkable development of this period which must not be overlooked was the production of statuary of considerable merit, made with lacquer composition (*kanshitsu*), a process derived from China, but carried to a high standard in Japan for a brief period, until it was superseded by wood sculpture. Some few authentic examples remain of the fine lacquer of the Heian period, notably the case for Buddhist Scriptures in the Ninnaji temple at Kyōto, made by order of the emperor Uda at the beginning of the 10th century. This is in black lacquer, sprinkled with gold dust and with a pattern of flowers, clouds, birds and Buddhist angels.

During the Kamakura period (A.D. 1185–1333), in spite of the disturbance caused by the famous struggle between the Minamoto and Taira clans, and the establishment of the feudal shogunate at Kamakura, which gives its name to the period, the art of making fine lacquer continued to progress, under the patronage of the Fujiwara family, who maintained the imperial court at Kyōto with ever increasing luxury. Marked features of this time are improved methods of inlay of precious metals and shell, and especially an attractive form of design in which beautifully written poems are interwoven with the pattern (*ashide-ye*). The process called *Kamakura-bori,* carved wood thickly lacquered with red or black, also dates from this period and continued to flourish for another two centuries or so. Modern imitations of this work have to be reckoned with by the collector. During this epoch occurred the beginnings of the characteristic Japanese treatment of landscape and flower subjects in design, generally in flat gold lacquer, with *nashiji* and pewter inlay.

The Muromachi period (A.D. 1335–1573) saw a further technical and artistic development, largely under the patronage of the shogun Yoshimasa; who, after holding office for two years only, retired in 1451 and devoted himself to a life of luxury. He gave great impetus to the tea and incense ceremonies, to the latter of which was especially due a whole series of new applications of the art, in respect of the exquisitely wrought small utensils required by that ritual. The ostentatious simplicity of the Zen sect of Buddhists was displayed in the use of black lacquer of the first quality with little or no ornament. Excellent work in shell inlay was also a characteristic of the time. The gold lacquer of the Muromachi craftsmen gained so great a reputation in China that artisans from that country came to Japan to learn the methods by which it was produced, though they seem to have had little success in introducing it into their own country. Among the leading Japanese craftsmen of the period may be mentioned Kōami Dōchō, Taiami, Seiami, and Igarashi Shinsai, but attribution of specific works to them is largely a matter of conjecture.

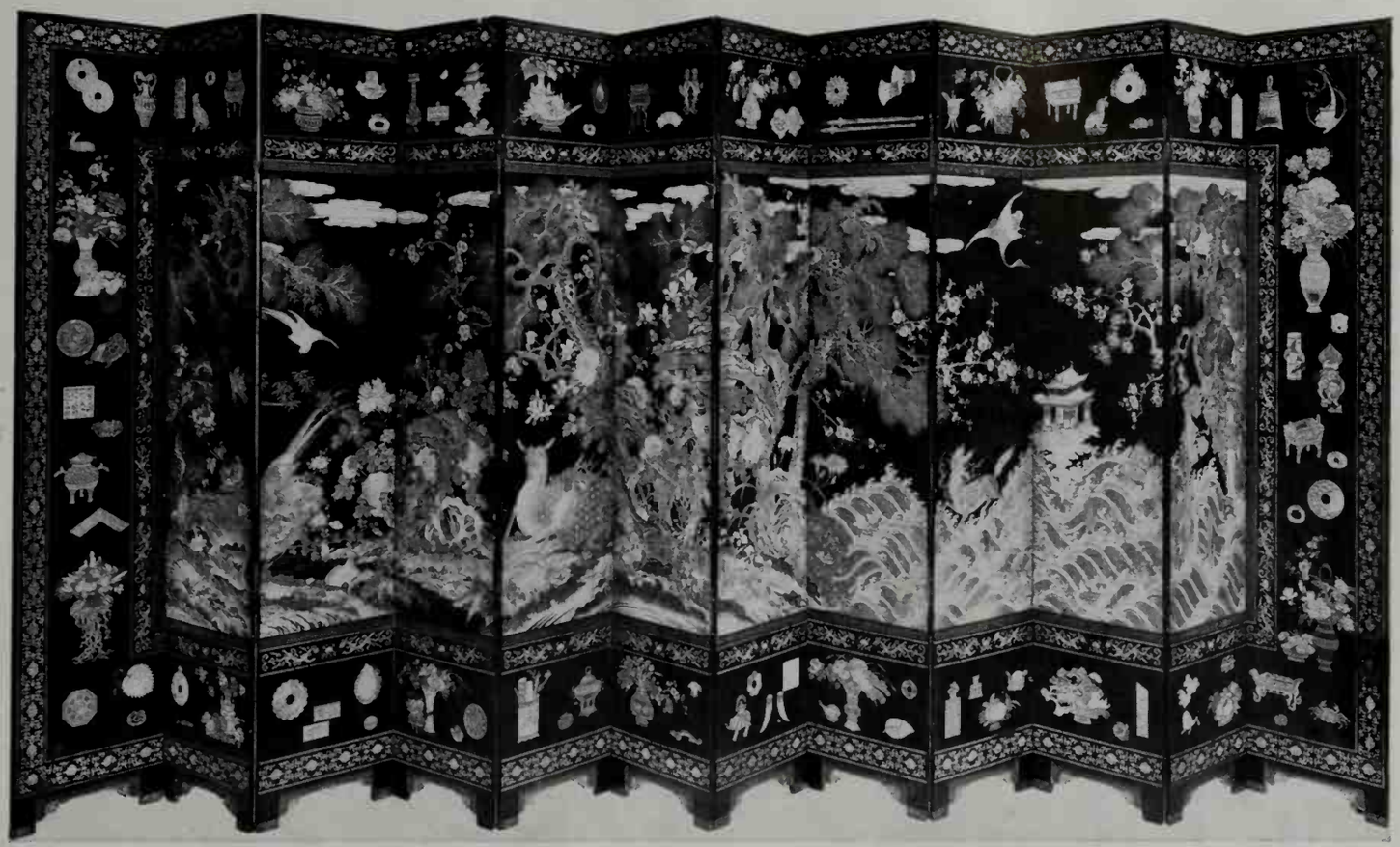
The civil wars which continuously infested Japan during the later middle ages checked the growth of the industry for a while; but the short Momoyama period (A.D. 1574–1603) which followed saw at least the work of one of the greatest of Japanese artists in lacquer, Honami Kōyetsu (A.D. 1557–1637). He was the founder of a striking and original style of ornament, essentially national in character. His designs were bold and simple in detail, generally executed in high relief with masses of shell or metal inlay. The great shogun Toyotomi Hideyoshi (d. 1598), who secured the peace of the country with a strong hand, was an enthusiastic patron of the arts; and under his patronage a real revival took place. At his death, his widow erected the Kōdaiji temple at Kyōto, in which a new method of lacquer decoration was used (*Kodaiji-makiye*). It still contains examples of this ware presented by her.

In 1603 began the rule of the Tokugawa shogunate, which continued without a break until the restoration of the imperial family to actual power in 1868. The first of the line, Ieyasu, established at Edo (the modern Tokyo) the great school of lacquer artists which is responsible for almost the whole of the artistic ware known outside Japan. Technical processes were still further developed with additions such as the engraved lacquer (*chinkinbori*) derived from China, carved red and black lacquer from the same source, and the so-called *Somada* ware of shell inlay on black, but different in character from the Chinese *laque burgautée* already mentioned above.

This period also saw the introduction of a class of work made by workmen, as a rule, specially devoted to it, namely the now well-known inro or portable medicine cases, worn on the girdle and an indispensable addition to the national costume so long as the latter was uncontaminated by western influence. These were small in size, generally oval or cylindrical in section and from 2½ to 4 in. in length. They consisted, as a rule, of from two to five compartments, beautifully fitted into each other and held together by silken cords running along each side, secured by a bead or toggle (*ojime*) and kept from slipping through the sash by a netsuke, sometimes of lacquer, but more often of cunningly carved wood, ivory, bone, or other material. On this class of work was lavished some of the finest artistry of the Japanese craftsmen, and the convenient size and intrinsic charm of these dainty utensils (originally, perhaps, made for seals) have caused them to be much favoured by collectors.

The earlier years of the Tokugawa period saw a considerable Chinese influence in the design of lacquer, especially in inro; but the work of the greatest of Japanese lacquer artists, Ōgata Kōrin (*c.* 1657–1716), followed and extended the style originated by his master, Kōyetsu. Ritsuō (1663–1747) and Hanzan (18th century) maintained this tradition, and a considerable revival of the style took place in the early years of the 19th century, when Hoitsu published his memorial volumes of the designs of the great master. To the latter period belong not a few objects which have been accepted as the original work of Kōrin himself. The more formal school of lacquerers included Kōami Choan and Koma Kitō-ye, who was appointed court lacquer artist to the shogun Iemitsu in 1636 and died in 1674. His succesors held this post for 11 generations. A set of three stands made by Kōami Nagashige in 1637 as a wedding present from Iemitsu to his daughter on her marriage with the daimyō of Owari is considered by some Japanese experts to be the finest extant piece of Japanese lacquer. Lacquer artists followed the practice of other craftsmen in Japan, in transmitting their names to sons or selected pupils. Thus, there were ten generations of the family of Yamamoto Shunshō, who died in 1682, aged 63. The Kajikawa family continued the tradition of its founder well into the 19th century, and the same must be said of Shiomi Masanari (Kyōto, *c.* 1716–36), whose work was notable for the quality of the rubbed-down gold and colour lacquer called *togidashi.*

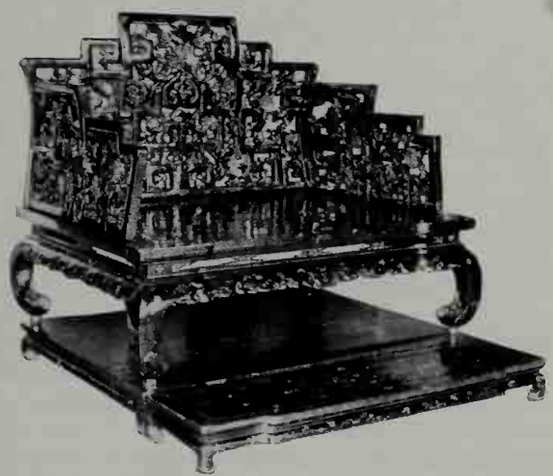
The Genroku epoch (1688–1703) saw, perhaps, the ultimate perfection of style and technique; but the work of the later 18th and, to some extent, of the early 19th centuries has many exquisite qualities. The later periods were characterized by more elaborate detail; but adulteration of the gold with bronze and



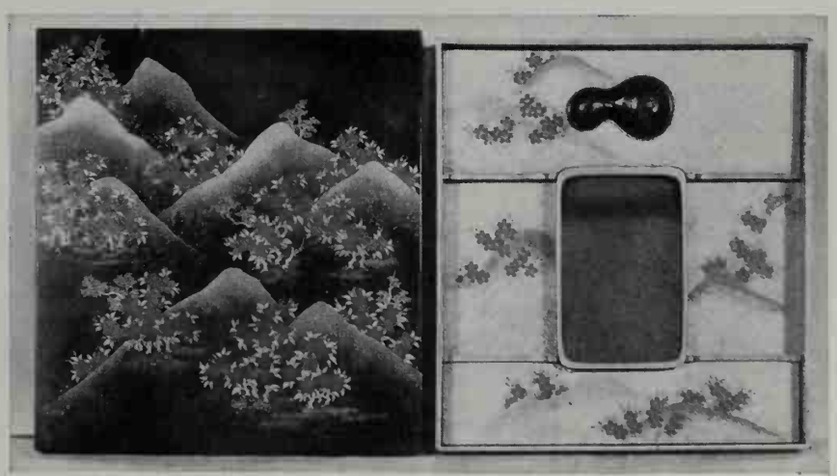
Chinese screen of black lacquered coromandel wood with designs incised and painted in gold and colours. 18th century

Chinese. Head of Lohan, dried lacquer. Liao-Chin dynasties, 10th–13th century

Korean. Detail from painted lacquer basket. Han dynasty, 1st–2nd century. In National museum, Seoul



Chinese throne in flat lacquer of various colours on black. Early 17th century

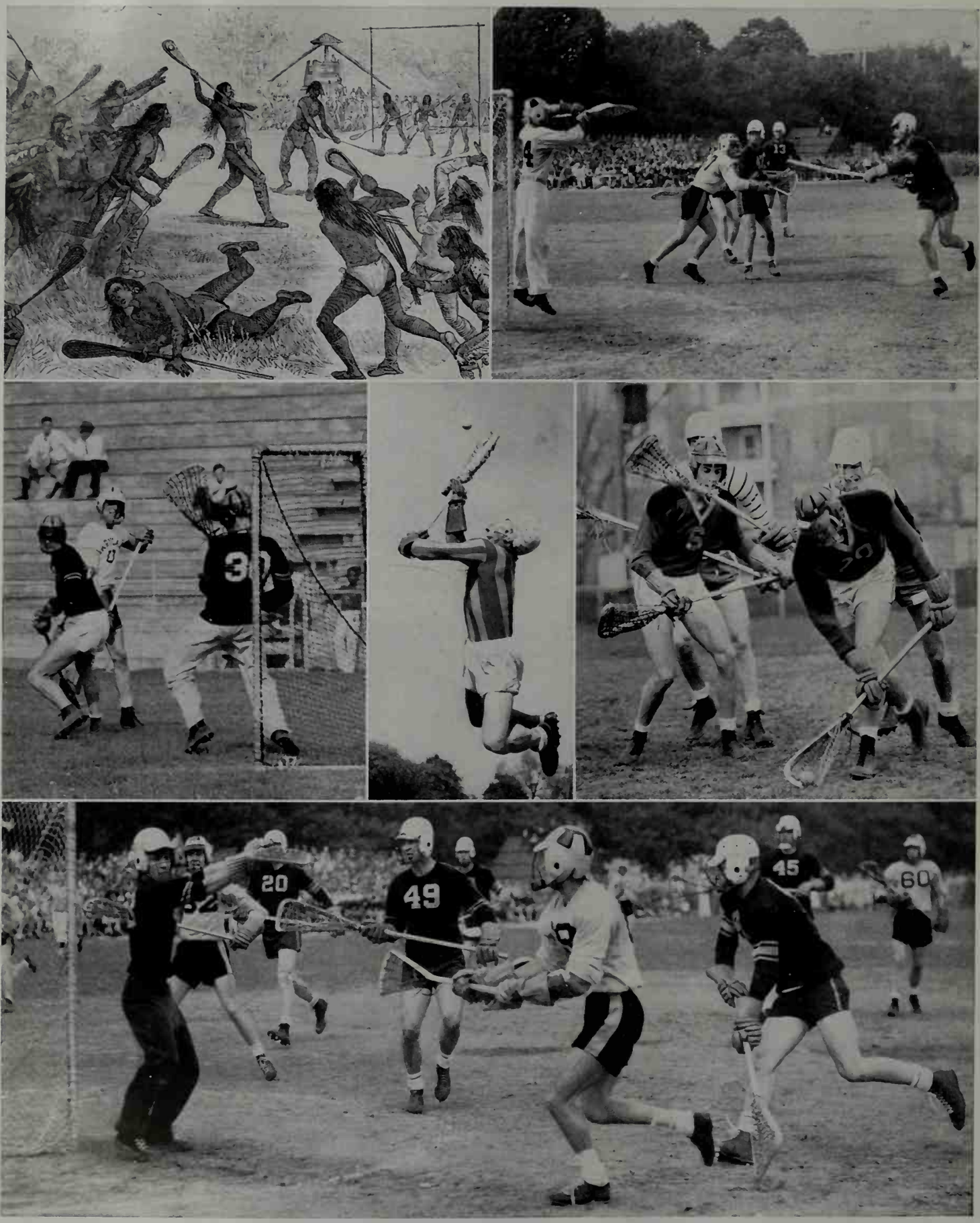


Japanese writing box and cover with ink stone and water container. Early 19th century

ORIENTAL LACQUER WORK

BY COURTESY OF (TOP, BOTTOM LEFT) VICTORIA AND ALBERT MUSEUM, (CENTRE LEFT) THE NELSON GALLERY OF ART—ATKINS MUSEUM, KANSAS CITY; NELSON FUND, (CENTRE RIGHT) FROM "RAKURO-SAIKYOZUKA," (BOTTOM RIGHT) THE ART INSTITUTE OF CHICAGO, NICKERSON COLLECTION

LACROSSE



BY COURTESY OF (TOP RIGHT, BOTTOM) THE SUN PAPERS, BALTIMORE, MD., (CENTRE LEFT) UNIVERSITY OF MARYLAND, COLLEGE PARK, MD., (CENTRE) CARL ZEISS, INC., (CENTRE RIGHT) PENNSYLVANIA STATE COLLEGE, STATE COLLEGE, PA.; PHOTOGRAPHS, (TOP LEFT) BETTMANN ARCHIVE, (TOP RIGHT, BOTTOM) EDWARD NOLAN

INDIAN LACROSSE AND SOME PHOTOGRAPHS FROM U.S. COLLEGE GAMES

Top left: Engraving of a game played between the Caddo and Choctaw tribes

Top right: Action on the crease. The ball may be seen on the ground near the foot of the white-shirted defender

Centre left: Goalie attempting to make a save in front of the net

Centre: Catch of the ball in mid-air

Centre right: Attack man picking up the ball

Bottom: A score. The ball has eluded the goalie and has been driven deep into the net

other metallic powders was too often prevalent. A fiery brown tint of the *nashiji* is a certain mark of quite late date. Nevertheless, there is plenty of good work of the early 19th century, and to this period belongs the last of the great artists of the industry, Shibata Zeshin (1807–91), who was a pupil of Koma Kwansei. His work will bear comparison even with some of the greatest of his predecessors, both in technique and in design.

Modern industrial conditions, however, have practically killed this ancient and beautiful art. It would not have survived so long had not the country been closed to alien influences for two and a half centuries.

The applications of lacquer to various purposes were much more extended in Japan than in China. In addition to the medicine cases already described, and the use of lacquer for all sorts of domestic utensils (it is capable of resisting great heat and is impervious to acids) and for furniture such as sets of shelves, cabinets, screens, etc., the greatest skill of the craftsmen was applied, for instance, to sets of writing materials, including the writing box with its inkstone, waterpot and rack for brushes, a document box, and a low table or stand. Boxes of every kind, sake cups, trays and sword scabbards were made of lacquer of the best quality and decorated by the leading artists of the industry, while, on a large scale, lacquer was extensively employed in the decoration of temples and other architectural works. Many cabinets imported into western countries from the 17th century on, and often attributed to China, were products of Japan exported through the British, and after the closure of the country, the Dutch and Chinese settlements at Nagasaki, but the first organized display of Japanese lacquer in Europe was at the Paris exhibition of 1867.

(E. F. S.; X.)

EUROPEAN LACQUER

Although oriental objects of art were brought to Europe in considerable quantity during the 16th century, it was not until after 1600 that a real China trade grew up, fostered by the East India companies of Holland, England and France. Porcelain and lacquer work then became so fashionable that European craftsmen undertook to make their own. The secret of porcelain manufacture was discovered shortly after 1700, and by that time the imitation of lacquer had become established in various parts of Europe. Jesuit missionaries had co-operated with scientists and master craftsmen to create formulas, and a small body of writing had appeared, which was to be augmented in the 18th century—the golden age of European lacquer.

Among the earliest surviving examples of this art are the Chinese landscape wall paintings at the Rosenborg castle in Copenhagen (Simon Clause?, 1616) and the ballot box of the Saddlers' company at the Victoria and Albert museum in London, dated 1619. Information on the lacquer process seems first to have been published by the Jesuit Martino Martini (*Novus Atlas Sinensis,* 1655). John Stalker and George Parker's *Treatise of Japanning and Varnishing* (London, 1688) was the first text with pattern illustrations. The English term "Japanning" was inspired by the superiority of Japanese lacquer, which Stalker found ". . . in goodness of black and stateliness of draught . . . more rich, grave and Majestick" than the lacquer of other places, which came to be known as "Indian" or "Bantam" work.

In France, on the other hand, *ouvrage à la Chine* was the term for the imitation of lacquer practised at the Gobelins from 1672. By the end of the century Berlin had become another centre of experimentation, from which the Fleming Jacques Dagly brought secrets that were to lead to the innovations of the Martin brothers, Guillaume (d. 1749), Simon, Étienne, Julien and Robert (1706–65). They created the lustrous *vernis Martin,* which was praised by Voltaire; the production of it in 1748 became a *manufacture nationale.* The Martins decorated rooms at Versailles and Robert's son Jean Alexandre worked for Frederick II the Great at Potsdam. French lacquer was further improved through new information provided by the *Mémoire sur le vernis de Chine,* which the missionary Father Pierre d'Incarville wrote in 1760 and which appeared as an appendix to *L'art du peintre, doreur, vernisseur* of the Sieur Watin (1772), the most precise account of lacquer work that appeared in the 18th century.

In this book Watin examined the recipes of his predecessors and recommended the best formulas for lacquering objects to be used indoors, such as furniture, and outdoors, such as carriages. Although nothing could equal the excellence of oriental resins, he found sandarac from western juniper trees the best substitute. This, together with various gums dissolved in fluids of alcohol and turpentine and mixed with bitumens, produced the different varnishes Watin relied upon. His book gives detailed instruction in preparing the wood, covering it with cloth, varnishing this with from 8 to 20 coats, polishing the surface, drawing and painting the designs and making relief decorations. The best results of this process (*e.g.,* the commode attributed to René Dubois at the Wallace collection, London) were never as hard and brilliant as real oriental lacquer, but they provided an admirable substitute; on occasion it is not easy to distinguish them, especially when oriental designs were imitated.

The chief interest of European lacquer of the 18th century lies, however, in the fact that it was not a purely imitative art, as it had been at its beginning. Until 1720 European craftsmen sought to reproduce exactly the grave figures, the architectural settings, the stylized vegetable forms of the imported lacquers. Then in keeping with the playful spirit of the rococo, they modified these designs by introducing European figures, exotic animals like monkeys, draperies and arabesques, cartouches and ribbon compositions. Along with this transformation in place of the conventional black and gold of the oriental products, came a wide choice of background colours, including scarlet, yellow, white, blue and green, sometimes flecked with gold. In Venice particularly, where craftsmen followed the rules of Filippo Bonanni's treatise (1720), great originality was achieved by the informal spacing of bouquets of flowers around gracefully posed figures set against delicate hues of yellow and bluish green (furniture at Cà Rezzonico).

European lacquer reflects in the use to which it was put the changing tastes of the 17th and 18th centuries. In the late 17th century it was principally employed for decorating the cases of cabinets set upon carved baroque bases or for ornamenting leather wall coverings. In the 18th century bookcase desks, tall clocks and tea tables became the most fashionable articles of lacquered furniture in England and Germany, while in France and Italy the chest of drawers and corner cabinet were preferred. Whole sets of furniture with orientalizing lacquer decoration were made in England by Giles Grendey and the cabinetmakers of the Chippendale era (1750–65), some of whose masterpieces, like the Badminton and David Garrick furniture, can be seen at the Victoria and Albert museum. Small lacquered boxes called "Bois de Spa" became a specialty of that Belgian town and the nearby centres of Liège and Aachen, where a member of the Dagly family was active. Rooms with lacquered walls have survived at the palaces of Nymphenburg near Munich, Bamberg and other German cities. Lacquering of metal and paper, begun in the mid-18th century, flourished in England, France, Germany and Holland, and continued in the tole ware (Pontypool) and the papier-mâché of Victorian times.

(R. C. Sm.)

See also references under "Lacquer" in the Index.

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(E. F. S.; R. C. Sm.)

LACRETELLE, JEAN CHARLES DOMINIQUE DE, known as LACRETELLE LE JEUNE (1766–1855), French historian and journalist, a pioneer in the historical study of the French Revolution, was born at Metz on Sept. 3, 1766. He went to Paris in 1787 and, during the Revolution, belonged to the party of the *Feuillants.* He was for some time secretary to the duc de la Rochfoucauld-Liancourt, the celebrated philanthropist, and afterward joined the staff of the *Journal de Paris,* then managed by J. B. A. Suard. He enlisted in the army as a refuge from the personal danger in which his monarchist sympathies placed him, but after Thermidor he returned to Paris and journalism. He was involved in the royalist movement of 13 Vendémiaire and condemned to deportation after 18 Fructidor; powerful influences, however, arranged for him to remain conveniently forgotten in prison until, after 18 Brumaire, he was set at liberty by Joseph Fouché. During the empire he became professor of history in the *Faculté des lettres* (1809) of Paris and a member of the Académie Française (1811). In 1827 he was prime mover in the protest made by the Académie against the comte de Peyronnet's law on the press, which led to the failure of that measure, but this step cost him his post as *censeur royal.* Under Louis Philippe I he devoted himself entirely to his teaching and literary work. In 1848 he retired to Mâcon. He died there on March 26, 1855.

J. C. Lacretelle's chief work is a series of histories of the 18th century, the Revolution and its sequel: *Précis historique de la Révolution française,* appended to the history of Rabaut St. Étienne, five volumes (1801–06); *Histoire de France pendant le XVIIIe siècle,* six volumes (1808); *Histoire de l'Assemblée Constituante* (1821); *L'Assemblée Législative* (1824); *La Convention Nationale* (1824–25); *Histoire de France depuis la restauration* (1829–1835); *Histoire du consulat et de l'empire* (1846).

LACROIX, (FRANÇOIS ANTOINE) ALFRED (1863–1948), French mineralogist whose *Les Minéraux des Roches* (1888), written in collaboration with A. Michel-Lévy, was in the early days of microscopic petrography a pioneer study of the optical properties of rock-forming minerals. Born at Mâcon, on Feb. 4, 1863, Lacroix first studied pharmacy. In 1883, however, he went to Paris, where the influence of Alfred Des Cloizeaux, Ferdinand André Fouqué and Michel-Lévy soon led him to specialize in mineralogy. From 1893 until 1936 he was the successor of Des Cloizeaux as professor of mineralogy at the Muséum d'Histoire Naturelle in Paris. Lacroix's *Minéralogie de la France et de ses colonies,* five volumes (1893–1913) and later his *Minéralogie de Madagascar,* three volumes (1922–23) stand unique in the field of regional mineralogy for their wide scope and comprehensive treatment. In volcanology he contributed greatly to knowledge by his study of the eruption of Mt. Pelée in Martinique (1902) and by his investigations of the 1906 eruption of Vesuvius in Italy. He became *secrétaire perpétuel* of the Académie des Sciences in 1920, and later wrote many biographies of great value to the history of science. Lacroix died in Paris on March 12, 1948. (C. E. T.).

LA CROSSE, a city of southwestern Wisconsin, U.S., lying at the point where the Black and La Crosse rivers enter the Mississippi and where the bordering bluffs recede nearly three miles from the riverbank. It is the seat of La Crosse county. The town owes its character to its geographical situation. The flat prairie, a gathering place of Indians, about 1840 became the site of a trading post and settlement which was chartered as a city in 1856. A railroad reached it in 1858 through a natural break in the bluffs.

With its river port, the city became an important transportation and manufacturing centre. It depended upon lumbering for its early prosperity but by 1900 had developed diversified industry. It attracted immigrants from New England and from Europe, particularly Germany and Norway.

Viterbo college, a Roman Catholic liberal arts college for women, founded in 1931, and the Wisconsin State college, chartered in 1909, are located there.

For comparative population figures *see* table in WISCONSIN: *Population.* (R. F. F.)

LACROSSE. Lacrosse was the name given by the French settlers of Canada to the old Indian game of "baggataway" (because the implement used, the curved netted stick, resembled a bishop's crozier). It is the oldest organized sport in America. It was played by the Six Nations of the Iroquois throughout the territory of upper New York state and lower Ontario before Columbus landed in the new world in 1492. The Iroquois confederation adopted the sport as a training measure for war. It is still played by the Indians at many government reservations in the United States and Canada.

Lacrosse was taken up by white men about 1840. At one time it was the national summer sport of Canada and it is popular in the British Isles and Australia. In the United States, the game is played at schools, colleges and clubs in various places. Because of its great speed, the game is regarded as an excellent body conditioner.

The United States Intercollegiate Lacrosse association actively organized and promoted the game. Membership in the association was made unlimited, and most of the colleges playing the game are members. An all-American team is picked annually by the association from the member colleges participating in the sport. The Wingate trophy, emblematic of the college lacrosse championship, is awarded each year by the association to the outstanding team in intercollegiate competition.

International series have been held periodically with England since 1884, and competition has taken place frequently between the United States and Canada since 1885. For several years prior to the outbreak of World War II, all-American teams sponsored by the U.S. Intercollegiate Lacrosse association played a series of games each year with the champions of Canada or England. When it was no longer possible to hold international games because of World War II, the association sponsored an all-star north-south game, starting in 1940. These games, held each year in early June, became a traditional part of lacrosse and a popular feature in United States sports.

Women's lacrosse was started in England about 1900 and later was introduced in the United States by English women. In 1934 an all-English women's team played in the United States, and the following year a U.S. team visited the British Isles. In addition to England and Wales and the United States, the game is played by women in other countries such as Ireland, Australia, New Zealand, Canada, and the Republic of South Africa. The sport was organized by the United States Women's Lacrosse association in the U.S.

Implements of the Game and Players' Equipment.—The crosse is formed of a light staff of wood, usually hickory, the top

THE "CROSSE," MADE OF BENT HICKORY WOOD. THE NETWORK OVAL TRIANGLE SERVES FOR CATCHING, CARRYING OR THROWING THE BALL

being bent to form a kind of hook, from the tip of which a thong is drawn and made fast to the shaft, usually about two or three feet from the other end. The oval triangle thus formed is woven with a loose network of gut or rawhide. The length strings of this network are woven within two inches of their termination, so that the ball cannot catch in the meshes. The crosse should not be longer than 6 ft. nor shorter than 3½ ft. (except that of the goalkeeper, which may be of any length). The width must not exceed 12 in. nor be less than 7 in. Metal of any kind is not allowed upon the crosse, and the use of one in which the pocket of the mesh has been permitted to sag to a depth which could make it unreasonably difficult for an opponent to dislodge the ball is prohibited. The ball is made of sponge rubber, weighs 5 oz. to 5¼ oz. and measures from 7¾ in. to 8 in. in circumference.

The goals are set up 80 yd. from each other, the goal posts being six feet high and the same distance apart, joined at the top by a rigid crossbar. The posts are fitted with a pyramid shaped cord netting which is fastened at a point seven feet behind the goal, made so as to prevent passage of the ball put through from the front. The goals are set in the middle of the goal crease, a clearly marked circular area of nine-foot radius.

There are 15 yd. of clear space behind each goal. The width of the field is between 60 and 70 yd. The field boundaries are marked with white lines, as are the centre line and the lines marking the goal areas (*see* diagram).

Under British rules, which in general are followed by commonwealth countries and were adopted by U.S. women's lacrosse when the game was introduced by English women players, the crosse may be of any length; the ball weighs not less than $4\frac{1}{2}$ oz. and not more than 5 oz.; the goals are 90 to 110 yd. apart and there are no side or end lines, the goal creases ($8\frac{1}{2}$ ft. radius for women) and a centre circle ($7\frac{1}{2}$ yd. radius under English Lacrosse union rules, 10 yd. for women) being the only ground markings; and there are 12 players on a side. Under the rules of the Canadian Lacrosse association the number of players was reduced from 12 to 7 in 1932 (and to 6 in 1953); the size of the playing area was reduced from 125 yd. by 110 yd. to 200 ft. by 90 ft. (outdoors) and 160 ft. by 60 ft. (indoors—sometimes known as box lacrosse).

The players' equipment in addition to the crosse is designed to afford the maximum of protection but is very light because of the need for speed and agility. Shoes with rubber cleats are usually worn. Each player wears a helmet with a face guard to give sufficient protection to the face and head. Light pads are worn under the jersey to protect the shoulders and arms. The gloves are very similar to those used in ice hockey.

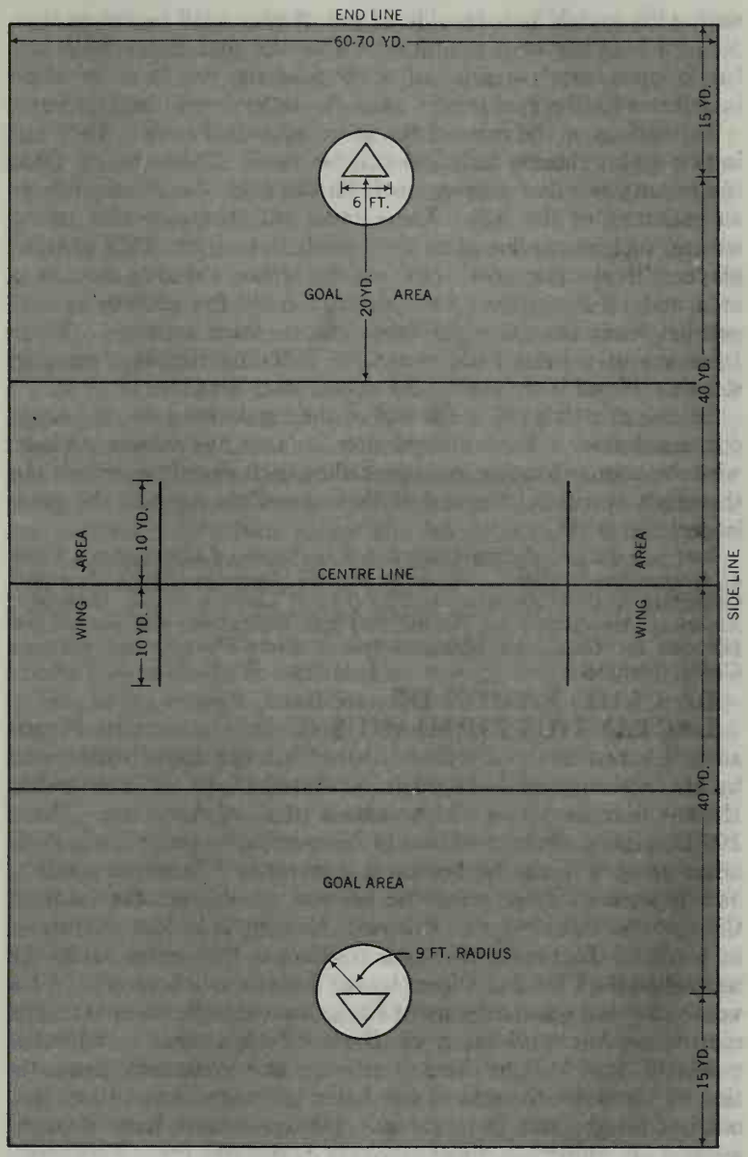
The Game.—The object of the game is to send the ball through the opponent's goal posts as many times as possible during the playing periods. While there are minor variations in the rules of the game in different countries, they are fundamentally similar to those prevailing in the United States. There are ten players on each side: a goalkeeper, three defense players, three midfield players and three attack players. They are designated as follows: goalkeeper; point; cover point; first defense; right wing; centre; left wing; first attack; inside home; and outside home. Games are officiated over by two officials, a referee and judge of play. One point is awarded a team for each goal scored.

The game is divided into four periods of 15 minutes each, with intervals of one minute between the first and second and the third and fourth periods and a ten-minute rest period between the second and third periods (half time). Play is started at the beginning of each quarter, and after each goal is scored, by facing at the centre of the field. This is done by placing the ball between the reverse surfaces of the crosses of the two centres, each with his back to his own goal, their crosses being held with the wood downward on the ground. At the referee's signal, the centres draw their crosses sharply apart in order to gain possession of the ball. When the ball is being faced at the centre of the field, each team must confine the goalkeeper and three other players in the defense goal area, three players in the attack goal area and one player in each of the wing areas. As soon as the referee's whistle sounds starting play, the players in the wing area are immediately released. However the defense and attack players cannot leave their area of confinement until (1) some player has possession of the ball; (2) the ball goes out of bounds; or (3) the ball crosses the line marking the defense goal area.

The game is extremely fast, since the ball can be passed and caught at terrific speed, and various kinds of plays are developed by a well-coached team, as in basketball and hockey. A good player must be adept in handling his crosse, an ability which requires considerable practice and skill. He must also be in good physical condition and be an alert "team" player.

Either team may request time out for a period not to exceed one minute, once during each period of the game, without penalty. Thereafter, unless the team calls time for the purpose of removing an injured player, the request is granted but a technical foul penalty is exacted. Requests for time out may be made by the captain only on a dead ball or when his team has possession of the ball in its attacking half of the field.

Substitution of players may be made during the match on the referee's whistle. It is also possible to substitute one man at a time while the game is in progress provided the exchange of players takes place at the center of the field and on the same side of the centre line. At all times during the game each team must



LACROSSE PLAYING FIELD

have at least three men on the attack, between the centre of the field and the boundary of the field behind the goal; and at least four players on the defense, between the centre of the field and the boundary behind its own goal. Any violation of this rule is known as an off-side play. The ball may be passed in any direction, forward, backward or sideways.

Although the ball may be thrown with the crosse a long distance (the entire length of the field by many players), long throws are seldom tried, it being generally more advantageous for a player to run with the ball in his crosse until he can pass it to a member of his side who is better placed to start an attack or to shoot at the goal. An opposing player may attempt to dislodge the ball by hitting the opponent's crosse with his own or by body checking. No player may interfere with another unless the latter has the ball, or is about to catch it, or is within 5 yd. of a loose ball.

A player in possession of the ball who steps on or over a boundary line loses the ball, and a free play is given to the player on the opposite side at the point where the first player stepped out. A free play means that the ball is given to the player in his crosse and play is started again at the referee's whistle. A free play is not made within 20 yd. of the goal, nor is the ball ever faced within this area. A ball crossing a boundary line (except on a shot) is given as a free play at the point where it crosses the line to a player on the side opposite that of the player who last touched it. A ball crossing a boundary line as a result of a shot is given to the player closest to the ball when it went out of bounds. No player is allowed to catch or throw the ball with other than his crosse. However, the goalkeeper may bat the ball with his gloved hand while protecting the goal. If any player loses his crosse

during the match he is considered out of play until he recovers it. No attacking player is permitted within the goal crease while the ball is in his team's attack half of the field, nor can he at any time interfere with the goal tender while the latter is within the crease.

Infractions of the rules of the game are called fouls. They fall in two major classes, technical and personal. For technical fouls the penalty is either suspension from the game for 30 seconds or an exchange of the ball. These fouls are generally of a minor nature, such as moving after the whistle, interfering with another player, illegal equipment, throwing the crosse, entering the crease area and off-side play. For personal fouls the penalty is suspension from the game for from one to three minutes. These fouls are of a more serious nature, including tripping, pushing, slashing, illegal body check and unnecessary roughness.

In case of a tie game at the end of the regulation periods, play is continued after a brief intermission for two five-minute periods, with the teams changing goals preceding each overtime period. In the event of a tie at the end of these overtime periods, the game is declared a tie.

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LA CRUZ, RAMON DE: *see* CRUZ, RAMON DE LA.

LACTANTIUS FIRMIANUS (LUCIUS CAECILIUS FIRMIANUS LACTANTIUS) (*c.* 250–*c.* 330), Christian Latin writer who by his Ciceronian style hoped to win intellectuals to Christianity. He was born in Africa and became a pupil of Arnobius. About 290 Diocletian summoned him to Nicomedia, to teach Latin rhetoric. In middle age he became a convert to Christianity and *c.* 317 he went to Trier, where he became, in old age, the tutor of Constantine I's eldest son, Crispus. Nothing is known of the end of his life. Lactantius writes a traditional Ciceronian style (he was called the Christian Cicero by the Renaissance humanists); his vocabulary is a queer mixture of Christian and Stoic elements. His most important surviving work, *Divinae institutiones* (written between 305 and 313), is the first attempt at a systematic presentation of Christian thought in the Latin language, but it lacks theological insight and discernment. His quotations from classical authors are numerous, those from the Scriptures few. Previously he had written *De opificio dei,* in which he follows Cicero and Varro, arguing that the human body in its admirable organization and beauty could only be created by the all-perfect God. Later (313) he wrote *De ira dei,* insisting, against Epicureans and Stoics, on God's care for man, which demands that he be moved to anger against those who do evil. His *Epitome* is an abridged new edition of the *Divinae institutiones.* The authenticity of *De mortibus persecutorum* is now generally admitted. It describes the divine anger against the persecutors of the church and their horrible deaths. The poem on the phoenix in elegiac couplets attributed to Lactantius by Gregory of Tours is of doubtful authenticity.

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LACTIC ACID (ALPHA HYDROXYPROPIONIC ACID, CH_3—CHOH—COOH) exists in nature in certain plant juices, in the blood and muscles of animals and in the soil. It is the commonest acidic constituent of fermented milk products such as sour milk, cheese and buttermilk. As such it has been of importance to man since prehistoric times; however, it was not isolated and identified as the principal acid of sour milk until 1780 by C. W. Scheele. In 1881 it was first made successfully on a commercial scale by C. E. Avery. The acid exists in three forms, the optically active dextrorotatory and levorotatory forms and the optically inactive racemic form. The distinction between these forms is of little interest commercially, since all three modifications are similar in their chemical and physical properties. As shown by its chemical structure, lactic acid has the properties of an alcohol as well as those of an acid. This chemical complexity and ease of reaction as an acid and as an alcohol makes difficult the obtaining of the pure substance. Lactic acid is readily dehydrated to the anhydride. It will react with itself to form the self-ester. Refined lactic acid of commerce is essentially a water solution of the acid and the anhydride. Pure racemic lactic acid was prepared by Krafft and Dyes in 1895 by distillation at a pressure of 0.5–1 mm. of mercury. Its boiling point at this pressure is 82°–86° C. It is a white crystalline solid that melts at 18° C. and rapidly absorbs water from the air to form the viscous solution. Pure lactic acid solutions are colourless, at most only faintly acidic in odour, and have the characteristic acid taste.

The acid can be isolated from sources of natural origin or it can be synthesized by the usual techniques of organic chemistry from acetaldehyde and carbon monoxide or hydrocyanic acid. It can be prepared by decomposing sugars with hot alkalies. All the commercial acid is prepared by the fermentation of inexpensive carbohydrate raw materials, such as sugar in the form of molasses, starch and milk whey, in the presence of alkaline materials, such as lime or calcium carbonate, which neutralize the acid as it forms. Such neutralization is required because the fermentation bacteria become inactive under acidic conditions. Starches are first converted to sugars by hydrolysis prior to fermentation. Starches from corn, potatoes, tapioca and various grains may be used.

The lactic acids of commerce are available as technical, edible and medicinal grades. The technical grades are the products obtained when fermentation liquors, from which the calcium has been precipitated with sulfuric acid and separated as the insoluble sulfate, are concentrated. These grades are available at 22%, 44% and 50% strength. They are generally amber-coloured liquids having a caramellike odour and are contaminated with unfermented sugar, dextrins, mineral salts and small amounts of volatile acids such as acetic.

The edible and medicinal grades of lactic acid are made from fermentation liquors by complicated purification processes. These processes may involve formation and successive crystallization of calcium lactate to yield the pure salt, from which pure dilute acid is obtained by treatment with sulfuric acid and decolorizing carbon. The pure dilute acid is concentrated to a strength between 50% and 85%, as required by the market. Because of more desirable crystallization properties, a similar process based on zinc lactate is preferred by some operators. In this process hydrogen sulfide is used to precipitate the zinc. Concentration and decolorization of the dilute acid are required. In another commercial method the extraction of lactic acid from the concentrated crude acid employs a different technique of purification wherein isopropyl ether, which is immiscible with crude acid or water, is used to extract lactic acid from the crude acid. Pure water is then used to extract the lactic acid from the separated, ether phase. This process is operated continuously. It yields a high-quality acid. Concentration and treatment for colour removal are required as in the other processes. Esterification processes are also utilized as a means of obtaining pure lactic acid from the crude fermentation products. In these processes alcohols are made to react with the lactic acid to yield the volatile esters which are distilled from the crude residues. These volatile esters are then decomposed by heating with water or dilute sulfuric acid to yield lactic acid and the corresponding alcohol, which is recovered for reuse.

If sulfuric acid is used in the decomposition (hydrolysis) it must be removed. The removal requires a treatment with calcium hydroxide or barium hydroxide; the calcium or barium sulfate thus formed then separates as the insoluble solid. The resulting pure lactic acid requires concentration to the required strength.

High-quality lactic acid of medicinal grade is produced by an esterification process or by distillation of pure, relatively low-strength acid under reduced pressure.

Lactic acid is used in the tanning industry for controlling the acidity of vegetable tanning liquors, for deliming hides and as a

plumping and drenching agent. It is used in the acid dyeing and printing of wool and as a flavouring agent and preservative in processed cheese, salad dressing, pickles, olives and carbonated beverages. Other uses include the preparation of lactates, organic solvents, pharmaceuticals and cosmetics, the softening of waters used in brewing and other processes, and fermentation control in the drying of egg white and in the purification and processing of gelatins and pectin from apple pomace. For some needs lactic acid may be used alternately with other acids such as tartaric, citric and hydroxyacetic. It has been used to produce plastics and synthetic elastomers by conversion to the acrylates and subsequent polymerization of the latter. These uses, largely experimental, illustrate the versatility of the material. It is used as a catalyst and acidifying agent in some processes of manufacturing synthetic resins of the phenol-formaldehyde type.

Lactic acid is a common and widely used product, but the total volume consumed is relatively small in comparison with some organic acids such as formic and acetic. *See* also references under "Lactic Acid" in the Index. (C. A. R.)

LACTONES, in chemistry, are cyclic esters formed by the condensation of an alcohol and an acid with the loss of water from hydroxy acids, or of hydrogen halides from halogenated acids. The γ- and δ-hydroxy acids frequently lose water spontaneously, even in aqueous solution, to form the corresponding γ- and δ-lactones with five- and six-membered rings, respectively; γ- and δ-halogenated acids usually lose a molecule of hydrogen halide on being heated, with formation of the same γ- and δ-lactones as before. Some β-lactones, with four-membered rings, have been made by the action of silver nitrate upon the sodium salts of β-iodoacids. Lactones with from 7 to 24 atoms in the ring have been prepared by slow distillation of the corresponding hydroxy acids under greatly reduced pressure, or by heating very dilute solutions of the hydroxy acids with benzene sulfonic acid. In the presence of water, lactones are hydrolyzed partially or completely to the hydroxy acids from which they are derived.

In alkaline solution, the hydrolysis is more rapid and goes to completion with formation of the salts of the acids. Lactones with six or more atoms in the ring tend to polymerize spontaneously, or on heating.

The simplest lactones are liquids that are soluble in water, alcohol and ether. γ-Butyrolactone, $CH_2.CH_2.CH_2.C(=O)-O$, is a colourless liquid boiling at 206° C. and volatile with steam. (G. W. Wd.)

LA CUEVA, JUAN DE: *see* Cueva, Juan de la.

LACY, FRANZ MORITZ, Graf von (1725–1801), Austrian field marshal in the service of Maria Theresa and her successors, was born at St. Petersburg, Russia, on Oct. 21, 1725. His father, who was of Irish extraction, followed the fortunes of the exiled James II and served as a Russian officer. The son was educated in Germany and entered the Austrian service in 1743. During the War of the Austrian Succession he served in Italy, Bohemia, Silesia and the Low Countries, and was twice wounded. During the early part of the Seven Years' War he rose rapidly in rank and esteem and sustained three further wounds. He was made a field marshal in 1765 and as president of the supreme army council (1766–73) was given the task of remodeling the Austrian army, which he did extremely well. In the War of the Bavarian Succession (1778–79) Lacy and Laudon were the chief Austrian commanders against Prussia, and when Joseph II came to the throne Lacy became his most trusted associate. In the Turkish war of 1787–91 he was not very successful and had to hand over the command to his rival Laudon. In his youth Lacy was an enterprising and courageous field commander; but he became prematurely aged, possibly as a result of being wounded so many times, although remaining a fine military administrator and organizer. His last years were spent at the castle of Neuwaldegg, near Vienna. He died in Vienna on Nov. 24, 1801.

See O. Regele, *Der österreichische Hofkriegsrat* (1949). (C. N. B.)

LACYDES (d. 216/215 B.C.), Greek philosopher, a native of Cyrene, was the successor of Arcesilaus as head of the Greek Academy (*see* Academy, Greek). The few of his opinions now known—for example his emphasis on the undependability of memory—are so similar to those of his predecessor (*see* Arcesilaus) that it is not clear why some ancient writers said that he gave a new turn to the doctrines of the Academy. He is the hero of a witty story in which his slaves force him to admit that his skepticism makes sense in school discussions only and does not work in life. Euander and Telecles succeeded him. (Pp. M.)

LADAKH (Ladak; Ladag), also known to educated Tibetans as Mangyal, Nearis and Maryul, a valley of the upper Indus and a range at the northwestern end of the Himalayas that give their name to the large eastern district of Kashmir, now known as the Frontier District of Ladakh in Jammu and Kashmir state, and to one of its *tehsils* (subdivisions). Before the cease-fire agreement between India and Pakistan, effective from Jan. 1949, the district, then known as the Ladakh and Baltistan *wazarat,* included as its northwestern part Baltistan, or little Tibet, and had three *tehsils* (Ladakh, Kargil and Skardu). The eastern end of the cease-fire line crossed the Ladakh valley and bisected the Ladakh range. This left Baltistan to the north and Leh, the district capital, with southern Ladakh including the whole of Leh *tehsil* and most of Kargil, on the Indian-controlled side.

Ladakh is one of the most elevated regions of the world. Its natural features may be explained by reference to two local terms, under one or the other of which every part of it is included: *changtang,* "northern" or "high plain," where the amount of level ground is considerable; and *rong,* "deep valley," where the contrary conditions prevail. The high plain predominates in the east, diminishing gradually westward. In the southeast of Ladakh lies Rupshu, a country of great brackish lakes and with a uniform height of about 13,500 ft. Cultivation there is difficult but a little beardless barley is raised; the small population consists mainly of nomadic shepherds. To the northwest of Rupshu, Zaskar (mostly Kargil *tehsil*) is drained by the Zaskar river which, flowing northward, joins the Indus below Leh. Zaskar is a bleak, inaccessible region where the people and the cattle remain indoors for half the year. In Ladakh proper, farther to the north, cultivation by means of manuring and irrigation ranges from 9,000 to 15,000 ft. The people are divided into shepherds, or *champas,* who follow pastoral pursuits on the upland valleys too high for cultivation, and the Ladakhis who till the land around the valley villages. Leh is an important trade centre and lies 160 mi. E. of Srinagar. The road to Leh from Srinagar (482 mi.) ascends the lovely Sind valley to the sources of the river at the Zoji La pass (11,578 ft.) in the Zaskar range. The Zoji La, which curves from the head of the Sind valley on to the bleak uplands of Dras (where lies the road to the trough of the Indus and Leh), is, despite its altitude, a pass on which little snow lies. From the Zoji La the road continues by easy gradients, following the line of the Dras drainage to the Indus, when it turns up the valley to Leh.

The climate is dry and healthy and the atmosphere of the Indus valley is remarkably clear. There is generally a difference of more than 16° C. (60° F.) between the reading of an exposed sun thermometer *in vacuo* and the air temperature in the shade. At Leh the mean maximum temperature for July, the hottest month, is 24° C. (76° F.) and the mean minimum for January, the coldest month, is −13° C. (8° F.). Average annual precipitation is 3.3 in. In January and February the air is generally calm. Fine dry, flaked snow is frequent and sometimes the fall is heavy.

Vegetation is confined to valleys and sheltered spots, where a stunted growth of tamarisk and *Myricaria, Hippophae* and *Elaeagnus,* furze and the roots of *burtsi,* a salsolaceous plant, supply the traveler with much-needed firewood. The trees are the pencil cedar (*Juniperus excelsa*), the poplar and willow (both extensively planted, the latter sometimes wild), apple, mulberry, apricot and walnut. Irrigation is skilfully managed, the principal products being wheat, a beardless variety of barley called *grim,* millet, buckwheat, peas, beans and turnips. Lucerne and *prangos* (an umbelliferous plant) are used as fodder. The only manufacture is that of woolen cloth, known as pattu and pashmina.

Among domestic animals are the well-known shawl goat, two kinds of sheep, of which the larger (*huniya*) is used for carrying

burdens and is a principal source of wealth, the yak and the *dso,* a valuable hybrid between the yak and common cow. Among wild animals are the kiang or wild ass, ibex, several kinds of wild sheep, antelope (*Pantholops*), marmot, hare and other Tibetan animals.

Baltistan lies in the midst of great mountain ranges with several peaks of more than 20,000 ft. and many large glaciers. The prevailing formation is gneiss. The Ladakh range divides the Indus valley (there 4 to 8 mi. wide) from that of its northern branch, the Shyok, which, with its fertile tributary valley of the Nubra, is again bounded on the north by the Karakoram range, which includes K2 or Mt. Godwin Austen (28,250 ft.), the second highest peak of the world. In the north is the 35-mi.-long Baltoro glacier, the largest outside the arctic regions. The Indus, as in lower Ladakh, runs in a narrow gorge, widening for nearly 20 mi. after receiving the Shyok. The proportion of arable and pasture land to barren rock and gravel is very small and the population is too large for the cultivated area. The climate is very severe and most of the rivers are frozen in winter, forming natural roads easier than the rough tracks on their banks. In July and August near the Indus, especially in the sandy plains of Skardu, the capital of Baltistan, and in the Rondu gorge farther west, the heat is intense with a mean maximum of 88° F. in July and a mean minimum of 16° F. in January at Skardu. Average annual precipitation is 6.3 in.

Skardu (pop. [1941] 2,537), a scattered collection of houses, is perched on a rock 7,250 ft. above sea level. There are a school, a hospital and a small airport 9 mi. distant. The population of the district, according to the 1961 census, was 88,651; the area in 1941 was 4,576 sq.mi. About one-fifth of the population in Ladakh proper is Buddhist while the Baltis are Muslims. The monasteries (*gompa*) play an important part in the life of the Ladakhis; almost every village has a monastery in which there are two head lamas, one attending to spiritual and the other (known as *nupa*) to temporal matters.

History.—The earliest notice of Ladakh is by the Chinese pilgrim Fa-hsien, A.D. 400, who, traveling in search of a purer faith, found Buddhism flourishing there. Ladakh formed part of the Tibetan empire until its disruption in the 10th century, and from that time continued to be ecclesiastically subject, and sometimes tributary, to Lhasa. Its inaccessibility saved it from any Muslim invasion until 1531, when Sultan Said of Kashgar marched an army across the Karakoram range, one division fighting its way into Kashmir and wintering there. Next year they invaded eastern Tibet, where nearly all perished from the effects of the climate.

Ladakh proper was invaded early in the 17th century by its Muslim neighbours of Baltistan, who plundered and destroyed the temples and monasteries, and again in 1685–88 by the Sokpa, who were expelled only by the aid of the lieutenant of Aurangzeb in Kashmir, Ladakh thereafter becoming tributary. The *gyalpo,* or king, then made a nominal profession of Islam and allowed a mosque to be founded at Leh, and the Kashmiris ever afterward addressed his successors by a Muslim title. When the Sikhs took Kashmir, however, Ladakh was conquered and annexed in 1834–41 by Gulab Singh of Jammu, the unwarlike Ladakhis being no match for the Dogra troops who then turned their arms successfully against the Baltis (in the 18th century subject to the Moguls) and were tempted to revive the claims of Ladakh to the Tibetan provinces of Rudok and Ngari. This brought down an army from Lhasa, and after a three-day fight the Indian force was almost annihilated, chiefly indeed by frostbite and other sufferings, for the battle was fought in midwinter, 15,000 ft. above the sea. The Chinese then marched on Leh but were soon driven out again, and peace was finally made on the basis of the old frontier.

After the partition of the Indian subcontinent in Aug. 1947, Ladakh, as a district of Jammu and Kashmir, became involved in the dispute between India and Pakistan when both countries claimed that state as part of their territory. In Oct. 1947 tribesmen from the northwest frontier of Pakistan advanced from the north and Indian air-borne troops were flown in to halt their advance. In the same month the Hindu ruler of Kashmir announced that his state, although predominantly Muslim in population, would accede to the Indian union. The dispute was referred to the United Nations and a cease-fire came into operation on Jan. 1, 1949. The rival forces halted on a cease-fire line which divided the state into two parts, the greater part of Ladakh district falling to the share of India. Subsequently all efforts at a permanent settlement failed and in the early 1960s the cease-fire line was still effective.

In 1959 it was announced that Chinese forces had occupied a sector of southeast Ladakh and had built a road across it. In the following years all Indian protests were rejected by the Chinese, who claimed the territory as their own. In 1963 Pakistan and China signed an agreement on the demarcation of their boundary. Pakistan gained 750 sq.mi., consisting of Oprang valley and the salt-mining areas above the Darwaza Darbar to the east of Shimshal pass. *See* also JAMMU AND KASHMIR. (K. S. AD.)

LADD, GEORGE TRUMBULL (1842–1921), U.S. philosopher and experimental psychologist, one of those responsible for making psychology a study of empirical phenomena, rather than a philosophy of "mind," was born in Painesville, O., on Jan. 19, 1842. He graduated from Western Reserve college in 1864 and from Andover theological seminary in 1869; preached for a decade in Ohio and Milwaukee, Wis.; was professor of philosophy at Bowdoin college, Brunswick, Me., in 1879–81 and Clark professor of metaphysics and moral philosophy at Yale university, New Haven, Conn., from 1881 till 1901, when he took charge of the graduate department of philosophy and psychology. He retired in 1905 and died in New Haven on Aug. 8, 1921.

Ladd was much influenced by R. H. Lotze, whose *Outlines of Philosophy* he translated (1877), and was one of the first to introduce (1879) the study of experimental psychology into the U.S., the Yale psychological laboratory being founded by him. He was the author of books on religion, education and the orient, as well as of numerous important works on psychology and philosophy, including *Elements of Physiological Psychology* (1887; new ed. with R. S. Woodworth, 1911); *Psychology, Descriptive and Explanatory* (1894); *Philosophy of Knowledge* (1897); *Philosophy of Religion* (1905); and *The Secret of Personality* (1918).

LADIN: *see* RAETO-ROMANCE DIALECTS.

LADING, BILL OF: *see* AFFREIGHTMENT.

LADISLAS, a name, adapted from the medieval Latin and German form Ladislaus, commonly used as an English form of the Magyar name László, borne by five kings of Hungary (*see* LÁSZLÓ). It was because of the Hungarian connections of the Angevins of Naples that the Neapolitan king Ladislas got the name (Italian Ladislao). The Czech form, Ladislav, was used by László V of Hungary in his capacity as king of Bohemia. Not to be confused with the name is the Polish Wladyslaw, in origin quite distinct. Thus Wladyslaw III of Poland, in his capacity as king of Hungary, was called Ulászló I (not László). The Czech name Vladislav (etymologically identical with Wladyslaw) was likewise magyarized as Ulászló when the fourth Vladislav to rule Bohemia (Vladislav II as king) became Ulászló II of Hungary.

LADISLAS (1377–1414), king of Naples from 1386 to 1414, was born in Naples, the son of King Charles III (*q.v.*), of the Durazzo branch of the Angevin dynasty. When his father was killed in Hungary (1386), Ladislas became king in Naples under the regency of his mother, Margaret of Durazzo; but in 1387 partisans of the pretender Louis II (*see* LOUIS, kings of Naples) expelled her from the capital. Taking Ladislas to Gaeta, she there withstood the combined hostility of Louis II's Neapolitan faction, the French king Charles VI, the antipope Clement VII and even the rightful pope, Urban VI. In 1390, however, Urban's successor Boniface IX had Ladislas crowned king of Naples at Gaeta; subsequently Charles VI withdrew his support from Louis; and at last, in 1399, having reduced the baronial opposition by force or by treaty, Ladislas could expel Louis from Naples.

Thenceforward Ladislas devoted all his audacity to enhancing his power. His marriage to Mary of Lusignan, daughter of James I of Cyprus, seemed to foreshadow a revival of his ancestor Charles I's schemes for Neapolitan expansion in the Levant (she died, however, in 1404); and in pursuance of his father's Hungarian ambitions he invaded Dalmatia and had himself crowned king of Hungary at Zara (Zadar) in Aug. 1403. He was engaged in a

campaign to break the power of the great feudatories in the kingdom of Naples when Boniface IX died in 1404. Then strife in Rome and the intrigues of the antipope Benedict XIII (who favoured Louis II), to get himself recognized there, led the new pope, Innocent VII, to welcome Ladislas as the restorer of order. Occupying Rome with a strong force, Ladislas was nominated "defender" of the Church and governor of the Campagna and the Marittima by the pope. Resuming his campaign against the feudatories, he subdued the house of Sanseverino and smartly made himself master of Taranto in 1407 by marrying Marie d'Enghien, widow of the prince, Raimondo del Balzo-Orsini, who had died a rebel against him.

Soon, however, it appeared that the papal schism might end if Gregory XII (Innocent VII's successor) and Benedict XIII both abdicated; but this might have enabled Louis II to resume his attempt on Naples. To prevent this, Ladislas occupied Rome, Latium and Umbria in spring 1408; and when the Council of Pisa deposed Gregory and Benedict and elected Alexander V instead (1409), Ladislas upheld Gregory and gave him shelter at Gaeta. The army of a league comprising Florence, Siena, the council's legate Baldassare Cossa—soon to be Alexander's successor as John XXIII—and Louis II then advanced against Ladislas. Louis entered Rome with John XXIII in April 1411 and defeated Ladislas at Roccasecca on May 19 but failed to subdue the kingdom of Naples, so that Ladislas had time to reorganize his forces, make peace with Florence and win the *condottiere* Muzio Attendolo Sforza over to his side. John, abandoning Louis, then came to terms with Ladislas, granting him the possession of several cities, large sums of money and the office of gonfalonier of the Church. In return Ladislas disavowed Gregory (1412).

When John XXIII and Sigismund of Luxembourg, rival of Ladislas for Hungary and newly elected German king, seemed to be planning a general council to end the schism, Ladislas saw his position in central Italy threatened again. He then entered Rome, sacked the city this time (June 1413) and advanced on Bologna to prevent John, who had taken refuge there, from joining the council summoned to meet at Constance. Florence and Siena were preparing to bar the king's way, but he made terms with them (envisaging a reconciliation with John) in anticipation of a move by Sigismund into Italy. On the point of making himself supreme in the papal state, Ladislas fell ill at Narni. Taken back to Naples, he died there on Aug. 6, 1414. His sister Joan II (*q.v.*) succeeded him.

See A. Cutolo, *Re Ladislao d'Angiò-Durazzo,* 2 vol. (1936).

(E. Po.)

LADO ENCLAVE, a former region west of the upper Nile river in Africa, reaching southward to Lake Albert, that was at one time leased to the Belgian Congo. Its area of about 15,000 sq.mi. covered parts of the present Equatoria province of the Republic of the Sudan and of Uganda's Northern province. A little north of latitude 5° N. in Equatoria lies Jabal Lado (3,301 ft.), 12 mi. W. of the Nile. It is the first hill seen from the Nile during the ascent of about 1,050 mi. from Khartoum, and gave its name to the region, the northern part of which was first visited by Europeans in 1839–42. Lado and Gondokoro, a few miles upstream on the opposite bank, became stations of the Khartoum ivory and slave traders and the region was overrun by slave raiders. Not until 1871, when Sir Samuel White Baker reached Gondokoro as governor of the equatorial provinces, was control of the slave traders attempted. Succeeding governors were Gen. C. G. Gordon and Mehmed Emin Pasha, who had their headquarters at Lado. During the Mahdist rebellion Belgian forces of the Congo Free State reached the Nile valley. Great Britain by virtue of its position in Uganda claimed the upper Nile region and in 1894 granted to Leopold II, as sovereign of the Free State, a lease of large areas west of the upper Nile, including Bahr el Ghazal and Fashoda (present Kodok). Under French pressure, however, Leopold agreed to occupy only the area east of 30° E. and south of 5° 30′ N.; in this way the actual limits of the enclave were fixed. After the French withdrawal from Fashoda, Leopold in 1899 unsuccessfully revived his claim to the whole area. The lease was annulled by a new agreement made with Great Britain in 1906. By this Leopold retained the enclave and it was handed over to the Anglo-Egyptian Sudan in 1910, six months after Leopold's reign ended.

LADOGA, LAKE (Russian LADOZHSKOYE OZERO, Finnish LAATOKKA), the second largest lake of the U.S.S.R., covering 7,000 sq.mi., lies northeast of Leningrad and the head of the Gulf of Finland, from which it is separated by the Karelian isthmus. After 1917 the northern and western shores were in Finland, but these areas were ceded to the U.S.S.R. in March 1940 after the "Winter War" (*see* FINLAND: *History*) and again by the 1945 peace treaty. The lake shores now are divided between Leningrad *oblast* and the Karelian Autonomous Soviet Socialist Republic. The lake surface is 16½ ft. above the level of the Gulf of Finland, into which it drains by way of the Neva river. Of the rivers flowing into the lake the most important are the Svir, flowing from Lake Onega, and the Volkhov, flowing out of Lake Ilmen. The general outline of Ladoga is rectangular, with the greatest length (124 mi.) orientated northwest-southeast. The maximum width is 77 mi.

Lake Ladoga occupies a broad depression, cut in ancient crystalline rocks in the north and Paleozoic sedimentaries in the south. The northern end is much deeper, reaching a maximum of 738 ft. The northern shore is rocky and greatly indented, with numerous small islands or skerries (over four-fifths of the 500 islands in the lake). There are two other large archipelagoes, the Valaam (Valamo) group of over 50 islands and the Mantsinsari group of about 40. On Valaam Island is a famous Russian Orthodox monastery founded in 992; the monks left in 1940. The southern shores, of recent submergence, are low and swampy. In late glacial times the lake formed part of the marine transgression which linked the Baltic and White seas, and some of the 80 species of fish found there are relict marine species. Another relict is the Ladoga seal.

The lake is subject to frequent severe storms, which act with particular violence on the southern coast, piling up the level of the water and even reversing the current of the Volkhov for as much as 12 mi. As early as 1719–31 Peter the Great cut a canal along the southern shore to protect shipping. In 1861–66 a second, larger canal was cut, parallel to the first. The ice regime is complex. The shallower southern end freezes first, the northern end remains ice-free until January; the centre usually freezes only in the most severe winters. The breakup occurs in late April in the south and a fortnight later in the north. During the siege of Leningrad in World War II supplies were brought into the city across the ice of Lake Ladoga. Water temperatures in summer below 100 ft. do not rise above 4° C. (40° F.), but the surface heats up greatly to about 16° C. (60° F.) in the north and 23°–25° C. (75–76° F.) along the southern shore.

The chief towns are Priozersk and Sortavala on its northern shores, and Petrokrepost and Novaya Ladoga on its southern.

(R. A. F.)

LADYBIRD BEETLE (LADY BEETLE, LADYBUG), the popular name given to the common beetles of the family Coccinellidae. They are small, usually less than one-quarter inch long, oval and convex insects, usually brightly coloured and often marked with black. (Some leaf beetles are similar but usually more elongate, less compact or with the colouring somewhat paler and indistinct.) The ladybirds also have three visible segments in the tarsus (lower part of the leg), whereas the leaf beetles have four. Most of the ladybird beetles are predaceous, both as adults and larvae, feeding on soft-bodied insects, many of which are plant pests, such as aphids. The adults are slow fliers, but they sometimes migrate considerable distances to hibernate by the thousands during the winter. The larvae are elongate, soft-bodied and spiny or tuberculose. They also are brightly coloured and spotted. They usually occur near

NORDISK FROM PICTORIAL PARADE

LADYBIRD BEETLE FEEDING ON APHIDS

aphid colonies but are often seen crawling on walks and buildings.

During serious outbreaks of aphids or scale insects, ladybirds in large numbers are sometimes imported or reared and liberated in the infested areas. They have often served as an effective means of biologic control, as when an Australian ladybird (*Rodolia cardinalis*) brought under control the cottony-cushion or fluted scale (*Icerya purchasi*) that was threatening to destroy the citrus trees of southern California. Only species of the genus *Epilachna* become pests, feeding on beans and squash, and are often very destructive. *See* BEETLE; INSECT. (R. E. BL.)

LADY CHAPEL, a chapel attached to a large church and dedicated to the Blessed Virgin. As the development of the chevet (*q.v.*), or system of radiating chapels, progressed during the 12th and 13th centuries, it became customary to give the one dedicated to the Blessed Virgin the most important position, directly behind the high altar of the church. It was frequently made larger than the others. No standard usage in building Lady chapels ever developed, however. In some French cathedrals they were emphasized (*e.g.*, Reims; Le Mans; Amiens), while in others no difference was made between them and other chapels (Notre Dame, Paris; Bourges). In England, where the common plan of a square east end lent itself to the elaboration of the Lady chapel, it was more consistently emphasized, but there was considerable variation in location. In Spain and Italy the finest Lady chapels date from Renaissance times. (AN. G.)

LADY'S-MANTLE (*Alchemilla*), a genus of herbaceous plants of the rose family (Rosaceae; *q.v.*). The plants are mostly natives of temperate regions. The flowers are small and numerous, with an eight-cleft calyx and no corolla. The leaves—from which the name, meaning mantle of Our Lady, is derived—are large, serrated and many lobed. The common lady's-mantle (*A. vulgaris*), which bears greenish-yellow flowers, is the most abundant; it grows in pastures throughout Europe and the British Isles. The field lady's-mantle (*A. arvensis*) is widely naturalized in North America from Nova Scotia to California; *A. vulgaris* has become sparingly established near the coast from Nova Scotia to Labrador. The Alpine lady's-mantle (*A. alpina*), which forms a dense, low-growing mat, is often cultivated in the rock garden.

LADYSMITH, one of the chief towns of Natal province, Republic of South Africa, lies at an altitude of 3,284 ft. on the Klip river, 203 mi. N.W. of Durban by rail (160 mi. by road). Pop. (1960) 22,955, including 7,296 Europeans. Ladysmith is ringed by low hills and has a dry and bracing climate; even the hottest season is tempered by cool breezes from the Drakensberg range, which rises to 10,000 ft. about 30 mi. westward. The town is an important rail junction and has a large marshaling yard. Stock breeding and dairy farming are carried on in the surrounding country and kafir corn, maize, soybeans, vegetables and fruit are grown. Ladysmith is a market and distribution centre and has factories for cotton spinning, weaving, dyeing, the manufacture of clothing, butter and cheese, heavy castings, mica and insulation products, and a frozen-fish distributing depot. The Natal coal fields lie 14 mi. N.E.

Ladysmith was founded in 1850 and named after the wife of Sir Harry Smith, then governor of Cape colony. The town is best remembered for the prominent role it played in the South African War when besieged by the Boers for four months (Nov. 1, 1899, to Feb. 28, 1900). The church contains stained glass windows and tablets commemorating the 3,000 men who died in the defense. *See* also SOUTH AFRICAN WAR: *The Course of the War.* (W. D. MACK.)

JOHN H. GERARD

YELLOW LADY'S-SLIPPER (CYPRIPEDIUM)

LADY'S-SLIPPER, the common name of the plants of the botanical genus *Cypripedium*, belonging to the orchid family (Orchidaceae). The genus comprises about 50 species, native to north temperate and tropical regions of Europe, Asia and the Americas. They are leafy-stemmed herbs, usually ½ to 2½ ft. high, with broad, many-veined leaves and extremely showy flowers. The lower petal is developed into a large, inflated, slipperlike sac. Lady's-slippers are found in cool bogs, on sandy plains and moist grasslands, preferring neutral to acid, rich, moist soil and partial to full sun. They are difficult to transplant from their habitat to the garden, and are best purchased from a wild-flower nursery where they have been conditioned for cultivation in borders and rock and wild-flower gardens.

LADY'S-TRESSES (*Spiranthes autumnalis*), a plant of the orchid (*q.v.*) family, found in pastures and on hillsides in Europe, the British Isles and north Africa. The white, scented flowers appear in August and are succeeded by a rosette of oval leaves. Below ground are several tubers. An allied species, the hooded lady's-tresses (*S. romanzoffiana*), which inhabits North America and the Kamchatka peninsula of the U.S.S.R., occurs also at Bantry bay in Ireland. Several other species occur in the eastern and southern United States and Canada, and one on the Pacific coast.

LAELIAN (ULPIUS CORNELIUS LAELIANUS), rival Roman emperor A.D. 268, rebelled against Postumus, emperor in Gaul, at Moguntiacum (Mainz) with the support of the 30th legion (*legio XXX Ulpia Victrix*), which he probably then commanded. Postumus was killed, but Laelian was soon afterward subdued by Postumus' colleague Victorinus. (JN. R. M.)

LAELIUS, the name of a Roman plebeian family. The chief members were: GAIUS LAELIUS (*d.* after 160 B.C.), a *novus homo* or "new man" who owed his political advancement to his friend P. Cornelius Scipio Africanus, whom he accompanied on his Spanish campaign (210–206 B.C.). In Scipio's consulship (205), Laelius went with him to Sicily; he then shared in his African campaign (204–202). In 203 he defeated the Numidian prince Syphax who had joined the Carthaginians, and at Zama (202) he was in command of the cavalry. In 197 he was plebeian aedile and in 196 praetor in Sicily. He was consul in 190 with L. Scipio and lived until 160 when he met Polybius, to whom he supplied information about Scipio Africanus.

GAIUS LAELIUS (surnamed SAPIENS), son of the preceding, is known chiefly as the friend of P. Cornelius Scipio Aemilianus and as one of the speakers in Cicero's *De senectute, De amicitia* (or *Laelius*) and *De republica.* He was surnamed *Sapiens,* probably from his scholarly and Stoic interests or, less probably, because he withdrew an agrarian bill when he saw that it was likely to cause disturbances. He and Scipio thus recognized the need for reform but were unwilling to antagonize the *optimates* (the senatorial aristocracy) in trying to achieve it. In 147 he accompanied Scipio to Africa and distinguished himself in the capture of the military harbour of Carthage. In 145 he was praetor and served in Spain and in 140 he was consul. Later he helped in prosecuting the supporters of Tiberius Sempronius Gracchus and in 131 opposed Carbo's bill to legalize the re-election of tribunes. A member of the "Scipionic circle," he was a student of philosophy and a poet and was one of those who helped to acclimatize Greek culture at Rome. As an orator, he was more at home in the senate than in the forum.

See H. Malcovati, *Oratorum Romanorum Fragmenta,* pp. 115 ff. (1955), for fragments of his speeches; on his agrarian bill *see* H. H. Scullard, "Scipio Aemilianus and Roman Politics," *Journal of Roman Studies,* vol. 50, pp. 59–74 (1960). (H. H. SD.)

LAËNNEC, RENÉ THÉOPHILE HYACINTHE (1781–1826), French physician, inventor of the stethoscope (*q.v.*) and regarded as the father of chest medicine, was born at Quimper, Brittany, Feb. 17, 1781. He was sent at the age of seven to live with his uncle, G. F. Laënnec, rector of the University of Nantes. He left at the age of 20 to study in Paris. Paris was then a centre of the study of morbid anatomy (*i.e.*, of the changes wrought by disease and revealed by post-mortem examination). J. N. Corvisart (Napoleon's personal physician), G. Dupuytren, M. F. Bichat and G. L. Bayle were the leaders of this school.

Laënnec's classical contribution to the establishment of links between disease in the living and in the dead body was his study of the

sounds heard in the chest, healthy and diseased. He invented the stethoscope in order to listen to these sounds. His stethoscope was a wooden cylinder one foot long, the idea of which he gained from seeing children scratching one end of a wooden beam with a pin and listening to the transmitted sound at the other end. Through his "cylinder" the lungs and the heart spoke in various sounds (wheezes, rattling and whistling noises and so on), but until he could correlate these sounds with the changes made by disease, they spoke in an unknown tongue. Over the next three years, he gathered evidence (by noting the various sounds heard in living patients and the type of disease seen after they had died) which enabled him to say what caused these sounds. Laënnec's methods and findings were described in one of the great books of medicine, *De l'auscultation médiate* (1819), and much of its teaching remains part of the daily currency of medical practice.

Apart from this discovery, he also described and illuminated vast tracts of respiratory and heart disease—bronchitis, pneumonia, pleurisy, emphysema, tuberculosis and many others—in fresh and vivid clinical writing.

Laënnec gained his doctor of medicine degree in 1804. In 1816 he became physician to the Hôpital Necker, in 1822 he was made a professor at the Collège de France and in 1823 he succeeded Corvisart as physician at the Charité. He produced a second edition of his book in the summer of 1826, though at that time he was dying with a grave chest ailment which was probably the result of tuberculosis. In May 1826 Laënnec left Paris for his Breton home at Kerlouanec, in the hope of recovering his health, but died on Aug. 13.

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LAETARE SUNDAY, the fourth Sunday in Lent, so called in the Western Church from the first word ("Rejoice") of the introit at its Mass. It is also known as mid-Lent Sunday, for it occurs just over halfway through Lent, and as Refreshment Sunday because it may be observed with some relaxation of Lenten strictness. In medieval England, simnel cakes (*i.e.,* special rich fruit cakes) used to be consumed on this day, which in Anglican churches is sometimes called Mothering Sunday with reference to a verse in the epistle (Gal. iv, 27). In the Orthodox Church there is a remembrance of the cross on mid-Lent Sunday.

LAETUS, JULIUS POMPONIUS (GIULIO POMPONIO LETO) (1428–1498), Italian humanist and founder of the Academia Romana, was born at Teggiano, in the Cilento. He decided to dedicate his life to the study of the ancient world, so went to Rome *c.* 1450, and in 1457 succeeded Lorenzo Valla, his former teacher, as professor of eloquence in the Gymnasium Romanum. From the outset he gathered round him a number of humanists in a semisecret society, the Academia Romana. The members, who changed their Christian names to pagan ones, met not only to discuss their antiquarian and archaeological interests but to celebrate, under the direction of Laetus as Pontifex Maximus, rites and mysteries of pagan Rome, such as the birth of Romulus and the festival of the Palilia. Their admiration for the ancient world thus developed into a materialistic vision of life, in conscious opposition to Christian ideals, with the possible object of achieving revolutionary political reforms. Hence the Academia Romana fell under the suspicion of Pope Paul II, who in Feb. 1468 dissolved it and arrested its members. Laetus, who for about a year had been living in Venice, was brought to Rome and imprisoned, but by May 1469 he and many of his associates were set free by an act of clemency. They did not regain full liberty until Sixtus IV, who succeeded Paul II in 1471, not only restored Laetus' professorship but also allowed the reconstitution of the Academia Romana.

Between his release and his death (at Rome in 1498) Laetus pursued his scholastic studies with extraordinary zeal, interrupted only by two visits to northern Europe (1472–73, 1479–83). His works of this period include treatises concerning Roman antiquities, commentaries on Latin authors and, most important, some *editiones principes* among which are those of Curtius and Varro, Pliny's *Letters* and Sallust. Laetus is not regarded highly as a humanist: despite his erudition, the lack of rigour and absence of critical spirit in his method cause his philological achievements to be treated with reserve by modern scholars.

For a comprehensive study of Laetus *see* V. Zabughin, *Giulio Pomponio Leto,* vol. 1 (1909), vol. 2 (text, 1910; notes, 1912). For a summary of his life and work, with bibliography, *see* V. Rossi, *Il Quattrocento,* 5th ed., pp. 313–319 (1953). (G. P. G.)

LA FARGE, JOHN (1835–1910), U.S. painter and author, who was without an American peer as a muralist, was born in New York city, March 31, 1835, of French parents. From his maternal grandfather, Binsse de St. Victor, a miniaturist, he received his first art training. After graduating from college he studied law for a time, but in 1856 he went to Europe to study art. Except for a few weeks with Thomas Couture he worked independently, spending most of two years in the art galleries of Europe. Returning to America, La Farge went to Newport, R.I., where he came under the strong influence of William Morris Hunt. His work at this time, chiefly landscapes and flower studies, was remarkably advanced in its handling of light. After a serious illness in 1866 he was never very well, but his inquiring mind, which Henry Adams considered one of the most complex in America, led him into fresh fields.

In the 1870s he took up mural painting. His finest mural is in the Church of the Ascension, New York city. About the same time he became interested in stained glass. Through his invention of opalescent glass and his imaginative designing, he brought about a revival of the art and won for himself an international reputation. From the 1890s date a notable series of water colours done during a voyage in the South Pacific. Among his writings were *Considerations on Painting* (1895), *An Artist's Letters From Japan* (1897) and a study of the Japanese artist Hokusai (1897). He died in Providence, R.I., on Nov. 14, 1910.

See Royal Cortissoz, *John La Farge* (1911). (D. H. W.)

LA FARINA, GIUSEPPE (1815–1863), Italian historian and political journalist of the Risorgimento, was born at Messina in the Kingdom of the Two Sicilies on July 20, 1815. Having taken part in the insurrection of 1837 against the Bourbons, he had to leave Sicily, but returned in 1839 and conducted various liberal newspapers until his efforts were interdicted, when he moved to Florence. He was in Sicily again during the revolution of 1848. After its failure he fled to France. In exile he wrote *Istoria documentata della Rivoluzione Siciliana del 1848–1849* (1850) and *Storia d'Italia dal 1815 al 1850,* six volumes (1851–52). He returned to Italy in 1854 and settled at Turin. In 1856 he founded the *Piccolo Corriere d'Italia,* an organ of the Società Nazionale Italiana (founded in the same year), of which he ultimately was chosen president. With Daniele Manin, one of the founders of that society, he anticipated Cavour in advocating the unity of Italy under Victor Emmanuel II of Sardinia and organized the emigration of volunteers from all parts of Italy into the Piedmontese army. He negotiated an interview between Cavour and Garibaldi, with the result that the latter was appointed commander of the *cacciatori delle Alpi* in the war of 1859. Later he supported Garibaldi's expedition to Sicily, but failed to bring about the immediate annexation of the island to Piedmont as Cavour wished. A member of the first Italian parliament in 1860, he was subsequently made councilor of state. He died at Turin on Sept. 5, 1863. There is an edition of his letters by A. Franchi, two volumes (1869).

LA FAYETTE, GILBERT MOTIER DE (*c.* 1380–1462), marshal of France in the Hundred Years' War, was born in Auvergne. He served under Marshal Jean Boucicaut in Italy and on his return to France in 1409 became seneschal of the Bourbonnais. In the English wars Jean I, duc de Bourbon, made him lieutenant general in Languedoc and Guienne. He failed to save Caen and Falaise for the dauphin (afterward Charles VII) in 1417 and 1418, but held Lyons for some time in 1418 against the Burgundians. After successes over the English and Burgundians on the Loire, in 1420 he was made governor of Dauphiné and a marshal of France. He commanded the Franco-Scottish troops at the battle of Baugé (1421). Taken prisoner by the English at Verneuil

in 1424, but soon released, he served with Joan of Arc at Orléans and Patay in 1429. A member of Charles VII's grand council, he took part in the conferences of Nevers and Arras (1435) which prepared the king's reconciliation with Burgundy. He did much for the army reforms (1445–48) and was recalled to military service in 1449 for the campaign against the English in Normandy. He remained a friend and adviser to the king all his life. He died on Feb. 23, 1462, and was buried at the abbey of La Chaise-Dieu in Auvergne.

LAFAYETTE (La Fayette), **MARIE JOSEPH PAUL YVES ROCH GILBERT DU MOTIER,** Marquis de (1757–1834), French soldier, statesman and hero of the American War of Independence, was born at Chavaniac in Auvergne on Sept. 6, 1757, of an ancient noble family. Losing his parents early, he was a wealthy man when, at 16, he married Adrienne de Noailles (1759–1807), daughter of the duc d'Ayen (J. P. F. de Noailles), and joined the circle of young courtiers at Versailles. He purchased a captain's commission in the Noailles dragoons. He soon found court life uncongenial, however, and wished to win distinction as a soldier. In Dec. 1776 he secured from Silas Deane, the American agent in Paris, a commission as major general in the continental army. Abetted by some influential persons, despite his father-in-law's and Louis XVI's disapproval, he departed for Philadelphia, where he arrived on July 27, 1777.

Service During the American Revolution.—Lafayette secured confirmation by the continental congress of his appointment as major general but was required to serve as a "volunteer" without a command and at his own expense. A conversation with General Washington marked the beginning of a lifelong influence. Lafayette was accepted as one of the commander's "family" and thereafter he referred to Washington as his "adopted father" and took him as his avowed model. He distinguished himself in his first battle (Brandywine, Sept. 11, 1777), where he was wounded. On his recovery, he was given command of a division and, in the winter of 1777–78, placed in charge of a projected invasion of Canada, but this had to be given up because of inadequate support—which Lafayette attributed to a plot (the "Conway cabal") against Washington. Later in 1778, as a division commander, he conducted a masterly retreat from Barren Hill (May 28) and fought in the battle of Monmouth Court House (June 28).

Meanwhile, Lafayette's daring departure from France and his conduct at Brandywine had endeared him to his countrymen. His popularity contributed to the pro-American sentiment in France and to the signing of a treaty of amity and commerce with the United States on Feb. 6, 1778. Thereupon Lafayette became not only the symbol but also the servant of Franco-American friendship. After the French fleet reached Rhode Island in mid-July 1778, he acted as liaison officer between the Americans and the comte d'Estaing, the French commander. Early in 1779 Lafayette returned to France where, at the request of congress, he gave the French government information regarding America's needs. Promoted *mestre de camp* (colonel) in March, he was assigned to an army preparing to invade England; but when that invasion was called off he was ordered to rejoin Washington. He returned in 1780 to a discouraged nation and a disaffected army, carrying the news that France was sending Rochambeau's expeditionary army. Lafayette again served as liaison between the American and French forces, begging his government for more money, men, supplies and, especially, ships. His American command became the Light division, an elite unit whose *esprit de corps* was soon renowned.

From April to Sept. 1781, Lafayette headed the continental army in Virginia. He showed skill and resourcefulness both in retreating before Lord Cornwallis' superior forces and in cautious but persistent skirmishing as the British withdrew to Yorktown under orders to ship to New York. While Cornwallis waited at Yorktown to be picked up, Washington's and Rochambeau's forces joined Lafayette's, and the comte de Grasse's fleet kept the British navy from Yorktown. On Oct. 19 Cornwallis surrendered. No one had been quicker than Lafayette to recognize the opportunity that Cornwallis' plight presented or more influential in securing the decisive French naval superiority. He was universally hailed as "America's Marquis"; and to Frenchmen he was "the friend of Washington" and "the hero of two worlds." Returning to France in 1782, he was promoted *maréchal de camp* (major general).

During a visit to the United States in 1784, Lafayette was made a citizen of several states, and he urged constitutional reform to strengthen the national government. He continued to advocate close Franco-American ties, and on his return to France he worked to secure commercial concessions for his "adopted country."

Service During the French Revolution.—In France after 1784 Lafayette identified himself with social and political reform. He undertook to improve the condition of the peasants on his estates. In company with friends in France, the United States and Great Britain (notably William Wilberforce and Thomas Clarkson), he advocated the abolition of slavery and the slave trade. As a member of the first assembly of notables (1787), he stood out among those who sought toleration for Protestants and a local assembly in every province. He demanded not merely the revival of the estates-general but a national assembly. On the eve of the convocation of the estates-general, he was generally recognized as a leader of the Patriot party. (*See* also France: *History.*)

Lafayette took his seat in the estates-general at Versailles in May 1789 as a deputy of the nobility of the district of Riom (Auvergne). Bound by the instructions of his electors, he could not openly join the movement to convert the estates-general into the National Constituent Assembly, but his sympathies were well known. When the assembly had come into being, Lafayette on July 11 proposed a draft (the first presented) of a Declaration of the Rights of Man and the Citizen. His declaration, composed with Thomas Jefferson's help and taking much from the Declaration of Independence and the constitutions of the American states, contributed notably to the declaration subsequently adopted (Aug. 27). Elected vice-president of the assembly on July 13, he led its delegation to congratulate Paris on the municipal revolution accompanying the capture of the Bastille. On July 15 he was chosen commander of the new bourgeois militia of Paris.

Lafayette organized this militia as the Paris national guard. He gave it the blue, white and red cockade that eventually became the French tricolor. The rest of France likewise created national guard units, but the Parisian was by far the largest, the best-equipped and the best-trained. When the king was brought to Paris and the Constituent Assembly followed (Oct.–Nov. 1789), Lafayette's responsibilities increased: the king made him commander of the regular army in the Paris area as well as of the Paris national guard. Lafayette was devoted to the principle of popular sovereignty, and for two years, except on a few occasions, he was able to keep order while the assembly outlawed many old abuses and wrote a new constitution. For some months he was rarely able to attend the assembly's sessions, but he influenced its decisions through intermediaries as a leader of the moderates. He now stood out as the most popular and most powerful man, next to the king, in France. Courted by the comte de Mirabeau (*q.v.*), who hoped to dominate him, Lafayette, distrusting Mirabeau's character and good faith, checked an effort to unite the groups that might have provided a strong monarch within a constitutional regime. In response to Louis XVI's request for counsel, Lafayette advised co-operation with the National Assembly.

The national guard units looked to Paris for leadership, but Lafayette would not accept command of a nation-wide organization. Nevertheless, "federations" (meetings of representatives of two or more national guard units) became frequent. In response to a demand for a national meeting, the city of Paris invited deputations to come to "a great federation." On that occasion, in the Champ-de-Mars on July 14, 1790 (the first anniversary of the capture of the Bastille), Lafayette administered the oath of loyalty to "the nation, the law and the king" not only to thousands of *fédérés* but also to deputations from the troops of the line and the sailors of France. This event marked the height of his popularity and political power.

Lafayette now occasionally took part in the debates of the assembly. Speaking on behalf of measures to check disorder, he declared that, while "resistance to oppression is the most sacred of duties," the new regime made resistance unjustifiable. He

spoke on behalf of a bill to abolish titles of nobility and after its passage never used his title. He favoured reform of the criminal procedure, trial by jury, religious toleration and political rights for free Negroes. He disagreed with the assembly's decision to establish a unicameral legislature, however, and advocated a bicameral system, with an elected senate. He also spoke in favour of giving the assembly the right to make war and peace and urged the adoption of provisions for early amendment of the constitution. He was attacked by the royalists as a revolutionary and by the radicals as a moderate. When the king's flight from Paris (June 1791) provoked demands for radical changes in the projected constitution, Lafayette, feeling that France was not yet ready for a republican form of government, continued to favour a limited monarchy under Louis XVI; and when the constitution of 1791 was accepted by the king, he favoured the passage of an act of general amnesty. When the Legislative Assembly had taken the place of the Constituent (Oct. 1791), Lafayette resigned the command of the Paris national guard and, believing the Revolution over, retired to Auvergne. As war with Austria became imminent, however, he was summoned by Louis XVI to take command of an army, with the rank of lieutenant general. He reached the headquarters of the army of the Centre at Metz in late Dec. 1791.

Military Service and Imprisonment.—During the early months of 1792, Lafayette prepared his army for war. He reestablished discipline and, despite the accusations of the Paris Jacobins that he was a counterrevolutionary and a friend of Austria, won the confidence of his troops and of the local civilian population. Hitherto the French army had had no mounted artillery unit: Lafayette gave it one, and mounted artillery was to contribute notably to the success of the Revolutionary and Napoleonic armies. Lafayette planned to put his army in the field on the border by May 1. The declaration of war against Austria on April 20 found both him and Rochambeau, commander of the army of the North, unprepared. In obedience to orders, however, Lafayette moved by forced marches from Metz to Givet to co-operate with Rochambeau. Then the defeat of Rochambeau's subordinates (April 28) so demoralized the French troops that the French armies went on the defensive.

Radicals in Paris, suspecting treason, resolved to be rid of Louis XVI, and Lafayette, hoping to maintain the constitution of 1791, went to Paris (June 26, 1792) in an unsuccessful effort to defend the monarchy. After his return to his army, the Paris rising of Aug. 10, 1792, led the assembly to suspend the king. Lafayette was then relieved of his command and ordered to Paris, and his troops swung to the antimonarchical side. Abandoned by his army and proscribed by the assembly, Lafayette, on Aug. 19, 1792, with 21 members of his staff, crossed the frontier, with the intention of proceeding to temporary asylum in America. Arrested by the Austrians at Rochefort (east of Dinant), he was held captive by the Prussians (to whom the Austrians handed him over) till 1795 and then by the Austrians till 1797, despite attempts by friends in England and the United States to procure his release. On the eve of the Franco-Austrian peace of Campo Formio, however, the Austrians surrendered him, as an American citizen, to the U.S. consul at Hamburg.

Later Political Activity.—Lafayette returned to France on the establishment of the consulate in 1799. Disapproving of Napoleon Bonaparte's aims and methods, he refused honours and office and retired to his wife's estate of La Grange-Bléneau (Seine-et-Marne) and became a gentleman farmer. In 1815, however, during the Hundred Days, Napoleon's liberal constitution led Lafayette to seek election to the chamber of deputies; and after Waterloo, as a vice-president of the chamber, he took a leading part in bringing about Napoleon's abdication and headed a futile mission to the allied leaders to ask them to recognize Napoleon's son (the future duke of Reichstadt) as ruler of France under a regency.

Under the Bourbon Restoration, Lafayette returned to the chamber in 1818. He advocated liberal measures, opposed the Holy alliance and, as the regime grew increasingly reactionary, became connected with underground movements in France and elsewhere. Liberal leaders in the southern Netherlands, Greece, Germany, Italy, Portugal, Poland, Spain and Latin America looked to him for aid and counsel. After 1820 his opposition stiffened, and the government saw to it that he was defeated in the election of 1824.

Lafayette then accepted an invitation to visit the United States as "the guest of the nation" (1824–25). Congress gave him money and land, and he was welcomed in every state as the last surviving major general of the War of Independence and as "the friend of liberty and mankind." His visit impressed a new generation of Americans with the significance of their political heritage and of their nation's place as one of the few surviving republics. He stood as the symbol of human freedom—in Jefferson's phrase, "the doyen . . . of the soldiers of liberty of the world." The hopes of liberals rose everywhere as they learned of the ovation given "the hero of two worlds," and no police precautions could stifle the welcome that he received on his return to France.

Lafayette was re-elected to the French chamber in June 1827. When Paris rose against Charles X in July 1830, Lafayette became commander of the national guard again and a leader of the revolutionary movement at the Hôtel de Ville. Finding little support for a republic and much for a monarchy under Louis Philippe, duc d'Orléans, and persuaded by Louis Philippe that he would be a liberal monarch, Lafayette publicly espoused the Orleanist cause in a dramatic demonstration on the balcony of the Hôtel de Ville. During the following months, as commander of the national guard of the realm, he kept order in a restless Paris. In the chamber, meanwhile, he spoke for the freedom of the press and for the abolition of the peerage, of slavery and of the slave trade. He urged the king to take a stand in favour of Belgian and Polish independence. In Dec. 1830, however, he resigned command of the national guard; and in 1832 he declared that Louis Philippe had failed to keep the liberal promises made in July 1830.

On Jan. 3, 1834, Lafayette made his last major speech in the chamber, speaking on behalf of the principles of a lifetime—the sovereignty of the people and natural rights. "True republicanism is the sovereignty of the people," he declared; and "There are natural and imprescriptible rights which an entire nation has no right to violate." Less than a month later, he contracted an illness from which he died, in Paris, on May 20, 1834.

The *Mémoires, correspondance et manuscrits du général Lafayette,* published by his family, appeared in 1837–38. There are editions of his letters to Jefferson by Gilbert Chinard (1929) and to Washington by Louis Gottschalk (1944).

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LA FAYETTE, MARIE MADELEINE PIOCHE DE LA VERGNE, COMTESSE DE (1634–1693), French writer whose masterpieces began a new era in the history of the novel, was born in Paris, where she was baptized March 18, 1634. Her father Marc Pioche de La Vergne died in 1649, and her mother in 1650 married Renaud de Sévigné, whose niece by marriage was the marquise de Sévigné (*q.v.*). In Paris during the period of the Fronde, young Mlle de La Vergne was in contact with Cardinal de Retz's circle, and Gilles Ménage paid his erudite attentions to her. She was married to François Motier, comte de La Fayette (1616–83), in 1655, and lived for some time with him on his estates in Auvergne, with occasional returns to Paris (mainly for litigation). She bore him two sons (1658 and 1659), but in 1661 it was decided that he would settle in Auvergne while she remained in Paris. Throughout the 1660s she was high in the favour of Henrietta of England, duchesse d'Orléans. About 1665, moreover, she began an intimacy with the duc de La Rochefoucauld that was to last until his death (1680), a liaison of remarkable constancy and affection on both sides. Their circle became a centre

of literary taste in which such works as Racine's *Alexandre,* Corneille's *Pulchérie* and Boileau's *Art poétique* were read and discussed, and they may have formed a literary partnership, though the share of each in the other's writings cannot be determined. Mme de La Fayette's later years were much occupied by diplomatic correspondence as an intermediary between the French government and Jeanne de Nemours, duchesse de Savoie. She died in Paris on May 25, 1693.

Writings.—Mme de La Fayette's first novel, *La Princesse de Montpensier,* was published anonymously in 1662, her second, *Zayde,* under the name of J. Regnault de Segrais in 1670 and her third, *La Princesse de Clèves,* anonymously in 1678. Her last novel, *La Comtesse de Tende,* appeared posthumously in 1724. She also left two historical writings, *Histoire de Madame Henriette d'Angleterre* (1720), which includes material provided by the duchesse d'Orléans herself, and *Mémoires de la cour de France pour les années 1688 and 1689* (1731).

La Princesse de Clèves is Mme de La Fayette's masterpiece. Though many writers were reacting against the interminable length and unreality of the novels of such authors as Mlle de Scudery and were exploring the possibilities of the short novel of sentimental analysis, the perfection of *La Princesse de Clèves* has driven Mme de La Fayette's competitors into oblivion. Her story is taken from the memoirs of Brantôme (which La Rochefoucauld may have read to her on their publication in 1665), and the way in which she extracts from his vivid and licentious pages her own delicate theme, leaving on one side all that most readers found exciting to concentrate on a central moral problem, is a perfect example of modern classical art. Characters are idealized, background is conventional, events play little part, a few crucial conversations suffice to pinpoint the real subject, the tragedy of a happy marriage, the conflict between passion and principle. Her heroine never succumbs to her passion for the duc de Nemours, but avows her weakness to her husband, and this avowal ruins his happiness and her own: her scrupulous integrity is, ironically, their undoing. This problematic story aroused much controversy in which the author, being anonymous, could take no part.

La Comtesse de Tende, however, in which the heroine yields to love, may have been meant as an answer. Mme de La Fayette's letters (collected ed., 2 vol., 1942), show that her own experience was at times not far from the themes of her novels. In one of her last letters she admits that we pay heavily to learn wisdom, we pay with our youth (*"Il nous coute cher pour devenir raisonnable, il nous coute la jeunesse"*).

BIBLIOGRAPHY.—The most useful modern edition of *La Princesse de Clèves* is by E. Magne (1950), in the series *Textes littéraires français;* modern English versions include one by H. Ashton (1925) and one by N. Mitford (1950). *See* H. Chamard and G. Rudler, in *Revue du XVIe siècle* (1914 and 1917); H. Ashton, *Madame de La Fayette* (1922); E. Magne, *Madame de Lafayette en ménage* (1926) and *Le Coeur et l'esprit de Mme de Lafayette* (1927). (W. G. ME.)

LAFAYETTE, a city of Indiana, U.S., on the Wabash river, 64 mi. N.W. of Indianapolis; the seat of Tippecanoe county. It lies in a valley 560 ft. above sea level, bordered on either side by the walls of the Wabash basin. The city is a market for grain, hogs and cattle. Manufacturing industries include automotive products, machinery, electrical equipment, prefabricated houses, pharmaceuticals, food, feeds and rubber and aluminum products.

West Lafayette, across the Wabash, is the seat of Purdue university, a state institution and land-grant college, named for a Lafayette businessman, John Purdue, whose gift secured its establishment there by the state legislature in 1869. The university was formally opened on Sept. 16, 1874. Courses are offered in agriculture and forestry, veterinary science, engineering, science, education and humanities, industrial education, industrial management, pharmacy and home economics.

Lafayette is 4 mi. N.E. of the first white settlement in Indiana (Ft. Ouiatenon) built by the French in 1717 to exploit their fur trade with the Ouia (Wea) Indians on the Wabash river. Lost to the English in 1763 and then to the Americans in 1779, it was a centre of Indian agitation. The fort was destroyed by the Scott-Wilkinson expedition in 1791. On the site stands a replica of the type of blockhouse common to the frontier. The replica and surrounding site were presented to Tippecanoe county in 1930.

Lafayette was laid out by William Digby on May 24, 1825, and named in honour of the French general, the marquis de Lafayette whose last visit to America was in 1824–25. The city was incorporated in 1853. Tippecanoe county was named in memory of the battle fought Nov. 7, 1811, when Gov. William Henry Harrison and his small army defeated an Indian confederacy under the leadership of the Prophet, brother of Tecumseh. The site of the battleground, now a state park, is 7 mi. N. of the city.

Population (1960) 42,330; Lafayette–West Lafayette standard metropolitan statistical area (Tippecanoe county, established 1966) 89,122. For comparative population figures *see* table in INDIANA: *Population.* (P. E. MI.)

LAFAYETTE, a city in south-central Louisiana, U.S., 145 mi. W. of New Orleans, located on Vermilion bayou approximately 45 mi. N. of the Gulf of Mexico; the seat of Lafayette parish. The area was first settled by exiled Acadians from Nova Scotia in the late 18th century. The earliest village, Vermilionville, was established in 1824, but was renamed Lafayette in 1884.

Until World War II the economy of Lafayette was dependent upon the area's intensive and highly specialized agriculture, which included sugar cane, rice, cattle, cotton and sweet potatoes. After the war it became the office and supply centre for much of the booming oil and gas industry of south Louisiana. More than 300 oil and service and supply companies maintain offices in Lafayette; nearly 200 of the offices are located in a unique oil centre, with its own post office and shopping facilities.

Before the oil boom Lafayette was primarily a French town and the older culture is evident in the prevalence of the French language, which is spoken by about one-half of the residents, in the predominance of Roman Catholicism (Lafayette is the diocese seat, with an imposing cathedral) and in many fascinating provincial customs, ranging from an unusual cuisine to local festivals. A growing population attracted by the oil industry has created a more cosmopolitan community, and has slowly changed many of the older customs. Educational and cultural activities centre on the University of Southwestern Louisiana, a state-supported coeducational institution, opened in 1901, and on a municipal auditorium.

For comparative population figures *see* table in LOUISIANA: *Population.* (P. K. C.)

LAFFITE (LAFITTE), **JEAN** (1780–1825?), patriot, privateer and smuggler about whose earlier life nothing authentic is known, was the leader of a colony on the Baratarian coast south of New Orleans from 1810 to 1814. Holding privateer commissions from the republic of Cartagena (in modern Colombia), the members of the colony preyed on Spanish commerce and illegally disposed of their plunder through merchant connections in New Orleans. Because the Baratarian gulf was an important approach to New Orleans, the British in their desire to capture the city during the War of 1812 offered Laffite $30,000 and a captaincy in the Royal Navy for his co-operation. Laffite dissembled, and sent the British papers to state officials in New Orleans to warn them of the city's peril. Instead of believing him, Gov. W. C. C. Claiborne aided the U.S. army and navy in dispatching an expedition whose purpose was to wipe out the Laffite colony. The expedition captured some Laffite ships, but did not destroy the business nor the manpower of the colony. Laffite, still protesting his loyalty to the United States, now offered aid to the hard-pressed forces of Gen. Andrew Jackson in the defense of New Orleans, provided the United States would grant full pardon to him and his men. Jackson accepted, and in the battle of New Orleans (Jan. 8, 1815) the Baratarians, in charge of the artillery, signally distinguished themselves. President Madison issued a public proclamation of pardon for them. Laffite might henceforth have followed an honourable career, but instead, in 1817, with nearly a thousand followers, he occupied the island site of the future city of Galveston, Tex., and from this depot continued his privateering against the Spanish. He seemed to lose control somewhat and when pressure was brought to bear by the United States in 1821

because several of his lieutenants had attacked U.S. ships, Laffite suddenly picked a crew to man his favourite vessel, "The Pride," and sailed away into the legendary realms from which he had come.

See M. V. Charnley, *Jean Lafitte, Gentleman Smuggler* (1934). (M. V. C.)

LAFFITTE, JACQUES (1767–1844), French banker prominent in public affairs from the end of the Napoleonic period to the first years of the July monarchy, was born in Bayonne on Oct. 24, 1767, the son of a carpenter. Going to Paris in 1788, he became a clerk in the great banking house of J. F. Perregaux, of which he was appointed head in 1804. Under the first empire he was made a regent of the Bank of France in 1809 and became its governor in 1814; and his appointment as president of the Paris tribunal of commerce (1813) increased his political as well as his economic influence. In 1814 he took part in the negotiations for the surrender of Paris and helped to constitute the provisional government after Napoleon's fall. He made himself useful to Louis XVIII during the Hundred Days, to Napoleon after Waterloo and then to the government of the second Restoration. On the one hand he was entrusted with the management of Napoleon's personal fortune (at least 5,000,000 francs in gold); on the other hand he produced 2,000,000 francs on his own account to meet arrears of pay due to Napoleon's troops before the Bourbon government could disband them.

Elected a deputy for the Seine *département* in 1816, Laffitte defended the liberty of the press in 1817 and resisted the proposal to change the electoral law in 1819. Consequently he was removed in 1819 from the governorship of the bank, despite his services in averting a financial crisis by the purchase of stock in 1818. Keeping himself apart from the systematic opposition of the left, he supported the comte de Villèle's financial program in 1824; but in 1827 he declared himself against Villèle and demanded the impeachment of his ministry. While the moderate vicomte de Martignac was in office Laffitte gave his support to liberal demands but remained on good terms with the government; but he could no longer stand by it in the subsequent reaction. On the outbreak of revolution in 1830, Charles X sent the comte Antoine d'Argout to offer him a ministry, but Laffitte refused with the words "It is too late! There is no longer a Charles X."

Anxious to avoid a republic, Laffitte, who was elected president of the chamber by the minority of deputies then in Paris, did much to secure Louis Philippe's accession to the throne. The new king made him a minister of state and finally, in Nov. 1830, prime minister. The economic crisis was causing discontent, the trial of Charles X's ministers led to disturbances in Paris, and the government's efforts to maintain order were criticized both by the disappointed left and by moderates who accused Laffitte of playing the revolutionary game. He tried to help revolutionary movements abroad (particularly in Italy) but would not let France intervene, except in Belgium, thus provoking criticism from right and left alike. Lafayette, commander of the national guard, and J. C. Dupont de L'Eure, minister of justice, who both sympathized with the republicans, resigned in Dec. 1830; and Laffitte himself resigned on March 13, 1831. He then went to sit with the left opposition in the chamber. Laffitte died at Maisons-sur-Seine on May 26, 1844.

Laffitte was one of the leaders of French economic development under the Restoration. The stagecoach company Laffitte et Caillard controlled traffic between Belgium and Bordeaux and Lyons. He was also the first French banker to propose a policy of discount, but his attempts to found a specialized discount bank in 1825 and 1837 broke down.

See P. Thureau Dangin, *La Monarchie de Juillet* (1884); B. Gille, *La Banque et le crédit en France de 1815 à 1848* (1959). (JE. V.)

LAFFITTE, PIERRE (1823–1903), French positivist philosopher who maintained Comte's system integrally, was born at Béguey, Gironde, Feb. 21, 1823, and educated in Bordeaux and Paris. Meeting Auguste Comte (*q.v.*) in 1844, he became his closest disciple and adopted his philosophical, political and religious ideas. On Comte's death in 1857, Laffitte, who was one of his executors, became head of the Comité Positiviste. Laffitte contributed to *La Politique positive* (1872) and founded *La Revue occidentale* (1878). He was appointed professor of the general history of science at the Collège de France in 1892. His economic and social theories were fully expressed as early as 1859 when, at the opening lecture of a course on philosophy, he stated that "the fundamental problem consists in the social integration of the proletariat" and "wealth, social in its origins, must also be social in its distribution." Laffitte died in Paris, Jan. 4, 1903.

His works include: *Leçons de cosmographie* (1853); *Cours philosophique sur l'histoire générale de l'humanité* (1859); *Considérations générales sur l'ensemble de la civilisation chinoise* (1861); *Les Grands Types de l'humanité* (1875); *De la morale positive* (1880); and *Le "Faust" de Goethe* (1899).

See E. Bréhier, *Histoire de la philosophie*, vol. 2, pt. iii (1932).

LA FOLLETTE, ROBERT MARION (1855–1925), U.S. leader of the Progressive movement who as governor of Wisconsin and later U.S. senator was noted for his support of reform legislation, was born in Dane county, Wisconsin, June 14, 1855. La Follette graduated from the University of Wisconsin in 1879, studied law there, was admitted to the bar in 1880 and began practice in Madison. From 1885 to 1891 he was a Republican representative in congress and, as a member of the house ways and means committee, helped draft the McKinley Tariff act. Retiring briefly to the practice of law, he soon accused Sen. Philetus Sawyer of attempting to use him in bribing a judge and re-entered politics to campaign against the political bosses of Wisconsin. Advocating a reform program as a "progressive" Republican, he sought to wrest the party from the "stalwarts." In 1900 he won the governorship of Wisconsin, and was re-elected in 1902 and 1904.

As governor, La Follette enlisted the support of a number of professors of the University of Wisconsin in drafting reform legislation. The legislature enacted laws taxing railroads according to valuation (1903) and regulating them through a state commission (1905). It provided for direct primaries for nominating candidates for public office (1903), set up a state civil service, created a legislative reference library which soon became a "bill-drafting factory," and established a state board of forestry. In 1906 La Follette resigned the governorship to enter the United States senate. He was three times re-elected.

In the senate, La Follette quickly became a leader of the "insurgents" who opposed higher tariffs and advocated various progressive reform measures which had been experimented with in Wisconsin and the middle west. In 1911 he helped form the National Progressive league to promote progressive legislation and progressive candidates. The league grew into a new party movement (*see* PROGRESSIVE PARTY, U.S.), and for a time La Follette hoped to be its presidential candidate. He suffered a physical breakdown early in 1912, and Theodore Roosevelt seized leadership of the progressive forces that formed the Progressive party of 1912. La Follette refused to support Roosevelt. He cooperated with most of Woodrow Wilson's policy of domestic social reform but opposed taking the United States into World War I. Denounced at home and censured in the senate, as the result of a false newspaper report, La Follette criticized the conduct of the war and at its end helped defeat the covenant of the League of Nations. In 1920 he declined to be a candidate of the Farmer-Labor Convention. In 1924 he campaigned for president, selecting Progressive as the name of his party. He had the endorsement of the Conference for Progressive and Political Action and of the American Federation of Labor. He received nearly 5,000,000 votes (about one-sixth the total number cast), but won only the 13 electoral votes of Wisconsin. He supported much progressive legislation, but only a seaman's act (1915), improving working conditions on U.S. ships, bore his name. He founded *La Follette's Magazine* (later the *Progressive*) in 1909, and published his *Autobiography, a Personal Narrative of Political Experiences*, in 1913. He died at Washington, D.C., June 18, 1925.

His son ROBERT M. LA FOLLETTE, JR. (1895–1953) was elected by a large plurality on Sept. 29, 1925, to fill his father's unexpired senate term. He was re-elected three times, his last term expiring on Jan. 3, 1947.

Another son, PHILIP F. LA FOLLETTE (1897–1965), was governor

of Wisconsin, 1931–33 and 1935–39.

He and his brother led the Progressives into a separate party, which returned to the Republican ranks in 1946.

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LAFONTAINE, MLLE (1655–1738), the first woman professional ballet dancer, made her debut at the Paris Opéra as *première danseuse* in Jean Baptiste Lully's ballet *Le Triomphe de l'Amour,* in 1681. Girls' roles had previously been taken by young men. Although hampered by the long, confining costumes and limited ballet technique of the time, Lafontaine's grace and charm were such that she was called queen of the dance.

After dancing at the Opéra for about a decade, in such works as *Persée, Amadis, Didon* and *Le Temple de la Paix,* Lafontaine is generally believed to have retired to a convent, where she died. (LN. ME.)

LAFONTAINE, HENRI MARIE (1854–1943), Belgian international lawyer who was president of the International Peace bureau from 1907 onward and received the Nobel peace prize in 1913, was born at Brussels, April 22, 1854. After studying law at Brussels university, he became a member of the bar in 1877, and established a reputation as an authority on international law, of which he was in 1893 appointed professor at Université Nouvelle in Brussels. He entered the Belgian senate as a representative of the Socialist party in 1895 and was vice-chairman, 1919–32.

Lafontaine's interest in international arbitration led to an early association with the International Peace bureau, founded in 1882. He played an active part in its work in bringing about the Hague conferences of 1899 and 1907. On several occasions he acted as *rapporteur* for the ratification of international agreements. He was a member of the Belgian delegation to the Paris Peace conference in 1919 and to the League of Nations assembly in 1920 and 1921. One of his projects for increasing international understanding was the Centre Intellectuel Mondial, which he founded in Brussels and which later became merged in the League of Nations Institute for Intellectual Co-operation. He also proposed the creation of such organizations as a world school and university, a universal library, an international auxiliary language, international offices for labour, trade, statistics and immigration and emigration, an international parliament and court of justice and a central monetary office. He was director of the International Institute of Bibliography and secretary-general of the Union of International associations.

In addition to legal handbooks on the rights and obligations of contractors of public works, and on the law of counterfeit, and a documentary history of international arbitration, he published *Bibliographie de la paix et de l'arbitrage international* (1904); *Bibliographia bibliographica universalis* (1898–1904); *The Great Solution* (1916); and was founder of the review *La Vie Internationale.* He died at Brussels, May 14, 1943. (M. H. ST.)

LA FONTAINE, JEAN DE (1621–1695), French poet, whose *Fables* rank among the greatest masterpieces of French literature, was born in 1621, probably on July 8, at Château-Thierry in Champagne. There he married (1647), and for nearly 20 years (1652–71) held office as an inspector of forests and waterways. It was in Paris, however, that he made his most important contacts, and spent his most productive years as a writer. An outstanding feature of his existence was his ability to attract the goodwill of patrons prepared to relieve him of the responsibility of providing for his livelihood. In 1657 he became one of the protégés of the wealthy *surintendant,* Nicolas Fouquet. From 1664 to 1672 he served as gentleman-in-waiting to the dowager duchess of Orléans in the Luxembourg. For 20 years, from 1673, he was a member of the household of Mme de la Sablière, whose *salon* was a celebrated meeting place of scholars, philosophers and writers. His last protectors were Anne d'Hervart and his wife Françoise, in whose house in Paris he died on April 13, 1695.

His Personality and His Literary Culture.—Though he never secured the favour of Louis XIV, La Fontaine had many well-wishers close to the throne and among the nobility. He moved among churchmen, doctors, artists, musicians and actors. But it was especially literary circles that he frequented. Legend has exaggerated the closeness of his ties with Molière, Boileau and Racine; but he certainly numbered them among his friends and acquaintances, as well as La Rochefoucauld, Mme de Sévigné, Mme de la Fayette and many less well-remembered writers.

The true nature of the man remains enigmatic. He was intensely and naïvely selfish, unconventional in behaviour and impatient of all constraint: yet he charmed countless friends—perhaps by a naturalness of manner and a sincerity in social relationships that were rare in his age—and made only one enemy (a fellow-academician, Antoine Furetière). He was a parasite without servility, a sycophant without baseness, a shrewd schemer who was also a blunderer, a sinner whose errors were, as one close to him observed, *"pleines de sagesse."* He was accommodating, sometimes to the detriment of proper self-respect; but he was certainly not the lazy, absent-minded simpleton that superficial observers took him for. The quantity and the quality of his work show that this legendary description of him cannot be accurate: for 40 years at least, La Fontaine, in spite of his apparent aimlessness, was an ambitious and diligent literary craftsman, of subtle intelligence and meticulous conscientiousness.

He was an assiduous and discriminating reader, whose works abound in judicious imitations of both the matter and the manner of his favourite authors. He was influenced by so many 16th- and 17th-century French writers that it is almost invidious to mention only Rabelais, Clément Marot, François de Malherbe, Honoré d'Urfé and Vincent Voiture. The authors of classical antiquity that he knew best were Homer, Plato, Plutarch—these he almost certainly read in translation—Terence, Virgil, Horace and Ovid. Boccaccio, Machiavelli, Ariosto and Tasso were his favourites among the Italians. La Fontaine was no romantic: his work derives its substance and its savour less from his experience of life than from this rich and complex literary heritage, affectionately received and patiently exploited.

Miscellaneous Writings and Les Contes.—La Fontaine's many miscellaneous writings include much occasional verse in a great variety of poetic forms, and dramatic or pseudo-dramatic pieces such as his first published work, *L'Eunuque* (1654), and *Clymène* (1671), as well as poems on subjects as different as *Adonis* (1658, revised 1669), *La Captivité de Saint Malc* (1673) and *Le Quinquina* (1682). All these are, at best, works of uneven quality ranking, in relation to the perfection of the *Fables,* as no more than poetic exercises or experiments. The exception is the leisurely narrative of *Les Amours de Psyché* (1669), notable for the lucid elegance of its prose, its skilful blend of delicate feeling and witty banter and some sly studies of feminine psychology.

Like his miscellaneous works, La Fontaine's *Contes* considerably exceed the *Fables* in bulk. The first of them was published in 1664, the last posthumously. He borrowed them mostly from Italian sources, in particular Boccaccio. But he preserved none of Boccaccio's rich sense of reality. The essence of nearly all his *Contes* lies in their licentiousness, which is not presented with frank Rabelaisian verve, but is transparently and flippantly disguised. Characters and situations are not meant to be taken seriously: they are meant to amuse, and are too monotonous to amuse for long. The *Contes* are the work far less of a poet than of an ingenious stylist and versifier. They owe such charm as they possess to the accent of La Fontaine the narrator, enlivening his story with playfully capricious comments, explanations and digressions.

Les Fables.—The *Fables* unquestionably represent the peak of his achievement. The first six books (the *"premier recueil"*) were published in 1668, five more (the *"second recueil"*) in 1678–79, and a twelfth in 1693. In the *"second recueil,"* the *Fables* show even greater technical skill than those of the first and they are longer, more reflective and more personal. Some decline of talent is commonly detected in book xii. But these variations are not so great as to preclude discussion of the 12 books as a whole.

La Fontaine did not invent the basic material of his *Fables:* he took it chiefly from the Aesopic tradition and also, for the *"second recueil,"* from the oriental. He enriched immeasurably the simple

stories that earlier fabulists had in general been content to tell perfunctorily, subordinating them to their narrowly didactic intention. He contrives delightful miniature comedies and dramas, excelling in the rapid characterization of his actors, sometimes by deft sketches of their appearance or indications of their gestures, and always by the expressive discourse he invents for them. The settings are usually rustic, and he evokes the perennial charm of the countryside with Virgilian felicity. And within the compass of about 240 poems, the range and the diversity of subject and of treatment are astonishing. Often La Fontaine holds up the mirror to the social hierarchy of his day. Intermittently it inspires him to satire; but sharp though his thrusts are, he has not enough of the true satirist's indignation to press them home. The *Fables* occasionally reflect contemporary political issues and intellectual preoccupations. Some of them, fables only in name, are really elegies, idyls, epistles or poetic meditations. But his chief and most comprehensive theme remains that of the traditional fable: the fundamental, everyday moral experience of mankind throughout the ages, exhibited in a profusion of typical characters, emotions, attitudes and situations. Simple countryfolk and the heroes of Greek mythology and legend, as well as the familiar animals of the fable, have their parts in this *"ample comédie à cent actes divers,/Et dont la scène est l'Univers"*; and the poetic resonance of the *Fables* owes much to these actors who, belonging to no century and to every century, speak with timeless voices.

Countless critics have listed and classified the morals of La Fontaine's *Fables,* and have correctly concluded that they amount simply to an epitome of more or less proverbial wisdom, in general prudential, but tinged in the *"second recueil"* with a more genial epicureanism. Thus detached from their context, these commonplaces give a quite inadequate idea of the perspicacity of the poet's moral insight. In La Fontaine—who was surely too shrewd to suppose that moral truths can ever be simple—the story told in the fable is no rudimentary illustration of the moral: it offers a subtle commentary on it, amplifying it, sometimes amending it and even hinting that only the naïve would take it at its face value. What the *Fables* teach is trivial in comparison with what they suggest: a view of life that is certainly incomplete (for it takes little account of man's metaphysical anguish or his highest aspirations), but is mature, profound, wholesome and wise.

What disconcerts many non-French readers and critics is that in the *Fables* profundity is expressed lightly. La Fontaine's animal characters illustrate the point. They are serious representations of human types, so presented as to hint that human nature and animal nature have much in common. But they are also creatures of fantasy, bearing only a distant resemblance to the animals the naturalist observes; and they are amusing, because the poet skilfully exploits the incongruities between the animal and the human elements they embody. Moreover—as in the *Contes,* but with far more delicate and lyrical modulations—the voice of La Fontaine himself can constantly be heard, always controlled and discreet, even when most charged with emotion. Its tones change swiftly, almost imperceptibly: they are in turn ironical, impertinent, brusque, laconic, eloquent, compassionate, melancholy or reflective. But the predominant note is that of *"la gaieté,"* which, as he tells us in the interesting preface to the *"premier recueil,"* he deliberately sought to introduce into his *Fables;* and "gaiety," he explains, is not that which provokes laughter, but "a certain charm . . . that can be given to any kind of subject, even the most serious." No one reads the *Fables* rightly who does not read them with a smile—not only of amusement, but of complicity with the poet in the understanding of the human comedy and in the enjoyment of his art.

To the grace, the ease and the delicate perfection of the best of the *Fables,* even close textual commentary cannot hope to do full justice. They represent the quintessence of a century of experiments in prosody and poetic diction in France. The great majority of the *Fables* are composed of lines of varying metre, and from the unpredictable interplay of their rhymes and of their changing rhythms La Fontaine derives the most exquisite and diverse effects of tone and movement. His vocabulary harmonizes widely different elements: the archaic, the precious and the burlesque, the refined, the familiar and the rustic, the language of professions and trades and the language of philosophy and mythology. But for all this richness, economy and understatement are the chief characteristics of his style, and its full appreciation calls for keener sensitivity to the overtones of 17th-century French than most foreign readers can hope to possess. No art could be more sophisticated. Yet the *Fables* can be enjoyed at many different levels. They form part of the culture of every Frenchman, for in France all school-children read them and learn some of them by heart. They also continue to delight men of letters, and in the 20th century the tributes notably of André Gide, Paul Valéry, and Jean Giraudoux have given fresh lustre to their reputation.

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For biography and criticism, *see* L. Roche, *La vie de Jean de La Fontaine* (1913); G. Michaut, *La Fontaine,* 2 vol. (1913–14); F. Gohin, *L'Art de La Fontaine dans ses Fables* (1929); V. Lugli, *Il prodigio di La Fontaine* (1939); P. Clarac, *La Fontaine* (1947; new ed. 1959); Margaret O. Guiton, *La Fontaine: Poet and Counterpoet* (1961); Odette de Mourgues, *O Muse, fuyante proie . . . Essai sur la Poésie de La Fontaine* (1962). (L. C. SY.)

LAFONTAINE, SIR LOUIS HIPPOLYTE (1807–1864), Canadian statesman and judge, joint leader with Robert Baldwin of "the great ministry" (1848–51) that established the principle of responsible government in Canada, was born at Boucherville, Lower Canada (Quebec), on Oct. 4, 1807. He was educated at the College of Montreal and in 1829 was called to the bar of Lower Canada. The following year he began his political career, being elected to the assembly of Lower Canada for the constituency of Terrebonne. He continued in the house until the rebellion of 1837. Although a supporter of Louis Joseph Papineau, he took no part in the rebellion. In 1838 he supported Lord Durham, but later opposed the Durham report as unfair to French Canadians. With the union of Upper and Lower Canada, he refused office under the first governor, Lord Sydenham, but allied himself and his party with the Upper Canadian Reformers under Baldwin, and the two leaders entered the reconstructed ministry of Sir Charles Bagot in 1842. Both men retired when Bagot's successor, Sir Charles Metcalfe, refused to accept their advice. After four years in opposition, LaFontaine became the senior member of the LaFontaine-Baldwin ministry under Lord Elgin. This "great ministry" held office until 1851, and enacted considerable legislation including the Rebellion Losses bill which precipitated the Montreal riots of 1849 (*see* CANADA: *History*). In 1851, although still a young man, LaFontaine retired, and in 1853 he was appointed chief justice of Lower Canada. He filled this office with ability and distinction for 11 years. In 1854 he was made a baronet. He died at Montreal on Feb. 26, 1864. (R. S. Lo.)

LAFORGUE, JULES (1860–1887), French Symbolist poet, a master of lyrical irony and one of the inventors of *vers libre,* was born in Montevideo, Uruguay, of French parents, on Aug. 16, 1860. He was brought up by relatives at Tarbes, France, from 1866 to 1876, when he joined his family in Paris. After finishing his schooling at the Lycée Fontanes, he attended Taine's lectures at the École des Beaux-Arts, browsed over medical and astronomical treatises, and read Baudelaire, Heine and Verlaine. Through Paul Bourget, he became secretary to Charles Ephrussi, an art collector and editor of the *Gazette des Beaux-Arts,* who introduced him to Impressionist painting. In Nov. 1881 he was appointed reader to the empress Augusta in Berlin and remained in Germany for almost five years, during which time he wrote most of his works. He married an English girl, Leah Lee, in London on Dec. 31, 1886, and then returned to Paris where, poverty-stricken, he died of tuberculosis on Aug. 20, 1887.

In the verse of *Les Complaintes* (1885), *L'Imitation de Notre-*

Dame la Lune and *Le Concile féerique* (both 1886), Laforgue gave ironical expression to his obsession with death, his loneliness and his boredom with daily routine. He was attracted by Buddhism and by German philosophy, being influenced by Schopenhauer's pessimism and von Hartmann's theory of the unconscious. His personal mythology was expressed by the figure of Pierrot transformed into a whimsical Hamlet. Inspired by the example of Tristan Corbière and Rimbaud, he forged new words, experimented with common speech, and combined popular songs and music hall tags with philosophic and scientific terms to create an imagery which still appears surprisingly modern. His search for new rhythms culminated in the *vers libre* which he and his friend Gustave Kahn (*q.v.*) invented almost simultaneously. He parodied Shakespeare, Wagner, Flaubert and Mallarmé in a collection of short stories, *Moralités légendaires* (1887). His art criticism, published in the Symbolist reviews and subsequently in *Mélanges posthumes* (1923), testifies to his remarkable understanding of the Impressionist vision. If the French Surrealists rather neglected Laforgue, the Imagists felt his impact: Ezra Pound admired in his poetry "the dance of the intellect among words," while T. S. Eliot admitted that his youthful ambition had been to "work out the implications of Laforgue."

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LAFOSSE, CHARLES DE (1636–1716), French historical painter who, together with his teacher Charles Le Brun, shared in the creation of the great decorative works undertaken during the reign of Louis XIV, was born in Paris on June 15, 1636. Stylistically his work represents a transition between the art of Le Brun and that of the rococo period. LaFosse was especially influenced by the work of Rubens and Van Dyck, as well as by that of the Italians Francesco Primaticcio, Titian and Veronese whom he studied during his five-year stay in Rome and Venice (from 1658). In 1689–91 LaFosse decorated Montague house in London. He became a member of the Royal Academy in 1673 and was named chancellor in 1715. LaFosse died in Paris on Dec. 13, 1716.

LA FRESNAYE, ROGER DE (1885–1925), French Cubist painter, was born at Le Mans. He studied at the École des Beaux Arts and at the Académie Ranson in Paris. His work up to 1909 betrays the influence of the symbolism of Maurice Denis. During the next few years (1910–13) he developed an interest in Cubism. He became a member of the Cubist association known as the Section d'Or that met regularly at the studio of Jacques Villon. Even at this early point, La Fresnaye's native sensitivity gave his Cubism an unorthodox quality. After being invalided out of the army in 1917 he went to the south of France for his health. There he produced a number of fine Cubist water colours and drawings, quite different in spirit and form from Picasso and Braque, stressing joyous colour, compositional relationships and even romantic feeling rather than the more typical simultaneist Cubist effects. They veer away from the increasingly contrived and often static orthodox Cubist works. La Fresnaye died in Grasse on Nov. 27, 1925.

See Germain Seligman, *Roger de La Fresnaye* (1945); Raymond Cogniat and Waldemar George, *Œuvre complète de Roger de la Fresnaye* (1948). (B. S. Ms.)

LAGAN: *see* FLOTSAM, JETSAM AND LAGAN.

LAGARDE, PAUL ANTON DE (1827–1891), German biblical and oriental scholar, played an important role also as religious and political thinker. Born in Berlin on Nov. 2, 1827, he began as *Privatdozent* in Halle, but was forced for years to make his living as a teacher in Berlin schools. He became the successor of H. G. A. Ewald at Göttingen in 1869, and died there on Dec. 22, 1891.

Lagarde's labours in the copying and editing of ancient texts in Greek, Aramaic, Syriac and Arabic were great. His most important contribution was his pioneer approach to a critical edition of the Septuagint—a legacy continued by Alfred Rahlfs. But Lagarde also was a great patriot. Seeing his people handicapped by heritages of the past he became a critic of its society (including the Jews) and its institutions—especially the church. Christianity, he felt, had to shed a great deal that was antiquated in it and be developed to meet the needs of modern man. He called for a full adaptation to nationality, thus paving the way for what National Socialism and the "German Christians" aspired to do before World War II. His *Deutsche Schriften,* two volumes (1878–81) contain his most significant thought.

See A. Rahlfs, *Lagardes wissenschaftliches Lebenswerk* (1928). (E. G. KR.)

LAGASH, one of the most important capital cities in ancient Sumer, now known as Telloh, occupies a site of about four by three kilometres, lying midway between the Tigris and Euphrates rivers, in southern Iraq, about 10 mi. from the modern town of Ash Shatrah. Twenty French expeditions worked at Telloh between 1877 and 1933; the last of them, led by A. Parrot, on behalf of the Musée du Louvre, contributed most to a scientific comprehension of the city. At least 50,000 cuneiform texts, the majority economic but many religious and historic in character, have proved one of the major sources for a knowledge of Sumerian activities in the 3rd millennium B.C.; dedicatory inscriptions on stone and on bricks also have provided invaluable evidence for assessing the chronological development of Sumerian art.

The city was founded in the prehistoric Ubaid period, and was still occupied as late as the Parthian era (2nd century B.C.–3rd century A.D.). It was particularly prosperous in the latter part of the Early Dynastic period, 2700–2400 B.C., and again toward the end of the Sargonids when a dynastic succession famous for the name of Gudea (fl. *c.* 2250 B.C. or, according to some authorities, *c.* 2150 B.C.) was in control. Nominally Lagash was probably then subject to the West Iranian Guti who had temporarily wrecked the old Sumerian and Akkadian city-states.

In the Early Dynastic period the Lagashite rulers styled themselves "kings" (*lugal*), though the city itself never was included within the official Sumerian canon of kingship. Among the most famous of the early Lagash monuments is the Stele of the Vultures erected to celebrate the victory of King E-anna-tum over the neighbouring state of Umma. The style of this and a series of stone plaques in relief depicting the family of King Ur Nanshe proves that this line of rulers was approximately contemporary with the 1st dynasty of Ur and the period of the royal cemetery in that city. Metalwork also displays a high degree of excellence; a silver vase dedicated by En-temena, beautifully engraved with the lion-headed eagle, national emblem of Lagash, is a unique masterpiece of the Sumerian silversmith's art. The last member of this dynasty was named Uru-ka-gina, a reformer whose hitherto independent dynasty was extinguished; the control of the country thereafter soon fell to Sargon of Agade. About 150 years later, when the Agade kings were hard pressed by the Gutian tribesmen from Iran, Lagash enjoyed a revival. Its most brilliant period of prosperity was under Gudea, whose title of *ensi* indicated that he was a governor rather than an independent king. Many statues of Gudea, carved cylindrically out of a hard, dark-gray diorite, bear witness to a brilliant school of Neo-Sumerian sculpture, in an assured style of unexcelled mastery which insists on the utmost economy of detail.

Lagash was once endowed with many temples, including the Enninu "House of the Fifty," a seat proper to the high god Enlil. Architecturally the most remarkable building is a well-preserved burnt-brick structure erected by Ugme, grandson of Gudea, formerly thought to have been a hypogeum but correctly identified by T. Jacobsen as a weir and regulator which doubtless once possessed sluice gates and conserved the Lagashites' water supply in reservoirs on the southeast side of the city. Jacobsen believes that Lagash is to be identified with the site of Al Hibba rather than Telloh, but the large number of inscriptions specifically referring to Lagash provide weighty evidence against such a hypothesis, which could only be substantiated by further extensive excavation at Al Hibba itself. None the less, uncertainty still exists as to the extent of Lagash, which denoted the district, Girsu being the sacred city enclosed within the mound of Telloh.

Although the city declined in importance after the time of

Gudea's grandson, many later remains have been found including extensive evidence of Parthian and Sasanian occupation.

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LÅGEN, the name of two rivers in Norway.

1. In Oppland *fylke* (county) drains the Gudbrandsdal (*q.v.*) valley, has a total length of 202 km. (126 mi.) and a catchment about 12,000 sq.km. (*c.* 4,600 sq.mi.). Its source is in the Lesjaskogsvatn (2,008 ft.) and it flows southward to Lake Mjösa (*q.v.*), receiving its largest tributaries from the west; *e.g.,* the Otta, Sjoa, Vinstra and Gausa, which have their sources in the central mountain region of the country. Below Mjösa the river is called the Vorma, which empties into the Glomma (*q.v.*). Available water power of the Lågen (sometimes called Gudbrandslågen) and its tributaries is 835,000 kw. and there are 25 power plants which have an aggregate machine installation of 469,000 kw. The largest plants are built on the tributary rivers having the highest falls and most of the power is transmitted to the densely populated districts of Mjösa and Oslo.

2. Rises in the Hardangervidda in southeastern Norway and flows for 342 km. (213 mi.) through the Numedal in a southeasterly direction to the Skagerrak at Larvik. Its power station at Norefjord serves the Oslo-Tönsberg area. The river is sometimes known as the Numedalslågen. (L. H. Hg.)

LAGER BEER: *see* BEER.

LAGERKVIST, PÄR FABIAN (1891–), Swedish poet, dramatist and novelist, who was elected to the Swedish academy in 1940 and awarded the Nobel prize for literature in 1951, was born on May 23, 1891, in Växjö, Småland. His grandparents were peasants, his father a railway workman, but he went to a high school and studied for a short time at the University of Uppsala. The most important influences in his early development were: the religious faith in which he was brought up, contrasted with the Darwinist view of man as a brute; the extreme individualism of the turn of the century; and the collectivism of the social democratic movement. In a manifesto entitled *Ordkonst och bildkonst* ("Literary and Pictorial Art," 1913), written after a visit to Paris, he tried to work out a literary parallel to Cubist art. The prose poems *Motiv* (1914) attempt to express modern man's split conceptions of the world in decorative patterns of bold contrasts.

Lagerkvist felt the tragedy of World War I deeply; collections of poems from this period are *Ångest* ("Anguish," 1916) and *Kaos* (1919). In his plays, too, for instance, *Sista människan* ("The Last Man," 1917), there is a presentiment of the imminent destruction of the world. Influenced technically by the form of Strindberg's dream plays, and probably by contemporary Expressionism, he stressed the symbolic nature of stage scenery.

In the early 1920s a more serene note is heard in Lagerkvist's writing, a longing for reconciliation with the human condition. A central work is *Det eviga leendet* (1920; Eng. trans., *The Eternal Smile,* 1934), a series of tales and conversations among the dead about the lot of man. The poems *Den lyckliges väg* ("The Happy Man's Way," 1921) express a sense of human fellowship, and the autobiographical novel *Gäst hos verkligheten* (1925; Eng. trans., *Guest of Reality,* 1936) describes with tenderness the secure world of his childhood and his inner struggles; it combines intimate realism with stylistic simplicity. *Hjärtats sånger* ("Songs of the Heart," 1926) are sincere, moving love poems.

Lagerkvist soon realized the danger of the new creeds of violence proclaimed in the early 1930s: there is a dark tone in the visionary poems *Vid lägereld* ("By the Camp Fire," 1932). His prose work *Bödeln* (1933; Eng. trans., *The Hangman,* 1936), later dramatized, is a brutal protest against the everlasting brutality in the world, and his essay *Den knutna näven* ("The Clenched Fist," 1934) is an appeal to militant humanism.

In 1944 he published *Dvärgen* (Eng. trans., *The Dwarf,* 1945) a novel in a Renaissance setting; its protagonist represents absolute wickedness, which originates from his sense of inferiority. The remarkable novel *Barabbas* (1950; Eng. trans., 1952) deals with the unbelieving malefactor, bound forever to the God he denies, and *Sibyllan* (1956; Eng. trans., *The Sibyl,* 1958), set in the 1st century A.D., analyzes poetic inspiration in a grandiose symbolic form and also reviews his own development. (L. G. G. T.)

LAGERLÖF, SELMA OTTILIANA LOVISA (1858–1940), Swedish novelist, the first woman to win the Nobel prize for literature (1909), was born on Nov. 20, 1858, at the small manor house of Mårbacka, Värmland. An illness left her lame for a time, but otherwise her childhood was happy. She was taught at home, then trained in Stockholm as a teacher and in 1885 went to Landskrona, Skåne, as schoolmistress. There she wrote her first novel, the two-volume *Gösta Berlings saga* (1891; Eng. trans. 1898, 1918). A chronicle of life in the heyday of Värmland's history, the age of prosperous iron founders and small manors, its heroes are the 12 Cavaliers, led by Gösta Berling, a renegade priest of weak character but irresistible charm. Written in a lyrical style, full of pathos, showing the influence of Carlyle, it played a part in the Swedish romantic revival of the 1890s. In 1894 she published a collection of stories, *Osynliga länkar* (Eng. trans., *Invisible Links,* 1899), and in 1895 won a traveling scholarship and gave up teaching and devoted herself to writing. After visiting Italy she published *Antikrists mirakler* (1897; Eng. trans. 1899), a socialist novel about Sicily, followed in 1899 by historical tales, *Drottningar i Kungahälla* (Eng. trans., *The Queens of Kungahalla,* 1917) and *En herrgårdssägen* (Eng. trans., *Tales of a Manor,* 1922), one of her finest works. A winter in Egypt and Palestine (1899–1900) inspired *Jerusalem,* two volumes (1901–02; Eng. trans. 1915), which established her as the foremost Swedish novelist. Other notable works were *Kristuslegender* (1904; Eng. trans. 1908); *Herr Arnes penningar* (1904; Eng. trans. 1923), a tersely but powerfully told historical tale; *Nils Holgerssons underbara resa genom Sverige,* two volumes (1906–07; Eng. trans., *The Wonderful Adventures of Nils,* 1907; *Further Adventures of Nils,* 1911), a geography reader combining legend and realistic description; *Liljecronas hem* (1911; Eng. trans. 1913), with the same setting as *Gösta Berling;* and *Kijsarn av Portugallien* (1914; Eng. trans., *The Emperor of Portugallia,* 1916).

World War I disturbed her deeply and for some years she wrote little. Then in *Mårbacka* (1922; Eng. trans. 1924), *Ett barns memoarer* (1930; Eng. trans., *Memories of my Childhood,* 1934) and *Dagbok för S.L.* (1932; Eng. trans. *The Diary of S. L.,* 1936), she recalled her childhood with subtle artistry, and also produced a Värmland trilogy, *Löwensköldska ringen,* set in the 18th century, *Charlotte Löwensköld* (both 1925); and *Anna Svärd* (1928; Eng. trans. of the trilogy, *The Ring of the Löwensköld,* 1931). She died on March 16, 1940, at Mårbacka, which had been sold after her father's death, but which she had bought back with her Nobel prize money. Selma Lagerlöf ranks among the most naturally gifted of modern storytellers. Her art is rooted in legend and saga, her descriptions often span the supernatural, and it is often the miraculous which gives epic movement to her stories.

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(At. Wn.)

LAGOMORPH, any of the gnawing mammals comprising the hares, rabbits and pikas (*qq.v.*). American zoologists regard these mammals as belonging to the order Lagomorpha. European zoologists, however, place them in the order Rodentia but separate them from typical rodents (in this system of classification, the suborder Simplicidentata) as the suborder Duplicidentata. The difference in classification is the result of opposing points of view: some zoologists hold that the similarities between lagomorphs and typical rodents indicate close kinship, and others hold that the similarities are simply the result of parallel evolutionary development. It is noteworthy that a few fossils of typical rodents and typical lagomorphs, known from as early as the late Paleocene, show no structural evidence of close relationship between the two groups.

Lagomorphs differ from true rodents in having four functional upper incisor teeth rather than two; upper tooth rows more widely

separated than the lower; a jaw that permits lateral but not forward and backward movement of the lower jaw; a spiral fold in the caecum (an outpouching of the digestive tract); and an elbow joint modified to prevent rotation of the forearm and a fibular remnant that articulates with the heel bone. In most kinds the sides of the rostrum of the skull are more or less latticelike rather than solid as in the rodents. Living lagomorphs belong to two families, Ochotonidae (pikas) and Leporidae (hares and rabbits).

In size they range from that of a rat to that of a small dog. The commonest colour is a buffy or tannish gray (agouti colour) but there are wide differences according to species, location and season. All lagomorphs molt; some kinds living in northern latitudes acquire a white coat with the onset of winter and regain the agouti coat in the spring. The tail is characteristically short and fluffy, but in the pika it is so short as to be invisible externally. In general both the ears and hind legs are exceptionally large, though there is much variation in these features among the several species. E. R. Hall and K. R. Kelson have pointed out the correlation between these structures and the means of detecting and escaping from enemies. The short-legged and short-eared pika, for example, lives in rock slides and when threatened merely drops into a crevice among the rocks. The pygmy rabbit with proportionately longer legs and ears lives in brushy areas and seldom ventures far from its burrow to which it can retreat in a few bounds. The brush rabbit, next in series proportionately, ventures farther from brushy areas to which it can retreat quickly. The cottontail rabbit ranges still farther afield from a refuge, thus relying more than the other lagomorphs on early detection of danger and speed of movement. At the extreme is the jack rabbit (actually a hare, not a rabbit), whose ears and hind feet are remarkably developed. The jack rabbit places reliance on the early distant detection of danger and on speed; it does not seek a refuge when threatened but seeks safety in flight from its enemies.

Lagomorphs are herbivorous, eating mainly tender leaves, shoots and occasionally berries. Some kinds also feed on the bark of young trees and shrubs and may do great damage in cultivated areas. The pika is unique in curing its food in the sun for later storage much as man does with hay. Most, perhaps all, lagomorphs possess a peculiar digestive adaptation which seemingly serves the same function as cud-chewing in ruminants. In this process, called coprophagy, food is sometimes passed through the digestive tract with only partial digestion. It is expelled from the anus and then re-eaten. Digestion is completed in the second passage through the tract. The extent to which the process is under the voluntary control of the animal is not known.

The fecundity of lagomorphs is proverbial. Some kinds are seasonal in their breeding; others are not. In the seasonal species, breeding takes place in early spring and may continue until autumn, depending on the climate. Two litters of one to eight young per season is usual. Nonseasonal species may produce as many as five to six litters a year. Ovulation usually takes place only after copulation or other strong sexual stimulus. The gestation period for most species is one to one and one-half months. Newborn rabbits, usually born in a fur-lined nest, are blind, naked and helpless (altricial young) as in the American cottontail or the European rabbit. Such young must have parental care for an extended period. The young of hares, born in a shallow depression beneath a bush or other semiconcealed place, are active and fully haired at birth (precocial young); they are able to hop about a few minutes after birth and are soon left to fend for themselves. Common names are often misapplied; thus the jack "rabbit" is really a hare, and the Belgian "hare" is actually the common domestic rabbit.

Some lagomorphs live in colonies and show well-developed social organization whereas others live alone. The genus *Ochotona* (pikas) occurs over the mountainous parts of western North America and in Asia. The living genera of rabbits and hares and their distribution are as follows: *Pentalagus,* east Asia; *Pronolagus* (red hare), southeast Africa; *Romerolagus* (volcano rabbit), Mexico; *Caprolagus* (Hispid hare), Asia; *Lepus* (hares), northern hemisphere generally; *Sylvilagus* (cottontail rabbits and allies), North America; *Oryctolagus* (rabbits), Europe; *Brachylagus* (pygmy rabbit), North America; and *Nesolagus* (Sumatra rabbit), Sumatra. (K. R. Kn.)

LAGOS, capital of the Federation of Nigeria in west Africa, includes the whole area described as federal territory. It lies on the coast of the Bight of Benin just above sea level, almost the whole area (27 sq.mi.) having been recovered from swampland. It consists of the islands of Lagos, Iddo and Victoria and (on the west shore of the lagoon) the mainland areas of Ebute-Metta, Apapa, Yaba and Suru-Lere. Pop. (1952 census) 267,407; (1961 est.) 374,000. The climate is hot and humid with an annual rainfall of about 72 in. Lagos was granted city status in 1963.

The eastern part of Lagos Island is wholly residential, with the official residences of federal ministers and others; on the remainder stand government offices, business houses and the old town. The main streets are the Marina facing south over the harbour and, almost parallel to it, Broad street leading eastward to Tafawa Balewa square. There, around the racecourse, are the National hall (in which the house of representatives meets), the senate house, supreme court, King's college (a government secondary school) and the 25-story Independence house, a government building. Nearby are the national museum, containing some of the finest treasures of Nigerian art, the King George V football stadium and memorial park, and the international Island club, famous throughout Africa. On the north side of Lagos Island the Iga Idunganran, the palace of the *obas* (kings) of Lagos, has as its nucleus buildings erected by the Portuguese about 1705. Buildings declared national monuments, such as the *Ilojo* ("water house"), are mostly in the Brazilian style introduced in the 19th century but modern office blocks dominate the skyline.

The Anglican and Roman Catholic cathedrals are also on Lagos Island, whence the Carter road bridge leads northwest to Iddo Island, site of the Lagos rail terminus and main power station. Causeways link Iddo with the mainland at Apapa (southward) and Ebute-Metta (northward). Apapa, the main port area, includes extensive industrial, commercial and residential quarters, the army headquarters and a naval base. From Ebute-Metta, with its railway workshops, minor industries and residential streets, the main road runs northward past Yaba, with industrial and commercial quarters, and Suru-Lere, with extensive housing estates and the national stadium, toward Lagos airport, 12 mi. from the centre of the city. The Yaba Technical institute was founded in 1948. The University of Lagos, opened in 1962, includes a law school and university teaching hospital. Ikoyi, east of Lagos Island, is mainly residential; Victoria Island south of Ikoyi is the latest part to be developed and has apartment blocks for legislators adjoining the site of the new house of representatives. Victoria beach and Tarkwa bay are popular for bathing and surfing.

As well as being the western terminus of the Nigerian railway and road systems, Lagos is the chief port of the federation, more

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LAGOS HARBOUR AND LAGOON WITH APAPA QUAYS (BACKGROUND), IDDO ISLAND (FOREGROUND) AND LAGOS ISLAND (LEFT)

than half of whose total trade pass through it. Numerous shipping lines maintain regular services, while the Lagos lagoon—the only natural inlet for hundreds of miles—is linked by creeks east and west that afford sheltered waterways for small coastal craft. International and domestic air services operate from Lagos airport.

Lagos has the greatest concentration of trade and industry in Nigeria. Industries include brewing, steel fabrication, printing, automobile assembly, food processing, ship repairing and the manufacture of soap, margarine, soft drinks, stationery, tires, furniture and metal containers.

Although Lagos is federal territory it has a separate city council largely independent of the supervisory ministry of Lagos affairs. The *oba* traditionally presides over the council, which is elected triennially by adult suffrage, the leader of the majority party becoming chairman of the council.

The first *oba* of Lagos set up his camp in 1630 on Lagos Island, then only a mudbank in the lagoon. Late in the same century, Portuguese adventurers secured a slaving monopoly in return for building a palace for the *oba*. British attempts to suppress the slave trade culminated in 1851 in a naval attack on Lagos and the deposition of the *oba*. His successor, reluctant to stop the slave trade and incapable of keeping order, agreed in 1861 to cede the port and island to Britain. A flourishing township soon developed, constituted as a separate administration 1862–66 and as one of the West African settlements governed from Sierra Leone until 1874. It was next administered as part of the Gold Coast (modern Ghana) until 1886, when it became a separate colony including a substantial coastal strip, with a protectorate embracing the adjacent hinterland. In 1906 it was joined with the protectorate of Southern Nigeria. In 1914, when Northern and Southern Nigeria were amalgamated, the former Lagos colony became the Colony (as distinct from the Protectorate) of Nigeria and the city's primacy was thereafter never seriously contested. By the federal constitution of 1954 most of the colony was administratively merged into the region of Western Nigeria but the city became the federal capital. This status was confirmed by the 1960 constitution.

(W. H. I.)

LAGRANGE, JOSEPH LOUIS (1736–1813), French-Italian mathematician, who made great contributions to the theory of numbers and to celestial mechanics, was born at Turin, Italy, on Jan. 25, 1736.

Lagrange was educated at Turin college and his early tastes were more classical than scientific. His interest in mathematics was aroused by the chance reading of a memoir by Halley. He then began unaided a course of study, pursued with such effect that at about the age of 16 he was appointed professor of geometry at the artillery academy. When he was 19 he sent to L. Euler a method of dealing with the isoperimetrical problems out of which grew the calculus of variations. In 1758 Lagrange, aided by the marquis of Saluces and G. F. Cigna, founded the society which was later incorporated as the Turin Academy of Sciences. To the five volumes of its memoirs, *Miscellanea Taurinensia,* he contributed many papers.

By 1761 Lagrange was recognized as the greatest living mathematician; but his health broke down, and he never recovered completely. In 1764 he was awarded the prize offered by the Paris Academy of Sciences for an essay on the libration of the moon, in which he used his now well-known equations. This success encouraged the academy to propose, in 1766, as a problem the theory of the Jovian system. The prize was again awarded to Lagrange; and he won the same distinction in 1772, 1774 and 1778. In 1776 Lagrange, on the recommendation of Euler and D'Alembert, went to Berlin to fill the post at the academy vacated by Euler, at the invitation of Frederick the Great, who expressed the wish of "the greatest king in Europe" to have "the greatest mathematician in Europe" at his court. Lagrange lived in Berlin for 20 years, during which time he communicated many memoirs to the Berlin Academy dealing with algebra, mechanics and astronomy, and produced his great work *Mécanique analytique* (1788), which testifies to his genius for generalization and analysis.

After the death of Frederick the Great, Lagrange accepted Louis XVI's invitation to Paris. There he was given apartments in the Louvre, was continually honoured and was treated with respect throughout the Revolution. In 1792 he married the daughter of the astronomer Lemonnier. In 1793 he was made president of the commission for the reform of weights and measures which introduced the metric system; and in 1795 was appointed professor in the École Normale, Paris; the school, however, was closed after a few months. In 1797 he became a professor in the newly founded École Polytechnique, and his lectures were as elegant and original as his writings. The same year he published *Théorie des fonctions analytiques,* which followed the lines of his lectures given on differential calculus. Napoleon was a particular admirer of Lagrange and heaped distinctions upon him, making him a count, senator and high official of the Legion of Honour. In 1810 he began the revision of his *Mécanique analytique,* but died on April 10, 1813, before it was completed. He was buried in the Panthéon, the funeral oration being given by Laplace and Lacépède. Lagrange was a very modest man, and had a great dislike of controversy.

See also references under "Lagrange, Joseph Louis" in the Index. His complete works were edited by Serret and Darboux, *Oeuvres de Lagrange,* 14 vol. (1867–92). Delambre's notice of his life, extracted from the *Mém. de l'Institute* (1812), is given in vol. i. *See* also G. Julia, "La vie et l'oeuvre de J. L. Lagrange," *Enseignement mathematique,* vol. 39 (1951). (O. Oe.; X.)

LAGRANGE, MARIE JOSEPH (1855–1938), French theologian, one of the leading Roman Catholic biblical scholars, was born at Bourg-en-Bresse on March 7, 1855. After studying law in Paris he entered the Dominican order in 1879 and was ordained priest in 1883. Lagrange taught church history at Toulouse (1884–88) and in 1888 studied oriental languages in Vienna prior to being sent by his order in 1890 to establish the Dominican École Pratique d'Études Bibliques in Jerusalem. There he founded in 1892 a new journal, the *Revue biblique,* and in 1903 started a series of scholarly commentaries on the Bible, the *Études bibliques,* with three volumes on the historical method of Old Testament criticism, on the Book of Judges and on the Semitic religions (1903). Although Lagrange welcomed the papal antimodernist pronouncements, his historicocritical commentary on Genesis so clearly represented the modernist point of view that it could be published only in part and privately (1906). In 1912 the opposition aroused by his methods of source criticism led to his being recalled to France by his superiors. He submitted to the papal judgment and was sent back to Jerusalem, where he taught, except during World War I, until his death at the St. Maximin priory, Marseilles, on March 10, 1938. His important commentaries on Mark (1911), Romans (1916), Galatians (1918), Luke (1921), Matthew (1923) and John (1925) in the *Études bibliques,* his books in the same series, *Le Judaisme avant Jesus-Christ* (1931), *Histoire ancienne du canon du Nouveau Testament* (1933), *Les Mystères: l'Orphisme* (1937) and above all his masterpiece on the textual criticism of the New Testament (1935) remain indispensable works that unite critical acumen and wide learning with loyalty to his church's tradition. (W. G. Kü.).

See F. M. Braun, *L'Oeuvre du Père Lagrange* (1943); an English adaptation *The Work of Père Lagrange* by R. T. Murphy (1963).

LA GRANGE, a city of western Georgia, U.S., 41 mi. N. of Columbus; the seat of Troup county. Incorporated in 1828, it soon became an important trade centre in an expanding plantation area; its oldest houses were built in classic style. Poultry, livestock and pulpwood have replaced cotton production in agricultural importance. Textile workers comprise the largest single occupational group; the factories produce carpets, towels, garments and natural and synthetic fabrics. Lumber products are second in importance. The city has a council-manager form of government, in effect from 1950. Near La Grange are Warm Springs (*q.v.*) and the Callaway gardens, privately operated, with a lake, a golf course and other facilities, the most noted recreation attraction in western Georgia. La Grange college, chartered in 1831 as an academy for women, is a coeducational liberal arts institution having the longest continuous history of any private college in Georgia. La Grange was named for the estate of the Marquis de Lafayette, who visited the area in 1825 as a guest of the governor of Georgia. For comparative population figures *see* table in Georgia: *Population.* (Js. C. B.)

LA GUAIRA, Venezuela's most important seaport city, lies on the Caribbean coast at the foot of the central highlands and in the federal district; it serves the capital, Caracas (10 mi. south over the mountains), and the entire central part of the republic. Its climate is more tropical, and hence more trying, than that of Caracas, which is about 3,000 ft. above sea level. Although founded in 1577, La Guaira grew slowly because of its climate and the limited area for expansion: it is built on a narrow beach under massive cliffs. Three highways connect La Guaira with Caracas; on one of these, completed during the early 1950s at a cost of $60,000,000, the 10-mi. trip can be made in 20 minutes. A railway built by British interests, but now operated by the national government, also connects La Guaira with Caracas, winding through the mountains for a distance of 23 mi. On La Guaira's western edge, Maiquetía, literally wrested from the mountains and the sea by blasting and filling in, is a major port of entry by air for goods of high value, mail and passengers. Macuto, to the east, is a fashionable seaside resort.

The seaport of La Guaira handles about 48% of Venezuela's exports and imports, the principal exports being coffee and cacao. A British company developed the harbour late in the 19th century, but in 1940 it became nationalized, as are all Venezuelan ports except certain oil ports. During the 1950s the port was much improved with new warehouses, a quay and breakwaters. Pop. (1961) 20,497. (L. We.)

LA GUARDIA, FIORELLO HENRY (1882–1947), U.S. congressman and mayor of New York city, was born in New York city on Dec. 11, 1882, the son of an army bandmaster. He was reared in Arizona and at the age of 16 moved to Budapest, Hungary, with his mother. He was employed at the U.S. consulate there and later served in the consulates at Trieste and Fiume, returning to the United States in 1906. While working as an interpreter for the U.S. immigration service he earned his law degree at New York university and was admitted to the bar in 1910. He was elected to congress as a Republican in 1916 but resigned to serve as a pilot with the air service of the U.S. army signal corps in World War I. In 1918 he returned to congress and in 1920–21 served as president of the New York city board of aldermen. In 1922 La Guardia was re-elected to congress where he became known as a progressive. He shared responsibility for the enactment of the Norris-La Guardia act (1932) that forbade courts to issue injunctions to restrain strikes, boycotts and peaceful picketing. In 1933 La Guardia was elected mayor of New York city on a fusion ticket, a position to which he was re-elected in 1937 and 1941. The colourful "Little Flower," as he came to be called, was known as a reform mayor; he fought corruption, fostered civic improvement and brought about a revision of the city charter. He was appointed director of the Office of Civilian Defense on May 26, 1941, and served as director general of the United Nations Relief and Rehabilitation administration (UNRRA) in 1946. He was forced to retire because of ill health and died in New York city on Sept. 20, 1947.

See Arthur Mann, *La Guardia: a Fighter Against His Times* (1959); Howard Zinn, *La Guardia in Congress* (1959). (Ri. W. C.)

LAGUNA, Philippine province in southern Luzon, bordering the southern shores of Laguna de Bay, the largest lake in the islands. Area 679 sq.mi. Pop. (1960) 472,064. The province is comprised of a series of quiescent volcanoes alternating with level to gently rolling plains areas. Rainfall averages 70–90 in., with a dry season from November to May. Two rice crops are raised yearly with irrigation. Large volumes of copra are produced.

Santa Cruz, pop. (1960) 32,850, is the provincial capital but the largest city is San Pablo (*q.v.*). Biñan and Calamba are important market and fishing towns on Laguna de Bay, while Pagsanjan has a hydroelectric station and a waterfall which attracts tourists. (R. E. He.)

LAGUNA, LA, a town, the seat of a bishop and of a university, the former capital of Tenerife, one of the Canary Islands (*q.v.*). Pop. (1960 mun.) 57,344. It lies 8 km. (5 mi.) N. by W. of the port of Santa Cruz de Tenerife, on a plain 1,800 ft. above sea level. The mean annual temperature exceeds 16° C. (61° F.) and snow is unknown, but the average yearly rainfall of 25 in. (mainly October–April) is heavy for the Canaries. The combination of moisture, warmth and rich volcanic soils produces grapes and abundant crops of cereals, fruits and vegetables. Los Rodeos, the airport for Santa Cruz, is near La Laguna. (R. P. Be.)

LA HABANA, Cuba: *see* Havana.

LA HARPE, JEAN FRANÇOIS DE (1739–1803), influential French critic, was born in Paris, Nov. 20, 1739. Of several uninspired plays, the best are perhaps *Warwick* (1763), a successful tragedy, and *Mélanie* (published in 1778), a pathetic drama never performed. Befriended by Voltaire, he lived for some time at Ferney. Returning to Paris in 1768, he wrote for the *Mercure de France* and acquired a reputation as a severe and provocative critic. He was elected to the Académie Française in 1776. In 1786 he began to lecture at the newly-established Lycée. His lectures published as the *Cours de littérature,* 16 volumes (1799–1805), show La Harpe at his best: his standpoint was independent of contemporary polemics and, though inexact on earlier writers, he was sound in his analysis of 17th-century literature, in particular in his *Commentaire sur Racine* (1807).

Although an extreme revolutionary, La Harpe was imprisoned in April 1794. He underwent a spiritual crisis in prison and, having become an ardent Catholic and reactionary, attacked his former friends when he returned to the Lycée. He died Feb. 11, 1803, in Paris. His *Œuvres* were published in 16 volumes in 1821. (W. D. Hh.)

LA HIRE (La Hyre), **LAURENT DE** (1606–1656), French painter and etcher of the transitional period preceding the classicism of Nicolas Poussin and Claude Lorraine, was born at Paris on Feb. 27, 1606. A pupil of his father, Étienne, and later of G. Lallemand, he was influenced by the works of Francesco Primaticcio at Fontainebleau as well as by those of Simon Vouet. His picture of Nicolas V opening the crypt (Louvre) was executed in 1630 for the Capuchins of the Marais; it shows a gravity and sobriety of character which marked La Hire's best work, and seems to have been of some influence on Eustache Le Sueur.

La Hire's drawings are treated as seriously as his paintings, and always show simplicity and dignity of effect. The example of the Capuchins, for whom he executed several other works in Paris, Rouen and Fécamp, was followed by the Goldsmiths' company, for whom he produced in 1635 "St. Peter Healing the Sick" (Louvre) and the "Conversion of St. Paul" in 1637. In 1648, with 11 other artists, he founded the French Royal Academy of Painting and Sculpture.

Richelieu called La Hire to the Palais Royal around 1640, to decorate the Salle des Gardes with mythological scenes. Chancellor Séguier, Tallemant de Reaux and many others also entrusted him with important works of decoration. For the Gobelins he designed a series of large compositions for tapestries. La Hire painted portraits, and etched about 40 plates of religious, mythological, portrait and landscape subjects.

He died in Paris, Dec. 28, 1656.

LAHN, a river of Germany, a right-bank tributary of the Rhine. Its source is on the Jagd Berg (2,218 ft.), a summit of the Rothaargebirge. It flows at first eastward and then southward to Giessen, then turns southwestward and with a winding course reaches the Rhine between the towns of Oberlahnstein and Niederlahnstein. Its valley, the lower part of which divides the Taunus hills from the Westerwald, is often very narrow as it lies along a line of structural weakness. Among the towns and sites of interest on its banks are Marburg and Giessen with their universities, Wetzlar with its cathedral, Runkel with its castle, Limburg with its cathedral, the castles of Schaumburg, Balduinstein, Laurenburg, Langenau, Burgstein and Nassau and the health resort of Bad Ems. The Lahn is 245 km. (152 mi.) long; it is navigable to small barges from its mouth to Giessen, and is partly canalized. (X.; R. E. Di.)

LAHNDĀ LANGUAGE (Western Panjābī) is the Indo-Aryan language (*q.v.*) of west Punjab (Pakistan), adjoining linguistic areas of Panjābī and Kāshmīrī to the east and north, Rājasthānī and Sindhī to the south and southwest and Balōchī and Paṣhtō to the west. Of the three main dialects of Lahndā, the southern, spoken in the doab of the Shahpur district, is the stand-

ard. A peculiarity of Multānī, a subdialect of the Multān and neighbouring districts, is the presence of recursive consonants, a feature also found in Sindhī (*q.v.*). A large number of Persian and Arabic words entered the vocabulary during the 1,000 years of Muslim rule.

Phonology.—The Lahndā phonological system corresponds in general to that of other Indo-Aryan languages. Whereas in other languages of the family short final vowels were lost after single consonants, in Lahndā the old final vowel affected the vowel of the preceding syllable; *e.g.*, from the Indic nominative singular masculine *kukkaṛ-u* ("fowl") was formed Lahndā *kukkuṛ* (with replacement of *a* by *u*). Kāshmīrī (*q.v.*) shares this peculiarity. Another feature is *h* pronounced like Arabic *'ain* when initial or medial after an accented syllable. In other positions the pitch of a preceding vowel is raised.

Morphology.—Lahndā has two genders, masculine and feminine, and two numbers, singular and plural. Case relationship is usually indicated by postpositions which are appended to the oblique form. There are some instances of suffixes for the locative, ablative and instrumental cases. An adjective agrees in gender, number and case with its noun; the comparative form has the suffix *ērā*. As in other Indo-Aryan languages, comparison is expressed by a postposition meaning "from" or "than" (here *thõ or nāḷõ*) added to the noun with which the comparison is made. Lahndā shares with Sindhī, and partly with Kāshmīrī, the use of pronominal suffixes attached to nouns and participles by means of certain junction vowels.

Verbs fall into two classes—transitive and intransitive. The passive verbal stem is made by adding *ī* to the root, and at the same time shortening the root vowel; the causal stem, by adding *ā* to the root. The subjunctive is made by attaching the appropriate personal endings to the verbal root; the future stem, by adding *ēs* to transitive roots, *s* to intransitives. Compound tenses are created from participles plus auxiliary tenses. (For a sketch of Lahndā, *see* the *Linguistic Survey of India,* vol. viii, part i [1919].)

Literature.—There is little recorded literature in Lahndā. In writing, Muslims use a variety of Persian script, and Hindus, the Laṇḍa script (related to Mahājanī of Māṛwāṛ and Śāradā of Kāshmīr).

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LA HOGUE, BATTLE OF, the name given in English to a series of engagements between the Anglo-Dutch and French fleets in the English channel in May 1692 during the War of the Grand Alliance. A French army under the marshal de Bellefonds (Bernardin Gigault) and the exiled King James II having been assembled for the invasion of England, Adm. de Tourville with the Brest fleet of 44 ships was ordered up the English channel to cover the operation. An Anglo-Dutch fleet of 63 English and 36 Dutch ships under Adm. Edward Russell and Adm. Philippus van Almonde put to sea to oppose him. Since he considered that his honour had been impugned by criticism from the court at Versailles, Tourville was determined to attack despite the manifest inferiority of his force. Permission to avoid battle in the circumstances never reached him, nor were any grounds found for the confidence of the Jacobite party that the English fleet would prove disloyal.

On May 29 (new style; 19, old style), 1692, the fleets met off Barfleur near Cherbourg. Tourville attacked and, though the Dutch failed to double his line, it was broken by Rear Adm. Sir Cloudesley Shovell. The French escaped from a critical position when the tide turned and carried many of the English ships back through their line with heavy loss. Tourville then withdrew but Russell continued an intermittent chase in bad weather until May 31 (N.S.; 21, O.S.), when F. D. d'Amfreville, piloted by a local sailor, Hervé Riel, escaped to St. Malo through the treacherous Race of Alderney. The flagship, "Soleil Royal," was carried into Cherbourg where, with other big ships, it was burned by Vice Adm. Sir Ralph Delavall. Tourville himself turned back east with the remainder of his ships to anchor under the guns of Ft. St. Vaast near La Hogue. There, on the night of June 2 (N.S.; May 23, O.S.) boats and frigates under Sir George Rooke destroyed all but nine French ships under the eyes of James II.

The 19th-century historian Jules Michelet claimed that the completeness of this victory changed the course of history by turning the French monarchy away from the sea toward unrewarding military campaigns on land. Certainly the navy that the great Colbert had created was now destroyed, and the French effort at sea was henceforth concentrated on commerce destruction. As a thank offering for the victory the English sovereigns William and Mary founded the Royal Naval hospital at Greenwich.

See O. Troude, *Batailles navales de la France* (1867); J. Tramond, *Manuel d'histoire maritime de la France* (1927); J. Ehrman, *The Navy in the War of William III* (1953). (C. C. L.)

LAHORE, the capital of West Pakistan and an ancient city which gives its name to a district and a division, lies near the left bank of the Ravi river, about 758 mi. N.E. of Karachi by rail. The population of the city, including the cantonment (68,481), was 1,296,477 at the 1961 census. Because of its inland position Lahore is very hot in summer but pleasantly cool in winter.

The modern city of Lahore, which covers 128 sq.mi., may be divided into four parts: the old city; the civil station; the cantonment 3 mi. beyond; and the suburbs, of which Model Town, Gulberg, Wahdat Colony, Samnabad, Choburji Gardens and Shadbagh are the chief. The old city was formerly surrounded by a 30-ft.-high brick wall and a moat, but these have been replaced, except in the north, by a garden. A circular road around the rampart gives access to the city by 13 gates. The architecture of Lahore cannot compare with that of Delhi, although there are some beautiful buildings in the fort dating from the time of Jahangir and Shah Jahan. The mosque of Wazir Khan (1634) and the northern wall of the fort display magnificent examples of kashi or encaustic tile work. Aurangzeb's Badshahi Masjid is a lofty structure of red sandstone ornamented with marble tracing. The buildings of Ranjit Singh and his mausoleum are common and meretricious in style. He was, moreover, responsible for much of the despoiling of the earlier buildings, having stripped the Muslim tombs of their ornaments and sent them to Amritsar. Two of the chief features of the city lie outside its wall—Shahdara and Shalimar gardens. Shahdara, about 3 mi. N. across the Ravi, contains the tomb of the emperor Jahangir, surrounded by a garden. The tomb itself is a splendid marble monument in a building largely of red sandstone, with a profusion of marble ornaments arranged in elegant mosaics representing flowers, and inscriptions in Arabic and Persian. The Shalimar gardens 6 mi. to the east, which were laid out in 1641 by Shah Jahan, are among the most magnificent in the world. Originally planned in seven parts, the gardens now have 3 terraces, rising one above the other, and 427 fountains in an area of 39 ac. Bagh-i-Jinnah, formerly Lawrence gardens, on the Mall is also very fine.

Lahore is an important junction on the Pakistan Western railway system, with connections to Karachi, Peshawar, Quetta and with India through Wagah. It is a leading commercial and banking city and the centre of one of Pakistan's principal industrial regions, with numerous cotton, silk, shoe, rubber, iron, steel and other mills. It is also noted for gold and silver lace and ornaments. Lahore is the chief educational and cultural centre of West Pakistan, being the seat of the University of the Punjab (1882), the oldest and largest in Pakistan, with its numerous colleges and institutes. A university of engineering and technology was established in 1961. Lahore is also the headquarters of the board of secondary education. The Punjab library in the city is one of the best in West Pakistan. The city has a sports stadium.

The site of Lahore has been occupied from early times and much of it stands high above the surrounding country, raised on the re-

mains of a succession of former habitations. The name appears in history under about 15 forms, one of which, Lohawar, means "the fort of Loh." Hindu tradition traces the origin of Lahore to Loh or Lava, son of Rama, hero of the epic *Ramayana*. Hsüan Tsang (*q.v.*), the Chinese traveler, notices the city in his *Itinerary*, and it seems probable that it was founded at the end of the 1st or the beginning of the 2nd century A.D. Lahore fell successively under the domination of the Ghazni and Ghori (Ghuri) sultans, who made it the capital of their Indian conquests and adorned it with numerous buildings, almost all now in ruins. But it was under the Mogul empire that Lahore reached its greatest magnificence when it became a place of royal residence. The reigns of Humayun, Akbar, Jahangir, Shah Jahan and Aurangzeb form the golden period in the annals and architecture of the city, but from the accession of Bahadur Shah I till the establishment of the rule of Ranjit Singh in 1799, its history is one of successive invasions and conquests. The Sikhs ruled Lahore from 1765 to 1849 when, at the end of the Second Sikh War, it came under British domination with the rest of the Punjab. Ranjit Singh made it the capital of his kingdom. Under British rule it became the capital of the province of Punjab and remained so till the partition of the subcontinent in 1947, when it became the capital of West Punjab in West Pakistan. In Oct. 1955 it became the capital of the unified province of West Pakistan.

LAHORE DISTRICT has an area of 2,216 sq.mi. and a population (1961) of 2,479,687. It lies between the Sutlej and Ravi rivers in the Bari Doab. The old course of the Beas passes through the middle, from northeast to southwest. The Manjha plateau, between the Ravi and the Beas, has been rendered fertile by the Upper Bari Doab canal. The principal crops are wheat, barley, millet, maize, oilseed and cotton. There are flour mills and numerous factories for ginning and pressing cotton. Lahore, Kasur, Chunian and Raiwind are the chief trade centres. Production of yarn and textile fabrics, glass and ceramics, leather goods and wood and bamboo work are the chief cottage industries.

LAHORE DIVISION lies in the northeast of West Pakistan and comprises the districts of Lahore, Sheikhupura, Gujranwala and Sialkot. Area 8,907 sq.mi. Pop. (1961) 6,448,575. While Lahore lies in the Bari Doab, the other three districts occupy the northeastern half of the Rechna Doab, between the Ravi and the Chenab. The whole area consists of a flat plain, sloping gradually to the southwest. The submontane strip has a good rainfall (20–35 in.). A large area is irrigated by the Upper Bari Doab, Upper Chenab and Lower Chenab canals; wells are also numerous. More than 75% of the cultivated area is irrigated, wheat being the principal crop. Other products include barley, maize and gram. The districts of Sheikhupura, Gujranwala and Sialkot are also important for the cultivation of rice and sugar cane, and Lahore for cotton. Lahore-Sheikhupura is one of the chief industrial regions of West Pakistan with subsidiary centres at Gujranwala and Sialkot. There are numerous rice and flour mills, and tanning and leather-processing works in the rural area. The division has the highest population density in West Pakistan, with 724 persons to the square mile in 1961. (K. S. AD.)

LAHTI, a town in Häme *lääni* (county), Fin., is situated at the southern end of Lake Vesijärvi, on and between the glacial ridges of Salpausselkä. Pop. (1960) 66,802. Lahti is a modern, rapidly growing town known internationally for its annual championship ski races. Well known are the town hall (built by Eliel Saarinen in 1912) and the concert hall. Lahti has numerous educational institutions, a theatre and orchestra, a museum and an art gallery. The most important radio station in Finland is situated in Lahti; there is also a television station. The town is the centre of the Finnish furniture industry. There are also woodworking factories, a clothing industry, breweries and a considerable foodstuff industry. There is a hydrofoil connection along Lake Päijänne to Jyväskylä; a motorship route runs to Heinola. Lahti was granted town rights in 1905. (E.-S. KU.)

LAI, a term, probably Celtic in origin, having two meanings in French: (1) A 12th-century narrative poem in octosyllabic couplets relating a sentimental adventure from Celtic sources, best exemplified by Marie de France (*q.v.*). (2) A lyric composition which developed from the late 12th to the 16th centuries (when it passed out of use) as a poem of 12 stanzas, each bipartite, usually quadripartite, and with its own melodies, all of which differ in metrical and rhyme pattern except the first and last, which are identical in these respects, but not in words. From this *grand lai* there derived in the late 15th century the *petit lai*, a single 2- or 4-part stanza of 12 lines, and the *double lai* or *lai renforcé* of 16 or 20 lines.

See G. Lote, *Histoire du vers français*, II, pp. 219–226 and 253–259 (1951). (F. J. WE.)

LAIBACH, CONGRESS OF (1821), the meeting of the powers of the Holy alliance (*q.v.*) at Laibach (Ljubljana in Slovenia) from Jan. 26 to May 12, 1821. It was attended by the Russian emperor Alexander I, with his foreign minister Count K. R. Nesselrode; by the Austrian emperor Francis I, with his chancellor Metternich; by the king of Prussia, Frederick William III, with his foreign minister C. G. von Bernstorff; by Ferdinand I, king of the Two Sicilies; by Charles Felix, king of Sardinia (Piedmont); by Francis IV, duke of Modena; and by Ferdinand III, grand duke of Tuscany. Also present as observers were the British and French ambassadors to Austria, namely Lord Stewart (Charles William Stewart, later 3rd marquess of Londonderry) and the marquis de Caraman (V. L. C. de Riquet).

The aim of the congress was to determine the conditions of the Austrian intervention in the Two Sicilies, which had already been decided upon at the congress of Troppau (*q.v.*), against the liberal revolution that had taken place in Naples in July 1820. The Russian and Austrian emperors and the king of Prussia, in agreement with King Ferdinand, decided to abolish the Neapolitan constitution and authorized the Austrian army to restore the absolutist monarchy. To justify their intervention, they proclaimed their hostility to the regimes born of revolutions and their right to combat them.

The British and French governments, unable to defend such a policy before their parliaments, publicly protested against these decisions, refused to be associated in the intervention and proclaimed their neutrality. The Neapolitans were thus encouraged to resist, but their forces were defeated by the Austrians at Rieti (March 7). Nevertheless, the Neapolitan example encouraged the Piedmontese to stage a successful *pronunciamiento* in Turin (March 10), whereupon Alexander immediately ordered his army to march toward Italy to help the Austrians. France proposed to mediate, but Great Britain stood aside, and in the meantime the Austrians defeated the Piedmontese at Novara (April 8), making the Russian intervention unnecessary. The Austrian army was then authorized to occupy those Italian lands where revolutionary movements were prevailing.

The congress of Laibach was a triumph for the Holy alliance within the framework of the quintuple alliance of the three eastern monarchies with France and Great Britain. Within the Holy alliance itself, it marked the predominance of the antiliberal policy of Austria. (J. H. PI.)

LAIDONER, JOHAN (1884–1952?), Estonian army officer, commander in chief of the Estonian forces during the war of independence of 1918–19, was born at Viiratsi, near Viljandi, on Feb. 12, 1884. He chose a military career in the Russian army, passed through the Vilnius cadets' corps and graduated from the St. Petersburg military academy. During World War I, he became assistant head of intelligence on the Russian western front and later, as lieutenant colonel, chief of staff of a division. When the Estonian provisional government decided in Dec. 1917 to form a national army, Laidoner was appointed commander of the 1st division. During the German occupation of Estonia (Feb.–Nov. 1918), he took refuge in Soviet Russia, assembling the Estonian soldiers still there. He returned to his country in Dec. 1918, shortly after the Soviet attempt to invade it. On Dec. 23 the provisional government appointed him commander in chief of the Estonian forces, and two months later he liberated the national territory. (*See* ESTONIA: *History.*)

Laidoner left the army with the rank of lieutenant general in 1920 and entered politics, but was recalled to service for a short time on Dec. 1, 1924, to deal with a Communist coup, and again in 1934 when Pres. Konstantin Päts proclaimed a state of emergency.

In 1925 Laidoner presided over the League of Nations commission on the Mosul frontier dispute between Great Britain and Turkey. After the Soviet army had occupied Estonia in 1940, he was arrested on July 19 and deported to Penza, in Russia, where—according to Soviet sources—he died 12 years later.

See V. Saarsen, *Johan Laidoner* (1953). (E. Ar.)

LAÍNEZ (Laynez), **DIEGO** (1512–1565), second general of the society of Jesus, who played an active part in the Council of Trent, was born at Almazán, Castile. After studying at Alcalá and Paris, where he met Ignatius Loyola, he was ordained priest at Venice in 1537. He accompanied Giovanni Cardinal Morone to the diet of Augsburg (1555), and took part in the colloquies of Poissy (1561–62), and the Council of Trent (1546, 1551, 1562–63). In 1556 he was elected vicar general and in 1558 general of the order. During his tenure of office, numerous colleges and residences were established in Europe and new foreign missions were opened. He died in Rome on Jan. 19, 1565.

Laínez' chief published writings are *Disputationes Tridentinae* (ed. by H. Grisar, 2 vol., 1886) and his letters in *Monumenta historica societatis Jesu. Lainii monumenta,* eight volumes (1912–17).

See M. Scaduto, *L'Epoca di Giacomo Laínez* (1964); J. Brodrick, *The Progress of the Jesuits,* ch. 3 (1946). (E. J. Bs.)

LAING, ALEXANDER GORDON (1793–1826), Scottish explorer of Africa and the first European to reach Tombouctou, was born at Edinburgh on Dec. 27, 1793. He was educated at Edinburgh university and visited Barbados in 1811. He was promoted to a company of the Royal Africa corps and in 1822, when serving in Sierra Leone, was sent by the governor, Sir Charles MacCarthy, to Mandingo country to attempt to develop trade and to abolish slaving. That year he visited Falaba, the capital of Sulima country, and discovered the source of the Rokell. He was prevented by the natives from reaching the source of the Niger. Laing fought in the Ashanti War (1823–24) and carried home the dispatches with the news of MacCarthy's death in action.

Lord Bathurst, secretary for the colonies, then instructed Laing to travel to Tombouctou and to explore the Niger basin. He left Tripoli on July 16 and began his journey across the Sahara. He reached Ghadames by September and in December was well received in Tuareg country. From there in Jan. 1826 he set out for Tombouctou across the Tanezroft desert and arrived on Aug. 18 after having to fight to protect himself and being severely wounded. He left Tombouctou on Sept. 24 and was murdered two days later. His papers were never recovered though it is believed that they were brought secretly to Tripoli in 1828.

The journal of Laing's earlier travels, *Travels in the Timannee, Kooranko and Soolima Countries, in Western Africa,* was published in 1825. (R. M. P.)

LAIRD, MACGREGOR (1808–1861), Scottish pioneer of legitimate commerce on the Niger river, largely undertaken as a means of undermining the influence of the slave trade, was born at Greenock in 1808. As the lower course of the Niger had been made known in 1831 by Richard and John Lander, Laird formed a company of Liverpool merchants to take advantage of this discovery. In 1832 the company dispatched a brig and two small steamers to the Niger; one, the "Alburkah," a paddle-wheel vessel of 55 tons designed by Laird, was the first iron vessel to make an ocean voyage. The expedition proved that the lower Niger could be navigated by ocean-going ships, but of its original 48 Europeans all but nine died from fever or from wounds.

Laird ascended the Benue as far as Fundah, being the first white man to do so, and formed an accurate idea of the river's course and source. On this journey he underwent many hardships from which he never fully recovered.

On his return to Liverpool in 1834, Laird published, with R. A. K. Oldfield in 1837, the *Narrative of an Expedition into the Interior of Africa by the River Niger. . . .* Later, he mainly devoted himself to the opening up of the Niger territory, and to the founding of the African Steam Ship company. In 1854, a second Niger expedition, promoted by him and led by W. B. Baikie, penetrated 150 mi. beyond any place previously reached and, as a result of good organization and the use of quinine, not a life was lost. The success of this venture, a landmark in the development of west Africa, led to expeditions by other traders. Laird's pamphlet on the price of sugar, published in 1844, shows concern both for the welfare of the English poor and of the Negro peoples and, with his *Narrative,* points to humanitarianism rather than personal advantage as the mainspring of his trading activities. Laird was one of the promoters of a company formed in 1837 to run steamships between England and New York, and the "Sirius," sent out by this company in 1838, was the first ship to cross the Atlantic from Europe entirely under steam.

Macgregor Laird, who was the brother of John Laird, pioneer of iron shipbuilding and first M.P. for Birkenhead, died in London, Jan. 9, 1861, while preparing another Niger expedition. (J. E. A.)

LAIS, in ancient Greece the name of several hetairai or courtesans in the 5th and 4th centuries B.C. The Greek writer Athenaeus (*fl. c.* A.D. 200) in his *Deipnosophistae* ("Authorities on Banquet") mentions a Corinthian of that name who was supposed to have been the mistress of the philosopher Aristippus of Cyrene (*c.* 435–356 B.C.); elsewhere in the same work a Lais is said to have been the daughter of Timandra or Damasandra, Alcibiades' mistress, and to have come to Corinth from Hyccara in Sicily; another, still a child in the time of Alexander the Great, is also mentioned as a native of Corinth.

Much that is related of them is anecdote rather than history ("Lais" was used proverbially as a name for an outstanding beauty) and it is difficult to distinguish the three in the account of Athenaeus.

See Athenaeus, *Deipnosophistae,* xii, 535c, 544b, d, and xiii *passim.*

LAISSEZ FAIRE, a French expression denoting a policy based on a minimum of interference by the government in the economic and political affairs of individuals and of society. *Laissez faire* was a doctrine usually associated with the physiocrats (*see* Physiocratic School) who flourished in France from about 1756 to 1778. Historically, the laissez-faire doctrine prevailed until at least the middle of the 19th century and has some adherents even today.

The origin of the term is uncertain. Two leading physiocrats, Mirabeau and Mercier de la Rivière, attributed it to Vincent de Gournay. A. R. J. Turgot, comptroller general under Louis XVI and biographer of Gournay, in his *Elogé de Gournay,* attributed the maxim to Le Gendre, a merchant who vigorously protested against excessive state regulation of industry and pleaded for liberty of action in the phrase, *Laissez-nous faire.* August Oncken credited the term to the Marquis d'Argenson, who used it in his *Mémoires* as early as 1736. (The entire phrase is, *Laissez faire et laissez passer: le monde va de lui-même.*) Since d'Argenson defended the cause of free trade with vigour, it is not improbable that he gave the term its immortality. Regardless of its origin, it became the epitome of a powerful philosophy that pervaded economic and political thought for many years.

The policy of *laissez faire* is usually associated with classical economics as it developed in Great Britain under the influence of Adam Smith. Smith was influenced by the founder of the physiocratic school, François Quesnay, whom he visited while in France. It is certain, however, that Smith opposed the monopolies enjoyed by so many under the prevailing policy known as mercantilism.

Classical economics taught that trade should be free and not a monopoly of a privileged few. Smith believed that the government should keep hands off the individual actions of men and the economic affairs of society. The belief stems from an optimistic view of the nature of man and the universe and a natural order or system of economic harmonies that will assure mankind the greatest advantage if permitted to work unhampered. It was held that the natural order was divine, universal and immutable and rooted in man's very nature. This explains, to a degree, the optimistic faith in the power of unregulated individual activity to bring about social benefits.

This basic philosophy pervades classical economics. It was implied in the works of Ricardo and Malthus, but John Stuart Mill first brought it into popular usage in his *Principles of Political Economy* (1848), wherein he set forth the arguments for and against government activity in economic affairs.

The most ardent practitioners of the free-trade principle were Richard Cobden and John Bright, cofounders of the Manchester school in England. In addition to supporting free trade in world commerce, they opposed such measures as the factory acts and acts regulating workers' wages. Cobdenism is still a synonym for free trade in England. Specifically, the principle of *laissez faire* in economics calls for perfect freedom in production; distribution of the returns (or profit) to the factors of production according to the productivity of each; and finally, markets in which prices are determined by the free interplay of forces that satisfy buyers and sellers.

Laissez faire is a political as well as an economic doctrine. The English philosopher Jeremy Bentham developed its political aspect into a potent philosophy of hedonism or utilitarianism. The basic hedonistic assumption is that an individual will seek pleasure and avoid pain. It implies that every person is the best judge of his own happiness and that no barriers should be erected to thwart his objective. The utilitarian phrase, "the greatest good for the greatest number," was adapted from the philosopher Francis Hutcheson (1694–1747), Smith's beloved teacher at Glasgow. Hutcheson's phrase, "the greatest happiness to the greatest number," characterized his outlook on religion, politics and political economy. Smith was aware of this philosophy before he visited France and before he published *The Wealth of Nations* in 1776. (*See* UTILITARIANISM.)

The combined economic and political attacks on state interference were largely responsible for the enactment of laws that characterized political democracy in the 19th century. Among them were the extension of the right to vote, changes in judicial procedure and in the laws of contract, and abolition of religious inequality. The pervading theory of this period was that the individual, pursuing his own desired ends, would thereby achieve the best results for the society of which he was a part. The function of the state was to maintain order and security, and to avoid interference with the initiative of the individual in pursuit of his own desired goals. (*See* INDIVIDUALISM.)

Laissez-faire philosophy prevailed in most nations for many years. It reached its peak around 1870, by which time the Industrial Revolution had nearly run its course. The rapid growth of industrialization brought excesses that could not be tolerated. The free working of the price system led to price fixing and combinations that made pricing of goods more a function of production than of demand in the competitive market, and these excesses brought forth antimonopoly measures. Experience has taught that *laissez faire* as a guiding philosophy cannot always be trusted; modern society is far more complex than that which prevailed when the laissez-faire philosophy was propounded.

In the late 19th century the industrial nations went through great changes in production techniques. Political changes also were so great that most of the motivating causes of Smith's and Bentham's time disappeared. Large-scale enterprises using methods of mass production and mass distribution weakened the power of the consumer and made his influence over the pricing and production processes negligible. Monopoly power was assumed by the state, ranging from small regulatory measures all the way to a totalitarian system that assumes to know what is best for the individual. As pointed out by Friedrich Hayek (*The Road to Serfdom*), Lionel Robbins (*The Economic Basis of Class Conflict*) and others, this was the end of *laissez faire*. In a highly competitive, nationalistic world, its theoretical economic and political basis was almost destroyed.

Even though the original concept of *laissez faire* had to yield to new theories, it still lives on and fights a vigorous rear-guard action. Many persons prefer less government regulation and resent the regulative practices of modern states. Others demand more rather than less regulation, thereby implying that society does not dare entrust its present and future to "unplanned" activity. The survival of nations in two world wars depended in large measure upon their ability to marshal productive forces for the greater good, often at the expense of some of their citizens.

The original laissez-faire doctrine called for a separation of economics and politics. Such a policy today would be an anachronism of impossible proportions, for politics and economics are inseparable in the modern state. Some freedom of economic motivation still exists; the consumer may still exercise some choice but his influence on the market structure is vastly different from what it was in 1756. People fear unregulated competition almost as much as they fear the failure of the productive process. The capitalistic system in most nations demands that the state be the umpire. *See* also references under "Laissez Faire" in the Index.

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LAJPAT RAI, LALA (1865–1928), Indian politician and extreme nationalist, was born in 1865 at Jagraon in the Ludhiana district of the Punjab. His father was Munshi Radha Krishna Lala, an Urdu author, who was converted to the conservative Hindu cult of the Arya Samaj (*q.v.*). After studying law at the Government college, Lahore, Lajpat Rai practised first at Hissar and then at Lahore, where he helped to found the Dayananda Anglo-Vedic college. Turning to politics, he joined the extremist wing of the Congress party and became closely associated with Balgangadhar Tilak (*q.v.*). For taking a leading part in political agitation in the Punjab he was deported without trial, in May 1907, to Mandalay. This action disturbed John Morley, the secretary of state for India, who found it difficult to defend against radical criticism in the house of commons, and in Nov. 1907 Lord Minto, the viceroy, decided to release him. When Lajpat Rai returned, with enhanced prestige, the extremist group tried to secure his election as president of the Congress party session at Surat in Dec. 1907. The moderate leaders refused to agree to the election of a deportee, and this was one of the reasons why the extremist group thereupon left the Congress party, not to return until 1916. In 1908 Lajpat Rai published *The Story of My Deportation* and in 1915, *Arya Samaj.*

He spent some time in the United States during World War I, and published *The United States of America: a Hindu's Impressions* (1916), in which he devoted some attention to social problems and to the Negroes whom he regarded as the untouchable class of that country. On his return to India he became president of the special session of the Congress party which launched the nonco-operation movement in 1920. He was imprisoned for seditious activities in 1921, but was released in 1923 and was then elected to the legislative assembly. In 1928 he moved the legislative assembly resolution for the boycott of the Simon commission on constitutional reform. While in a poor state of health he was involved in a demonstration against that commission, which was broken up by the police, and he died in Lahore on Nov. 17, 1928. It was asserted that the police were responsible, but this was officially denied. His last important work, *Unhappy India* (1928), was a reply to Katherine Mayo's *Mother India.*

(KE. A. B.)

LAKANAL, JOSEPH (1762–1845), the reformer of the French educational system during the Revolution, was born at Serres, near Foix, on July 14, 1762. Though his father was an illiterate blacksmith, he became a teacher and was later vicar assistant to his uncle Bernard Font, the "Constitutional" bishop of Pamiers, till in 1792 he was elected to the Convention as deputy for Ariège. He voted for the death sentence for Louis XVI. He changed the spelling of his name, originally Lacanal, to distinguish himself from his royalist brothers.

A member of the committee of public instruction from Jan. 1793, Lakanal presented a *Projet d'éducation nationale* to the Convention on June 26. This proposed not only that "national" holidays should be substituted for the feasts of the Church but also that the state should provide free elementary education for boys and girls. The plan was at first rejected; and in Oct. 1793 Lakanal was sent to the Dordogne *département,* where he founded an arms factory at Périgueux. After Robespierre's fall, however, he became president of the education committee and in Oct. 1794 presented

a version of his plan for elementary schools which was enforced for about a year. He also presented a plan for *écoles centrales* (secondary schools), which functioned until the *lycées* were set up in 1802. He started the *école normale* for training teachers in 1795.

A member of the council of 500 from 1795 to 1797 and a founder of the Institut, Lakanal was sent by the Directory in 1799 to organize the defense of the Rhine frontier against invasion. After the *coup d'état* of Brumaire (Nov. 1799), he returned to Paris to teach. He was appointed bursar of the Lycée Bonaparte in 1804 and inspector general of weights and measures in 1809.

Proscribed as a regicide on the second Restoration (1815), Lakanal went to the United States, where from 1817 to 1825 he was president of the College of Orleans. Returning to France in 1834, he published his *Exposé sommaire des travaux de Joseph Lakanal* (1838), describing his struggle against the vandalism of the Revolution.

He died in Paris on Feb. 14, 1845.

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LAKE, GERARD LAKE, 1ST VISCOUNT (1744–1808), British general, prominent in Ireland and India, was born at Harrow on July 27, 1744, and entered the foot guards in 1758. He served in Germany (1760–62) during the Seven Years' War and at Yorktown (1781) during the American Revolutionary War and was later equerry to the prince of Wales (afterward George IV). In the Netherlands in 1793 Lake commanded at the action of Lincelles on Aug. 18. He took command in Ireland in April 1798, ordered the surrender of all arms by the people of Ulster, and when the rebellion broke out dispersed the rebels at Vinegar Hill (June 21) and exercised great severity to all rebels found with arms. Subsequently Lord Cornwallis assumed command but in August Lake was sent to oppose a French force landed at Killala bay and compelled the French to surrender near Cloone on Sept. 8. In 1800 he was made commander in chief in India (*see* INDIA-PAKISTAN, SUBCONTINENT OF: *History: British Ascendancy*.

Arriving in Calcutta in July 1801, Lake made great efforts to improve the Indian army. He became a full general in 1802 and on the outbreak of war with the Maratha confederacy in 1803, took the field against Sindhia of Gwalior. Within two months he defeated the Maratha powers under Gen. Pierre Perron at Koel and Delhi, stormed Aligarh, took Agra and Delhi, rescued the Mogul emperor Shah Alam and broke Sindhia's power at the battle of Laswari on Nov. 1, 1803. This victory, followed by that of Gen. Arthur Wellesley (afterward duke of Wellington) at Argaon on Nov. 21, compelled Sindhia to come to terms and a treaty was signed in Dec. 1803. Operations continued against Jaswant Rao Holkar, who defeated Col. William Monson and besieged Delhi in 1804. Lake defeated Holkar at Farrukhabad on Nov. 17, but failed to take Bharatpur in 1805. He was superseded as commander in chief in July 1805 by Lord Cornwallis but after the latter's death in October Lake pursued Holkar into the Punjab and forced him to surrender in December. Lake then returned to England where he received the thanks of parliament and a peerage. He represented Aylesbury in the house of commons (1790–1802) and sat in the Irish parliament in 1799 to vote for the Union. Lake died in London on Feb. 20, 1808.

See H. W. Pearse, *Memoir of the Life and Military Service of Viscount Lake* (1808). (T. G. P. S.)

LAKE, a mass of still water situated in a depression of the ground, without direct communication with the sea. The name is also applied, however, to widened parts of rivers and to bodies of water which lie along sea coasts and in direct communication with the sea. The terms pond, tarn, loch and mere are applied to smaller lakes according to size and position. Lakes are nearly universally distributed, but are most abundant in high latitudes and in mountain regions, especially those which have been recently glaciated. They are common along rivers which have low gradients and wide flats, being clearly connected with the changing channel of the river. Lowlands in close proximity to the sea, especially in wet climates, have numerous lakes (*e.g.*, Florida). The primary source of lake water is atmospheric precipitation, which may reach the lake by rain, melting ice and snow, springs, rivers and immediate runoff from the land surfaces. Because of their isolation from the great oceans, lakes have peculiar physical, chemical and biologic features.

Lakes may be either fresh or salt water, some being more salty than the sea itself. They occur at all altitudes: *e.g.*, Lake Titicaca (South America) is 12,497 ft. and Yellowstone lake (U.S.) is 7,731 ft. above sea level; and on the other hand, the surface of the Caspian sea is 92 ft. below sea level, that of the Sea of Galilee 696 ft. below the Mediterranean and that of the Dead sea 1,302 ft. below the level of the Mediterranean.

Lakes vary notably in size also. The Great Lakes (*q.v.*) of the United States and Canada constitute the world's greatest array of large lakes. Lake Superior has the greatest fresh-water surface area (31,820 sq.mi.), but by volume it is not the largest lake in the world. That distinction goes to Lake Baikal in southern Siberia, which has a considerably smaller surface area (12,162 sq.mi.) but which is so deep that its total volume is greater than that of Lake Superior. Scattered in a great arc across North America are at least eight lakes with areas larger than 7,000 sq.mi.—lakes Ontario, Erie, Huron, Michigan, Superior, Winnipeg, Great Slave and Great Bear. Several hundred miles west of Lake Baikal in southwestern Siberia is another large lake, Lake Balkhash. Another very large one, Lake Ladoga, is near the Soviet-Finnish border. East Africa contains a series of great lakes: Lake Victoria, with a surface area second only to Superior, and lakes Rudolph, Tanganyika and Nyasa. South America contains only one true large lake, Lake Titicaca, on the Peru-Bolivian border; but Lake Maracaibo, a shallow arm of the sea in northern Venezuela, also is a major inland body of water.

Origins.—Lakes may form in any undrained depression or in any depression that has an outlet somewhat above the lowest parts of the depression, and where there is an adequate supply of water to keep the depression filled. Unquestionably more of the world's present lakes were produced by glacial action than by any other single agent.

The continental glaciers that covered Canada, the adjacent northern United States, Finland and parts of Sweden gouged out undrained depressions in the bedrock of these areas, thereby producing tens of thousands of rock-shored lakes. Many of these lakes are interconnected by narrow inlets or short streams; they have numerous sprawling bays and may be filled with islands. Many of them are comparatively shallow. Where they are particularly abundant they may occupy as much as 75% of the total surface, as in the Quetico canoe country of northeastern Minnesota and adjacent parts of Canada.

Continental glaciers also create lakes by depositing across preexisting drainage patterns rock debris that dams up the streams and creeks, lakes being formed behind the debris dams. Oftentimes also glacial debris spread indiscriminantly over the landscape will leave scattered small shallow swales or depressions, and these will contain shallow lakes with sand or gravel banks and bottoms. When glaciers melt they sometimes leave deep pits called kettle holes (*see* GIANT'S KETTLE) which fill with water and become lakes; such lakes are extremely numerous in some areas. Mountain glaciers also produce lakes in mountain valleys by the same processes of erosion and deposition. Most, though not all, mountain lakes are glacial in origin.

There are other mountain lakes which are formed by dams thrown across streams by landslides or mudflows. Ordinarily such a lake is relatively short lived because the outlet at the lower end is quickly cut down through the relatively unresistant material in the dam. Lakes so formed by lava flows, however, are likely to be permanently established.

Other barriers to pre-existing drainage resulting in lake formation are sand dunes deposited across a small stream, beach deposits across the mouth of a river or the alluvium laid down by a large stream across the course of a smaller tributary. Deltaic deposits that are laid down in a sluggish stream by a silt-laden, more swiftly flowing stream may dam the former and produce a lake

upstream. The flood plains of large streams contain lakes formed in former channels of the river, called oxbow lakes. Also, undulations in the surface of the flood plain may cause shallow lakes to form.

The craters of extinct or dormant volcanoes commonly contain lakes; Crater lake in Oregon is one of the best-known examples. At various places the earth's crust has been warped or broken into depressed blocks which fill with water. Lake Michigan may be attributable partly to downwarping. Several of the large African lakes (Nyasa, Tanganyika) lie in the Great Rift valley, a huge, long, down-dropped block of the earth's crust. Lake Superior is partly the result of such forces also.

Regions underlain by highly soluble limestones (*see* KARST) develop depressions called sinkholes which under some circumstances may fill with water and become lakes. The lake region of north-central Florida is of this type.

Shallow lakes develop on glacial ice. So-called organic lakes are formed in great numbers in the tundra regions bordering the Arctic ocean.

One class of lake occurs in any arid region where there is insufficient water to form an integrated drainage system. In such a region a lake basin may contain a permanent lake if the inflow is great enough to maintain a water body throughout the year, or it may contain an ephemeral lake forming during the rainy season and drying up during the dry season.

Life History.—Viewed on the geological time scale, lakes are short-lived features of the earth's crust. They are formed in the various ways reviewed above, but as soon as they are formed three processes start their eventual destruction. All inflowing streams bring sediment into the lake and deposit it in the lake's still waters, thereby starting the process of filling the depression. If the lake fills its basin sufficiently so that it overflows, the outflowing stream will tend to erode a notch through the lip of the basin and thereby drain the depression. Last, the accumulation of organic deposits from vegetation may cause shallow lakes to change to bogs or swamps, and eventually they may become dry land. Relatively long-lived lakes are those located in deep basins or in arid regions where the drainage will integrate only very slowly.

Properties.—The composition of lake water can vary from almost pure water to lakes so extremely salty that they are really a salt slush. In general, the lakes of arid regions are rich in saline and alkaline compounds because all the salts derived from the surrounding rocks and brought into the lake in solution remain, there being no outlet, and evaporation causes the proportion of salt to increase steadily. However, extremely salty lakes (*e.g.*, the Dead sea and Great Salt Lake) are found in areas where the climate has changed from humid to arid.

The science that deals with the physical, chemical and biological properties of lakes is called limnology. Lakes are extraordinarily interesting environments, because they constitute the major areas of quiet fresh water found on the surface of the globe, and thus form a highly specialized type of environment for both plants and animals. Because lakes are relatively shallow, in high latitudes with cold winters and warm summers a lake may experience a complete double turnover of the water each year. Many lakes during the warm season develop sharp vertical stratification, which may be a critical factor in the distribution of plant and animal life. Lakes also display currents of various kinds. One particularly interesting type of current allows some of the material brought into a lake to be carried through the standing water and out at the outlet. (W. C. C.)

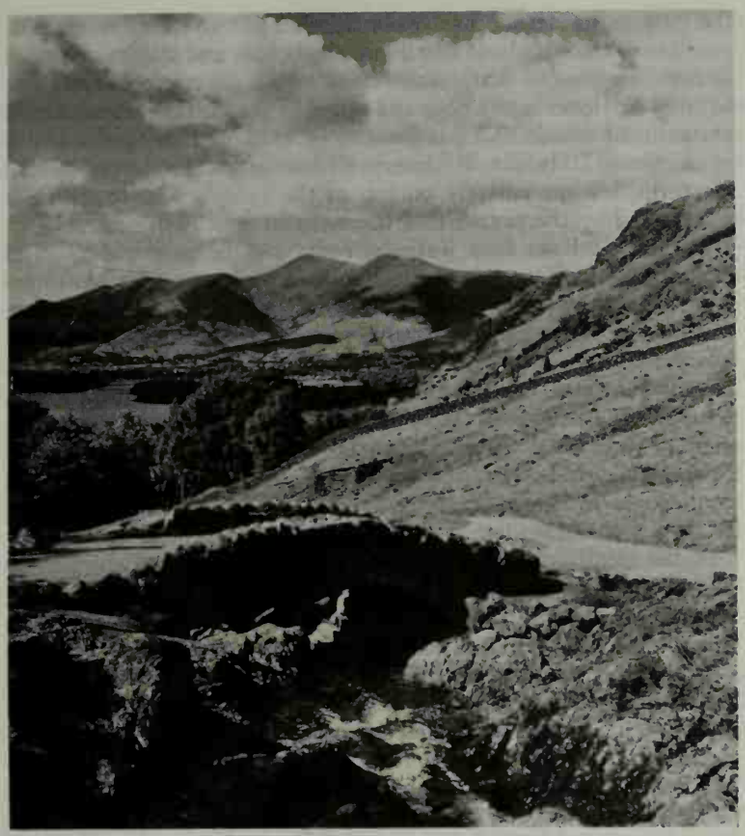
LAKE CHARLES, a city of southwestern Louisiana, U.S., on the Calcasieu river and Lake Charles, 37 mi. from the Gulf of Mexico; the seat of Calcasieu parish. It is a port of entry with a 35-ft. channel to the gulf, which was opened in 1926. Jacob Ryan laid out the city in 1852, named it for Charles Sallier, an early settler, and promoted the exploitation of the heavily timbered pinelands to the north and west. The building of railroads increased the timber industry and brought an influx of grain farmers from the midwest, who developed nearby the principal rice-growing area of the U.S.

Development of mineral deposits in the 20th century—first sulfur, then oil and gas—made Lake Charles one of the nation's leading petrochemical production centres. Fur trapping and offshore oil drilling make the nearby coastal marshes productive. Educational facilities include a modern city school system, McNeese State college, established in 1939, and a state trade school.

Lake Charles is a shallow, fresh-water, cypress-bordered reach of the Calcasieu river, about 3 mi. in diameter, and a recreation centre. Many other nearby bodies of water provide excellent fresh- and salt-water fishing and duck hunting. Pop. (1960) 63,392; standard metropolitan statistical area (Calcasieu parish), 145,475. For comparative population figures *see* table in LOUISIANA: *Population.* (W. M. Lo.)

LAKE DISTRICT lies in the English counties of Cumberland, Lancashire (Furness) and Westmorland. It contains the principal English lakes, including Windermere, the largest, 10½ mi. long, and the highest English mountains, of which Scafell Pike (3,210 ft.) is the chief. These combine to form a series of distinctive landscapes varying from the wild mountain scenery round Wastwater to the attractive peacefulness of that round such lakes as Bassenthwaite and Esthwaite waters. This diversity of scenic types lies within a circle of 30 mi. in diameter centring on Easedale tarn near Grasmere. It consists of ridges and dales radiating from the central mountains. There are as a result few easy "through" routes, although the largest town, Keswick, on Derwentwater, lies at the crossing of a T where an east-west route across the north of the district (from Penrith in the Eden valley to Cockermouth and the Irish sea) joins a route going south to Windermere and Kendal over a low pass, Dunmail Raise (780 ft.). The district is best appreciated by using road transport to go up the dales and then by walking. The short distances over the hills between one valley and the next, the numerous good ridge walks and the varied scenery to be encountered in a single day make the district especially attractive to walkers, who can reach the summits of all the larger hills with reasonable care against bad weather or mist. There is also good rock climbing, particularly from Wasdale head. As in most British hill districts, the rainfall is at times heavy and averages more than 100 in. a year in the central mountains.

The diversity of landscape is due partly to geological structure and partly to historical influences. The structure is basically a dome; the central mountains are the hard lavas and volcanic sediments of the Borrowdale series (Ordovician), outcropping in numerous bold crags and forming most of the principal summits, Scafell Pike (3,210 ft.), Scafell (3,162 ft.), Great Gable (2,949 ft.) and Helvellyn (3,118 ft.) farther east, as well as the striking but smaller Langdale Pikes. To the north of these lie rather softer sedimentary rocks, slates and grits, culminating in Skiddaw (3,053 ft.) and Saddleback (2,847 ft.) and generally giving more conical or rounded hills. The resulting scenic contrasts are well illustrated on going south toward the head of Ullswater or on comparing the surroundings of Bassenthwaite water with the head of Derwentwater and Borrowdale in the same drainage system or with Wastwater farther west. The southern lakes, Windermere, Esthwaite water and Coniston water, lie mainly on the Bannisdale slates and grits, softer rocks giving much lower and more rounded hills, their outlines often still further softened by layers of glacial drift. The pleasant pastoral or wooded shores of these lakes contrast effectively with the mountains around their heads and are strikingly different from the wild scenery of the western lakes, Wastwater and Ennerdale water. Much of the recent molding of the district is due to the ice sheets of the glacial periods terminating about 10,000 years ago. The lakes themselves generally lie in glacial rock basins, deepest toward the dale head and with steep, more or less parallel valley sides; *e.g.*, Wastwater and Coniston water. The characteristic points (*ees*) on Esthwaite water and some of the islands in Derwentwater are ground moraines although most of the material eroded by ice was deposited outside the Lake district. By deepening the existing main lines of water movement the ice sheet also left many lateral hanging valleys, from which the streams often emerge as attractive waterfalls; *e.g.*, Lodore, Dungeon Gill and Pier's Gill. These



CAMERA PRESS—PIX FROM PUBLIX

VIEW OF SKIDDAW FROM ASHNESS BRIDGE, LAKE DISTRICT

should be visited after rain as the runoff is rapid.

Historically the district was for long isolated from the south and east by Windermere, the Shap moorlands and the great peat bogs (now drained) of the Kent and Winster valleys. The district was originally wooded to 2,000 ft. A series of stone circles, *e.g.*, Swinside in the Duddon valley and Castleriggs near Keswick, record the presence of Neolithic man. Later, the district was part of the northwest frontier of the Roman world. A strategic road ran along High Street (2,718 ft.) to Penrith and the Great Wall, with a lateral route over the Wrynose (1,270 ft.) and Hardknott passes to a naval base at Ravenglass. The main period of forest clearance followed the Norse invasions of the 10th century. The Northmen occupied and cleared the valleys, as is shown by the characteristic place names: *thwaite*, "a clearing"; *satter* = *saeter*, "a summer holding"; *grise-* or *swin*-dale, where pigs ran through the remaining woods. *Fell*, the local name for a hill, derives from the Norse *fjeld*. The district early came under the sway of the great Cistercian abbeys, Furness and Byland, and was exploited for wool production while the remaining woods were used to provide charcoal for smelting, at first of iron ore carried in on pack animals, later of lead and copper. Thus by Elizabethan times the native forests had almost disappeared. The measures enjoined by the crown at that time apparently preserved large areas of woodland for charcoal production, a local industry which continued into the 20th century when the product was also used for making gunpowder and the small timber for cotton bobbins. Ore smelting diminished when lead and copper mining became uneconomic after the 1870s, the labour being diverted into slate and building-stone quarries.

The typical Lake district scene thus remained from Tudor times, meadows along the lake or stream sides yielding winter keep for stock, oak woods along the steeper valley sides and extensive sheepwalks over the fells above. The advent of wealthy residents in the early 19th century led to much landscape planting.

The Lake district became a national park in 1951. Greatly increased motor traffic raised the problem of how to reconcile increasing numbers of visitors and facilities for tourists with the modes of life and rural industries which originally gave the district its character. The development of modern large-scale forestry and the increasing need for water in industry make additional demands on the district which have not always been easily reconciled with the existing amenities. (W. H. Pl.)

Literary Associations.—The Lake district first caught the notice of English readers in the work of two early travelers, Celia Fiennes (1698) and Daniel Defoe (1724), but it was two later travelers, Thomas Gray (1769) and William Gilpin (1772), who were first able to rouse wide interest in the area. The work of these four, together with that of other visitors including Thomas Pennant (1769 and 1772) and Ann Radcliffe (1794), has an honourable place in the literature of travel.

It was William Wordsworth, however, who made the Lake district into one of England's most important centres of creative writing. Born at Cockermouth and educated at Hawkshead, he settled at Grasmere in 1799 with his sister Dorothy, and lived either there or at Rydal until his death in 1850. He is buried, beside his sister and his wife, in Grasmere churchyard, as also is Hartley Coleridge, whose father, Samuel Taylor Coleridge, had been attracted to the Lake district in the first place by the presence of the Wordsworths. Coleridge, in his turn, drew thither Robert Southey, who occupied Greta hall, Keswick, from 1803 to 1843. Among those in the early part of the 19th century who became at least part-time residents were Thomas De Quincey at Grasmere and John Wilson ("Christopher North") at Windermere. Ambleside was the home of Thomas Arnold (of Rugby) at Fox Howe and of Harriet Martineau at "The Knoll"; F. W. Faber, the hymn writer, assisted the vicar of Ambleside during 1837–42. John Ruskin went to Brantwood, on Coniston water, in 1871, remaining there until his death, and among the many literary figures who visited the region were Scott, Lamb, Samuel Rogers, Shelley, Keats, Crabb Robinson, Felicia Hemans, A. H. Clough, Tennyson, Matthew Arnold and Charlotte and Branwell Brontë. In the 20th century two popular novelists made their homes in the district, Hugh Walpole near Keswick and Constance Holme at Kirkby Lonsdale and Milnthorpe. Beatrix Potter lived for many years at High Sawrey near Esthwaite water.

(N. C. N.)

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LAKE DWELLINGS, the usual name given in English to what German-speaking archaeologists more comprehensively call *Pfahlbauten*, that is, pile structures. The theory of the *Pfahlbauten* was advanced by the Swiss Ferdinand Keller in the middle years of the 19th century. It states that there were in prehistoric times buildings erected not on firm ground but on platforms supported by piles above the water surface. This theory is founded on the proved existence of remainders of settlements within what are today the margins of lakes, discoveries from the vicinity of the south German, Swiss, French and Italian lakes providing the primary evidence. The large number of well-preserved remains of piles in connection with objects of organic material served to corroborate Keller's theory; and acquaintanceship with recent pile structures, particularly in the southern Pacific region, was supposed to prove it. It thus became rooted so firmly that for more than 70 years nobody doubted the existence of prehistoric lake dwellings.

Doubts arose, however, as the technique of excavating became more exact. The various opinions put forward cannot here be evaluated severally. In all these discussions, however, the material taken into account was restricted to a comparatively small territory, so that the question of settlements on water was dealt with from one angle only, equally relevant evidence from other territories being neglected. While research continued, certainty was nevertheless reached on three points. In the first place, for reasons of method, evidence of recent pile structures outside Europe must not be adduced to prove the existence of prehistoric pile structures, as the geographical conditions of settlement are different in every case. Secondly, research has shown that there

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MUSEUM DIORAMA SHOWING HOW ANCIENT SWISS LAKE DWELLERS PROBABLY LOOKED AS THEY SEINED FOR FISH; PILE STRUCTURES APPEAR IN THE BACKGROUND

were some settlements on peat bogs and on marshy land adjacent to ordinary settlements on dry ground: the formulation of a new term, bog structure (*Moorbau*), for such settlements as these facilitated discussion by narrowing the field. Thirdly, it has become clear that every site has to be treated as a separate question.

It is an established fact that settlements on dry ground generally disfavour absolutely any preservation of organic substances: they preserve, if anything, mere traces of the previous dwellings (postholes, stone foundations, baked clay daub), with no objects other than those made of stone, pottery or metal. Yet the sites on which Keller's theory was founded yielded considerable parts of the house structure itself and were moreover conspicuous for their wealth of wooden implements.

Such wooden objects can only be preserved when, from the moment in which they are deposited in the relic bed, they are subject to conditions excluding the access of air, thus preventing oxidization. As there is not a single important site relevant for the problem of the pile structures that shows the conditions of preservation characteristic for land dwellings, it appears that the relic beds of these sites were sealed permanently from air by sufficient humidity of the soil. This is not surprising in the case of the bog dwellings proper, but is of great significance in that of so-called lakeshore dwellings, as being by itself enough to show that the relic beds of these sites were deposited in a period when the place of their deposition was by nature humid. As, however, the deposition of relic layers is only possible underneath the level of the settlement (except in the case of ditch dwellings), the level of such settlements must have been situated above the humid layer of deposition. In other words, the relic beds from lakeshore dwellings presuppose a dry level of settlement above the humid level of deposition, which was attainable only by artificial supporting on piles. A humid level of deposition, then piles, then a raised platform of settlement—these three form therefore an architectural and stratigraphical unity, in regard to which it is fundamentally irrelevant whether the humid level was marshy or the bottom of some stagnant water at the margin of a lake. The only decisive fact is that of the preservation of objects made from organic substance, which must have been kept more or less hermetically sealed against air from the time of their deposition. Only the difference in altitude between the two levels, therefore, is essential for the pile structure—never the question as to whether there were water or land pile structures or neither.

This differentiation of levels is confirmed by the only recorded information known from the ancient world referring to the problem of pile structures. Herodotus (v, 16) tells that in the 5th century B.C. dwelling platforms were erected at Lake Prasias in just the same way as has been deduced from prehistoric source material. This statement, though still unverified in the 1960s by evidence from the site, supplies the theoretical base for an approach to prehistoric source material, especially if it is taken into account that both the river pile structures of the 5th–3rd centuries B.C. on the Sava near Donja Dolina and the slightly older pile structures of Ripač, near Bihač, within the river and inundation margin of the Una in Bosnia were erected in conformity with the passage in Herodotus. Excavations at Donja Dolina made it possible to trace without any doubt the houses and stables arranged in rows on wooden platforms—even with a succession of two inhabited platforms one above the other. Likewise the remains of a platform of wooden boards discovered east of the Lago di Ledro in northern Italy can be interpreted only in this sense, as the platform lies immediately on top of the relic bed, onto which it was forced by the pressure of the layer of peat above it.

Hence it follows that Keller's theory can be accepted as valid in its fundamental principles. But it is no longer possible to interpret in the same way all the sites previously quoted by scholars in this connection; nor is it any longer possible, in view of what has been ascertained since Keller's day about climatic changes in postglacial times, to take the present level of the lake surface as a basis for the height of the artificially constructed level of settlement. More particularly, the postglacial climatic optimum, comprising the whole Neolithic as well as the Bronze Age, is held responsible for an appreciable falling of the lake level, while it is argued that the deterioration during the urn-field period contributed decisively to the abandonment of the settlements on humid ground, followed by an inundation of the layers of depositions. The catastrophic character of the climatic deterioration during and after the urn-field period must not however be overestimated: it should be borne in mind that investigations into the chronology of the Alpine copper mining have supplied no evidence for a really fundamental deterioration.

It appears, then, that the form of settlement which is characterized by construction on an artificially raised level is common to several periods and consequently to different cultures, belonging no less to the Neolithic period than to the Bronze Ages and occurring also, according to local necessity, throughout the Iron Ages. The reasons for such building thus could have been different on different sites, and no generalization can safely be made about them. Finally, a settlement discovered in an area of humid soil represents in itself only a small fraction of the whole source material available for the study of its particular cultural affinities; and this consideration alone should be enough to discard the old generalizing conceptions and treat every cultural phenomenon as historically unique. From this point of view prehistoric lake dwellings cannot be compared with those of recent times outside Europe. They can be used only for illustrating the main character of such buildings in past and present. (RD. P.)

Throughout the world people living in humid subtropical or tropical regions often build houses and storage buildings on platforms supported by wooden piles or stone foundations. The elevation of buildings is usually a protective device against dampness or rodents. Though many of the raised houses are above dry land they are often built adjacent to rivers or lakes. The best known examples of people living in pile dwellings are those in Malaysia, though they are also found in such places as northern Iran along the Caspian sea and in Florida, where the Everglades-living Seminole Indians inhabit a boggy environment. *See* also DWELLINGS, PRIMITIVE. (F. A. HE.)

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LAKELAND, an inland city of south-central Florida, U.S., 32 mi. E. of Tampa, amid the rolling hills and fresh-water lakes of Polk county. It is the shipping centre for the county, which produces a large portion of the pebble phosphate mined in the U.S. and is the centre of the citrus industry of the state. It is the headquarters for the Florida Citrus commission, Florida Citrus Mutual, whose members own most of the state's citrus, the state frost-warning service, the Florida Tangerine co-operative and the Grower's Administrative committee.

Because of its central location, Lakeland also serves as the home of the Florida Federation of Women's clubs, the Florida State Junior Chamber of Commerce, the Florida Life Underwriters as-

sociation and the United Brotherhood of Carpenters and Joiners of America.

Florida Southern college, a Methodist-related coeducational institution established in 1885, is located in the city. Its campus has the largest concentration in the United States of buildings designed by the internationally famous architect, Frank Lloyd Wright.

The city is a popular winter resort and has a well-developed recreational program as well as excellent medical facilities. Lakeland began to develop in 1884, when the Florida Southern railway reached there. It was incorporated as a city in 1885 and has had a council-manager form of government since 1914. For comparative population figures *see* table in FLORIDA: *Population.*

(J. E. Jo.)

LAKE OF THE WOODS, a scenic 1,485 sq.mi. lake on the U.S.-Canadian boundary where the state of Minnesota and the provinces of Ontario and Manitoba meet. The largest portion of it is in southwestern Ontario. Relatively shallow and exceedingly irregular in shape, it is 34 mi. wide and 72 mi. long, and has 14,742 islands and an estimated 25,000 mi. of shore line. Its elevation is 1,062 ft. above sea level and the drainage area is 27,170 sq.mi. The chief river flowing into the lake is the 80 mi. Rainy, which enters at the southeast corner.

Lake of the Woods drains into Lake Winnipeg by the Winnipeg river on the northeast, at Kenora, which has flour, pulp, paper and lumber mills and is the centre of a prosperous tourist and resort area.

Discovered by Pierre Gaultier de Varennes, sieur de la Verendrye, in 1732, the lake was used by French *voyageurs* as part of the fur trade route west. In the convention of 1818 between the U.S. and Great Britain, Lake of the Woods served as the basis of the boundary separating the Louisiana territory from Canada.

(W. T. F.)

LAKE PLACID, a village of Essex county in northeastern New York, U.S., about 145 mi. N. of Albany, is located on both Mirror lake and Lake Placid in the Adirondack mountains. It is one of the outstanding resort communities in the eastern United States, having extensively developed the natural resources of the local setting for both summer and winter recreational activities.

Adjacent to the village are golf courses, ski centres and tows, bobsled runs and miles of bridle paths and hiking trails. The famous Lake Placid club (private) was founded in 1895 by Melvil Dewey, inventor of the Dewey Decimal system for libraries. The Olympic arena, first used for the 1932 Winter Olympics, provides space for indoor ice skating and convention meetings. Located at an altitude of 1,864 ft., the village lies at the foot of Whiteface mountain (4,867 ft.), and is within a few miles of Mt. Marcy (5,344 ft.), the highest mountain in the state. A modern highway reaches the summit of Whiteface. John Brown, the abolitionist, is buried 3 mi. E. of the village. The village was incorporated in 1900; the resident population in the latter part of the 20th century was about 3,000. (D. E. A.)

LAKEWOOD, a city of Cuyahoga county in northeastern Ohio, U.S., adjacent to Cleveland (*q.v.*) on the west and a part of the Cleveland standard metropolitan statistical area. Pop. (1960) 66,154; for comparative population figures *see* table in OHIO: *Population.* Its population density of more than 12,000 per square mile is one of the highest in the state. Lakewood is a residential suburb of Cleveland. Its industrial activity is confined to a small area and includes among its products conveying equipment, tools and dies, hardware, boxes, molds, carbon products, cosmetics and plastics.

In the early years of settlement of the western reserve, the area that was to become Lakewood was under the jurisdiction first of Trumbull and later of Cuyahoga county. The organization of the hamlet of Lakewood in 1889 was quickly followed by its incorporation as a village in 1903 and full city status in 1911. The name originated because of the wooded areas along the shore of Lake Erie. (W. G. K.)

LAKHIMPUR, a district in northeastern Assam, India. Area 4,926 sq.mi.; pop. (1961) 1,563,842. It is bisected by the Brahmaputra, flowing from northeast to southwest. On the north, east and northwest the district is bounded by hills now grouped under North East Frontier Agency. The Brahmaputra is navigable for steamers in all seasons as far as Dibrugarh; its navigable tributaries within the district are the Subansiri, Dibru and Buri Dihing. An interesting feature is Majuli Island in the southwest, the abode of the Assamese religious heads, satradhikars. The principal tribes inhabiting the district are the Miris, Mishmis, Khamtis, Phakials, Mataks, Kacharis and Kachins.

Lakhimpur is famous for its tea cultivation, with over 100,000 ac. under tea gardens. Rice, black peas, mustard seeds, sugar cane and jute are other agricultural products. Endi and Muga silk are produced. Oil is found in the Makum field and refined at Digboi (pop. 35,028). A large oil field also was found in the Dihing valley. Coal (Tertiary) is mined in the southeast at Ledo, Margherita and Barogolai. There are sawmills to provide timber for the manufacture of tea chests.

The district has two subdivisions: Dibrugarh, with most of the tea gardens, coal mines and oil wells; and North Lakhimpur on the north bank. Dibrugarh (58,480), the district and subdivisional headquarters, lies at the terminus of a branch of the North-East Frontier railway, and is an important trade centre. Its arts, commerce and science college and the Assam medical college are affiliated to Gauhati university; there are several high schools and a civil court. The Mohanbari airfield is 12 mi. east. Other towns are Tinsukia, a railway junction and trade centre, and Dum Duma, a tea centre; Naharkatia and Jalani are new oil towns. (M. Ba.)

LAKSHMI (SHRI), who in the epic Hindu mythology rose from the milk-ocean clad in white and for whom gods and demons contended, is Vishnu's wife, worshiped as goddess of prosperity and good fortune. She represents the gracious aspect of the mother-goddess (*see* SHAKTISM). In modern India Lakshmi is widely worshiped at four or five specified times in the year. *See* also DURGA; KALI.

LALANDE, JOSEPH JÉRÔME LE FRANÇAIS DE (1732–1807), French astronomer, was born at Bourg, on July 11, 1732. His parents sent him to Paris to study law; but the accident of lodging in the Hôtel Cluny, where J. N. Delisle had his observatory, drew him to astronomy, and he became the zealous and favoured pupil of both Delisle and P. C. Lemonnier. Lalande completed his legal studies, and then went to Berlin to make observations on the lunar parallax in concert with those of N. L. de Lacaille at the Cape of Good Hope. The successful execution of this task procured for him, before he was 21, admission to the Academy of Berlin and the post of adjunct astronomer to that of Paris. He now devoted himself to the improvement of the planetary theory, publishing in 1759 a corrected edition of Halley's tables, with a history of the celebrated comet whose return in that year he had helped A. C. Clairaut to calculate. In 1762 Delisle resigned in Lalande's favour the chair of astronomy in the Collège de France, the duties of which were discharged by Lalande for 46 years. His house became an astronomical seminary, and among his pupils were J. B. J. Delambre, G. Piazzi, P. Mechain and his own nephew Michel de Lalande. His planetary tables were the best available up to the end of the 18th century, and by his publications in connection with the transit of Venus in 1769 he won great fame. He is best known, however, as a popularizer of astronomy. The Lalande prize, instituted by him in 1802 for the chief astronomical performance of each year, still testifies to his enthusiasm for his favourite pursuit. Lalande died on April 4, 1807.

Among his voluminous works are *Traité d'astronomie* (2 vol., 1764; enlarged edition, 4 vol., 1771–81; 3rd ed., 3 vol., 1792); *Histoire céleste française* (1801), giving the places of 50,000 stars; *Bibliographie astronomique* (1803), with a history of astronomy from 1781 to 1802; *Astronomie des dames* (1785); *Abrégé de navigation* (1793); *Voyage d'un français en Italie* (1769), a valuable record of his travels in 1765–66. He communicated papers to the Paris Academy of Sciences, edited the *Connoissance des temps* (1759–74), and (1794–1807) wrote the concluding two volumes of the 2nd edition of J. E. Montucla's *Histoire des mathématiques* (1802).

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LALANDE, MICHEL RICHARD DE (1657–1726), the finest French composer of sacred music in the first part of the 18th century, was born in Paris on Dec. 15, 1657, the 15th child of a tailor. He became a chorister at the church of St. Germain l'Auxerrois. While there he learned to play various instruments but he excelled as an organist and in this capacity was appointed to four Paris churches simultaneously. Because of his youth he was refused the post of royal organist to Louis XIV but was asked to superintend the musical education of the princesses. In 1683 he was one of four men appointed as *surintendants* of the Chapel Royal, and such was his talent that by continually extending his power he was in sole control of all the sacred music at court by 1704 as well as being in charge of the royal chamber music. He died at Versailles on June 18, 1726, having been in court service for 45 years.

Lalande's fame rests upon his 42 motets for chorus and orchestra written for the chapel at Versailles and published posthumously in 1729. His counterpoint is firm, his handling of the texts masterly and his admixture of French and Italian styles well contrived; what J. B. Lully did for opera in France, Lalande did for sacred music. Of his instrumental music the *Symphonies pour les Soupers du Roy* was so appreciated by Louis XIV that he ordered A. Philidor to copy the complete set in 1703. He also wrote secular cantatas and pastorals as well as music for the dramatic presentations of the sacred tragedies produced by the Jesuit college in Paris. (B. P.)

LALIBALA (ROHA-LALIBALA), a small town in the Lasta district of Wallo province, Ethiopia, 35 mi. N.W. of Waldia (three–four days over rough country by mule). Roha, for about 300 years the capital of the Zague dynasty whose most important monarch was Lalibela (1181–1221), is inhabited by more than 1,000 Coptic priests attached to the 11 ancient rock churches. One group of these churches, surrounded by a trench 36 ft. deep in the red volcanic tuff which isolates a small hill, includes Beit (house of) Emmanuel, Beit Mercurios, Abba Libanos and Gabriel-Rufael. All of them are carved from the solid rock of the hill. The second group, also encircled by a deep trench, includes Beit Golgotha-Mikael, Beit Marcam and Medhane Alem ("The Saviour of the World"). The last is 109 ft. long and 35 ft. deep in the rock, roof level with the ground, and is the largest and most impressive. Beit Giorgis, cruciform in shape, is carved from a sloping rock terrace a short distance to the west. Beit Emmanuel, Beit Mariam and Medhane Alem are completely isolated from the surrounding rock; the others are tunneled into the rock, having the front elevation open to the trenches. The date of these structures is uncertain; they have Aksumite elements in construction as well as later decorative features, and work may well have begun before the Christian era.

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LA LIBERTAD, a department and port of the small Central American republic of El Salvador. The department of La Libertad extends from the Pacific ocean across a volcanic mountain zone to Lempa valley. Area, 642 sq.mi.; population (1961) 203,480. The capital is Nueva San Salvador (Santa Tecla; *q.v.*). The department ranks first in the country in production of beans, second in sugar and coffee and third in fruits, vegetables and corn (maize).

The coastal plain supplies 41% of the national output of balsam, important for medicinal preparations. Industries include sugar, alcohol, leather, woodworking, textiles and food processing.

La Libertad (pop. [1961] 4,943), an open roadstead port, 24 mi. S. of San Salvador by modern highway, handles nearly one-third of the nation's foreign commerce, and its beautiful beaches are a popular seaside resort. (C. F. J.)

LALIQUE, RENÉ (1860–1945), French jeweler and glassmaker, was born at Ay in Marne on April 6, 1860, and died in Paris on May 5, 1945. His brooches and combs in *art nouveau* style attracted great attention at the Paris international exhibition in 1900. In 1908 he acquired his own glass factory. Stimulated by an order for perfume bottles, he developed that style of molded glass which is generally associated with his name; it is characterized by iced surfaces, elaborate, partly realistic, patterns in relief and occasionally applied or inlaid colour. Used for luxury articles, Lalique glass was the height of fashion during the 1920s and continued to be made in quantity until World War II. (A. B. Po.)

LALLY, THOMAS ARTHUR, COMTE DE (1702–1766), French general remembered for the personal disaster that followed his defeat by the British in India. He was born at Romans in Dauphiné on Jan. 13, 1702, the son of Sir Gerald O'Lally, an Irish Jacobite in the French service who had married Anne Marie de Bressac de Faventine. Enrolled at birth as a soldier in his father's regiment (the Régiment de Dillon in the Irish brigade), he followed it even as a child and in 1721 was given a company in it. He served in the War of the Polish Succession and in some of the continental campaigns of the War of the Austrian Succession, being present at Dettingen (1743) and commanding a regiment of his own at Fontenoy (May 1745). Louis XV made him a brigadier on the field. Already involved in Jacobite plots, Lally in July 1745 went to Scotland with the pretender Charles Edward, whose aide-de-camp he was at the battle of Falkirk (Jan. 1746). Escaping back to France, he served with the marshal de Saxe in the Low Countries, being promoted *maréchal de camp* at the capture of Maastricht (1748).

When the Seven Years' War broke out, Lally was given the command of a French expedition to India. He reached Pondicherry in April 1758 and at the outset met with some trifling military success. He was a man of courage and a capable general; but his pride and ferocity made him disliked by his officers and hated by his soldiers. He regarded the Indians as slaves, despised their assistance and trampled on their traditions of caste. This ruined the French system of alliances with native princes. His attack on Tanjore failed, and the arrival of a British fleet made him raise his siege of Madras in Dec. 1758. Defeated by Sir Eyre Coote at Wandiwash (Jan. 1760) and besieged in Pondicherry, he had to capitulate in Jan. 1761. Taken to London as a prisoner of war, he learned that the French were accusing him of treachery and insisted on returning on parole to France to stand trial. He was kept prisoner for nearly two years before the trial began; then, after many painful delays, he was sentenced to death (May 6, 1766) and beheaded three days later. A scathing account of the proceedings against Lally is given in Voltaire's *Siècle de Louis XV.*

See G. B. Malleson, *The Career of Count Lally* (1865); M. Chassaigne, *Le Comte de Lally* (1938).

LALLY-TOLLENDAL, TROPHIME GÉRARD, MARQUIS DE (1751–1830), was born at Paris on March 5, 1751. He was the legitimized son of Thomas Arthur, comte de Lally (*q.v.*), and only discovered the secret of his birth on the day of his father's execution, when he began a long series of vain efforts for the rehabilitation of his parent's memory. Elected a deputy to the estates-general for the *noblesse* of Paris in 1789, he played some part in the early stages of the Revolution, but threw himself into opposition to the "tyranny" of Mirabeau and condemned the epidemic of renunciation which in the session of Aug. 4, 1789, destroyed the traditional institutions of France. In October he emigrated to Switzerland. Returning to France in 1792, he was arrested, but escaped the September massacres and went to England. During the trial of Louis XVI by the Convention (1793) he offered to defend the king, but was not allowed to return to France and published his *Plaidoyer pour Louis XVI* in London. He did not return till the time of the consulate, when he helped with the publication of the *Mémoires concernant Marie-Antoinette* (1804). He welcomed the return of Louis XVIII who created him a peer of France (1815); and in 1816 he became a member of the French Academy. From that time until his death, on March 11, 1830, he devoted himself to philanthropic work, especially prison reform.

LALO, (VICTOR ANTOINE) ÉDOUARD (1823–1892), French composer who helped found the 19th-century school of French chamber music, and who is known for the clarity of his orchestration, was born at Lille, Jan. 27, 1823, of a military family of Spanish origin. He went to Paris in 1839 where he studied the violin with François Habeneck at the conservatory. He published his first songs in 1848. In 1855 he joined the Armingaud quartet as viola player. His chamber works, which show an affinity with Weber and Schumann, include three trios and two piano and violin sonatas. His opera *Fiesque* (1866) was not performed, but he won success with his *Symphonie espagnole* for violin and orchestra, first performed by Pablo de Sarasate in 1875. In this, in his cello concerto (1876) and in the ballet *Namouna* (1882) he showed his gift for orchestration in the clarity of his texture, his imaginative use of wood wind and in his characteristic fanfare effects on the brass. *Namouna,* which reacted against the ballet traditions of Adolphe Adam and A. L. Minkus, was a precursor of the early ballets of Diaghilev in that it claimed attention more for its musical score than for its choreography. In 1887 Lalo produced his Symphony in G minor, and in the following year the second version of his opera *Le Roi d'Ys.* (He had destroyed the first version because it was too reminiscent of Wagner.) *Le Roi d'Ys* resembles the operas of Weber in its development of the main themes in the dramatic overture.

Lalo died in Paris, April 22, 1892, leaving unfinished the opera *La Jacquerie,* which was completed by Arthur Coquard and produced in 1895. His son, Pierre Lalo (1866–1943), was music critic of *Le Temps* and the *Journal des Débats.*

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(E. LR.)

LAMAISM: *see* TIBETAN BUDDHISM.

LA MANCHA: *see* MANCHA, LA.

LAMAR, LUCIUS QUINTUS CINCINNATUS (1825–1893), U.S. statesman and supreme court justice, was born in Putnam county, Ga., Sept. 17, 1825. His father, Lucius Q. C. Lamar (1797–1834), a judge of the superior court of Georgia, was the compiler of the *Laws of Georgia From 1810 to 1819* (1821). In 1845 young Lamar graduated from Emory college, Oxford, Ga., and in 1847 was admitted to the bar. In 1850–52 he was adjunct professor of mathematics at the University of Mississippi. In 1852 he moved to Covington, Ga., to practise law, and in 1853 was elected a member of the Georgia house of representatives. In 1855 he returned to Mississippi and in 1857 became a member of the U.S. house of representatives, where he served until Dec. 1860. He was elected to the "secession" convention of Mississippi and drafted for it the Mississippi ordinance of secession. He was appointed a lieutenant colonel in the Confederate army in the spring of 1861 and a colonel in May 1862, but in October he resigned from the army. In Nov. 1862 Pres. Jefferson Davis appointed him special commissioner of the Confederacy to Russia; but he did not proceed farther than Paris before his mission was terminated by the refusal of the Confederate senate to confirm his appointment.

From 1873 to 1877 Lamar was again a Democratic representative in congress; from 1877 to 1885 he was a U.S. senator; from 1885 to Jan. 1888 he was secretary of the interior; and from 1888 until his death at Macon, Ga., on Jan. 23, 1893, he was an associate justice of the supreme court of the United States.

While Lamar is perhaps chiefly remembered for his service in the senate and for the part he took after the American Civil War in helping to effect a reconciliation between the north and the south, he was probably best fitted by temperament and training for a distinguished judicial career, as evidenced by his famous dissent in *In re Neagle* (1890; which defined certain implied presidential powers) and other of his opinions. Ill health and the shortness of his period of service on the bench, however, prevented him from realizing his full potential as a judge.

See Edward Mayes, *Lucius Q. C. Lamar: His Life, Times and Speeches* (1896); Wirt Armistead Cate, *Lucius Q. C. Lamar: Secession and Reunion* (1935).
(W. A. CA.)

LA MARCHE, OLIVIER DE (*c.* 1425–1502), Burgundian chronicler and poet, the historian of the ducal court and the eloquent spokesman of the chivalrous tradition, was born at Villegaudin, near Chalon-sur-Saône, of a noble family of Bresse which had served the dukes of Burgundy from the 14th century. His father, Philippe de La Marche, warden of the forests of Burgundy, died in 1437, but a few years later Antoine de Croy obtained for Olivier a post as page to Philip the Good, duke of Burgundy, who made him a pantler-squire in 1447. He then entered the service of the duke's son, Charles of Charolais (*see* CHARLES the Bold, duke of Burgundy), whose secretary he became.

Olivier remained faithful to the Burgundian service all his life: he was knighted on the battlefield at Montlhéry (1465); stood by Charles in his negotiations with Louis XI of France at Péronne (1468); and was taken prisoner at Nancy, when Charles was killed (1477). Charles had also sent him on important diplomatic missions to Brittany in 1466, 1467 and 1469; to England in 1467 and 1470; to Switzerland in 1475; and to Milan in 1476.

Olivier de La Marche was also an organizer of splendid court functions: for instance the chapters of the Order of the Golden Fleece; the banquet of 1454 at which Philip the Good and his guests took the "Oath of the Pheasant" to reconquer Constantinople from the Turks; and the ceremonial festivities for the marriage of Charles the Bold to Margaret of England in 1468. Faithful to Charles' heiress Mary and her husband the Austrian archduke Maximilian, he was made premier maître d'hôtel (1477) and entrusted with the education of their son Philip the Handsome (1480). In retirement from 1492, he died in Brussels on Feb. 1, 1502.

Olivier de La Marche's writings, in prose or in verse, almost all glorify the house of Burgundy. The most important are *L'État de la maison du duc Charles de Bourgogne* (1474); *Description de la solennité faite par les chevaliers de la Toison d'or* (1481); *Le Chevalier délibéré,* an allegorical poem about Charles the Bold; *L'Advis au roi Maximilien* (1491); and his own *Mémoires.* These *Mémoires,* in two books covering the periods 1435–67 and 1467–88, were completed about 1490 and dedicated to Philip the Handsome. Though the style has charm and liveliness, Olivier cannot compete with Philippe de Commynes in psychological profundity or with Georges Chastellain in elevation of ideas. Nor are the *Mémoires* very reliable as historiography: the author makes mistakes in chronology and was too resolutely devoted to the house of Burgundy to be objective, especially in his judgments on French policy. Nevertheless the *Mémoires* constitute a first-hand historical testimony of great importance. They are edited by H. Beaune and J. d'Arbaumont, four volumes (1883–88).

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(MI. M.)

LAMARCK, JEAN BAPTISTE PIERRE ANTOINE DE MONET, CHEVALIER DE (1744–1829), French naturalist, best known for his theory of evolution and for his distinction of vertebrate from invertebrate animals, was born at Bazantin, Picardy, on Aug. 1, 1744. While studying medicine in Paris, he became interested in meteorology and in chemical speculations, but especially in botany. In 1778 he published *Flore française,* in which he used and developed dichotomous keys that helped identification by stressing the opposing characters of species. This work won him admission to the Académie des Sciences and attracted the attention of G. Buffon.

With Buffon's assistance he traveled across Europe in 1781 under the title of botanist to the king and on his return wrote the *Dictionnaire de Botanique* and the *Illustrations de Genres,* works contributed to the *Encyclopédie Méthodique* (1785). In 1788 Lamarck took up a botanical appointment at the Jardin du Roi, but in 1793 he was made a professor of zoology and called to lecture on the *Insecta* and *Vermes* of Linnaeus, the animals for which he introduced the term Invertebrata. His views on evolution, introduced in his *Système des Animaux sans Vertèbres* (1801) and *Recherches sur l'Organisation des Corps Vivans* (1802), were elaborated in his *Philosophie Zoologique* (1809); and, in spite of

impaired sight, he published the *Histoire naturelle des animaux sans vertèbres* (1815–22) with the help, in the last two volumes, of his eldest daughter and of P. A. Latreille (1762–1833). Lamarck died, blind and in great poverty, in Paris on Dec. 18, 1829.

His most important contribution was his detailed investigation of living and fossil Invertebrata. He was the first to distinguish vertebrate from invertebrate animals by the presence of a vertebral column, and among the Invertebrata to found the groups Crustacea, Arachnida and Annelida. In 1785 he pointed out the necessity of natural orders in botany by an attempt at the classification of plants.

The idea, favoured by Buffon before him, that species were not unalterable and that the more complex were developed from pre-existent simpler forms was widely propagated by Lamarck. He explained the whole organization of animals and formation of different organs by four laws (introduction to his *Histoire naturelle des animaux sans vertèbres,* 1815):

1. Life by its proper forces tends continually to increase the volume of every body possessing it and to enlarge its parts, up to a limit which it brings about.
2. The production of a new organ in an animal body results from the supervention of a new want continuing to make itself felt and a new movement which this want gives birth to and encourages.
3. The development of organs and their force of action are constantly in ratio to the employment of these organs.
4. All that has been acquired, laid down, or changed in the organization of individuals in the course of their life is conserved by generation and transmitted to the new individuals that proceed from those which have undergone these changes.

The second law is often referred to as Lamarck's hypothesis of the evolution of organs in animals by appetence or longing, although he does not teach that the animal's desires affect its conformation directly, but that altered wants lead to altered habits, which result in the formation of new organs as well as in modification. (*See* LAMARCKISM.) The fourth law expresses the inheritance of acquired characteristics. *See* EVOLUTION, ORGANIC.

BIBLIOGRAPHY.—A. S. Packard, *Lamarck the Founder of Evolution,* with bibliography (1901); H. G. Cannon. *Evolution of Living Things* (1958); E. Perrier, *Lamarck* (1925); H. Daudin, *Cuvier et Lamarck: Les Classes Zoologiques et l'idée de série animale* (1926).

LAMARCKISM. The doctrine often spoken of as Lamarckism is only a part of Lamarck's teaching concerning the transformation of lower into higher forms of life, and probably not the most important part. Lamarck incorporated into his theory of transformation (organic evolution) a belief that had been current in many lands as long as we have records, written and oral, and that is still ardently adhered to by many animal breeders. In the folklore of primitive peoples there are stories that take for granted that acquired characteristics are inherited. These stories, which now appeal to our sense of humour, would have been forgotten or disregarded long ago by scientists were it not that in every generation new illustrations are continually brought forward. Much of this evidence rests on hearsay, and much of it arises from a succession of events that is merely fortuitous.

Acquired Characteristics.—As used by professional biologists, "inheritance of acquired characteristics" has a precise but limited meaning—one that does not include all that the words, taken literally, might imply (*see* ZOOLOGY: *Inheritance of Acquired Characters*). Actually, all characteristics not present at birth but which develop later in life are acquired; to deny the inheritance of these characteristics would be to deny heredity itself. Thus some confusion has arisen through the technical use of the phrase that is now synonymous with Lamarckism.

Biologists define an acquired characteristic as one that has developed in the course of the life of an individual in the somatic or body cells, usually as a direct response to some external change in the environment or through the use or disuse of a part. The inheritance of such a characteristic means its reappearance in one or more individuals in the next or in succeeding generations. For example, the skin of many Caucasian peoples turns brown on exposure to sunlight. If this acquired characteristic were transmissible, the children from two tanned persons (or even from one of them, perhaps) should have a darker skin than that typical of the white race to which the parents belonged. Whether it is to be expected that the children should be as dark as their sun-tanned parents, or only somewhat darker than the average of the white race, as some Lamarckians suggest, is a matter of choice. There is no evidence that such transmission occurs even though it is evident that the darker-skinned races of man are found in tropical and subtropical parts of the earth.

A somewhat different example would be found in the supposed inheritance of a change brought about by the use and disuse of a special organ. The blacksmith's arm (or any other set of muscles) enlarges when used continually against an external resistance, such as the weight of the hammer. If the effect were inherited, his children at birth would have unusually large arms; if not at birth, then when they became adults, even though they had not used their arms excessively. There is no evidence supporting this case. A more subtle illustration is found in the supposed inheritance of an increased dexterity of the hands of a musician through practice; the skill acquired, although causing no visible increase in size of the fingers, might be imagined to be inherited by his children, and they might then be expected to play skilfully on the piano without practice; or if this seems too ridiculous, they might be imagined to learn more rapidly than did one of their parents. Just how the intricate interplay of cerebral sequences that has given the dexterity to the musician's fingers could ever be transferred to the musician's sex cells (spermatozoa), and through them to his children, has never been brought within the range of biological possibilities. It is clear that the case of a musician's children playing the piano exceptionally well might be due to parent and offspring both inheriting unusual musical aptitude, quite apart from practice.

Lamarck recognized several ways in which the environment brings about changes in plants and animals, and it is significant to note that his attention was directed more particularly to the adaptive character of the response, which, as Henri Bergson points out, implies the teleological, or purposeful, nature of the result. In plants the response is direct and immediate; *i.e.,* not through the mediation of a central nervous reaction system, since this is absent in plants. In animals the adaptive changes are supposed to be more indirect. According to Lamarck, new needs (*besoins*) arise in animals as a result of a change in the environment. This leads to new types of behaviour involving new uses of pre-existing organs. Their use leads to an increase in size or to other methods of functioning. Conversely, the disuse of other parts leads to their decline. It is the resulting material alterations that are inherited.

The examples that Lamarck gives to illustrate his doctrine are illuminating. In animals, as stated above, a new environment calls forth new needs, and the animal seeks to satisfy them by making some effort. Thus new needs engender new habits which modify the parts. The effects are inherited. For example, the giraffe, seeking to browse higher and higher on the leaves of trees on which it feeds, stretches its neck; as a result of this habit, continued for a long time in all the individuals of the species, the giraffe's front limbs and neck have gradually grown longer. Birds that need to rest on the water, *i.e.,* to find their food, spread out their feet when they wish to swim. The skin becomes accustomed to being stretched and forms the web between the toes. The horns of ruminants have resulted from the ruminants' butting their heads together during combats. These naïve examples constitute some of the evidence on which Lamarck rested his theory.

The Influence of Lamarckism.—In his *Origin of Species,* Darwin accepted the principle of the inheritance of acquired characteristics as one of the factors contributory to evolution; this endorsement of Lamarckism has resulted in some confusion in terminology. In the Soviet Union, for example, where the inheritance of acquired characteristics is accepted and where it has an official standing, it is presented as a part of the Darwinian theory and is referred to generally as "creative Soviet Darwinism," as distinct from the "reactionary Darwinism" of capitalistic countries. In his later book, *The Variation of Animals and Plants Under Domestication,* Darwin elaborated his view and proposed a "provisional hypothesis" to explain the transmission. This hypothesis he called pangenesis. Each part of the body is imagined

to throw off invisible particles called gemmules, which, getting into the blood stream, are supposed to collect in the germ cells and there combine with like units already present, modifying them in accordance with the changes that have taken place in the peripheral organs from where they came. Thus the next generation arising from the germ cells is a photograph, as it were, of the parent at the particular stage when the germ cells were formed. It is, perhaps, almost needless to point out that this vague conception of the mode of development of the germ cells is totally at variance with modern knowledge concerning the origin of eggs and spermatozoa, which in many cases are present and often developed before the adult stages are reached. The most that might be claimed would be that the units of heredity already present might be modified by late contributions from other parts of the body.

August Weismann's challenge of the entire theory of the transmission of acquired characteristics marks a turning point from the older credulous attitude to the modern demand for more critical evidence. Weismann's challenge, based on a few questionable experiments, can scarcely be regarded as convincing. For example, Weismann cut off the tails of mice for many consecutive generations without creating a tailless type; this he felt was evidence against the theory of inheritance of acquired characteristics. Darwin had, in fact, already pointed out that the loss of a part is not inherited because, he added, the germ material already contains the inherited units for the development of each part. Nevertheless, the admission weakens the argument that organs become rudimentary through disuse. Weismann succeeded in showing the complete inadequacy of much of the evidence generally accepted by Lamarckians in support of their views, and he pointed out that the continuity of the germ plasm suffices to account for the inheritance of the great majority of characteristics common to all individuals of a species without the need of postulating contributions from the body cells.

Later the discussion was carried on by several paleontologists, Alpheus Hyatt, Edward D. Cope and, at one time, Henry F. Osborn (*see* PALEONTOLOGY: *Evolutionary Evidence*). In fact, as early as 1833 Sir Charles Lyell had reported Lamarck's views and reprinted them in later editions of his famous *Principles,* treating the evidence, however, with great caution and skepticism. The doctrine has also appealed to some psychologists and popular writers, owing to a fancied resemblance of heredity to memory (Ewald Hering and Samuel Butler, *q.v.*). Others, impressed by the difficulty of explaining co-ordinated reactions and instincts unless nervous reactions are inherited, have resorted to Lamarck's doctrine. The inheritance of acquired characteristics was also maintained by the English philosopher Herbert Spencer (*q.v.*).

Experimental Evidence: Pro and Con.—In more recent times, experimental evidence for and against Lamarckism has come conspicuously to the front on several occasions. This evidence covers a great diversity of subjects and a variety of methods, opening up new possibilities, some of which are far removed from the original contention. One line of evidence goes back to the extraordinary results of Charles E. Brown-Séquard with guinea pigs. He believed that injury—localized or even more general—to one of the parents caused in the offspring epilepsy or deformation and sloughing off of a limb or toes; these effects were, he thought, sometimes transmitted to a few of the descendants. The results have not been confirmed by subsequent work. It became obvious that, unless work of this sort is done with inbred and pedigreed material, any conclusion is venturesome in the extreme; for, unless it can be demonstrated first that some of these peculiarities were not present in the stock from the beginning, the results may be caused by germinal inheritance of recessive characters, or to indirect injury to the germ cells themselves.

C. C. Guthrie exchanged the ovaries of black and white fowls and concluded that a change was brought about in them, but C. B. Davenport's later experiments showed that no such effects are produced. Guthrie's results were probably caused by impurity in the birds or by regeneration of the original ovary. W. E. Castle and J. C. Phillips transplanted the ovaries of a black guinea pig into a white one. When mated to a white male, black offspring resulted.

W. Heslop Harrison has described the appearance of melanic (darkened) forms in the moth *Selenia* after feeding on leaves treated with lead nitrate or manganese sulfate. The evidence points to the conclusion that the treatment brought about the change and that the change was directly on the germ cells. The melanic types that appeared—one a dominant, the others recessive—were shown to give Mendelian inheritance when crossed to the type forms.

Beginning in 1907 Paul Kammerer brought forward case after case supporting the doctrine of the inheritance of acquired characteristics. He studied the effect of coloured surroundings on the skin colour of the spotted salamander (*S. maculosa*). When placed on a yellow background, the young salamander develops a greater amount of yellow colouring as it reaches the adult stage; when on a black background, it develops more black. Offspring from the former develop on a yellow background even more yellow than their parents and on a dark background more yellow than does the ordinary salamander when so treated. Similarly the offspring of artificially produced black salamanders become blacker than did their parents on a black background.

Kammerer's experiments when repeated by others (Secerov, Herbst, Von Frisch, Przibram-Dembowski, Boulenger) have shown that the background does affect the relative amount of yellow or of black in an individual, but it has never been shown that the effects are transmitted. Kammerer's claim and the resultant publicity actually helped to bring the Lamarckian doctrine into disrepute. William Bateson (1919–23) questioned the validity of Kammerer's work in a number of papers and demanded that Kammerer allow him to examine the preserved specimens of salamanders and midwife toads (*Alytes*) that Kammerer claimed had proved that acquired characteristics were inherited. Bateson never saw the specimens, but finally, in 1926, they were examined by G. K. Noble and Hans Przibram, who reported that the preserved salamanders and toads had been doctored with India ink. In a letter to the Communist Academy in Moscow—the same letter in which he announced his impending suicide (*Science* 64:493, 1926)—Kammerer admitted the facts but denied having any personal knowledge of the fraud. This affair received great publicity, with the very natural result that other claims supporting the inheritance of acquired characteristics were questioned.

The announcement of Pavlov (1923) that a conditioned reflex established in mice is inherited and shows marked advances in each generation was withdrawn by Pavlov as an error. The results as announced were, moreover, in direct contradiction to somewhat similar experiments by Halsey J. Bagg, E. Carleton MacDowell and Emilia Vicari.

An elaborate series of experiments with rats was carried out by the psychologist William McDougall (1927–30). The young rats were given a choice of two escape passages from a tank of water into which they were plunged. One passage was illuminated, and the rat escaping by it received a strong electric shock. The other passageway was only dimly lighted, and a rat escaping by it did not receive a shock. In time the rats learned to take the less-illuminated passage. The test was brought to an end when each rat made 12 successive escapes by the dim passage. These rats became the parents of another generation, which, in turn, received the same training. McDougall's records show that the time taken by the rats to learn to take the passageway that gave no shock decreased gradually in successive generations; this was a result, he claimed, of the experience of their ancestors. The same experiment was later repeated by F. A. E. Crew (1932), who found no evidence of improvement in 18 successive generations.

Several biologists have drawn attention to certain similarities between the hereditary element, the gene, and virus particles. Both have the property of multiplying indefinitely within living cells. In 1944 Sterling Emerson and A. H. Sturtevant proposed tentatively that antibodies produced against specific cellular antigens might unite with and modify specific genes in chromosomes and thereby be carried to subsequent generations. Critical evidence has not yet been produced to support this interpretation. There is a remote possibility that this line of research might result in a method of securing specific or directed mutations. Such

induced hereditary changes, however, would in no way be instances of the Lamarckian inheritance of acquired characteristics.

There was another class of experiments carried out in later years that has also opened up a wide field for discussion, namely, the direct and indirect effect of the external environment on the germ cells themselves. There are two distinct possibilities involved in the situation: (1) It has been claimed that the same kind of effect produced in the body cells by an external agent may simultaneously affect the germ cells (egg or sperm) in such a way that they produce a new individual showing the same trait (parallel induction). (2) The external agent may produce a change only in the germ cells, which change appears in the individuals of the next generation developing from such germ cells (direct induction). The same effects may then appear in later generations, because the affected germ material itself is handed on.

The first supposition, however plausible it may sound, may rest on a false analogy. The response of the body cells to an external agent is presumably a reaction depending on their specific differentiation. This view is supported by the absence of a similar response in other kinds of organs or tissues. What grounds, then, are there for supposing that the undifferentiated germ cells should be affected specifically but not show their response until the definite organ in question develops? There can be given no rational explanation for such an expectation, which obviously rests on an assumption at variance with what is known to physiology. There is no positive evidence to appeal to in support of this supposition, although there are a few cases which may at first sight seem to come under this heading. For example, Michael F. Guyer injected crushed lenses from the eye of a rabbit into fowls, with the intention of producing in the blood of the fowl an antibody to rabbit lens tissue. Later some of the blood of the fowl was injected into a pregnant rabbit. In rare instances one or more of the young rabbits that were born showed abnormalities of some kind in their eyes. From a few of those affected individuals, offspring were produced which sometimes had abnormal eyes, but it was not claimed that the same specific abnormalities always appeared in parent and offspring. Several explanations may be offered. It is known that occasionally rabbits are born with defective eyes, but the absence of abnormal eyes in the control, unoperated relatives of those used, was supposed to meet this argument. Until the frequency of the occurrence is known, the reply is not entirely adequate. Nevertheless, the facts as reported appear to make it improbable that the connection was accidental. Julian S. Huxley and A. M. Carr-Saunders repeated Guyer's experiments and failed to produce inherited defects in the eyes of the offspring, and other failures in mice and other species have been reported by other workers.

Hermann J. Muller's experiments with *Drosophila* (1927) treated with X-rays, in which defects, and even mutant types of a specific kind, were produced and inherited, appear to have been due to the direct action of the X-rays on the germ cells. Some of the mutant types thus produced were identical with those which had occurred "spontaneously" in earlier experiments. Radiation, heat and certain chemicals are known to induce gene mutations. The effect is a direct one on the germ cells and not by way of somatic cells. (*See* MUTATION: *Radiation-Induced Mutations.*)

Finally, the most complete disproof of the inheritance of somatic influence is demonstrated in almost every experiment in genetics. When an individual with a dominant character is mated to one with a recessive character, all the offspring show the dominant character, in some cases in full force, in others less completely. When the hybrid is bred back to the recessive stock, half of the offspring show the dominant character, half the recessive. This is the expected ratio if half the ripe germ cells of the hybrid carry the dominant, half the recessive element. This result could not happen if the bodily characteristics (dominant) of the hybrid produced a sympathetic effect on the germ cells. Furthermore, it is possible to breed continuously from hybrid forms only—a common procedure in certain Mendelian work—yet when after many generations the stock has been tested, the dominant character has never been found to have affected the recessive elements in the germ material. It is surprising that this critical evidence is seldom referred to by the advocates of the inheritance of acquired characteristics. Here, then, in the only field of heredity where there is really scientific evidence, the facts are positive and unquestioned, and contradict thoroughly the claim that the germ cells are affected specifically by the bodily characteristics of the individual.

Persistence of Lamarckism.—By the 1930s the inheritance of acquired characteristics had been rejected by most students of heredity, though belief in it persisted in popular and in some literary circles. Indeed, as late as 1955 C. D. Darlington called the belief the "evergreen superstition." Lamarckism seems to be able to last indefinitely on the folklore level, but as a serious scientific hypothesis it has been abandoned. In about 1948 Lamarckism was revived rather violently by the Communist authorities in the U.S.S.R., and it became a part of the official biology.

In Politics.—Both Karl Marx and Friedrich Engels were staunch Lamarckians and assumed that this type of inheritance would guarantee the future improvement of the human race. Thus any Soviet biologist who endorsed the doctrine was in a strong tactical position in the socialist competition for status. From 1936 to 1948 a prolonged and bitter scientific controversy raged in the Soviet Union; the final ruling on the dispute was a boon to the Communist theoreticians—the Lamarckians were completely victorious. At the famous meeting of the Lenin Agricultural Academy in 1948, the party line in genetics and evolution was drawn, and Lamarckism, as part of the Soviet or Michurinist school, became official. Mendelism was denounced, and T. D. Lysenko, the proponent of Michurinism, became the dictator of Soviet biology. A number of the communists in western Europe followed the Soviet directives and sought to rehabilitate Lamarckism.

During the next decade the discussions of Lamarckism were political rather than scientific, and a great deal of confusion was naturally introduced into the subject, some of it perhaps intentionally. A number of the published polemics are clearly dishonest, and the situation grew so bad that the American Institute of Biological Sciences had to protest against the widespread misquoting of western biologists (1949). But over and beyond the political misrepresentations, some confusion has always existed in the field because of the ambiguity of the phrase "the inheritance of acquired characteristics." (*See* GENETICS: *Soviet Genetics.*)

In Science.—Lamarck had pictured the bodily characteristics, modified by an animal's activities, as being passed on to future generations. Weismann, as stated earlier, showed that in animals the body (soma) and germ cells are separate, that only the germ cells produce the next generation and that, consequently, all such modifications in the higher animals have to be transmitted from the soma of one generation to its germ plasm and then on to the soma of the succeeding generation. In the lower unicellular organisms, where there is no separation of soma and germ plasm, Lamarckism, as it is understood in the higher forms, cannot apply. Induced changes in the germ plasm are known to be inheritable; thus in bacteria and protozoa we would expect a number of the modifications that they acquire to be inherited. These induced hereditary alterations are of several different types. It was perhaps inevitable that this kind of inheritance would be cited by some as evidence of the inheritance of acquired characteristics. In the 1950s spectacular advances in the genetics of bacteria and protozoa—the discovery of the importance of deoxyribonucleic acid (DNA) in the machinery of heredity, and intensification of work on cytoplasmic inheritance—have made it essential that Lamarckism be understood accurately and precisely.

In a number of papers (1913–34) V. Jollos showed that environmentally produced changes in *Paramecium* (a "one-celled" animal; *see* PROTOZOA) could continue through several cell generations even in the absence of the causative agent, but that under certain conditions they would disappear by stages or even in a single generation. These induced alterations were called *Dauermodifikationen.* M. Demerec (1948), by subjecting bacteria to several antibiotics, discovered resistant strains that owe their viability to specific gene mutations. Some of the mutants actually became dependent upon the antibiotic that destroyed their nonmutant competitors. If these mutants were produced by the antibiotic itself, this would approach very closely to directed

mutations; however, analyses of similar cases (virus sensitivity and virus resistance in bacteria) by Salvador E. Luria and M. Delbrück (1943) showed that this was probably not the case. Demerec also concluded that in his experiment mutations conferring resistance were present before the treatment. M. Cohen (1958) induced changes in the enzyme system of the colon bacillus (*Escherichia coli*) that seemed to last indefinitely (150 cell generations) even though there appeared to have been no change in the nuclear apparatus. The work of T. M. Sonneborn (1947), John R. Preer (1948, 1950) and others has shown that changes in the cytoplasm of a protozoan (*Paramecium*) can be transmitted through a number of generations.

The proof of a sexual process in certain bacteria was given by E. L. Tatum and Joshua Lederberg (1947), and the discovery of the role of DNA in the mechanism of heredity has clarified a number of puzzles in the induced and transmissible alterations in bacteria. A. D. Hershey and R. Rotman (1949) showed that even virus particles that attack bacteria (bacteriophages) can exchange, segregate and recombine their hereditary factors and can act as carriers of hereditary material (genes) from one strain of bacteria to another. The fact that characteristics can be shifted from one bacterial strain to another via the bacteriophages—and without the usual fusion of gametes that had always been considered the essential of sexual reproduction—has been cited as an instance of the inheritance of acquired characteristics. But no transmission of a purely bodily modification in a higher animal or plant has ever been verified.

The social evolution of man has obviously come about by the transmission of the experience of one generation to the next by means of oral and written instruction. Our thinking has been so saturated with this point of view that it was natural to extend it to the bodily structures and behaviour of lower animals. Instincts have, in fact, been sometimes defined as inherited habits, which implies the Lamarckian theory. Experience has shown, however, that it is unwise to apply the evidence from one domain to another where an entirely different set of relations is known to exist.

See also GENETICS; HEREDITY; EVOLUTION, ORGANIC.

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LA MARMORA, ALFONSO FERRERO (1804–1878), Italian general and statesman of the Risorgimento, was born at Turin on Nov. 18, 1804. Having entered the army of Sardinia-Piedmont in 1823, he distinguished himself at the siege of Peschiera in May 1848 (*see* ITALIAN INDEPENDENCE, WARS OF; ITALY: *History*). On Aug. 5, 1848, he saved the king, Charles Albert, from the Milanese revolutionaries who resented his conclusion of an armistice with the Austrians. Promoted general in Oct. 1848, he was also minister of war until November. After suppressing the Genoese revolt in 1849, he was again appointed minister of war in November and held this post, with interruptions, till 1860, doing much to strengthen the armed forces. He led the Sardinian expedition to the Crimea in 1855 and fought against the Austrians in 1859.

Having been prime minister from July 1859 to Jan. 1860, La Marmora was governor of Milan and, from 1861, king's lieutenant in Naples. In 1860 also he had visited Prussia and Russia to secure approval for the establishment of the kingdom of Italy. In Sept. 1864 he became prime minister of Italy in succession to Marco Minghetti, whose convention with France he promptly modified so as to conserve freedom of action with regard to Rome. Having concluded an alliance with Prussia in April 1866, he brought Italy into the war against Austria in June (*see* SEVEN WEEKS' WAR), resigning the premiership to command an army corps. He was defeated by the Austrians at Custoza on June 24. In 1867 he was sent to Paris to object to the French expedition to Rome. On the fall of Rome to the Italians he was king's lieutenant there. In 1873 he published *Un po' più di luce sugli eventi dell' anno 1866,* defending his tactics in the Custoza campaign, against Italian charges of treason and Prussian charges of duplicity. La Marmora died in Florence on Jan. 5, 1878.

LAMARTINE, ALPHONSE DE (1790–1869), French poet and statesman. The earliest of the great French romantic poets, his spontaneous response to nature and his emotional sincerity rescued French verse from the abstractions of an exhausted classicism. He was born at Mâcon on Oct. 21, 1790. His family was staunchly royalist, and when he had completed his education with the Jesuits at Belley (1803–07), he was not allowed to take service under Napoleon because they considered him a usurper. Lacking settled occupation, the young Lamartine wrote verse and traveled. At Naples, early in 1812, he met a working-girl, Antoniella, and fell deeply in love with her; he learned of her death in 1815, and it was in her memory that he wrote, in 1844, the prose "anecdote" *Graziella.* For several months he served in Louis XVIII's bodyguard, but emigrated to Switzerland during the Hundred Days and almost immediately left the army. Suffering in body and mind, he went to Aix-les-Bains where, in Oct. 1816, he became passionately attached to Mme Julie Charles; she was suffering from a fatal illness and died in Dec. 1817. In 1820 Lamartine published his first book of poems, *Les Méditations,* and because of its new romantic tone and sincerity of feeling, it was immensely successful. In the same year he was appointed secretary to the embassy at Naples and married (June 6) an Englishwoman of his own age, Mary Ann Birch. His son Alphonse, born at Rome in 1821, died in Nov. 1822; his daughter Julia, born in May 1822, died at Beirut on Dec. 7, 1832.

The *Nouvelles Méditations* and *Mort de Socrate* (1823), and the *Dernier Chant du pélerinage d'Harold* (1825) increased Lamartine's reputation. While chargé d'affaires at Florence (1825–28), he wrote *Harmonies poétiques et religieuses* (publ. 1830). In Nov. 1829 he was elected to the Académie Francaise.

When Louis Philippe succeeded Charles X after the July Revolution of 1830, Lamartine abandoned his diplomatic career to seek election as a deputy. Unsuccessful in the elections of 1831, he set off for the middle east where he visited Jerusalem and Baalbek, returning in autumn 1833 by the Balkans and Austria. While at Beirut he was elected by the *département* du Nord as its representative in the chamber of deputies. He remained a deputy until Dec. 2, 1851.

In 1836 Lamartine published *Jocelyn,* in 1838 *Chute d'un ange:* two fragments of a vast metaphysical poem, an "epic of the soul" he had first conceived in 1821 and called *Les Visions.* His last volume, *Les Recueillements,* appeared in 1839, and from then on he abandoned poetry for politics. After entering the chamber he tried to influence the conservatives, his natural friends, to adopt a far-seeing policy of social justice; the attempt was fruitless and by 1842 it was clear to him that his advice was ignored. Believing that a working-class revolution was inevitable and imminent, he decided to put himself at the head of the extreme radical opposition in order to give some guidance to the revolution when it broke out. The outbreak occurred on Feb. 24, 1848, and, because of his *Histoire des Girondins* (1847), which had earned him immense popularity with the left wing parties, Lamartine became, in effect if not in name, the head of the provisional government., Two million votes were cast for him in the elections of 1848. But the national assembly, with its conservative majority, would only maintain him in power if he agreed to a reactionary policy, and this he refused to do. The right wing parties thereupon deliberately provoked riots by closing down, despite all his efforts, the national workshops; and Lamartine, with the executive commission, was thrown out on June 24, 1848. From that moment he was a broken man. On Dec. 10, 1848, he polled fewer than 20,000 votes for the office of president of the republic; Louis Napoléon Bonaparte was elected instead. But until the *coup d'état* Lamartine, defeated at Mâcon but elected at Orléans in 1849, still attempted, in his newspaper *Conseiller du peuple,* to turn opinion toward a liberal republic. The *coup* of Dec. 2 put an end to his political career.

Financially ruined, less by personal extravagance than by the yearly allowances he gave his five sisters (as the only male in the family he had inherited all the estates and houses of his father and uncles), Lamartine once more took to writing in order to make a living. He published *Les Confidences, Raphäel* (both 1849), *Geneviève, Le Tailleur de pierres de Saint-Point* (1851), several historical works and the *Cours familier de littérature,* 28 volumes (1856–69) in which some fine poems, such as "La Vigne et la Maison," are to be found. A national subscription was launched for him in 1858, but there was little response. He worked without respite. In 1867 the imperial government granted him a pension of 25,000 fr., but in the same year he suffered a severe stroke. He lingered on, enfeebled and almost unrecognizable, for nearly two years, and died in Paris on Feb. 28, 1869.

Poetic Status and Style.—France recovered a lost poetic sensibility in the poems of Lamartine; his *Méditations* of 1820—a *"respiration de l'âme"*—were, as he himself asserted later, something new and exciting after the desiccation of literature during the empire. Yet Lamartine remained captive to an exhausted vocabulary. Rimbaud saw him as a *"voyant"* (seer) who was still "inhibited by the old style of prosody." Lamartine's gifts to French poetry were a new rhythm and music: a rhythm which carried the verse forward, a music of great subtlety; and a profound feeling for the essence of things and for their symbols. It would be a mistake, however, to think of him only as a musician in verse, for his poetry is essentially in his thought. The philosophic poems of *Recueillements* ("Utopie") or *Chute d'un ange* ("Fragments du livre primitif"), as well as one of his very last poems: "Le désert, ou l'Immatérialité de Dieu," have a poetic and intellectual value at least as great as is commonly accorded to Alfred de Vigny's *Les Destinées.*

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LAMB, CHARLES (1775–1834), English essayist and letter writer, the "Elia" of the *Essays,* was born in London at 2, Crown Office row in the Inner Temple. His father was a scrivener and acted as servant and assistant to a bencher called Samuel Salt. Lamb described his father (as Lovel) in his essay "The Old Benchers": he was a merry man, full of jokes and antics, who would always stand up for the victims of oppression and oppose even the slightest dishonesty. About Lamb's mother little is known. His early memories of the Temple and of a family house at Mackery End, Hertfordshire, are the subject of some of the most charming of the *Essays of Elia.* A precocious child, he read widely among the books belonging to Samuel Salt. When he was seven and a half he was sent to Christ's Hospital, which he later described in an essay in *The Gentleman's Magazine* and then in his famous piece on "Christ's Hospital Five-and-Thirty Years Ago." He seems to have been happy at school, where he was a near contemporary of Samuel Taylor Coleridge and Leigh Hunt. As the school was in London, he had the advantage of having friends and relations whom he could visit on half-holidays. He was a promising scholar, reaching the dignity of "deputy Grecian" and being honoured (unlike Leigh Hunt) by having one of his essays inscribed in the headmaster's *Liber Aureus.* But for his stutter, the natural course would have been for him to proceed to Cambridge and so into the church; but as it was, he left school just before he was 15, and two years later he began what was to prove a lifelong occupation as a clerk in the East India house.

Letters.—Lamb is one of the greatest of English letter writers and his early letters to Coleridge, which begin in 1796, throw a great deal of light on his development. They reflect a very different personality from that of the "Elia" of the essays. The first of them reveals that he had just recovered from a fit of insanity, and is a reminder that the fear of madness haunted him throughout his life. It is noticeable also that his early literary tastes differ greatly from those of the mature Elia: he is an admirer of Rousseau, William Bowles and Henry Mackenzie. In Sept. 1796 his sister Mary went mad and killed their mother. Lamb behaved with the greatest possible courage and loyalty, taking on himself the lifelong care of his sister, and from this point can be dated a distrust of the unbridled workings of the imagination that reminds one of Dr. Johnson. Although he rejected his brother's view that Coleridge with his "damned foolish sensibility and melancholy" had been responsible for his own fit of madness, it is clear that he came to associate Coleridge with an epoch in his life which had ended. "With me the former things are passed away," as he wrote to Coleridge in 1796, "and I have something more to do than to feel."

Escaping from Coleridge's influence helped Lamb to discover his own identity, and the process of discovery may be followed through his letters. Obscure as he was in his daily life, he was rich in friendships: in an age of genius he corresponded with half the men of genius, including William Godwin, William Hazlitt, Thomas Hood and the Wordsworths; and being exceptionally sensitive to the characters of his friends, he found inspiration in the tastes and temperaments of his correspondents. When he wrote to Thomas Manning, the mathematician, for example, he was able to criticize Wordsworth's humourless egotism with a freedom which was out of the question in a letter to Coleridge. On the other hand he often reacted against the tastes of his correspondent: some of his most characteristic passages in praise of London may be found in letters to Wordsworth. He knew that he needed friends of different types: complaining of the death of several of his friends, he once wrote that "every departure destroys a class of sympathies . . . One never hears any thing, but the image of the particular person occurs with whom alone almost you would care to share the intelligence." Thus, there is a remarkable variety in his letters. One must not look to them (indeed) for the news of the day, while many of the great themes (such as religion and philosophy) are hardly touched on. Instead, one hears about Lamb's friends, his determination to give up smoking, his liking for roast pork and, above all, books—his own books, his friends' books, books he has been reading and books he has been buying, new books and old books. Most of his best criticism is to be found in his letters, in the form of marginalia, reactions and responses, brief comments delicately phrased but hardly ever argued or dis-

cussed. Many of the finest letter writers have been men and women who have been frustrated, and Lamb is one of the clearest examples of this. Written in snatches as he sat at his high stool in the office, his letters were a way of escaping from the daunting sobriety of receipt book and ledger, and many of them contain a marked element of play and make-believe. His hoaxing letters began in 1800, and it is not surprising that the more literal-minded of his correspondents (such as the Quaker poet Bernard Barton) were often at a loss. Some of the most entertaining of the letters were written in deep unhappiness: the postscript of one of them, "I write in misery," might have served for many. It is never the happiest of men who take *"Vive la bagatelle"* for their motto.

Poetry.—Lamb's first appearances in print were as a poet. By 1802, when he was 27, his only prose publications were *A Tale of Rosamund Gray* and an imitation of Robert Burton; but he had already published some 30 poems in collections by Coleridge and Charles Lloyd, and *John Woodvil* (1802), a poetic tragedy. It is fitting that the poem given first in the collected editions ("As when a child on some long winter's night") seems to have been a joint composition with Coleridge, for he (with Bowles and Charlotte Smith) was the dominant influence on all Lamb's early verse. One of the early poems, "The Old Familiar Faces," remains one of the best remembered, and it is hard to tell how far its effectiveness is due to awkwardness and how far to metrical sophistication. Lamb was at his best in the stricter metres, such as iambic tetrameters: at his worst in blank verse. "Angel Help" might be the work of a lesser Crashaw, while the lines "On an Infant dying as soon as it was born" remain Lamb's finest poetic achievement. The "Farewell to Tobacco" is an excellent imprecation, written in "stammering verse," a reminder that smoking helped him to refrain from stuttering. Mary Lamb thought it "a little too old-fashioned" but as Lamb himself commented, "I cannot write in the modern style, if I try ever so hard." *John Woodvil* is less a tragedy than a collection of poetical speeches, inspired by the Elizabethan dramatists.

Criticism.—In 1807 Lamb and his sister produced their *Tales from Shakespear,* a retelling of the plays for children which came to enjoy an enormous vogue; and the following year saw the publication of *Specimens of English Dramatic Poets, who Lived about the Time of Shakespear.* Lamb remarked that "Specimens" was a new name for what had formerly been called "Beauties," but he tried to give whole scenes rather than detached speeches. He chose "not so much passages of wit and humour . . . as scenes of passion . . . tragic rather than . . . comic poetry," and simply reprinted from accessible texts, omitting passages at will. Lamb was proud of the book, claiming in his miniature "Autobiography" to have been "the first to draw attention to the old English dramatists." In fact there had been several men in the previous century who knew more about Shakespeare's contemporaries than did Lamb, but there is no doubt that his advocacy did a great deal to bring their work to the attention of "the common reader."

The amount of explicit criticism in the *Specimens* is surprisingly small, and in fact Lamb wrote very little formal criticism from first to last. His essay "On the Tragedies of Shakespeare" makes it clear that he was interested in Shakespeare's characters rather than in their actions and that he greatly preferred reading the plays to seeing them acted. The essay "On the Artificial Comedy of the last Century" is a piece of special pleading designed to cut the ground from beneath the feet of moralizing critics, while that on Hogarth serves as an admirable reminder of the very high reputation that this typically 18th-century genius continued to enjoy in the period labeled "romantic." Unfortunately the only long review that Lamb ever wrote, on Wordsworth's *Excursion,* was characteristically "gelded" by William Gifford (editor of the *Quarterly Review*), but even so it speaks out courageously for the "boldness and originality" of Wordsworth's genius. The letters, however, fill out the picture of Lamb's critical tastes. He admired the poets of the 17th century and loved such prose writers as Thomas Fuller, Sir Thomas Browne and Robert Burton. In the 18th century he was most at home with the novelists. In all periods he liked writers who describe real life, hating "masques, and Arcadian pastorals." The poetry of Shelley seemed to him "too ideal," but he was one of the first critics to comment perceptively on Blake. If we compared him with Hazlitt, we find that his interests were far more limited, being confined to what used to be termed "belles-lettres." He is more interested in style than in content, in the part than in the whole, and never discusses the plot or structure of any work.

Essays.—Although he had written a few essays earlier, it was the founding of the *London Magazine* in 1820 that gave birth to "Elia" and to Lamb's greatest achievements. The fact that the essays are in a sense a development from his letters helps to explain their intimate tone. Whereas the 18th-century essayist was usually concerned with improving his reader's mind, with Lamb the didactic intention of "Modern Gallantry" is quite exceptional, as may be seen by comparing his subjects—"All Fools' Day," "Old China," "Mackery End in Hertfordshire"—with those of Dr. Johnson: "Happiness not Local," "Passion not to be eradicated," "The Arts by which bad Men recommend themselves." He is the least philosophical of essayists and the most human, "a bundle of prejudices," in knowledge "a whole Encyclopaedia behind the rest of the world." In his essays, as in his letters, he avoids whatever is urgent and disturbing: politics, suffering, sex, religion.

He is almost everywhere autobiographical (though he is apt to appropriate to himself experiences that had befallen his friends), and noticeable above all is his habit of writing about his own early life. His early surroundings must have encouraged his tendency to look over his shoulder toward the past, and few writers have ever been more aware of this habit than he. It was partly that he was afraid that the new world of factory, railroad and political economy would rob the imagination of its food. Lamb is an extreme case of a tendency characteristic of his age: in the 18th century men wrote of the present, in the 19th they wrote of the past. Many of his best essays deal with things half a century past, "recollected in tranquillity" in such a manner that anything disturbing in the original experience has been distilled away. His essays are vistas revealed by an imagination looking back down the experiences of a lifetime. His style is much more elaborate than that of most essayists, highly personal and mannered. It is sometimes simple, but never plain. Its function is to create the persona of Elia, and for this reason it is full of echoes and archaisms, ellipses and nuances, periphrases and calculated familiarities. At times the archaisms (in particular) are overdone and Lamb comes close to self-parody; but the triumphs easily outweigh the incomplete successes and the very few failures. It is a frankly literary style: Montaigne, Burton and Sir Thomas Browne lie behind it. His style is a reminder that Lamb preferred the prose writers of the 17th century to those of the 18th.

In the *Last Essays* the persona of Elia is much less prominent and the reader finds less to reward him. "Where shall I get another subject," Lamb writes to a friend, "or who shall deliver me from the body of this death?" He was discouraged by the poor sale of the first series when it appeared in 1823 as a book, and depressed by Robert Southey's attack on his religious opinions; while the decline in the standard of the *London Magazine* itself also undermined his confidence. The only masterpiece among the *Last Essays* is "The Superannuated Man," in which he was writing on a theme round which his imagination had been playing throughout many laborious years: it stands as a fitting epilogue to an incomparable series of essays which have always as their deepest and truest theme the character of Elia himself.

Lamb's release from drudgery with his retirement in 1825 was destined to prove a profound disappointment. His sister's condition deteriorated, his removal (for her sake) to Edmonton took him away from the circle of friends who gave him life and courage, and his tendency to drink too heavily became more pronounced. He died at Edmonton on Dec. 27, 1834. His sister outlived him by 13 years.

BIBLIOGRAPHY.—The standard ed. of the writings of Lamb and sister is that by E. V. Lucas, *The Works,* 7 vol. (1903–05); the best available ed. of the letters is also by Lucas, 3 vol. (1935). There were early biographies by Sir T. N. Talfourd, *Final Memorials* (1848) and B. W. Procter, *A Memoir* (1866); the standard Life is by E. V. Lucas (1905, rev. ed. 1921). *See* also Edmund Blunden, *Charles Lamb and his Con-*

temporaries (1933) and the full bibliography in *The English Romantic Poets and Essayists,* ed. by Northrop Frye and others (1957); Ian Jack, *English Literature, 1815–1832,* vol. x of *Oxford History of English Literature* (1963). (I. J.)

LAMB, SIR HORACE (1849–1934), English mathematician who contributed to the field of mathematical physics, was born at Stockport on Nov. 27, 1849. He was educated at Owens and Trinity colleges, Cambridge, where he was second wrangler and second Smith's prizeman. In 1872 he was made a fellow and assistant tutor of Trinity college; in 1875, professor of mathematics in Adelaide university; and in 1885, professor of mathematics in Manchester university, from where he retired in 1920. He became the recognized authority on hydrodynamics, publishing the *Mathematical Theory of the Motion of Fluids* (1878) and *Hydrodynamics* (1895; numerous later editions), the standard work on this subject, to successive editions of which Lamb added results of his further researches. He wrote many papers, principally on applied mathematics, his researches including wave propagation, electrical induction, and the elastic deformation of plates and shells.

On questions concerning the motions of the air involved by aircraft, he gave valuable assistance to the Aeronautical Research committee. Lamb was made fellow of the Royal society in 1884, and vice-president in 1909 and 1920–22. He was awarded the Royal medal in 1902 for his researches in mathematical physics, and the Copley medal in 1923; he was knighted in 1931. Lamb died on Dec. 4, 1934.

His other publications include: *Infinitesimal Calculus* (1897); *Dynamical Theory of Sound* (1910); *Statics: Including Hydrostatics and Elements of the Theory of Elasticity* (1912); *Dynamics* (1914); and *Higher Mechanics* (1920).

LAMB, WILLIS EUGENE, JR. (1913–), U.S. physicist and joint recipient of the 1955 Nobel prize for physics, was born at Los Angeles, Calif., July 12, 1913, and was educated at the University of California from which he received the Ph.D. degree in 1938. He joined the faculty of Columbia university and worked there in the radiation laboratory during World War II.

In 1947 Lamb and a student, Robert Retherford, observed a small displacement later called the "Lamb shift" of the $2^2S_{\frac{1}{2}}$ energy level in atomic hydrogen from the $2^2P_{\frac{1}{2}}$ level with which it had been supposed to coincide on the basis of the theory of P. A. M. Dirac. These measurements and experiments of Polykarp Kusch (*q.v.*), with whom Lamb shared the Nobel prize, spurred theoretical physicists to examine the effect of the electron on its own radiation field, with the result that a small correction to the magnitude of the electron's magnetic moment was found. The shift predicted theoretically for hydrogen, based upon this correction, is within 0.05% of the measured $1057.77 \pm 0.10 \times 10^6$ cycles/second.

As professor of physics at Stanford university (1951–56), Lamb devised and applied microwave techniques for examining helium excited states of short lifetimes. He was the principal author of an important series of papers in the *Physical Review* on the fine structure of the hydrogen atom. In 1956 he accepted the appointment to the chair of theoretical physics at Oxford university in England. (G. E. Pe.)

LAMBALLE, MARIE THÉRÈSE LOUISE DE SAVOIE-CARIGNAN, Princesse de (1749–1792), the intimate companion of Queen Marie Antoinette of France, was born at Turin in Piedmont on Sept. 8, 1749. In 1767 she was married to Louis Alexis, prince de Lamballe, son of Louis Jean Marie de Bourbon, duc de Penthièvre. After her husband's death the following year she retired with her father-in-law to Rambouillet until she returned to court on the marriage of the dauphin. Marie Antoinette singled her out as a confidante and, having become queen, had her appointed superintendent of the queen's household (1775) in spite of the king's opposition. Between 1776 and 1785 Yolande de Polastron, comtesse de Polignac, succeeded in supplanting her, but when the queen became tired of the avarice of the Polignacs she turned again to Madame de Lamballe. From 1785 to the Revolution she was Marie Antoinette's closest friend and the instrument of her caprices. In 1789 she went with the queen from Versailles to the Tuileries in Paris, and her *salon* became a meeting place for the queen and the members of the National Assembly whom she wished to win over. The people believed her to be the soul of all the intrigues. She shared the queen's imprisonment in the Temple on Aug. 10, 1792, but was transferred to La Force on Aug. 19. Having refused to take the oath against the monarchy, she was on Sept. 3 delivered over to the fury of the populace, who carried her head on a pike before the windows of the queen.

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LAMB AND MUTTON. The flesh and carcass of a young sheep is called lamb and that of the mature animal, mutton. Certain breeds of domestic sheep are pre-eminently wool producers, while others produce high-quality flesh. The flesh of sheep is eaten universally, there being no objection to its use on religious grounds. The United Kingdom is the only country in the northern hemisphere consuming any quantity of mutton and lamb—about 22 lb. per capita annually, compared with 1 lb. in the German Federal Republic and 4 lb. in the United States. The highest consumption is in New Zealand and Australia, where it is 76 lb. and 74 lb. respectively.

Lamb is an ancient symbol of spring and its flesh is popular at religious festivals, especially the Christian Easter and the Jewish Passover.

Cuts and Cooking.—Lamb lends itself to a wide range of cooking techniques from the elaborate curries of the East Indies to the shish kebabs of the near east, Great Britain's double mutton cutlet with kidney, the mutton and barley broths of Scotland and the barbecues of the U.S. The leg is used as a roast or for cutlets. The loins may be used for roasting or chops, while a pair of loins (saddle) may be roasted for double cutlets. The rack (ribs), or best end neck, may be roasted whole or cut into chops or prepared for "French chops" by clearing the fat and muscle from the tops of the rib bones and covering the end of the bone with a paper frill (chop holder). The shoulder is normally roasted. The middle neck and scrag are usually stewed but may be braised; the breast is frequently deboned, stuffed and baked or made into patties; the shank usually is stewed. (*See* also Food Preparation: *Meat.*)

Food Value.—On the basis of 100 g. of raw edible meat, leg of lamb compares very favourably in food energy, mineral and vitamin content with beef (round steak). The higher percentage (usually) of fat in leg of lamb results in a higher caloric value and a lower protein and water percentage (*see* Table).

Composition of Leg of Lamb and Beef (Round Steak)
(100 g. of raw edible portion)

Component	Lamb	Beef
Water	63.7%	69.0%
Protein	18.0 g.	19.5 g.
Fat	17.5 g.	11.0 g.
Calcium	10.0 mg.	11.0 mg.
Phosphorus	213.0 mg.	180.0 mg.
Iron	2.7 mg.	2.9 mg.
Thiamine	0.16 mg.	0.08 mg.
Riboflavin	0.22 mg.	0.17 mg.
Niacin	5.2 mg.	4.7 mg.
Caloric value (food energy)	235 cal.	182 cal.

Production.—Most sheep are slaughtered for consumption directly from pasture or the open range (with the exception of some milk-fed lambs). There is a considerable export trade in frozen mutton and lamb from New Zealand, Australia and South America. Many million head (chiefly lamb) are fattened each year, particularly in the U.K. and the U.S., by being fed hay, grain, sugar-beet pulp, silage, etc., to increase weight rapidly and to improve condition. After slaughter, sheep may be round dressed or plain dressed; *i.e.,* the pelt, head, viscera and shanks are removed. With some types of fancy dressing the shanks and head may be left on and with some lambs the caul fat (omentum) may be draped over the carcass. Dressing percentages vary considerably

with different breeds and crossbreeds and are greatly influenced by the quantity and the condition of the wool and the intestinal content (fill). The carcass weight in relation to live weight will approximate 50% for good average mutton breeds. Although mutton and lamb are considered to account for only 8% of the total meat output in principal countries exclusive of the far east, it has been estimated that for the world as a whole about 10,000,000 tons of mutton and lamb are consumed annually.

Trade.—In the mid-20th century New Zealand, Australia, Argentina, the U.K., western Europe and the U.S. placed considerable emphasis on meat production in sheep. In the case of Australia, New Zealand and South America, the development of refrigerated transport made possible the export of frozen carcasses, rather than wool, skins and tallow. International trade in frozen mutton and lamb prior to World War II averaged about 350,000 metric tons per year; in the postwar period the average rose to about 440,000 tons. Exports from particular sources vary from year to year but come chiefly from the following countries in the following approximate amounts: New Zealand, 260,000 tons; Argentina, 100,000 tons; Australia, 60,000 tons; Uruguay, less than 10,000 tons.

The major importer is the U.K., which receives about 400,000 tons per year, most of it from New Zealand. As the killing season in the southern hemisphere is opposite to that of the U.K., such imports fit conveniently into the U.K. economy.

Grades of Carcasses.—Age is an important factor in carcass grades, although some variation is produced by differences in the rate of maturity; *e.g.*, in down as compared with hill lambs. Small milk lambs are a luxury article, demanding a relatively high price. Many of the smaller lambs (about 32 lb.) are killed at about three to four months. Some lambs may be marketed at 6 to 12 months old, directly from pastures or after special fattening. Yearling mutton is from 12 to about 20 months old. Sex differentiation is less important than in the case of beef, except in the case of breeding stock when the flock consists predominantly of ewes and relatively few rams, tups or bucks (uncastrated mature males). The practice of running on wethers (*i.e.*, putting them out to graze) for two to three years to produce a full-flavoured product was at one time common in Scotland but is now rare.

Conformation, finish, quality and, in many cases, weight may enter into methods of grading. New Zealand has established a high export standard for mutton and lamb carcasses. Conformation relates to the form; *i.e.*, to the proportion of meat to bone. The more valuable cuts—legs, loins, ribs and shoulders—have a high percentage of meat by weight. Conformation is much affected by breeding, age, sex, the plane of nutrition and general environment. Finish, or the quantity, quality and distribution of fat, is somewhat related to breed type but is largely dependent on feed. For satisfactory flavour and possibly tenderness, there must be a certain amount of surface fat, the optimum thickness for modern demands being about $\frac{1}{4}$ in. Quality is related to texture, the colour of the lean meat and the fat, and the colour and porosity of the bone, which indicates the age of the animal. U.S. government grades are prime, choice, good, utility and cull. Only a small percentage of mature mutton carcasses in the U.S. are graded as high as "good." (F. GE.)

LAMBAYEQUE, a coast department of northern Peru, bounded north by Piura, east and south by Cajamarca and Libertad, southwest by the Pacific ocean. Area 6,404 sq.mi.; pop. (1961) 347,192. In the desert coast zone, only irrigated river valleys are cultivated (about 150,000 ac.). Lambayeque is the centre of rice production, grown on small holdings, and second only to Libertad in sugar cane, grown on large estates. Cotton, maize (corn), vegetables and fruits are also cultivated. Cattle are raised in the upper valleys. Railways connect agricultural areas with the departmental capital (Chiclayo) and ports (Pimentel, Eten). The chief industry of Chiclayo, pop. (1961) 86,904, is rice milling. (P. E. J.)

LAMBERMONT, AUGUSTE, BARON (1819–1905), Belgian statesman who finally solved the Scheldt question for his country, was born at Dion-le-Val (Brabant) on March 25, 1819. He entered the seminary of Floreffe, but soon left the monastery for Louvain university, where he studied law and prepared himself for the military examinations. On the outbreak of the Carlist War (1834), he went to Spain to serve in Queen Isabella's army and was entrusted with the command of two small cannon. He distinguished himself at the siege of Morella and was decorated by Isabella with the cross of the highest military Order of St. Ferdinand.

Returning to Belgium, Lambermont entered the ministry for foreign affairs in 1842. He was one of the first Belgians to see the importance of developing the trade of the newly independent country, and at his own request he was attached to the commercial branch of the foreign office. The tolls imposed by the Dutch on navigation of the Scheldt had strangled Antwerp's trade since 1648. From 1856, therefore, Lambermont devoted himself to the removal of the levy: he drew up a plan of action and prosecuted it until he saw it embodied in an international convention at Brussels in 1863; and on July 15 the treaty freeing the Scheldt was signed. For that achievement Lambermont was made a baron. He was prominent at the Brussels conference in 1874 and at the Berlin conference in 1884, where Belgian rights over the Congo were recognized. He died in Brussels on March 7, 1905.

See A. de Robiano, *Le Baron Lambermont* (1905).

LAMBERT, CONSTANT (1905–1951), English composer, conductor and critic who played a leading part in establishing the ballet as an art form in England, was born in London on Aug. 23, 1905. He studied there at the Royal College of Music under R. O. Morris and R. Vaughan Williams. While still a student he was commissioned by Diaghilev to write the ballet *Romeo and Juliet* (1926). *Pomona,* his second ballet, was given the following year. In the meantime he had been associated with the Sitwell family and his choral work *Rio Grande,* on a poem of Sacheverell Sitwell, was given in 1929. In the same year he became conductor of the Camargo society, formed to continue the work of Diaghilev; the society led to the creation of the Sadler's Wells ballet, which Lambert directed until 1947. He produced two further ballets, *Horoscope* (1938) and *Tiresias* (1951), and made numerous arrangements for the ballet of works by William Boyce, Purcell, Handel, Liszt and others. His compositions also include a piano concerto, a piano sonata and a song cycle, *Eight Chinese Songs.* His style is marked by a strong sense of rhythm and a distinguished lyrical character. As a conductor he was well known for his enterprise in bringing little-known works before the public and for his interpretations of 20th-century works. Lambert was also a perspicacious critic. His assessment of the contemporary scene, *Music Ho! A Study of Music in Decline* (1934), in which he foresaw developments of the succeeding generation, was long held to be one of the most illuminating studies of 20th-century music. He died in London on Aug. 21, 1951.

LAMBERT, DANIEL (1770–1809), an Englishman famous for his great size, was born in Leicester on March 13, 1770, the son of the keeper of the jail, to which post he succeeded *c.* 1791. Though he had led an active and athletic life he weighed in 1793 32 stone (448 lb.). He died on June 21, 1809, and at the time measured 5 ft. 11 in. in height and weighed $52\frac{3}{4}$ stone (739 lb.). His waistcoat, now in the Leicester museum, measures 102 in. around the waist. His coffin contained 112 ft. of elm and was built on wheels. His name has been used as a synonym for immensity. George Meredith describes London as the "Daniel Lambert of cities," and Herbert Spencer used the phrase "a Daniel Lambert of learning." The best portrait of him, a large mezzotint, is preserved at the British museum in D. Lysons' *Collectanea.*

LAMBERT, FRANZ (*c.* 1486–1530), the Protestant reformer of Hesse, was the son of a papal official at Avignon, where, at 15, he entered the Franciscan monastery. After 1517 he was an itinerant friar, traveling through France, Italy and Switzerland. His study of the Scriptures shook his faith in Roman Catholic theology and by 1522 he had abandoned his order. He did not, however, identify himself with either Zwinglianism or Lutheranism; he disputed with Zwingli at Zürich in 1522 and then made his way to Eisenach and Wittenberg, where he lectured, 1523–24. He returned to Strasbourg in 1524 to preach among the French-speaking population of the neighbourhood. By the Germans he

was distrusted and in 1526 his activities were prohibited by the city of Strasbourg. He was befriended by Jacob Sturm, who recommended him to the landgrave Philip of Hesse, with whose encouragement he drafted his *Reformatio ecclesiarum Hassiae* for the Synod of Homberg (1526). Its basis was essentially democratic and congregational, though it provided for the government of the whole church by means of a synod. Pastors were to be elected by the congregation and the whole system of canon law was repudiated. This plan was far too democratic to commend itself to the Lutherans, and Philip abandoned it. By his influence, however, Lambert was appointed in 1527 professor and head of the theological faculty in the landgrave's new university at Marburg. Patrick Hamilton, the Scottish martyr, was one of his pupils; and it was at Lambert's instigation that Hamilton composed his *Loci communes* or *Patrick's Pleas,* as they were popularly called in Scotland, upholding justification by faith. Lambert took part in 1529 in the conference of Marburg, when he definitely adopted the Zwinglian view of the Eucharist. He died of the plague in Marburg on April 18, 1530.

See L. Ruffet, *Lambert d'Avignon* (1873); G. Müller, "Franz Lambert von Avignon und die Reformation in Hessen," *Veröffentlichungen der historischen Kommission für Hessen und Waldeck,* no. 24, vol. 3 (1958).

LAMBERT, JOHANN HEINRICH (1728–1777), Swiss-German mathematician, astronomer, physicist and philosopher, who was an unusually productive scholar with wide interests, was born at Mulhouse, Alsace, on Aug. 26, 1728, the son of a tailor. He was mainly self-educated and early began geometric and astronomical investigations by means of instruments constructed by himself. In 1748 he became tutor to a noble Swiss family in Chur and later for several years accompanied his pupils on European travel. His first paper (1755) was on the theory of heat; then followed publications on pure mathematics, the orbits of comets, map construction and theory of light.

Among his most important works should be mentioned *Pyrometrie* (1779) and *Photometria* (1760). The *Neues Organon* (1764), his principal philosophical work, contains an analysis of a great variety of questions, among them formal logic, probability and the principles of science.

In 1764 he was made a member of the Berlin Academy, and in 1765 *Oberbaurat* (government surveyor), a position which he held until his death on Sept. 27, 1777.

See J. H. Lambert, *Opera Mathematica,* 2 vol. (1946, 1948); M. Steck, *Bibliographia Lambertiana* (1943). (O. Oe.)

LAMBERT, JOHN (1619–1684), parliamentary general during the English Civil War and the principal architect of the Protectorate, was born in the autumn of 1619 at Calton in the West Riding of Yorkshire. He is believed to have been educated at Kirkby Malham grammar school, Trinity college, Cambridge, and at one of the Inns of Court. His family belonged to the "rising" gentry whose wealth derived from the dissolution of the monasteries. When he was 20, he married Frances, daughter of a neighbour, Sir William Lister. Through the Listers he was connected with the Fairfaxes and was on Heyworth moor on June 3, 1642, when Charles I rejected a petition presented to him by Sir Thomas Fairfax inviting him to become reconciled to parliament. At the beginning of the Civil War John Lambert served as a captain in Fairfax's cavalry regiment. By the end of 1643 he was colonel of his own cavalry regiment and took part in the relief of Nantwich in Cheshire. He first distinguished himself in a fight with the royalists at Bradford. In 1644 he served under Fairfax on the right wing at the battle of Marston Moor. He was raised to the rank of commissary general in Jan. 1645 and in the New Model army he was colonel not only of a cavalry but also of a foot regiment which he took over from Col. Edward Montagu, afterward earl of Sandwich. He was not present at the battle of Naseby (June 1645), but took part in the pursuit, and accompanied Fairfax on his campaign in the west of England. He was one of the commissioners who negotiated the surrender of Oxford (June 1646) and was appointed temporary governor of the city where he used his influence to prevent damage to the churches.

In July 1647 Lambert returned to Yorkshire with the rank of major general when he was only 28 years old. Though a good disciplinarian and administrator, he was very popular with the soldiers and was chosen as a spokesman by a committee of officers which represented the point of view of the army when resistance was being offered to the demand from parliament that the army should either disband or serve in Ireland under new commanders. Lambert helped Henry Ireton draw up the "Heads of the Proposals," a draft constitution aimed at reconciling the attitudes of the army, parliament and king. He was sent north to reorganize the unruly regiments and to prevent mutiny.

When the second phase of the Civil War began in 1648 Lambert was in command in the north and exerted himself to crush royalist risings in Yorkshire. He defeated the royalist commander, Sir Marmaduke Langdale, but when the Scottish "Engagers" entered England to fight for Charles I he was forced to withdraw south and await the arrival of Oliver Cromwell who ordered him not to fight until he arrived with reinforcements. Lambert then did well in the Preston campaign and accompanied Cromwell to Scotland. When Cromwell returned to London, Lambert was left in command in the north and eventually reduced the town of Pontefract, the last stronghold to resist on behalf of the king. He showed mercy at Pontefract and was awarded £300 a year by parliament for his success. Because Pontefract did not surrender until after the king's execution, Lambert, although named one of the commissioners at Charles's trial, was detained in the north and did not sign the death warrant. At the Restoration he claimed that he did not approve of the king's execution.

Lambert was Cromwell's second-in-command during the Scottish campaigns of 1650 and 1651 and was sent south with a cavalry contingent to harass Charles II during his advance to Worcester. After the battle of Worcester parliament voted him lands to the value of £1,000 a year and he accepted the post of lord deputy of Ireland in succession to Ireton. However, this appointment was suddenly changed to that of commander in chief, which Lambert refused. He became a wealthy man, partly through buying land and partly by speculating in soldiers' debentures (claims for arrears of pay). In May 1652 he bought a large house at Wimbledon. He pressed upon Cromwell the dissolution of the Long or "Rump" parliament in 1653 and when the "Assembly of Saints," which replaced it, failed, he was responsible for drawing up the Instrument of Government (*q.v.*) under which Cromwell became lord protector.

For a time Lambert was Cromwell's right-hand man. In Oct. 1654 he proposed that the protectorate should be made hereditary. Lambert was active in the council of state and was opposed to the West Indian expedition and war against Spain. He was made a major general of the horse militia, responsible for securing northern England apart from Lancashire. When the second protectorate parliament met he proposed a plan whereby those elected who were known opponents of the government should be prevented from taking their seats. In 1657 he was vehemently opposed to the idea of Cromwell becoming king. After a new constitution—the Humble Petition and Advice (*q.v.*)—had been accepted, Lambert refused to swear to be faithful to the protector and was deprived of all his offices and commissions, but was given £2,000 a year.

After Cromwell's death Lambert slowly returned to politics, though he did not take an openly leading part in the movement to overthrow Oliver's son, Richard. He received back his regiments and suppressed a royalist rising in Cheshire led by Sir George Booth in 1659. Afterward he compelled the restored "Rump" parliament to dissolve, but was unable to resist Gen. George Monck who came from Scotland to its rescue. In June 1662 Lambert was sentenced to death by the court of king's bench for his part in the Civil War, but was reprieved. He spent the rest of his life in prison, dying at St. Nicholas island, off Plymouth, in March 1684. He was an ambitious man who had no strong religious leanings but loved power and wealth; he was a better soldier than a politician.

See W. H. Dawson, *Cromwell's Understudy: General John Lambert* (1938). For details about Lambert's regiments, *see* Sir Charles Firth and G. Davies, *The Regimental History of Cromwell's Army,* 2 vol. (1940). (M. P. A.)

LAMBESSA (Lambèse), a village in Algeria, north Africa, famous for its Roman remains. It lies in the Batna *département* on the slopes of the Jabal Aurès, 80 mi. SSW of Constantine by road. Pop. (1960) 4,365 (city), 6,805 (commune).

The modern settlement was founded in 1848 by French agriculturalists attracted by the fertile soil. A large convict prison for French political deportees was established there in 1852. The village is noted only for its museum of Roman remains. The inhabitants are mostly farmers and woodcutters.

The remains of the Roman town (Lambaesis) and camp are, together with those of Timgad (*q.v.;* 16½ mi. E), among the most interesting ruins in northern Africa. They include two triumphal arches (one to Septimius Severus), temples, an aqueduct, remains of an amphitheatre, baths, and much masonry belonging to private houses. Lambaesis was a military foundation. The camp of the third legion, charged with defending north Africa, was moved there from Tebessa between A.D. 123 and 129 in the reign of Hadrian. The camp stands on level ground a short distance north of the village. Its site, about 1,500 ft. square, is partly occupied by the prison and its grounds. Its chief building is the so-called praetorium in the centre, dating from A.D. 268, whose southern facade has a splendid peristyle consisting of a front row of massive Ionic columns and an engaged row of Corinthian pilasters. Lambaesis became a town during the reign of Marcus Aurelius (when the amphitheatre was built) and the capital of the Roman province of Numidia under Septimius Severus, but with the departure of the legion in about 392 the town soon declined. (G. Vl.)

LAMBETH, one of the 32 London boroughs constituting Greater London, Eng., is bounded west by Wandsworth, north by the Thames, east by Southwark, and south by Bromley, Croyden, and Merton. This inner London borough was established on April 1, 1965, under the London Government Act 1963 by the amalgamation of the metropolitan boroughs of Lambeth and Wandsworth (in part) (*see* London). Area 10.5 sq.mi. (27 sq.km.). Pop. (1965 est.) 339,560. It embraces the districts of Vauxhall (including Kennington), Brixton, and large parts of Norwood, Clapham, and Streatham. Its parliamentary constituencies comprise Lambeth Vauxhall, Lambeth Brixton, Lambeth Norwood; Wandsworth Clapham, and Wandsworth Streatham (the last two in part).

Lambeth Town Hall is at Brixton Hill. The parish church, St. Mary's, lies alongside Lambeth Palace, the London residence of the archbishop of Canterbury. Lambeth's Thames frontage directly faces the Houses of Parliament and Westminster with which it is connected by five bridges.

The origin of "Lambeth" is disputed, but prior to the Domesday Survey, "Lambehythe" and variations are recorded, probably indicating "harbour where lambs are shipped." Domesday records three manors (including "Chenintune") in the "Brixistan Hundred," also those of Clapham and Streatham. Traces of an earlier community and of a Roman fort have been found. Parish churchwardens' and vestry records exist from the 16th century.

Although the population of the area was increased by fugitives from the Black Death, the Great Plague, and the Great Fire of London, it was thinly peopled until the 18th century, the majority living near the Thames and most being associated with agriculture or the river. Direct access across the Thames was by ford, horse-ferry, or boat until 1750. However, proximity to London, royal connections, and Lambeth Palace led to many notables' living in the district. From the 17th century new industries were established followed by the commercial development of the river frontage. Thereafter growth was rapid. By 1801 the population was probably 35,000 and by 1901 over 450,000. Borough features were its fashionable pleasure gardens (Spring [later Vauxhall] Gardens and Cuper's were the best known); theatrical associations (Astley's Amphitheatre 1771, Bower Salon 1838, and the Royal Cobourg 1818); street markets; and medicinal wells.

The borough is a principal traffic centre with Waterloo Station and an underground and overground railway network. There are also main roads leading to the Thames bridges. It is largely residential but administrative and office developments for government, local government, and commercial purposes have been established. The borough includes the main administrative centre of the Greater London Council, the Shell Centre, a growing cultural centre comprising the Royal Festival Hall, the "Old Vic" (now the National Theatre), and the National Film Theatre. Famous hospitals include St. Thomas' and King's College, both with medical schools. Also there are Morley College, the Oval Cricket Ground, extensive open spaces (including Brockwell Park and parts of Clapham, Tooting Bec, and Streatham Commons), four so-called "Waterloo" churches, and the headquarters of the London Fire Brigade. (J. E. F.)

LAMBETH CONFERENCES, an important organ of united Anglican opinion, are gatherings of bishops of the Anglican communion held from time to time at Lambeth palace, the London house of the archbishop of Canterbury, who convenes and presides over them. The first conference was held in 1867 as a result of a request from the Church of England in Canada. The archbishop, C. T. Longley, was careful to explain the limited scope of their deliberations: "We merely purpose to discuss matters of practical interest, and pronounce what we deem expedient in resolutions which may serve as safe guides to future action." He later emphatically stated that it was not proposed "that questions of doctrine should be submitted for interpretation in any future Lambeth Conference. . . ." In spite of this cautious approach, only 76 of the 144 bishops of the Anglican communion accepted the invitation. The archbishop of York, among others, declined to attend, and A. P. Stanley, dean of Westminster, refused the use of the abbey for the closing service, because of doubts as to the status and wisdom of the gathering. The first conference lasted only four days; that of 1958 lasted five weeks. Ten years is regarded as the normal interval between conferences. By 1958 the number of bishops had so increased that it was found desirable to limit invitations to diocesan bishops and to certain other bishops who were invited for special reasons: 310 attended.

Lambeth conferences are recognized as indispensable to the life of the Anglican communion; indeed they are the only means of joint consultation for Anglican leaders on a broad scale. The conferences normally issue an encyclical letter and a series of resolutions, and also publish the reports prepared by committees, on which the resolutions are based. The decisions of the conference have no power over Anglican churches, which must adopt them by synodical or other constitutional means to make them legally binding. But the fact that all diocesan bishops are invited to the conferences gives their decisions great influence.

In the agenda of the conferences a prominent place is given to relations with other Christian churches. Internal Anglican matters naturally also have a regular place, and in 1958 the bishops also considered the role of the Bible, the reconciling of conflicts between and within nations, and the family in contemporary society; in connection with the last subject public attention was attracted by the approval given by the conference to the use of artificial methods of birth control within a Christian outlook on marriage. The conferences have grown steadily in importance and influence. Following a resolution in 1958 a bishop has been appointed as "executive officer" of the Anglican communion to coordinate the work and plans of its various churches. Since 1897 a permanent consultative body exists to advise about preparation of the agenda.

See S. C. Neill, *Anglicanism* (1958). (H. M. W.)

ROCHE

LAMB'S QUARTERS (CHENOPODIUM ALBUM)

LAMB'S QUARTERS, pigweed, white goosefoot, some of the names commonly given to the cosmopolitan weed *Chenopodium album,* of the goosefoot family (Chenopodiaceae), growing in moist soil throughout all agricultural regions, except in the extreme north. It is an erect, usually slender, much branched, pale green annual, one to ten feet high, with somewhat lance-shaped,

more or less lobed or toothed leaves, one to four inches long, commonly white-mealy beneath. The numerous small green flowers are borne in dense terminal or axillary clusters.

The seeds, which are usually matured in great profusion, are very small, black and somewhat glossy. While exceedingly abundant and of rapid growth, this weed is readily controlled in fields in which the growing crop is frequently cultivated, and, because of its later germination, does not usually become injurious in fields of growing grain.

The young shoots of this plant are sometimes used as potherb, like spinach. *See* CHENOPODIUM; WEED.

LAMECH appears in the genealogy of Gen. iv, 17–24 as a descendant of Cain, in that of Gen. v as a descendant of Seth. Unsuccessful attempts have been made to identify Lamech with a name in the Babylonian lists of ante-diluvians. According to the story of Gen. iv, Lamech had two wives, Adah and Zillah (*i.e.*, "Dawn" and "Shadow"). His three sons are Jabal, Jubal and Tubal, such assonances being a regular feature of legendary genealogies. As the story now stands Tubal appears as Tubal-cain, but, as the break away from the assonance suggests, the double name is probably due to an attempt to identify two different figures. To these three brothers are attributed the development of pastoral civilization, music and metalwork, respectively. The sister Naamah—the name may be also that of a deity—is probably a later addition to the legend. The song ascribed to Lamech (Gen. iv, 23–24) is often called a "sword-song," and is supposed to express Lamech's joy at possessing the new weapon forged by Tubal. But the song in fact is quite independent of its context; it is a jubilation over the practice of blood revenge. The way in which the sevenfold revenge of Cain is depreciated is quite unlikely if Cain were an ancestor of Lamech, and would be much more likely if the Cain referred to were a contemporary. The song may well be based on some actual incident. (W. L. W.)

LAMELLIBRANCHIA (BIVALVIA), a group of aquatic invertebrate animals the most familiar examples of which are the oyster, mussel and clam. *See* BIVALVE; CLAM; MUSSEL; OYSTER.

LAMENNAIS, HUGUES FÉLICITÉ ROBERT DE (1782–1854), French priest and philosophical and political writer, was one of the most influential and controversial figures in the church of France. He was born at St. Malo on June 19, 1782, of a bourgeois family whose liberal sympathies were chastened by the course of the French Revolution. The turbulence of the times was matched by, and perhaps contributed to, the restlessness of his spirit, the intensity of his emotions and the vigour of his intelligence. Together with his saintly elder brother, Jean, he early conceived the idea of a revival of Catholicism as the key to a regeneration of society. After Napoleon's restoration of the French church, the brothers sketched a far-sighted program of reform in *Réflexions sur l'état de l'église en France pendant le 18e siècle et sur sa situation actuelle* (1809), and at the height of the emperor's conflict with the papacy they produced a historical defense of Ultramontanism (*q.v.*) in *Tradition de l'église sur l'institution des évêques* (1814).

During the Hundred Days Lamennais went into exile in England. On his return to France, urged on by friends who admired his talents, he was ordained priest (1816), and in 1817 published the first volume of his *Essai sur l'indifférence en matière de religion*, which won him immediate fame because of the brilliance of its style and the novelty of its apologetic. He appealed to the authority of tradition and the general reason of mankind in contrast to the individualism of private judgment. The subsequent volumes of the *Essai* were viewed with misgiving by older theologians, but Lamennais gradually gathered round him a gifted company of young disciples who included P. O. Gerbet and L. A. de Salinis (both of whom eventually became bishops) and the poet Maurice de Guérin. He attacked the Gallicanism of the bishops and the monarchy, and his book *Des progrès de la révolution et de la guerre contre l'Église* (1829) showed that he was ready to marry Catholicism with political liberalism.

After the July revolution in 1830 Lamennais founded *L'Avenir* in collaboration with Henri Lacordaire, Charles de Montalembert (*qq.v.*) and a group of enthusiastic liberal Catholic writers. The paper's advocacy of democratic principles and the separation of church and state soon roused the hostility both of the French ecclesiastical hierarchy and of Louis Philippe's government, and it found little favour in Rome despite its flamboyant Ultramontanism. Pope Gregory XVI had no inclination to assume the revolutionary role designed for him. In Nov. 1831 publication of the paper had to be suspended. After a vain appeal to the pope, the principles of *L'Avenir* were condemned in the encyclical *Mirari vos* (Aug. 1832). The liberal Catholics duly made their submission, but Lamennais did so in bitterness of soul because his dream of an alliance of Catholicism with liberty was shattered. In 1834 his exasperation found expression in *Paroles d'un croyant*, a little apocalypse that caused an immense sensation because of the violence of its attack on the papacy and the European monarchs. It provoked another papal encyclical, *Singulari nos*, which in turn led to his severance from the church.

Henceforth Lamennais dedicated himself to the cause of the people, and his pen was tirelessly at the service of republicanism and socialism. His publications in this period included *Le Livre du peuple* (1838) and *De l'Esclavage moderne* (1839). He also published his *Esquisse d'un philosophie* in four volumes (1841–46) and other purely literary works. After the 1848 revolution he was a prominent member of the constituent assembly, but his hopes were again defeated when the *coup d'état* set the seal on Louis Napoleon's dictatorship. He died in Paris on Feb. 27, 1854, having refused to be reconciled to the church, and by his own wish he was buried in a pauper's grave.

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LAMENTATIONS OF JEREMIAH, a book of the Old Testament, placed in the Hebrew Bible among the Kethubim (or Hagiographa; "Writings"), where it is one of the five festal scrolls (Megilloth); and in the Septuagint, Peshitta and Vulgate (hence also in English Bibles) among the Prophets, immediately after Jeremiah. In the Hebrew Bible it is entitled Ekha ("How"), this being the initial word of the first, second and fourth chapters. The rabbis entitled it Qinoth ("Elegies"), and an equivalent word was used by the Septuagint (Threnoi) and by the Vulgate (Lamentationes).

Contents.—The work consists of five poems (chapters) conceived in the form of laments for Judaea and Jerusalem invaded by the Babylonians, under Nebuchadrezzar, and finally devastated in 586 B.C., and for the sufferings of the population and of the poet himself (ch. iii) during and after, intermingled with abject confessions of sin and prayers for divine compassion. The following is a recapitulation:

First Elegy.—The poet echoes the distress of Jerusalem and its inhabitants (1–11); Zion itself takes up the lament (12–16); the poet, in a parenthetic verse, bemoans the lack of a comforter for Zion (17); Zion acknowledges the justice of Yahweh's judgment and makes a pathetic appeal for pity (18–22).

Second Elegy.—The poet describes in anguished terms the desolation of Judaea, Jerusalem and the Temple, caused by an angry God (1–12); he acknowledges that the sufferings are the result of sin (13–17); he invites Jerusalem to supplicate Yahweh (18–19); Zion, accepting the invitation, pleads for the Lord's mercy (20–22).

Third Elegy.—The poet bemoans his personal suffering (1–18); he overcomes, however, his despair and recalls to mind Yahweh's unfailing mercies (19–24); he declares that man in the midst of suffering should be resigned to the Lord's will and patiently await his help (25–39); the people seek pardon through repentance and bewail their miseries which are the result of sin (40–47); the poet again sets forth, with intense emotion, his personal sufferings and voices his certainty that God will requite his enemies (48–66).

Fourth Elegy.—The poet grieves over the horrors consequent on the siege of Jerusalem (1–12); he recalls the people's insurrection against their guilty leaders (13–16); he dwells upon the hopelessness of human aid (17–20); he concludes with an imprecation against Edom (21–22).

Fifth Elegy.—The poet lays before Yahweh the wretched state of the people, both the exiles and those left behind in Judaea, in order to secure the divine mercy and restoration to favour (1–22).

Structure and Form.—The first four elegies are alphabetic acrostics. The fifth is not, although like the others it has 22 stanzas, which is the number of letters in the Hebrew alphabet. The stanzas of the first three contain three distichs and of the fourth two. In the third the appropriate letter begins all three distichs of a stanza, so that each letter is used three times. There is the further peculiarity that, whereas in the first poem the order of the Hebrew letters is the usual one, elsewhere the *pe* precedes the *'ayin.*

In the first four poems the *qinah* ("elegiac") metre is used in the construction of the distich; in this "limping" rhythm each distich has two parts with, as a rule, three significant words in the first and two in the second. This limping arrangement conveys the impression of grief. In the fifth poem there are three significant words in both parts of the stanza.

Date of Composition and Authorship.—Most critics place the composition of the book before the return of the Jews from exile in 537/536 B.C. Certain passages (*e.g.*, ii, 6, 9 ff. and iv, 10) appear to be pen pictures of an eyewitness and would, therefore, have been written shortly after the destruction in 587 B.C.

Until the 18th century the work was universally attributed to Jeremiah. There was the testimony of the prologue in the Septuagint and in some manuscripts of the Vulgate. The Targum, Josephus and the Talmud attributed the book to the prophet. The early Christian writers (*e.g.*, Origen, Epiphanius) did likewise. But the poems are anonymous in the Hebrew Bible, the authenticity of the Septuagint prologue cannot be proved and it is possible that the ancient tradition may rest on a misunderstanding of II Chron. xxxv, 25 which presents Jeremiah as a composer of elegies.

Since the 18th century many scholars, chiefly on internal evidence, have been against the attribution to Jeremiah. A comparison of Lam. ii, 9 with Jer. xlii, 4 ff.; of Lam. iv, 17 with Jer. xxxvii, 5–10; of Lam. iv, 20 with Jer. xxxvii, 17 ff.; and of Lam. v, 7 with Jer. xxxi, 29–30 shows that the ideas and sentiments expressed in Lamentations are unlike those in Jeremiah. Moreover, it is unlikely that the spontaneity and naturalness so characteristic of Jeremiah's utterances could be accommodated to a poetic form so complicated and artificial as that in Lamentations. There are critics who would doubt unity of authorship. The theory of multiple authorship, which is the more probable one, finds favour because of the variation in the order of the Hebrew letters, the peculiar literary structure of the third elegy, the fact that the fifth is more a community prayer than a lamentation and the fact that the only resemblance of the fifth to an alphabetic acrostic is that it has 22 stanzas.

Liturgical Use.—Lamentations was placed in the Jewish liturgy to be read on the 9th Ab (July/August), the anniversary of the destruction of Jerusalem. The Christian church employs the book to pour out its grief over the passion and death of Christ.

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(M. J. LE.)

LA MESA, a city of San Diego county in southern California, U.S., 8 mi. E. of San Diego bay and adjoining the eastern boundary of the city of San Diego (*q.v.*). Originally known as Allison's Springs, La Mesa occupies the site of a sheep ranch purchased in 1869 by Robert and Josiah Allison. The city enjoys a dry and even climate and is primarily a family residential centre; the majority of its working population is employed in the industry, commerce and naval activity of neighbouring San Diego. The city is the centre of a district specializing in the production of avocados. Incorporated in 1912, the city has a council-manager form of government, in effect since 1953. For comparative population figures *see* table in CALIFORNIA: *Population.* (K. J. R.)

LAMETH, ALEXANDRE THÉODORE VICTOR, COMTE DE (1760–1829), a nobleman of the *ancien régime* who was prominent as a liberal in the early stages of the French Revolution, was born in Paris on Oct. 28, 1760. With his brothers Charles and Théodore he fought for the colonists in the American Revolution, serving as aide-de-camp to the comte de Rochambeau and rising to be adjutant general. On his return to France he was appointed colonel of the Royal-Lorraine cavalry regiment (1785).

In May 1789 Lameth represented the nobility of the bailliage of Péronne in the estates-general. With 43 other nobles he went over to the third estate, thus ensuring the creation of the National Assembly. He was the first to propose freedom of worship, and several articles in the Declaration of the Rights of Man and of the Citizen were adopted on his suggestion. In September, when Louis XVI had refused to sanction the decree abolishing the feudal regime, a "Monarchien" or "Anglomane" group emerged seeking to uphold him, but Lameth, Adrien Duport and Antoine Barnave, together known as "the triumvirate," took control of the Patriot party and won the day. Later in 1789 and in 1790, when Lafayette seemed to be the man of the moment, the triumvirs several times took an extremist attitude to checkmate him, but basically their views were the same as his.

In the spring of 1791 Lameth and his group began to move closer toward the court, and after Mirabeau's death (April 1791) they replaced him as the secret advisers of the royal family, which subsidized their production of a new paper, the *Logographe.* Having patched up their quarrel with Lafayette, they secured the exclusion of "passive citizens" (those who had not the property qualification for voting) from the national guard. With Lafayette, they wanted to raise the property qualification for voting, to suppress the political clubs and to curb the press, and they sought to represent Louis XVI's flight to Varennes as an abduction.

When the Legislative Assembly met in Oct. 1791, Lameth, as a former member of the Constituent Assembly, was automatically excluded from it. The king and queen turned to other counselors, and it became clear that Lameth's ideal of a constitutional monarchy with the property qualification was impracticable. When war was declared against Austria (April 1792), he joined the army of the north, in which he commanded the vanguard. After the fall of the monarchy (Aug. 10) he emigrated with Lafayette. Released after more than three years' detention by the Austrians, he went to England early in 1796 but was soon expelled and then settled in Hamburg. Returning to France in June 1797, he had to emigrate again after the *coup d'état* of Fructidor (Sept. 4) but finally returned again in 1800. In April 1802 he was appointed a prefect, a post which he held until 1815, when he was dismissed at the second Restoration. In 1819 he was elected deputy for the *département* of Loire-Inférieure and took his seat among the liberal opposition. He died in Paris on March 18, 1829. (A. So.)

LAMETTRIE, JULIEN OFFRAY DE (1709–1751), French physician and philosopher who has been called "the Aristippus of modern materialism," was born at St. Malo on Dec. 19, 1709. He studied under Jesuit teachers at Caen but then spent several years in Paris, where he came under the influence of the Jansenists. His interest turned to medicine and he qualified as a doctor at Reims. In 1733 he went to Leiden in Holland to study under Boerhaave, and in 1742, after practising in his native town, he obtained the appointment of surgeon to the guards in Paris. During an attack of fever he made observations on himself with reference to the action of quickened circulation of the blood upon thought, which led him to the conclusion that psychical phenomena were to be accounted for as the effects of organic changes in the brain and nervous system. This conclusion he worked out in his earliest philosophical work, the *Histoire naturelle de l'âme* (*c.* 1745).

The outcry caused by the publication of this work drove Lamettrie back to Holland, where he developed his doctrines still more boldly and completely, and with great originality, in *L'Homme-machine* (1747–48; Eng. trans., 1750; ed. with notes by J. Assezat, 1865) and *L'Homme-plante* (1748), treatises based

on principles of the most consistently materialistic character. The ethics of these principles were worked out in *Discours sur le bonheur ou l'Anti-Sénèque* (1748), *Système d'Épicure* (1750), *L'Art de jouir* (1751), *Vénus métaphysique* (1751) and *Le Petit Homme à longue queue* (1751; new ed. by P. Lemée, 1934), in which the end of life is found in the pleasures of the senses and virtue is reduced to self-love. Atheism, according to Lamettrie, is the only means to ensuring the happiness of the world, which has been rendered impossible by the wars brought about by theologians. The soul is only the thinking part of the body and passes away with the body. When death comes, the farce is over (*la farce est jouée*), therefore let us take our pleasure while we can.

In 1748 Lamettrie was compelled to leave Holland for Berlin, where Frederick the Great appointed him court reader. He led a gay, carefree life and died there on Nov. 11, 1751, of a surfeit of pheasant *pâté* that had gone bad. His views were abhorrent to Catholics, to philosophers and to doctors alike, and he was never taken seriously by his friends. His writings, however, hold an important place in the history of early materialism. His collected *Oeuvres philosophiques* first appeared in 1751. There are selections edited by Marcelle Tisserand (1954).

See P. Lemée, *Julien Offray de La Mettrie,* 4 pt. (1925–37); R. Boissier, *La Mettrie* (1931); La Mettrie, *L'Homme machine: a Study in the Origins of an Idea,* critical ed. with an introductory monograph by Aram Vartanian (1960). (R. Ni.)

LAMIA, a female demon who devoured children. According to late myths she was a queen of Libya, beloved by Zeus. When Hera robbed her of her children, out of jealousy, she killed every child she could get into her power; a similar story was told of a queen of the Laestrygonians by the historian Diodorus Siculus.

She was also known as a sort of fiend who, in the form of a beautiful woman, enticed young men to her embraces in order that she might devour them. The nature of Lamia's tower (mentioned by Tertullian in his *Adversus Valentinianos*) is unknown. In Keats's poem "Lamia," derived through Burton from Philostratus' *Life of Apollonius of Tyana* (2nd–3rd century A.D.), Lamia is a witch, beloved by Lycius, who is destroyed by the sage Apollonius.

LAMMAS, the conventional name of the quarter day in Scotland which falls on Aug. 1. It used to be a quarter day in England too. In the early English church it was kept as a harvest festival, when loaves of bread made from the new grain were consecrated, Lammas being derived from "loaf-mass." Gule is another old name for Aug. 1, which is also the festival of St. Peter's chains and of the Maccabees.

LAMMERGEIER (Bearded Vulture), also spelled lammergeyer or lammergeir, is the largest old-world bird of prey, intermediate between vultures (*q.v.*) and eagles (*q.v.*). This bird is placed by some in the old-world vulture subfamily Aegypiinae, family Accipitridae, and by others held to constitute the subfamily Gypaëtinae in the same family. It has a tuft of long bristly hairs on the chin, and stiff bristles hide the nostrils. It is blackish-gray above, otherwise pale tawny; the white cap is bordered black; the iris is light orange; the "white" of the eye, scarlet. The common bearded vulture (*Gypaëtus barbatus aureus*), 40 to 46 in. long, has a wingspread of nearly 10 ft. It is confined to high mountain ranges of southern Europe (practically extinct in Pyrenees and Alps), the Mediterranean islands, and central Asia east to northern China and south to southern Arabia and the Himalayas. Despite the name lammergeier (lamb-vulture), it is not known to attack or carry off live animals. It feeds on carrion and is said to drop bones from great heights to get at the marrow. The nest is a huge mass of sticks, lined with sheep's wool and goat's hair, placed on a ledge or in a cave in a cliff. The one or two whitish eggs, stained or mottled rusty, are nearly four by three inches. The young are covered with dirty white down. An allied race (*G. b. barbatus*) inhabits the Atlas mountains of northwest Africa; another (*G. b. meridionalis*) is found in the mountains of Ethiopia and eastern and southern Africa. (G. F. Ss.)

ERIC HOSKING

LAMMERGEIER OR BEARDED VULTURE (GYPAËTUS BARBATUS AUREUS)

LAMMERMUIR HILLS, a range of round-backed hills forming the northern boundary of Berwickshire, Scot. The average height is about 1,000 ft.; the highest summit, Meikle Says Law, 1,750 ft. The name is also given to the upland district, northwest of Duns, in which the hills are situated. *See* Berwickshire.

LAMOIGNON, a French family prominent among the *noblesse de robe* or judicial nobility in the last two centuries of the *ancien régime.* It took its name from Lamoignon in the Nivernais, a place said to have been in the family's possession since the 13th century. The chief branch of the family, that of Basville or Bâville, was founded by Charles de Lamoignon (1514–1573), an *avocat* in the Paris *parlement* and councilor of state, who bought the estate of Basville in 1559. His grandson Guillaume de Lamoignon (1617–1677), a counselor in the Paris *parlement* in 1635, became intendant of Brittany in 1655 and premier president of the Paris *parlement* in 1658. He presided at the earlier sittings of Nicolas Fouquet's trial, which he regarded as unjust. From 1667 to 1672 he sat on a committee for the reformation of French law, the results of which, known as the *Arrêtés de Lamoignon,* Louis XIV refused to promulgate. Lamoignon was created marquis de Basville and comte de Launay-Courson in 1670. His second son, Nicolas de Lamoignon de Basville (1648–1724), was intendant of Poitou in 1682 and then of Languedoc from 1685 to 1718. In Languedoc he took strong measures against the Protestants in general and the Camisards in particular. In consequence he was much hated, despite his efforts to improve agriculture, industry and communications. Basville's eldest brother, Chrétien François de Lamoignon (1644–1709), was *avocat-général* in the Paris *parlement* from 1674 to 1699 and *président à mortier* from 1699 to 1706. The latter's great-grandson Chrétien François de Lamoignon (1735–1789) became president of the Paris *parlement* in 1758 and *garde des sceaux* in 1761. He was one of Étienne de Loménie de Brienne's assistants and shared his fall in 1788. This line of the family became extinct with the death of his son Chrétien Réné in 1845.

The most important members of a younger branch of the family were Guillaume de Lamoignon (1683–1772), seigneur de Blancmesnil and de Malesherbes, head of the *cour des aides* (1743) and chancellor of France (1750); and his son, the famous Chrétien Guillaume (*see* Malesherbes).

See L. Vian, *Les Lamoignon* (1896).

LAMONT, JOHANN VON (1805–1879), Scottish-German astronomer, noted for his work on the dynamics of the solar system, a great star catalogue and researches into terrestrial magnetism, was born at Braemar, Aberdeenshire, on Dec. 13, 1805. At the age of 12 he went to study at the Scottish Benedictine monastery near Regensburg, Bavaria, later reading mathematics at the Regensburg lyceum. In 1827 Lamont went to work at the royal observatory, Bogenhausen (near Munich), being appointed assistant to the director, J. Soldner, the next year. He adopted German nationality and worked at Bogenhausen for the rest of his life, becoming director of the observatory in 1835 and, in 1852, being appointed also professor of astronomy at Munich university. Besides much other work, he determined the orbital elements of the satellites Enceladus and Tethys of Saturn, the periods of the second and fourth satellites of Uranus and thus the mass of the planet; and he also catalogued over 34,000 stars. Lamont established a magnetic observatory at Bogenhausen in 1840 and discovered that the range of the diurnal magnetic variation fluctuated and had a period in excess of 10 years. He also discovered the existence of earth currents and in 1849 published his great *Handbuch des Erdmagnetismus.* He died in Munich on Aug. 6, 1879. (Cn. A. R.)

LAMONT, THOMAS WILLIAM (1870–1948), U.S. banker, was born at Claverack, N.Y., on Sept. 30, 1870. He was educated at Phillips Exeter academy, Exeter, N.H., and at Harvard, where he graduated in 1892. He worked as a reporter for two years with the *New York Tribune*. Entering banking in 1903, he was associated with the Bankers' Trust company in New York as secretary and treasurer and, after 1905, as vice-president. In 1909 he was elected vice-president of the First National bank of New York city, serving for two years. On Jan. 1, 1911, he entered the firm of J. P. Morgan and company. He took part in the work of the firm in floating British, French and other Allied loans in the U.S. during and after World War I. From 1918 to 1922 he was proprietor of the *New York Evening Post*. In 1919 he was one of the financial and economic advisers to the U.S. delegation to the peace conference in Paris. After selling the *Post* he financed the founding of the *Saturday Review of Literature* in 1924. He worked on the Dawes plan for German reparations in 1924 and on the establishment of the Bank for International Settlements in 1931, and was a delegate to the World Economic conference in London in 1933. In 1943 he was elected chairman of the board of J. P. Morgan and Company, Inc. He died on Feb. 2, 1948, at Boca Grande, Fla.

In 1946 Lamont published *My Boyhood in a Parsonage* and five years later his *Across World Frontiers* appeared.

LAMORICIÈRE, LOUIS CHRISTOPHE LÉON JUCHAULT DE (1806–1865), French general remembered chiefly for his part in the conquest of Algeria, was born at Nantes on Feb. 5, 1806. After early studies in Paris under Auguste Comte and, from 1824, at the École Polytechnique, during which he became firmly devoted to the ideas of the comte de Saint-Simon (*q.v.*), he entered the artillery and engineering school at Metz as a second lieutenant in 1826. Lieutenant in the engineers in 1829, he was sent to Algiers as captain in the Zouaves.

In 1833 Lamoricière was appointed secretary of the commission that prepared the way for the creation of *bureaux arabes* in Algeria. Promotions followed rapidly: in 1837, after distinguishing himself at the capture of Constantine, he was made colonel; in June 1840 *maréchal de camp;* in Aug. 1840 commandant of the province of Oran; and in 1843 lieutenant general. During General Bugeaud's absence in 1845 he acted as governor general of Algeria.

In Oct. 1846 Lamoricière was elected deputy for Sarthe in order to put forward a plan for free rather than military colonization in Algeria, but he was in Algeria in Dec. 1847 to receive the surrender of Abd-el-Kader (*q.v.*). After the revolution of Feb. 1848 in Paris he sat on the constituent assembly's commission for national defense and from June to December was minister of war. In 1849 he was elected to the legislative assembly (May) and sent on a mission to Russia (July–November). An opponent of Louis Napoleon, he was imprisoned on the *coup d'état* of 1851 and then exiled (Jan. 1852), though his right to half pay as an officer was maintained. He was allowed to return in 1857.

In 1860 Lamoricière led the papal troops against the Piedmontese but was defeated at Castelfidardo in September (*see* ITALIAN INDEPENDENCE, WARS OF). He died at Prouzel, near Amiens, on Sept. 11, 1865.

See E. Keller, *Le Général de Lamoricière,* 2 vol. (1873). (L. G.)

LA MOTHE LE VAYER, FRANÇOIS DE (1588–1672), French writer and philosopher, one of the most independent thinkers of the 17th century, an exponent of what has been called *"le scepticisme orthodoxe,"* a position halfway between the doubt of Montaigne and the extreme Pyrrhonism of Pierre Bayle. Born in Paris on Aug. 1, 1588, of a noble family of Maine, he became *avocat* at the *parlement* of Paris. His *La contrariété entre la nation française et l'espagnole* (1636) and *Considérations sur l'éloquence française* (1638) caused him to be received into the Académie Française in 1639. *De l'instruction de Mgr. le Dauphin* (1640) attracted Richelieu's attention and in 1649 Anne of Austria entrusted him with the education of her second son and, from 1652 to 1657, with the completion of Louis XIV's education. The king rewarded him by appointing him historiographer of France and counselor of state. He died in Paris in 1672. His other works include *De La Vertu des Païens* (1642); a treatise entitled *Du peu de certitude qu'il y a en histoire* (1668), which in a sense marks the beginning of historical criticism in France; and skeptical *Dialogues,* published posthumously under the pseudonym Orosius Tubero.

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LA MOTTE, ANTOINE HOUDAR DE (1672–1731), French critic and dramatist, was born in Paris on Jan. 17, 1672, and educated by the Jesuits. Achieving success in a variety of minor literary genres, he was elected to the Académie Française in 1710. Essentially an innovator, he took a leading part, distinguished by his kindly handling of opponents, in the revival of controversy between the Ancients and the Moderns: he produced in 1714 a banal arrangement of Homer's *Iliad,* based on Mme Dacier's translation (La Motte knew no Greek), accompanied by a "Discours sur Homère," in which he attacked the beauties of the original. He also defended the Moderns in his *Réflexions sur la critique* (1715; 2nd ed., 1716). His first tragedy, *Les Macchabées* (1721; printed 1722), was followed by three others: *Romulus* (1722), *Inès de Castro* (1723) and *Oedipe* (1726; printed 1730). *Inès de Castro,* which reflects above all the contemporary taste for the pathetic in tragedy, was one of the outstanding theatrical successes of the 18th century. In 1730, in a series of "Discours sur la tragédie," La Motte advocated startling innovations in the tragic drama, including the rejection of the classical "unities" and the abandonment of verse, which he represented as a mere mechanical arrangement of prose. Affected by blindness in the latter part of his life, La Motte died in Paris on Dec. 26, 1731. His collected works, ten volumes, were published in 1754.

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LAMP, in the strictest sense, is a vessel with a wick in which oil or other combustible substance used for illumination is held. The term was also employed for the apparatus that burned gas for lighting and came to be applied to electrical lighting appliances.

Ancient Times.—The earliest-known lamps, dating from the Paleolithic period, were made of sandstone, hollowed out to provide a container for oil, and with a spout at the front that held the wick. By the 4th century B.C. the lamp had come into general use for domestic purposes in Greece, and no doubt had been employed long before in temples and other places where a permanent light was required. Herodotus saw nothing strange in the festival of lamps which was held at Sais in Egypt, though he did comment on the vast number used.

The usual type of domestic lamp was made of terra cotta, shaped somewhat like a shallow cup, with a spout or nozzle in which the wick burned, a circular hole in the top for filling, and a carrying handle. Some lamps had two or more spouts and a third type had a large number of open spouts in each of which a wick could be placed. Decoration was confined to the front of the handle and the circular space on the top around the filling hole. The latter was decorated with a subject in relief, taken from classical mythology, from scenes of the hunt, from daily life or from displays of gladiators or chariot races. Alternatively the lamp might be shaped like an animal, a monster or even a human foot. Terra-cotta lamps were covered with a heat-resisting red or black glaze; the stamped signature of the maker is often found under the foot. The typical classical hand lamp was a combination of the flat form necessary for steadiness when being carried or set down and the round shape characteristic of vessels produced on the potter's wheel.

A more expensive type of lamp was produced in bronze. This followed the form of terra-cotta lamps though the material permitted a greater fantasy in design and ornament. The standard form had a handle with a ring for the forefinger and a palmette or crescent above it as a support for the thumb. With bronze lamps a cover could be provided to protect the flame from the wind, and such covered lamps were used in Athens in the open air. Hanging

lamps were usually made of bronze, with most of the decoration on the under part. The finest example of these is a lamp found at Cortona, Italy, in 1840. It is round with 16 nozzles, ornamented alternately with a siren and a satyr playing on double flute; between each pair of nozzles is the head of a river god and on the bottom is a large mask of Medusa surrounded by bands of animals. The lamp seems to date from the beginning of the 5th century B.C. and the workmanship explains the high esteem in which Etruscan lamps were held in antiquity.

A bronze lamp in the British museum, found in the baths of Julian in Paris and of later date, is also of excellent design. The suspension chain was attached to the tails of two dolphins, while lions' bodies emerge from the sides of the lamp.

The Erechtheum on the Acropolis of Athens had a gold lamp which burned night and day. It was the work of the sculptor Callimachus and was apparently made for the newly rebuilt temple shortly before 400 B.C. One filling of oil is said to have been sufficient to keep it alight for a year. The wick was made from the least combustible fibre known, now thought to have been a kind of cotton. A bronze palm tree rose above the lamp, its leaves serving as reflectors while its hollowed stem carried the fumes through the roof. This lamp was refilled on exactly the same day each year, so that there may have been some idea of measuring time by it; this was presumably also the case in regard to the lamp stand capable of holding as many lamps as there were days of the year, which the Sicilian tyrant Dionysius placed in the Prytaneum at Tarentum (modern Taranto).

In the market place at Pharae in Achaea there was an oracular statue of Hermes with a marble altar before it, to which bronze lamps were attached; whoever desired to consult the statue went there in the evening and filled and lit the lamps, placing a bronze coin on the altar. A similar custom prevailed at the oracle of Apis in Egypt, and Pausanias speaks of a chasm at Argos into which it was still the custom in his time to let down burning lamps, presumably in honour of the goddess of the lower world, Persephone. At Cnidus many terra-cotta lamps were found crowded together and buried a little distance underground, and it has been conjectured that there must have been a statue or altar at which lamps were left burning at night. Among the Romans a deceased person might bequeath money to provide for the placing of a lighted lamp with incense on it at his tomb at certain specified times. Terra-cotta lamps were also used as birthday presents, ornamented with two figures of Victory holding a disk inscribed with a good wish for the new year.

As the lamp superseded the torch in fact, so also did it in mythology. In the early myth of Demeter, the goddess goes forth with a torch in search of her daughter; in the later myth of Cupid and Psyche, Psyche carries an oil lamp, from which a drop of hot oil falls on Cupid. Bronze lamps of classical form were still produced in Byzantium and the eastern Mediterranean for ecclesiastical use during the early Christian period. They are immediately recognized by the handle in the form of a cross. These lamps were sometimes set on tall tripod stands with spreading bases.

BY COURTESY OF VICTORIA AND ALBERT MUSEUM

FIG. 2.—ITALIAN RENAISSANCE LAMP, BRONZE, EARLY 16TH CENTURY

Middle Ages.—The oil lamp was not improved in Europe during the middle ages, and a form similar to that of classical antiquity continued in use. To the end of the 17th century lamps comprising only a wick laid in an open vessel continued to be used, sometimes in preference to candles as they would burn for a considerable time and not require snuffing. Lamps made of precious metal enriched with jewels were frequently entered in the French royal inventories. In general, however, candles were in wider use than lamps.

Renaissance.—In Italy the Renaissance brought a revival of the classical lamp, and artists such as the Paduan bronze-founder Riccio produced small bronze lamps modeled as fauns or human beings in gross postures. In the notebooks of Leonardo da Vinci are three sketches of a type of lamp in which the flame burns in a long glass cylinder, which is in turn enclosed in a water-filled sphere.

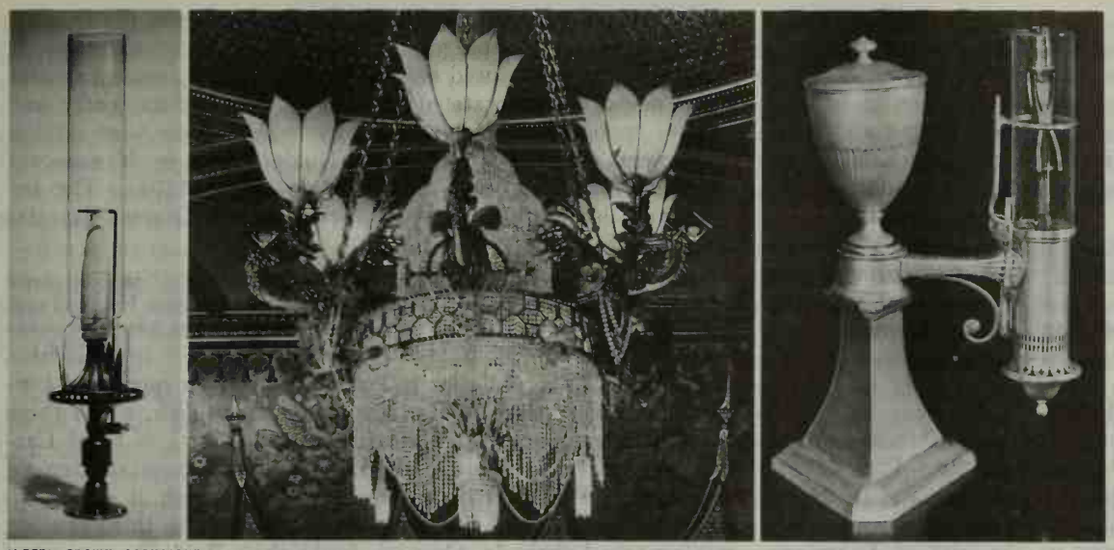
Queen Elizabeth I owned a lamp of silver gilt embellished with a crystal, while another is described in the inventory of her plate as a "round silver lamp with two instruments to the same"; this may have been some form of spirit lamp for warming dishes and not intended for illumination. In the dwellings of the poor, the simple crusie lamp (an open tray with one or two spouts for wicks) was still in use in the 19th century. In Roman Catholic countries there was a constant demand for sanctuary lamps, and they must have been made in quantity, especially after the Counter-Reformation; fashions in church plate, however, led to the destruction of the earlier examples, and few of the lamps which hang in such large numbers in Flemish or Spanish churches are earlier than the late 17th or 18th century.

18th and 19th Centuries.—The hand lantern, which had been used since earliest times, became a common domestic accessory in the 18th century. These were usually square and made of brass sheet, glazed with horn or a glass bull's-eye. Fully enclosed open-flame oil-burning spout lamps, which illumined innumerable small homes in the 18th century, were made of brass, copper, tinplate or iron and had a cylindrical reservoir fitted with a straight tubular wick holder sloping forward from the base. The lamp burned a round plaited wick and emitted a yellowish light of about two candlepower. A table lamp was usually supported by a thick, hollow stem rising from a spreading foot weighted with sand. Oil-burning lamps from which the time could be read during the night were also made in the 18th century; the oil was contained in a tall glass tube fitted into a brass case, the wick holder protruding at the top, and the time was indicated by the sinking of the oil in the tube, which was marked with the hours.

In the second half of the 18th century various improvements were invented in France, including self-filling devices and the plaited cotton wick to obviate smoke. The hanging oil lamps which were reintroduced by Robert Adam in the English houses he designed, while extremely elegant in form, did not incorporate the French improvements. The most important development of the late 18th century was the perfection of the Argand burner, so-

(LEFT, ABOVE AND BELOW, AND CENTRE) BY COURTESY OF THE TRUSTEES, THE BRITISH MUSEUM; (RIGHT) C. H. CANNINGS, BY COURTESY OF VICTORIA AND ALBERT MUSEUM

FIG. 1.—ANCIENT LAMPS: (LEFT, ABOVE) GREEK BRONZE LAMP OF THE MYCENAEAN PERIOD; (LEFT, BELOW) SWAN-SHAPED ROMAN LAMP; (CENTRE) ROMAN BRONZE LAMP WITH LIONS AND DOLPHINS, FROM THE BATHS OF JULIAN, PARIS, 1ST CENTURY A.D.; (RIGHT) COPTIC BRONZE LAMP, 6TH CENTURY A.D.



(LEFT) CROWN COPYRIGHT, SCIENCE MUSEUM, LONDON; (CENTRE) BRIGHTON CORPORATION; (RIGHT) "COUNTRY LIFE"

FIG 3.—LAMPS OF THE 18TH AND 19TH CENTURIES: (LEFT) GAS BURNER WITH WELSBACH UPRIGHT MANTLE; (CENTRE) GASOLIER WITH SILVER DRAGONS HOLDING TINTED GLASS LOTUS BLOSSOMS, FROM THE ROYAL PAVILION, BRIGHTON, ENG., EARLY 19TH CENTURY; (RIGHT) ARGAND LAMP, SHEFFIELD-PLATED, ENGLISH, *c.* 1790

called after its Swiss inventor, in 1784. The burner consisted of two concentric tubes with the wick between them, an arrangement which allowed a double current of air. A little later the flame was protected by a glass funnel, thus increasing its brilliance. James Watt interested himself in lighting and a large number of Argand burners were made in the Soho works at Birmingham. The containers of these lamps were made of Sheffield plate, the cheap substitute for silver that had been perfected by Matthew Boulton, and were filled with colza, a heavy oil that descended to the burner by gravitation. An alternative method was to force the oil upward by a mechanized device from a container below the level of the wick. At his Etruria works Josiah Wedgwood also produced many lamps of jasper ware and basalt in the neoclassical style.

Toward the end of the 18th century metal standard lamps and hanging lamps were designed in classical and Egyptian style. A superb set of standard lamps with mahogany pedestals and gilt metalwork are preserved at Syon house, Middlesex; in these the four burners are fed from a central vase by gravity. In 1812 the prince regent presented to the Royal Academy a magnificent bronze lamp, with 30 spouts and costing £2,400. In the reign of George IV two new kinds of lamp were devised, a reading lamp with an adjustable Argand burner and a japanned iron shade, and the Sinumbra lamp, in which the burner was set below a hollow ring which acted both as a tank for the oil and as a support for the large hemispherical shade. This latter type of lamp, invented in France, was generally known as the French lamp. The principle of the Argand burner, however, was retained well into the Victorian age for gas lighting. Although few examples have survived, brass chandeliers and wall brackets for gas, with prominent anthemion and acanthus ornament, were in production before 1830. The design of light fittings varied widely in the mid-19th century. Functional efficiency was seldom the first consideration and the design was usually concealed beneath a medley of more or less appropriate decorative features. Gas-burning chandeliers and wall lights spouted flames from monsters, cherubs or flowers. Some of the most extravagant of mid-19th century gas burners are or were to be seen in the larger English churches: huge standing lamps of a pseudo-Gothic design in lacquered brass, with burners formed as lilies. The term gasolier was used to describe these and the gas-burning hanging chandeliers.

20th Century.—In the 20th century the general use of electricity led to a great simplification of lighting fittings, and the usual form was a metal holder with glass shade. For lighting rooms designed in a "period" style there was a constant demand for reproduction chandeliers, of which three main types were made: Venetian chandeliers in varicoloured glass; cut-glass chandeliers, mostly made in Bohemia; and brass ones based on Dutch or English 18th-century styles. Modern designers seemed to have had great difficulty in planning a satisfactory chandelier, and the tendency was to avoid the problem by using some form of concealed or diffused lighting. The most ingenious development was the adjustable desk lamp, the socketed arm of which could be set in a variety of positions. (J. F. H.)

Near and Far East.—The development of lamps in eastern countries does not present a picture of steady progress toward better standards of lighting. Many very primitive lamps, consisting of fibre wicks floating in shallow containers of oil and giving a flickering, smoky light of low intensity, are still in use throughout India, Africa and the far east.

Early Mesopotamian civilizations knew the use of a spout or channel for the wick, and lamps of alabaster, bronze and gold dating from before 2500 B.C. have been found. These would have been exceptional, however; the commoner types were of pottery or sea shells filled with vegetable or fish oil. Rush lights were also used, with copper or other metal stands. In Baluchistan a pottery bowl lamp with four pinched "lips" for wicks dates from about 3000 B.C. Archaeological finds from Mohenjo-Daro in the Indus valley indicate the use of hanging pottery lamps, and niches for similar small lights are set into the walls. These date from 2750–2500 B.C.

In China the use of the lamp was probably developed about 500 years later. The characteristic form, which changed very little over many centuries, was of a candle in a small holder within a folding paper or silk covering. These Chinese or Japanese lanterns, usually of cylindrical or global form, may still be bought. The more elaborate are decorated with traditional motifs and hung with tassels.

In Islamic countries, mosque lamps developed from earlier Byzantine types made use of glass at an early date, with floating wicks in small glass containers. These hanging lamps were held in brass or bronze supports which were pierced to allow more light to be carried downward. Gradually in the 13th and 14th centuries the containers came to be made of solid metal, throwing only upward light. The metalwork was embossed and damascened in fine patterns with calligraphic texts incorporated in the design.

C. H. CANNINGS, BY COURTESY OF THE VICTORIA AND ALBERT MUSEUM

FIG. 4.—SYRIAN LAMP, MID-14TH CENTURY

The period of Mameluke rule in Egypt and Syria, from 1250, produced many fine glass lamps modeled originally on the hanging metal types and echoing their design. About 300 examples of these exist, dating mainly from the 14th century. They were larger than most metal lamps and were splendidly decorated with coloured enamels. A great variety of shape occurs in these lamps although in broad outline they are basically similar.

The 19th-century lighting of Hagia Sophia in Istanbul, with concentric circles of many small glass lamps suspended about nine feet from the floor, giving a restricted glow of light in the vast building, probably repeated a much earlier method of mosque lighting.

See LIGHTING for a discussion of the various oils used in lamps and for electric lamps; CANDLESTICK; LANTERN. *See* also refer-

ences under "Lamp" in the Index. (E. C. D.)

LAMPANG, an important town and province in northern Thailand. The province, with an area of 4,833 sq.mi. (12,517 sq.km.) drained by the Wang river, had a population in 1960 of 471,699. Major crops are tobacco, rice, beans, cotton and sugar cane, the last refined locally. Mineral products include lignite, exported in large quantities to Bangkok, antimony, lead and tungsten.

The capital town (muang) of LAMPANG, also known as Lakhon, has as its nucleus the old walled city which was formerly the seat of an autonomous principality. It is a commercial centre on the railroad, 399 mi. (642 km.) from Bangkok, and is one of Thailand's largest provincial towns; pop. (1960) 36,486. (G. W. SK.)

LAMPBLACK: *see* CARBON BLACK.

LAMPEDUSA, a small Italian island in the Mediterranean, 112 mi. S.S.W. of the town of Agrigento, Sicily. Pop. (1961) 4,941 (commune). Lampedusa and the nearby island of Linosa are known as the Isole Pelagie and are reached by steamer from Porto Empedocle. Eight miles west is the islet of Lampione. Lampedusa's greatest length is about 7 mi., its greatest width about 2 mi.; the highest point is 436 ft. above sea level. It stands on the edge of the submarine platform of the east coast of Tunisia, from which (at Mahadia) it is 90 mi. E. The soil is calcareous; it was covered with scrub (chiefly the wild olive) until comparatively recent times, but this has been cut and the rock is now bare. The valleys are, however, fairly fertile. On the south, near the only village, is the harbour, dredged to a depth of 13 ft. and good for small craft. The island has sponge, coral and sardine fisheries. There are prehistoric hut foundations, Punic tombs and Roman buildings near the harbour.

Linosa, about 30 mi. N.N.E., measures about 2 by 1 mi. and is entirely volcanic; its highest point is 640 ft. above sea level. It has landing places on the south and west and is more fertile than Lampedusa, but suffers from lack of springs. Fragments of Roman pottery and Roman coins have been found there.

Lampedusa is the Lopadusa of Strabo and the Lipadosa of Ariosto's *Orlando Furioso.* In 1436 it was given by Alfonso of Aragon to Don Giovanni de Caro, baron of Montechiaro. A thousand slaves were taken from its population in 1553. In 1661 its then owner, Ferdinand Tommasi, received the title of prince from Charles II of Spain. In 1737 the earl of Sandwich found only one inhabitant. Some French settlers established themselves there in 1760 and in 1843 Ferdinand II of Naples established a colony. After the Allied victory in north Africa in World War II, British and U.S. planes bombed Lampedusa and Pantelleria. The latter surrendered June 11, 1943, and Lampedusa the next day. Linosa and Lampione submitted to the Allies on June 13. (G. KH.)

LAMPERT VON HERSFELD (*c.* 1025–after 1081), German chronicler of the Investiture controversy, was born of a landed family (with its seat perhaps in Franconia) and probably educated at the monastic school of Bamberg. He entered the Benedictine monastery of Hersfeld on March 15, 1058, and was ordained the following autumn at Aschaffenburg. Immediately afterward he went on pilgrimage to Jerusalem, returning on Sept. 17, 1059. He visited Saalfeld and Siegburg in 1071 to study the reformed monasticism brought from Italy. As abbot of Hasungen, near Kassel, he made a reform there. He died at Hasungen some time after 1081.

After 1065 Lampert wrote a *Vita Lulli,* a life of the founder of Hersfeld abbey who later became archbishop of Mainz; it has no independent value. A second work, written *c.* 1073, is lost; it was a history of Hersfeld abbey since the death of the emperor Henry III, composed in hexameters. When doubts were raised about its trustworthiness, Lampert wrote a prose history of the abbey down to 1073, the *Libellus de institutione Herveldensis ecclesiae,* of which little remains. His fourth and most important work, the *Annales,* written probably about 1078–79, consists of annals from the creation of the world to 1077. Down to 1040 it is a valueless compilation, but from then onward it provides an extensive account of contemporary history. Long held to be one of the most important sources for the history of the Investiture controversy because of its fluent and detailed narrative, it must nevertheless be used only with great caution, since Lampert was a one-sided advocate of the ecclesiastical reform party and a bitter opponent of the emperor Henry IV. There is an edition of Lampert's extant works by O. Holder-Egger in *Monumenta Germaniae historica,* series *Scriptores rer. germ.* (1894). The *Annales* are also edited by W. D. Fritz, with a German translation by A. Schmidt (1957).

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LAMPETER (LLANBEDR PONT STEFFAN), a municipal borough in Cardiganshire, Wales, lies on the river Teifi, which there forms the boundary with Carmarthenshire, 23 mi. N.E. of Carmarthen by road. Pop. (1961) 1,855. The incorporation of the town was first recorded in 1282, but though it is an old market town its chief buildings are modern. The third crusade was preached there in 1188 by Archbishop Baldwin, supported by the historian Giraldus Cambrensis. The site of the castle demolished by Owain Gwynedd in 1187 is now occupied by St. David's college, founded by Bishop Thomas Burgess in 1822, chiefly to educate clergy for Wales, and opened in 1827 (*see* also UNIVERSITY: *19th and 20th Centuries*). Its royal charters establishing degrees of divinity (1852) and arts (1865) made it the first college of university status in Wales. Remaining autonomous, it is linked for financial and certain academic matters with the University college at Cardiff. The college library contains illuminated and other rare books. The town is a distributing centre; it has a sawmill and a large fortnightly market for cattle, sheep and pigs. (F. J. T. D.)

LAMPHUN, a province of northern Thailand with an area of 1,702 sq.mi. (4,408 sq.km.) and a population in 1960 of 249,820. The site of an early Mon principality, it was subjugated by Thai forces in the 13th century, but survived as an autonomous principality until the late 19th century. Major crops are rice and tobacco.

The town (muang) of LAMPHUN (pop. [1960] 10,600), the provincial capital, with the old walled city as its nucleus, lies on the Kuang river in the densely populated northern plain. After 1921, when the railroad from Bangkok was built through Lamphun, the town lost commercial importance to Chiangmai, the rail terminus, only 20 mi. (32 km.) to the north. (G. W. SK.)

LAMPMAN, ARCHIBALD (1861–1899), Canadian poet, whose most characteristic work sensitively records the sensations evoked by scenes and incidents of the out-of-doors. Born in Morpeth, Ont., Nov. 17, 1861, he was educated at Cobourg Collegiate institute, Trinity College school at Port Hope, and Trinity college in the University of Toronto. From 1883 until his death, Feb. 10, 1899, he lived in Ottawa, employed in the post office department of the Canadian civil service.

The material for his poems he derived from his contemplation of Ottawa and its environs, and the Gatineau countryside of Quebec. Among his finest nature poems are "Morning on the Lièvre," "Heat" and "In November." Of the many sonnets which Lampman wrote, a fair number are of admirable quality; *e.g.,* "Winter Uplands," "A January Morning," "Evening," "Solitude" and "The Frogs." He composed, as well, several narrative poems, reminiscent of William Morris, Keats and Tennyson, but they were not very successful. Two poems, however, show individual qualities of insight and energy: "The City of the End of Things" and "At the Long Sault: May, 1860." A few short poems severely criticizing contemporary abuses of power and wealth show him to have been of radical tendencies in politics and economics, but do not create the kind of conviction communicated by his poems of description and reflection.

Lampman wrote several literary essays and collaborated with two other Ottawa poets in the writing of a weekly column, "At the Mermaid Inn," in the *Toronto Globe* during 1892 and 1893. Authentic impressions of his life and temperament may be drawn from the extracts from his letters to E. W. Thomson published in

1956 by Arthur Bourinot and from the various memoirs by Duncan Campbell Scott. During his lifetime Lampman published two volumes of verse, *Among the Millet and Other Poems* (1888) and *Lyrics of Earth* (1893). After his death, his friend and literary executor, Duncan Campbell Scott, edited *The Poems of Archibald Lampman* (1900) and *Lyrics of Earth: Sonnets and Ballads* (1925). Several hitherto uncollected poems were published by E. K. Brown in 1943. Most critics would name Lampman among the five or six foremost Canadian poets.

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LAMPONG, a people of southeast Sumatra who are closely related to the Redjang (and often considered together as the Lampong-Redjang group), occupying an area in which are found monumental stone carvings suggestive of the highly developed Dongson Bronze Age culture of northern Indochina. Despite this background, most of the present inhabitants appear to be just emerging from a simple Batak-like origin (*see* BATAK). The earliest accounts describe those dwelling in the hills as nomadic hunters, while their kinsmen in the valleys were somewhat more advanced due to trade relations with people of the coast. Eventually, because they grew excellent pepper plants in their dry-land fields, they fell under the influence of Sundanese traders.

Such contacts resulted in a curious mixture of Batak-type institutions with those of the highly organized Hindu-Javanese states. Chiefs with high-sounding titles sit on elevated benches, and they and their families wear rich garments and golden ornaments—all this in contrast to the simple life of most of their kinsmen. Government likewise is a mixture of the old customary law with borrowed ideas. The territory is divided into provinces made up of districts inhabited by patrilineal groups, but the basic unit is still the village with its headman.

A gift is given for the bride, who then belongs to her husband's group. Should he die she marries his brother. Elaborate feasts accompany marriages and all other great events of life. Each settlement has a communal house which is used as a seat of government, a ceremonial centre and as a dormitory for guests.

The Indonesian government, in its effort to move entire villages from overpopulated Java to this district, is threatening the existence of the Lampong-Redjang as a separate people. In the early 1960s they numbered about 1,000,000.

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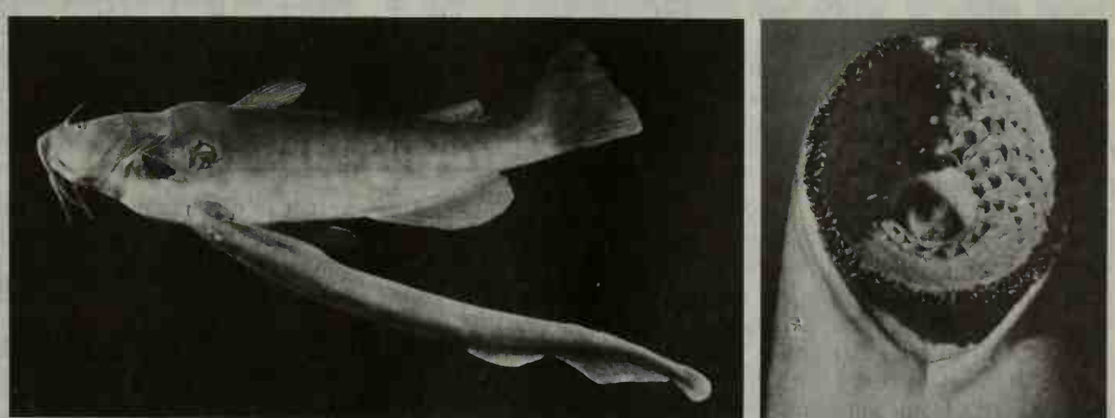
LAMPOON, a virulent satire either in prose or verse; the idea of injustice and unscrupulousness seems to be essential to its definition. The word is used by Evelyn in 1645, "Here they still paste up their drolling lampoons and scurrilous papers," and soon after it is a verb—"suppose we lampooned all the pretty women in Town." Both of these forms, the noun and the verb, have been preserved ever since in English, without modification, for violent and reckless literary censure.

Tom Brown (1663–1704) was a past master in the art of lampooning. As a rule, the lampoon possessed no poetical graces, and in its very nature was usually anonymous. The notorious *Essay on Woman* (1764) of John Wilkes was a lampoon, and was successfully proceeded against as an obscene libel. The law made it more impossible for private malice to take the form of baseless and scurrilous attack, and the lampoon, in its open shape, died of public decency in the 18th century.

LAMPREY, any of the eel-shaped, scaleless fishes comprising the family Petromyzonidae, which, with the similar hagfishes or slime eels, form a distinct primitive group of vertebrates, the Cyclostomata (*see* CYCLOSTOME; HAGFISH). The lamprey has a single nostril on the top of its head, seven round gill openings on each side; it has no jaws, but instead a round sucker beset with horny teeth. Many species of lampreys, especially the sea lamprey (*Petromyzon marinus*), are parasites. They feed on other fishes by holding on securely with the sucking mouth and rasping a hole in the flesh with the comblike teeth on the tongue. A chemical that is injected into the fresh wound prevents the coagulation of the blood; the lamprey ingests the free-flowing blood until its straight intestinal canal is filled to capacity and then detaches itself from the host fish. Other closely related species are not parasitic. Such, for example, is the northern brook lamprey (*Ichthyomyzon fossor*) of the American Great Lakes region. The nonparasitic type of lamprey never feeds when adult, is much smaller than the sea lamprey (which may attain three feet), has degenerated teeth and a shrunken alimentary canal.

All lampreys spawn in fresh water in gravel nests that they prepare, whereupon they promptly die. For several years the small young live in the stream bottom as toothless, nearly blind, wormlike larvae known as ammocoetes. Then they metamorphose rapidly into the adult type during late summer or fall. The nonparasitic species pass one winter without food, whereas the parasitic ones descend to a lake or to the sea, where they feed and grow rapidly for a year or more. All spawn in the spring. About 28 species are known from the temperate rivers and coastal seas of both hemispheres. In North America 19 species of lampreys occur, and in Eurasia, South America, New Zealand and Australia a few others are found. With only minor variations, all lampreys have a life history similar to that of the sea lamprey.

Lampreys, especially the sea lamprey, were considered a delicacy in Europe during the middle ages. Henry I of England is said to have died of eating a surfeit of them. The larvae are extensively used as bait. The sea lamprey occurs in the Atlantic ocean from Florida to the west coast of Greenland and from northern Norway to the Mediterranean. It can spawn only in cold streams having riffles of clean sand and gravel, and the young can survive only if there are also beds of sand mixed with organic material, on which they feed. Although Niagara falls had been a natural barrier to the upstream migrating adults that spawn in the St. Lawrence drainage, the construction of the Welland canal in 1829 made it possible for many of them to invade Lake Erie. Lake Erie is generally too warm for adult sea lampreys, and most of the rivers emptying into it do not provide satisfactory spawning conditions; consequently they did not become well established there. However, early in the 1930s many sea lampreys somehow crossed that barrier to enter the other lakes, where conditions for their survival were conducive to rapid multiplication. The infamous sea lampreys' first and principal victims were the lake trouts, which had been the most valuable of the commercial and game fishes. As the sea lampreys increased and spread, the lake trouts declined almost to the point of extinction, first in Lake Huron, then



BY COURTESY OF THE AMERICAN MUSEUM OF NATURAL HISTORY

(LEFT) SEA LAMPREY (PETROMYZON MARINUS) ATTACHED TO CATFISH; (RIGHT) SUCKING MOUTH OF SEA LAMPREY. (BOTH ARE MUSEUM MODELS)

in Lake Michigan and finally in Lake Superior. Then the sea lampreys began preying on the large chubs and whitefishes. The United States bureau of commercial fisheries and the fisheries research board of Canada initiated a control program against this destructive pest. To be most effective, control measures are directed at those points in the life cycle when the sea lampreys are most concentrated and vulnerable.

The upstream migrating adults are attacked by a combination of mechanical traps and electrical barriers; the larvae are killed with selective chemicals.

See also references under "Lamprey" in the Index.

(L. A. Wd.)

LAMPROPHYRE, any member of a group of dark gray to black igneous rocks generally formed as dikes and characterized by a porphyritic texture in which large crystals (phenocrysts) of dark iron-magnesium (mafic) minerals including biotite, hornblende, augite or olivine are enclosed in a fine-grained to dense matrix. The abundance, large size, well-formed crystal outline and brilliantly reflecting cleavage faces of the mafic phenocrysts give the rock a striking appearance. Mafic minerals not only constitute virtually all of the phenocrysts but occur in the matrix or groundmass as well, together with much potash feldspar, plagioclase or feldspathoid.

Lamprophyres are set apart from most other igneous rocks by the occurrence of mafics both as phenocrysts and in the groundmass, by the lack of feldspar phenocrysts, and by the abundance of mafics combined with alkali-rich feldspar. Many varieties of lamprophyre have been described and given special rock names.

Table I.—*A Simple Classification of the Common Lamprophyres*

Dominant or characteristic mafic mineral	Dominant feldspar		No feldspar	
	Potash feldspar	Plagioclase	No olivine	Olivine
Biotite	Minette	Kersantite	Ouachitite	Alnöite
Hornblende	Vogesite	Spessartite	—	—
Barkevikite	—	Camptonite	Fourchite	Monchiquite

Due largely to the gradational character of the many types, no satisfactory classification has been proposed. A simple classification of the common lamprophyres, based on the type of feldspar and mafic mineral present or dominant, is shown in Table I.

The most common lamprophyres are frequently found associated with large masses of granite and diorite and include minette (also the name of an oölitic iron ore), vogesite, kersantite and spessartite (also the name of a variety of garnet). Classic examples are found in the Highlands and southern uplands of Scotland, the Lake district of Ireland, the Vosges, Black Forest and Hartz. In these varieties biotite mica exhibits corroded to well-formed hexagonal plates with red-brown, iron-rich rims surrounding pale yellow, magnesium-rich centres. In some rocks biotite is titanium-rich, particularly near grain borders. Green hornblendes as slender prisms or needles and diopsidic augite are common. Augite crystals may show green cores surrounded by colourless material, which in turn is rimmed by hornblende. In some lamprophyres lilac coloured, titanium-rich augite is abundant. Olivine is rarely abundant and is generally replaced by serpentine or carbonate. Stumpy laths or irregular grains of potash feldspar (orthoclase or sanidine) make up much of the groundmass and may enclose abundant tiny grains of other minerals. Sodic plagioclase (albite-andesine) as poorly formed laths or irregular grains constitutes much of the groundmass. It may be zoned with more calcic cores and more sodic rims. Quartz is not abundant and is generally interstitial. Other minor constituents include apatite, magnetite and sphene.

Less common types include camptonite (from Campton, N.H.) in which barkevikite is the diagnostic mafic and labradorite the common plagioclase. Additional minerals may include olivine, titanaugite and biotite. Alnöites (after the island of Alnö, Swed.) are rare rocks with unusual mineral assemblages. Diagnostic are melilite, perovskite, olivine and carbonates. Quachitite (from the Quachita river, Arkansas) is similar to alnöite but lacks olivine. Monchiquite (from Serra de Monchique, Port.) is uncommon and may carry much barkevikite in addition to olivine and augite. These mafics are embedded in a base of analcite or glassy material. Some varieties contain melilite, nephelite or other feldspathoid. Fourchite (from the Fourche mountains, Arkansas) is essentially an olivine-free monchiquite. In addition to the occurrences from which they were named classic examples are found in Bohemia, Brazil, Norway, Scotland and other places.

Lamprophyres show a strong tendency to weather and decompose. Many have been altered, undoubtedly while the rocks were still buried some distance beneath the surface, by hot solutions or vapours derived from crystallizing rock melts at still greater depth. The common alteration products include carbonate, chlorite, serpentine and limonite.

There is little justification for the once prevailing view that normal magma splits into two complementary fractions, a mafic component giving rise to lamprophyre and a felsic component giving rise to aplite and pegmatite.

Some lamprophyres have formed by direct crystallization of a lamprophyric magma; others represent the mixing of magma with foreign crystalline material. The abundance in some lamprophyres of large, strongly embayed and altered crystals of feldspar and quartz or fragments of granite, quartzite, schist, etc. suggests that large quantities of foreign matter may be incorporated and partly digested by basic magmas. The presence of corroded and altered mafic phenocrysts indicates these crystals were not in equilibrium with the enclosing melt and that phenocryst and groundmass may have had different origins.

There is good evidence that late alkali-rich fractions of crystallizing magmas have acquired their phenocrysts by incorporating clusters of mafic crystals before being injected as dikes. Such a mechanism explains the unusual association of abundant mafics with alkali-rich rocks.

The highly altered character of many lamprophyres suggests that some varieties of these rocks have been transformed from more normal basic dike rocks. This transformation may have involved late-stage liquids or vapours which escaped from the crystallizing portions of the dike and moved out to attack and change those parts already solidified. Many lamprophyres may represent old basic dikes (diabase) which have been altered by permeation of fluids or ions escaping from large granitic bodies below. Fluids or volatiles, escaping from some deeper source and channeled along fractures in the earth, might react with the adjacent rock and convert it to dikelike masses of lamprophyre.

Table II.—*Analyses of the More Common Lamprophyres*

Component	Minette (10 analyses)	Vogesite (4 analyses)	Kersantite (20 analyses)	Spessartite (14 analyses)	Camptonite (15 analyses)	Monchiquite (16 analyses)	Fourchite (Arkansas)	Alnöite (Sweden)	Ouachitite (Arkansas)
SiO_2	49.45	52.62	50.79	52.85	40.70	45.17	42.03	33.37	36.40
Al_2O_3	14.41	14.86	15.26	15.74	16.02	14.78	13.60	7.56	12.94
Fe_2O_3	3.39	3.60	3.29	3.04	5.43	5.10	7.55	5.33	8.24
FeO	5.01	4.18	5.54	4.81	7.84	5.05	6.65	6.39	4.59
MgO	8.26	8.55	6.33	6.24	5.43	6.26	6.41	12.50	11.44
CaO	6.73	5.86	5.73	7.58	9.36	11.06	14.15	20.25	14.46
Na_2O	2.54	3.21	3.12	3.58	3.23	3.69	1.83	2.03	0.97
K_2O	4.69	2.83	2.79	2.39	1.76	2.73	0.97	3.06	3.01
TiO_2	1.23	0.54	1.02	1.03	3.86	1.90	3.70	2.56	0.42
H_2O	2.43	2.70	3.10	2.05	2.62	3.40	1.08	3.46	2.36
P_2O_5	1.12	0.21	0.35	0.07	0.62	—	0.57	1.50	1.04
CO_2	0.61	—	2.61	0.12	2.97	—	—	1.56	3.94

Table II furnishes chemical analyses of the more common lamprophyres. Chemically the lamprophyres form a unique group of igneous rocks. They are characterized principally by a low silica content and a high iron, magnesium and alkali content. The high contents of water and carbon dioxide, as shown in Table II, may be due principally to the more or less altered condition of the analyzed specimens.

Further information on mineralogical and crystallographic processes and concepts referred to in this article is given under Crystallography; Geochemistry; Mineralogy. (C. A. Cn.)

LAMPSACUS, an ancient Greek colony in Asia Minor, situated on the Hellespont, opposite Callipolis (Gallipoli) in Thrace. It was known as Pityusa or Pityussa before its colonization by Ionian Greeks from Phocaea (654) and Miletus. It possessed a good harbour, and the neighbourhood was famous for its wine. Lampsacus opposed the Athenian occupation of the Chersonese (*c.* 546 B.C.) but took part, with Athens, in the Ionian revolt from Persia (499). After the defeat of Xerxes Lampsacus joined the Delian league (*q.v.*); its high tribute shows its prosperity. Revolt from Athens in 411 was soon crushed, but when Athens' power was broken (405) Lampsacus again came under Persian control until the invasion of Alexander the Great of Macedonia (334). In winter 197–196 B.C. it was besieged by Antiochus III of Syria, after which its inhabitants were received as allies of Rome. Lampsacus was the chief seat of the worship of Priapus (*q.v.*), a god of fertility, closely connected with the culture of the vine. The ancient name is preserved in that of the modern village of Lapseki, but the Greek town possibly lay at Cardak immediately opposite Gallipoli.

LAMP SHELL, a popular term applied to brachiopods—shelled marine invertebrates—on account of the supposed resemblance of the shell of certain species to ancient Roman lamps. When the animal rests upon its ventral valve, the shell corresponds to the body of the lamp, and the slender pedicle, protruding from a perforation in the beak of the ventral valve, bears a fancied likeness to a wick. *See* BRACHIOPODA.

LANAO, a region, formerly a province, of northern Mindanao, Republic of the Philippines, was divided after 1958 to form the provinces of Lanao del Norte (area, 1,313 sq.mi.; pop. [1960] 270,603) and Lanao del Sur (area, 1,261 sq.mi.; pop. [1960] 378,327). About 30% of the population is Bisayan in origin and about 65% is Moro. Narrow coastal plains border the Mindanao sea and the Moro gulf and gently rolling plains border Lake Lanao; other areas are largely mountainous.

The separately administered city of Marawi, formerly Dansalan (pop. [1960] 48,463), is the capital of Lanao del Sur. The largest Moro city in the Philippines, it occupies a magnificent site at the head of Lake Lanao and is an important trading centre and the centre of Muslim handicraft and bladed weapons production. Southwest of Iligan, the capital of Lanao del Norte (pop. [1960] 60,083), are the Maria Cristina falls which provide hydroelectric power for nearby industries, including a steel mill and a fertilizer plant. (R. E. He.)

LANARK, a royal and small burgh and the county town of Lanarkshire, Scot., stands on high ground about half a mile from the right bank of the Clyde, 25 mi. S.E. of Glasgow by road. Pop. (1961) 8,436. Lanark was made a royal burgh by David I, in whose reign St. Kentigern's church (now in ruins) was built and the ceremony of "the Lanimers" (the riding of the marches) was instituted. Lanimer day is still kept on a Thursday between June 6 and 12, when a procession of pageants and tableaus with the Lanimer queen passes along the gaily decorated streets. The Scottish kings lived from time to time in Lanark castle and hunted in the surrounding forest. Sir William Wallace (*q.v.*) is said to have lived and been married in the town, to have quarreled with the English, who put his wife to death, and there slain the English sheriff, William Hazelrig. After this he hid in a cave (now called Wallace cave) at the Cartland crags (northwest), where Mouse water runs through a precipitous red sandstone ravine and is crossed by a bridge of single span, supposed to be of Roman origin, and by a three-arched bridge designed by Thomas Telford. In the 14th century the Gray Friars built a monastery in Lanark where a convention of the whole order was held in 1496. The grammar school is of 12th-century foundation. William Lithgow (1582?–1645), the traveler, William Smellie (1697–1763), the obstetrician, and Gavin Hamilton (1730–97), the painter, were born at Lanark.

New Lanark, 1 mi. S., is known for the socialist experiments of Robert Owen (*q.v.*) in 1800–28. The village was founded by David Dale (Owen's father-in-law) in 1785, with the support of Sir Richard Arkwright, inventor of the spinning frame. Lanark's industries are chiefly hosiery manufacture and agricultural engineering, while at New Lanark are mills making sailcloth. Lanark, in the centre of rich agricultural country, is mainly a market town with regular sales of cattle, horses and sheep. At the racecourse meetings are held in May, July and September, the principal trophy being an ancient silver bell. The course is on the moor where also is Lanark loch, used as a pleasure place. Braxfield, on the Clyde, gave the title of Lord Braxfield to Robert Macqueen (1722–99), who was born in the mansion and acquired on the bench the character of the Scottish Jeffreys. He is portrayed by Robert Louis Stevenson in *Weir of Hermiston.* Lee house, the home of the Lockharts, is 3 mi. N.W. The old castle, largely rebuilt in the 19th century, contains some fine tapestry and portraits, and also the "Lee penny," familiar to readers of Sir Walter Scott's *The Talisman.* It is a carnelian encased in a shilling of the reign of Edward I, which was brought from Palestine in the 14th century by Simon Lockhart of Lee.

LANARKSHIRE, a county in Scotland, mainly in the south of the mid-lowland, coincides broadly in area and in shape with the catchment area of the river Clyde. Area 837 sq.mi. It is bounded on the south by Dumfriesshire, on the east by Peeblesshire, Midlothian and West Lothian, on the north by Stirlingshire and Dunbartonshire and on the west by Renfrewshire and Ayrshire.

The great southern uplands fault runs northeast across Lanarkshire through Roberton, Lamington and Coulter near the middle Clyde. Southeast of this is the fault-line scarp rising to a dissected plateau with hills of 1,800 to 2,400 ft. The fault-line scarp faces northwest across lowland plateaus cut across diverse rocks and plastered with boulder clay or, in places, with fluvioglacial sands and gravels including eskers or kames, as near Carstairs. Northwest of Lamington, Tinto (2,335 ft.), a felsite laccolith, rises from a plateau surface of about 799 to 1,000 ft. A broad but narrowing sweep of low plateau at 100 to 500 ft. extends upstream from the Glasgow area along the line of the Clyde, within which are the actual flood plain and river bluffs. Near Lanark, hydroelectric developments now mar the beautiful wooded Old Red Sandstone gorge and Falls of Clyde (Bonnington Linn, Corra Linn, Dundaff Linn and Stonebyres Linn). East of the river are Carboniferous sediments, the southwestern part of the great syncline pitching to the northeast and stretching through Stirlingshire and Clackmannanshire to the fault-line scarp of the Ochils. Round the edges are important coal seams. Near Hamilton, Barren Red Measures overlying Coal Measures prevented early exploitation.

Mean annual rainfall varies from over 70 in. on the high exposed hills of the southwest to 35 to 40 in. on sheltered lowlands. The lower middle Clyde area round Lanark is notably dry and sunny in the harvest months, where mean monthly temperatures range from about 2.8° C. (37° F.) in January to 14.4° C. (58° F.) in July.

Soils on the higher and wetter country include acid peats on heather moors interdigitated with purple moor grass-sedge associations on wetter areas, especially in the west, and Nardus associations on drier moorlands. The Clyde valley has large spreads of lighter soils based on fluvioglacial sands and gravels as well as Recent alluvium, alternating with heavier but fertile boulder clay. (A. T. A. L.)

It was probably in the reign of David I that Lanarkshire became an administrative district with boundaries approximating those of the present day. The county has played a prominent part in Scottish history, from the days of Sir William Wallace, who lived in Lanark and is reputed to have found his wife there, through the tragic times of Mary, queen of Scots, who assembled her supporters at Hamilton before the battle of Langside, to the stern days of the Covenanters, in whose fortunes the battles of Drumclog and Bothwell Bridge were decisive. In more modern times, Lanarkshire was in the forefront of the struggle to improve the lot of the working classes, and names like Thomas Muir, James Wilson, Robert Owen (*q.v.*), James Keir Hardie have an honoured place in its annals. Literary figures born in the county include Allan Ramsay, John Gibson Lockhart, Joanna Baillie and Janet Hamilton, and other famous figures were the surgeons William and John Hunter and David Livingstone, missionary and explorer,

whose birthplace at Blantyre is a national shrine.

The population of the county in 1961 was 1,626,424. There are five large burghs: Airdrie (33,611), Coatbridge (53,825), Hamilton (41,928), Motherwell and Wishaw (72,794) and Rutherglen (*qq.v.*; 25,067); and two small burghs: Biggar (1,359) and Lanark (*q.v.*; 8,441).

The county is divided into three wards: the Upper, with Lanark as its centre; the Middle, based on Hamilton; and the Lower, comprising Glasgow (*q.v.*) and its environs. These have little administrative significance in modern times. Lanarkshire is a sheriffdom, with a sheriff principal in Glasgow and sheriff courts at Airdrie, Hamilton and Lanark presided over by sheriffs substitute. The county elects seven members to parliament.

Farming, fruit growing and tomato culture are important features of the county's economy. Crops, including fruit and good grassland, cover approximately 220,000 ac. and, in addition, there are about 237,000 ac. of rough grazing. Livestock includes beef and dairy cattle, sheep, pigs and Clydesdale horses, which are increasing in importance. Lanark is an important stock market centre. The main crops are oats, potatoes, turnips and swedes. Large areas are sown in grassland and there is about half a square mile under glass for the culture of tomatoes, early vegetables and flowers. Sandy haughs and sunny, well-drained slopes are intensively cultivated round the jam-making town of Carluke.

Industrial development started with the discovery in the mid-19th century of blackband ironstone in the Monkland district, adjacent to rich seams of coal. Later, from about 1870, the steel industry was started in Motherwell, and iron and steel remains the staple industry of the county, although local supplies of ironstone have long been exhausted and iron ore is imported from abroad. Although Lanarkshire was once the richest coal-producing county in Scotland, its yield of coal has steadily declined except for one area in the Chryston-Stepps district. The main industries are iron and steel products. Other important products are chemicals, paper, electric motors and other appliances, airplane engines, radio and television components, furniture, textiles, carpets, clothing, drugs, concrete and bricks. Formerly unduly dependent on heavy industry, the county achieved a greater industrial balance after World War II by the establishment of industrial estates at Blantyre, Carfin, Coatbridge (*qq.v.*), Larkhall and Newhouse, providing a wide range of lighter trades and industries. Important industrial development accompanied the building of the New Town of East Kilbride (*q.v.*; pop. [1961] 31,970), where a national engineering laboratory was sited. (W. B. Pa.)

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LANCASHIRE, a northwestern county of England, bounded on the north by Cumberland and Westmorland, east by Yorkshire, south by Cheshire and west by the Irish sea. Area 1,879 sq.mi.

Physical Features.—The coast is generally flat, with low boulder clay cliffs at places and broken by great inlets, with wide expanses of sandy foreshore at low tides. The chief inlets, from north to south, are the estuary of the river Duddon; Morecambe bay; and the estuaries of the Ribble and Mersey. Morecambe bay receives the Crake and Leven rivers in a common estuary, and the Kent from Westmorland; while the Lune and Wyre discharge into the southern part of the bay. Morecambe bay also detaches from the rest of the county the district of Furness and Cartmel, which has off its coast the island of Walney, 8 mi. long. The principal seaside resorts, from south to north, are Southport, Lytham St. Anne's, Blackpool, Fleetwood, and Morecambe and Heysham (*qq.v.*).

Of the rivers the Mersey (*q.v.*), which largely separates the county from Cheshire, is the chief and receives from Lancashire the Irwell and several smaller streams. The Ribble (*q.v.*), which rises in the mountains of the West Riding of Yorkshire, forms for a few miles the boundary with that county and then flows southwest to Preston, receiving the Hodder from the north and the Calder, Darwen and Douglas from the south. The Lune rises among the mountains of east Westmorland and gathers in a few small tributaries such as the Greta and the Wenning. Furness (*q.v.*), entirely hilly except for a narrow coastal tract, extends north to include the southern part of the Lake district (*q.v.*); it contains Coniston lake and borders three-quarters of Windermere, with some smaller lakes and such mountains as the Old Man and Wetherlam. Another elevated district, forming part of the Pennine uplands, runs through the whole of the eastern part of the county and occupies more than half the area south of the Ribble (*see* also Pennines). The high moorlands in the southern district are generally bleak and covered with heather. To the north the scenery is frequently beautiful, the green, rounded, elevated ridges being separated by pleasant valleys variegated by woods and watered by rivers. The finest scenery is found in Furness and in the limestone areas of the northern half of the county, while the moorlands of the southern half are formed of Millstone Grit and Coal Measure shales and sandstones. None of the summits of the Pennines within Lancashire attains an elevation of 2,000 ft., the highest being Fairsnape (1,701 ft.), Pendle (1,831 ft.) and Wards Stone (1,836 ft.). Along the seacoast from the Mersey to Lancaster there is a continuous plain, formerly occupied by extensive peat bogs, almost all of which have been reclaimed, the bad drainage being due to deposits of boulder clay. The shore near Formby and north of Blackpool shows traces of submerged woodland. Though almost the whole coast from the Wyre to the Mersey was covered by sand hills, these have almost entirely disappeared except for a small area in Lytham St. Anne's and a larger one between Southport and Crosby.

On the south Lancashire coal basin are situated the most important towns of the county; part of the Ingleton coal field also lies in Lancashire. Large pockets of iron ore (hematite) occur in the Carboniferous Limestone of Furness, but it is no longer worked. The economic reserves of coal available in Lancashire in the early 1960s amounted to 1,200,000,000 tons. In addition to coal and fire clay, quantities of limestone, sandstone, slate and salt, which is also obtained from brine, are raised. Sources of metals are unimportant.

The climate in the hilly districts to the north and east is often cold and bleak with a rainfall exceeding 60 in. in places, but in the coastal plain to the west and south it is mild with a rainfall of about 30 in. The soil varies from the rich, peaty plains to the thin, poor covering of the hills which, particularly in the southeast, is badly affected by smoke pollution. Lancashire was once heavily wooded, but comparatively little timber exists today, except in the well-wooded Furness area, other than the small coverts which are widely distributed over the coastal plain.

There is a wide variety of plant and animal life resulting from the great variation of natural conditions: hills, woodlands, salt marshes, rivers, ponds and sand hills. Deer still wander in the woods of Furness; badger and fox are far from uncommon; and many rare birds are to be seen, especially on the coast.

The Lake District National park, established in 1951, covers much of Furness. It is 866 sq.mi. in extent. At Grange-over-Sands is a nature conservancy research station and at Sawrey, a fresh-water biological research station. The National trust owned over 10,000 ac. in the county in the early 1960s, of which all but 619 ac. were in Furness; there were also five nature reserves, and much of the forest of Bowland, an "area of outstanding natural beauty," is in Lancashire.

History.—Traces of New Stone Age, Bronze Age and Iron Age settlements have been found in various parts of Lancashire, including many small flint implements on the moorlands round Rochdale, a hoard of bronze implements including socketed axes near Winmarleigh (northwest of Garstang), stone hammers and bronze celts near Pilling and a tanged bronze dagger near Colne. Winwick near Warrington has important early Bronze Age burials, while at Bleasdale is a wooden circle. There are remains of two stone circles in Furness, which is richer in prehistoric remains than the rest of Lancashire, of two others on the moors north of Bolton and two more south of Burnley. Manchester, Wigan, Ribchester, Lancaster, Burrow in Lunesdale and Kirkham were Roman centres. There are various sculptured crosses, mostly of

the 8th century or later, and a few traces of Celtic art.

The Cistercians had abbeys at Furness (*q.v.*) and Whalley (founded at Stanlawe, in Cheshire, in 1178 and removed to Whalley in 1296). There are remains at both these places. Priories of Augustinian canons were founded at Conishead in the time of Henry II, at Burscough in that of Richard I and at Cartmel. There were friaries of Dominicans at Lancaster, of Franciscans at Preston and of Augustinians at Warrington. An Augustinian cell existed at Cockerham and, at Cockersand, a hospital founded in the reign of Henry II was changed to a Premonstratensian abbey in 1190 and still shows its chapter house. Hornby had a Premonstratensian cell.

Remains exist at Upholland of a Benedictine priory, and the order had a priory at Lancaster (1094) and cells at Lytham and Penwortham. There was a Cluniac cell at Kersal.

AUTHENTICATED NEWS

THE VILLAGE OF DOWNHAM ON THE RIVER RIBBLE, LANCASHIRE

Besides the churches discussed in separate articles on the various towns, the more interesting include Aldingham; Aughton; Cartmel; Churchtown near Garstang; Halsall; Hawkshead; Heysham (which has a pre-Conquest chapel dedicated to St. Patrick and an ancient cross); Hornby; Kirkby, which has a very ancient font; Kirkby Ireleth, late Perpendicular with Norman doorway; Leyland; Melling (in Lonsdale), Perpendicular; Middleton, rebuilt in 1524 but containing part of the Norman church and several monuments; Ormskirk; Overton, with Norman doorway; Radcliffe; Ribchester; Sefton, Perpendicular with fine brass and recumbent figures of the Molyneux family, also an exquisitely carved screen; Stidd, near Ribchester, much Norman work; Tunstall, late Perpendicular; Upholland priory church; Urswick; Walton-le-Dale; Warton, with an old font and the Washington coat of arms; and Whalley, with fine stalls from the abbey.

The principal castles are those of Lancaster; Dalton, a small rude tower; Gleaston, built by the lords of Aldingham in the 14th century; Clitheroe (Norman keep); Hornby and Thurland; the ruins of Greenhalgh castle, built by the 1st earl of Derby; and the ruins of Fouldrey in Piel Island near the entrance to Barrow harbour, erected in the reign of Edward III and almost dilapidated by the middle of the 20th century. Hoghton tower, Preston, is a late 16th-century fortified manor house and in its banqueting hall the "Sir Loin" is said to have been knighted by James I. Rufford Old hall and Speke hall (Liverpool) are beautiful half-timbered houses belonging to the National trust. There are many other large historic houses in the county.

Following the departure of the Romans there was an infiltration of Anglians whose settlements in many cases have continued to the present day. After the peace of Wedmore, Lancashire was included in the Danish kingdom of Northumbria. Scandinavian place names abound and indicate a wedge driven between the Welsh of Wales and of Strathclyde. The Anglo-Saxon Chronicle records the reconquest of the district between the Ribble and the Mersey in 923 by the English king, when it appears to have been united with Mercia, but the areas north of the Ribble remained in Northumbria until it was incorporated into England. During the 10th century there was considerable settlement, especially in the coastal areas, by Norsemen from Ireland and the Isle of Man. William I gave the lands between the Ribble and the Mersey, and Amounderness, to Roger of Poitou, but at the time of the Domesday Book these again belonged to the king.

The name Lancashire does not appear in Domesday; the lands between the Ribble and the Mersey were surveyed with Cheshire and those north of the Ribble with Yorkshire. Roger of Poitou soon regained his lands; William (II) Rufus added the rest of Lonsdale south of the sands and, as Roger had the Furness fells, he owned all that is now known as Lancashire. In 1102 Roger finally forfeited all his lands and these Henry I held till, in 1118, he created the honour of Lancaster and bestowed it upon his nephew, afterward King Stephen. Henry II gave the whole honour to William, Stephen's son, but in 1164 it came again into the king's hands until 1189, when Richard I granted it to his brother John. In 1194 it was confiscated and the honour remained with the crown till 1267. In 1229, however, all the crown demesne between the Ribble and the Mersey was granted to Ranulf, earl of Chester, and on his death in 1232 came to William Ferrers, earl of Derby. The Ferrers held it till 1266, when it was confiscated. In 1267 Henry III granted it to his son Edmund, who was created earl of Lancaster. His son, Earl Thomas, married Alice, the heiress of Henry de Lacy, earl of Lincoln and Salisbury, and thus obtained the great estates belonging to the De Lacys. On the death of Henry, 1st duke of Lancaster, in 1361, the estates, title and honour fell to John of Gaunt, and by the accession of Henry IV, John of Gaunt's son, to the throne, the duchy became attached to, but not merged in, the crown.

The county of Lancaster is mentioned in 1169 as first contributing to the royal exchequer. The creation of the honour decided the boundaries. Ecclesiastically the whole of the county originally belonged to the diocese of York, but in 923 the district between the Ribble and the Mersey was placed under the bishop of Lichfield. Up to 1541 the district north of the Ribble belonged to the diocese of York, but in that year the diocese of Chester was created and Lancashire was divided into two archdeaconries. In modern times bishoprics have been established at Manchester (1847), Liverpool (1880) and Blackburn (1926), and they divide the county between them except for Furness and Cartmel, which were transferred to the diocese of Carlisle soon after that of Manchester was created.

As a duchy and county palatine Lancashire has its own special courts, but the first record of palatinate jurisdiction being exercised was in 1351 under Henry, duke of Lancaster. In 1377 the county was erected into a palatinate for John of Gaunt's life, and in 1396 these rights were extended and settled in perpetuity

on the dukes of Lancaster. The palatinate courts consist of a chancery which dates back at least to 1376, a court of common pleas, the jurisdiction of which was transferred in 1873 by the Judicature act to the high court of justice, and a court of criminal jurisdiction which in no way differs from the queen's ordinary court. The duchy and the county palatine each has its own seal.

At the close of the 12th and during the 13th century there was a considerable advance in the importance of the towns. In 1199 Lancaster, and in 1207 Liverpool, became incorporated boroughs; in 1230 Salford was made a free town; in 1246 Wigan became a free borough; and in 1301 Manchester was granted a charter. The Scottish wars drained the county of some of its best blood. In 1349 the county was visited by the Black Death and in ten parishes 13,180 persons perished between Sept. 1349 and Jan. 1350. Lancashire was apparently slow to recover from the effects of this plague; its boroughs ceased to return members to parliament early in the 14th century and trade had not yet made any great advance. The drain of the Wars of the Roses on the county must also have been heavy (*see* ROSES, WARS OF THE). Lancashire's poverty is shown by the fact that out of £40,000 granted in 1504 by parliament to the king, Lancashire's share was only £318. Under the Tudors the county prospered.

In the assessment of ship money in 1636 the county was put down for £1,000, toward which Wigan was to raise £50, Preston £40, Lancaster £30 and Liverpool £25 (*cf.* Hull £140 and Leeds £200). On the eve of the Civil War parliament, early in 1642, resolved to take command of the militia, and Lord Strange, eldest son of the 6th earl of Derby, was removed from the lieutenancy. On the whole, the county was royalist. Manchester was the headquarters of the parliamentarians and was besieged by the 7th earl of Derby (formerly Lord Strange) for seven days in Sept. 1642, but not taken. Early in 1643 the parliamentarians from Manchester successfully assaulted Preston and then captured Hoghton tower and Lancaster. In April Wigan, one of the chief royalist strongholds in the county, was taken by parliamentary forces, which also again captured Lancaster, and Warrington fell after a week's siege. Lord Derby also failed in an attempt on Liverpool, and the tide of war had clearly turned against the royalists in Lancashire. In June Lord Derby went to the Isle of Man, which was threatened by the king's enemies. Soon after, the parliamentarians captured Hornby castle and later Thurland castle, and in Feb. 1644 they besieged Lathom house, the one refuge left to the royalists, which was bravely defended by Lord Derby's wife, Charlotte de la Trémoille. The siege lasted nearly four months and was raised on the approach of Prince Rupert. Bolton was carried by storm; Rupert ordered that no quarter should be given. He advanced without delay to Liverpool and took it after a siege of three weeks. In November Liverpool surrendered to the parliamentarians. In Dec. 1645 Lathom house surrendered at last after a five-month siege, and was entirely destroyed. For the moment the war in Lancashire was over. In 1648, however, the royalist forces under the duke of Hamilton and Sir Marmaduke Langdale marched through Lancaster to Preston, hoping to reach Manchester; but near Preston were defeated by Oliver Cromwell in person. In 1651 Charles advanced through Lancaster, Preston and Chorley on his southward march to defeat at Worcester. This was followed by the execution of Lord Derby at Bolton. (*See* also DERBY, EARLS OF.)

During the rebellion of 1715 Manchester was the chief centre of Roman Catholic and high church Toryism. On Nov. 7 the Scottish army entered Lancaster, where the pretender was proclaimed king, and advanced to Preston, at which place a considerable body of Roman Catholics joined it. The rebels remained at Preston for a few days, apparently unaware of the advance of the government troops, until Gen. Charles Wills from Manchester and Gen. George Carpenter from Lancaster surrounded the town which, after a sharp engagement, surrendered on Nov. 13. In 1745 Prince Charles Edward passed through the county and was joined by about 200 adherents called the Manchester regiment.

Population and Administration.—The population of Lancashire increased from 673,486 in 1801 to 5,131,646 in 1961. There are four cities, Lancaster, Liverpool, Manchester and Salford (*qq.v.*), and three cathedral towns, Blackburn (*q.v.*), Liverpool and Manchester. Besides the 17 county boroughs, 9 of which have populations of over 100,000 (excluding Stockport which is partly in Lancashire, partly in Cheshire), there are 26 noncounty boroughs, 69 urban districts and 14 rural districts. Preston (*q.v.*) is the seat of the county council. The area of the administrative county is 1,615 sq.mi. Lancashire is one of the counties palatine, comprises six hundreds and is in the northern circuit. Assizes are held at Lancaster with crown courts (from 1956) at Liverpool and Manchester. There are four quarter sessional and 29 petty sessional divisions. The county boroughs of Blackburn, Blackpool, Bolton, Burnley, Liverpool, Manchester, Oldham, Salford and Wigan have separate commissions of the peace and courts of quarter sessions; Preston has a separate commission of the peace and a borough court of pleas. Noncounty boroughs with separate commissions of the peace are Accrington, Ashton-under-Lyne, Eccles, Lancaster, Leigh, Morecambe and Heysham, and Nelson. The dioceses of Blackburn, Liverpool and Manchester are wholly in Lancashire, which also includes parts of the sees of Bradford, Carlisle and Ripon. Lancashire also contains the Roman Catholic archdiocese of Liverpool and the dioceses of Lancaster and Salford.

Liverpool and Manchester are both seats of universities and of other important educational institutions; in 1964 a third university was established at Lancaster. Within the county are many denominational colleges and training colleges for teachers.

Economy.—The first industry established in Lancashire was that of wool. With the founding of Furness abbey in 1127 wool farming on a large scale began there, but the bulk of the wool was exported, not worked up in England. In 1282, however, there was a mill for fulling or bleaching wool in Manchester, and by the middle of the 16th century there was quite a flourishing trade in worsted goods. The 17th century saw the birth of the class of clothiers, who either kept their own sheep or purchased wool in large quantities and delivered it to weavers, who worked it up into cloth in their houses and returned it to the employers. The earliest mention of the manufacture of real cotton goods is in 1641, but the industry did not develop to any extent until after the invention of the fly shuttle by John Kay in 1733, of the spinning jenny by James Hargreaves of Blackburn about 1764, of the water frame throstle by Richard Arkwright of Bolton in 1769 and of the mule by Samuel Crompton of Hall-i'th'-Wood, near Bolton, in 1779. So rapid was the development of the cotton manufacture that in 1787 there were more than 40 cotton mills in Lancashire, all worked by water power. In 1789 steam power was applied to the industry. This rapid growth was accompanied by intermittent periods of depression, which in 1819 in particular led to the formation of various political societies and the Peterloo massacre (*see* PETERLOO). During the American Civil War the cotton famine caused untold misery.

During the 18th century the only town where maritime trade increased was Liverpool, whose prosperity was closely bound up with the slave trade. With the increase of trade, means of communication also improved. The latter half of the 18th century saw the period of canal construction. In 1830 the first passenger railway of any length in England was opened between Manchester and Liverpool and other railways followed in quick succession.

South Lancashire is one of the principal seats of the world's cotton manufacture, the trade centring upon Manchester. The worsted, woolen, artificial silk and silk manufactures, flax, hemp and jute industries are also important. The manufacture of machines, appliances, conveyances, locomotives and motor vehicles is significant, especially in supplying the needs of the immense weaving and spinning industries. For the same purpose there is a large branch industry in the manufacture of wooden bobbins. The shipbuilding industry is important at Barrow-in-Furness; there are great glassworks at St. Helens, electrical and aircraft works at Preston and leather and soap works at Warrington (*qq.v.*). Printing, bleaching, dyeing works, paper and chemical works, rubber and tobacco manufactures are also important activities of this great industrial region.

Besides the port of Liverpool, of world-wide importance, the principal ports are Manchester, brought into communication with the sea by the Manchester Ship canal in 1894, Barrow-in-Furness, Fleetwood, Heysham, Preston and Lancaster. The sea fisheries, for which Fleetwood and Liverpool are the chief ports, are of considerable value.

Despite its industrial reputation, Lancashire is still one of the most productive farming areas in the country and consists largely of family holdings. In the southwest the sandy loams and peats (mosslands) are devoted to intensive arable farming. Specialities are potatoes and peas and other vegetables grown on contract for canning or deep freezing. To the north and south of the Ribble estuary lies an area devoted to greenhouse cropping, with winter lettuce as a special crop. At Esprick is a small experimental station for greenhouse design and crops. The Fylde vicinity and the area round Preston, where there is much heavy loam with peat and moss in some parts, grows excellent crops of grass, and intensive dairy farming is the main enterprise with intensive forms of pig and poultry husbandry. Lancashire also produces cheeses of excellent quality. In the Furness fell area livestock rearing and hill sheep husbandry are carried on. On the slopes of the Pennines in east Lancashire, where the soils are thin and poor and the atmosphere is subject to heavy smoke pollution, there is poor permanent grass and rough grazing, farmed to produce milk or hill sheep.

Apart from the Manchester Ship canal, canal traffic is still of some importance in the industrial area. In 1760 the Sankey canal, 10 mi. long, the first canal opened in Britain, was constructed from St. Helens to the Mersey. Similar enterprises followed including the more publicized Bridgewater canal. A network of railways connects the industrial centre. Many suburban lines have been electrified.

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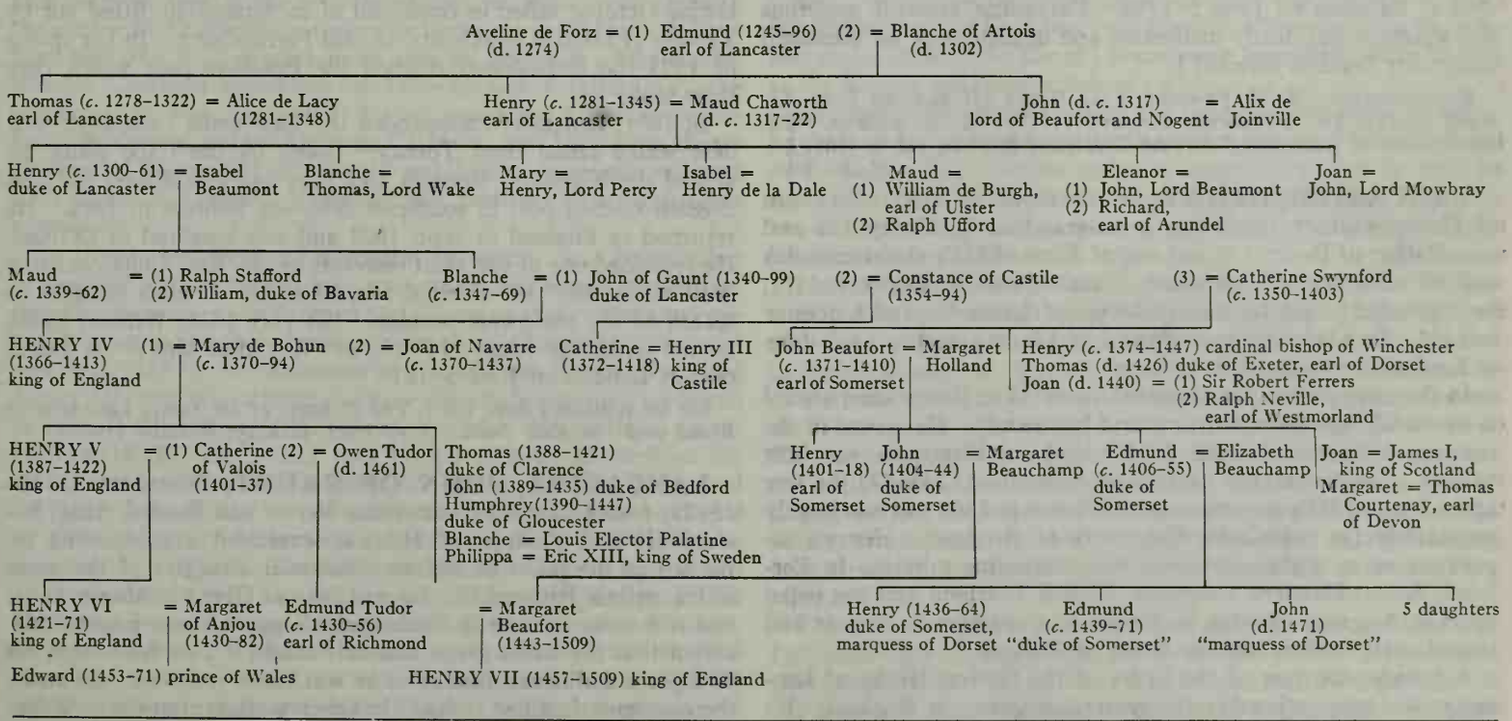
LANCASTER (HOUSE OF), the name of a cadet branch of the Plantagenet family which, in the 15th century, provided three kings of England and, defeated by the house of York (*q.v.*), passed on its claims to the Tudor dynasty. The title first appeared in 1267, when it was granted to Edmund "Crouchback" (1245–96), the youngest son of Henry III. Two of Edmund's sons by his second wife, Blanche of Artois, succeeded to the title: Thomas, earl of Lancaster (d. 1322), and Henry, earl of Lancaster (d. 1345). Henry's son, Henry, 1st duke of Lancaster (d. 1361), was survived only by two coheiresses; the elder, Maud, married to William, duke of Bavaria, died without issue a year after her father. The Lancastrian inheritance thus fell to the younger daughter, Blanche, and to her husband, John of Gaunt (d. 1399), third surviving son of Edward III (*see* LANCASTER, JOHN OF GAUNT, duke of). After Gaunt's death his son Henry of Lancaster deposed Richard II and became king himself. On his accession the duchy of Lancaster was merged in the crown and the house of Lancaster, in the persons of Henry IV, Henry V and Henry VI, ruled England for over 60 years.

The power of the house before this apotheosis had rested on the large wealth of its lands, judiciously supplemented from government sources and the profits of war. The original inheritance in the north, the midlands and Wales was increased by profitable marriages; that of Earl Thomas to the heiress of the earl of Lincoln was, eventually, especially lucrative. Moreover, no cadet line arose to share the patrimony; apart from the six daughters of Henry (d. 1345), surplus children were few. The extent of the estates and the men employed in their administration provided, at least under Gaunt, political power and a potential army for troubled times. The main power of the house lay in the appanage of Lancaster, and when, after Gaunt's death, Richard II attempted to acquire not only the estates but also the Lancastrian retainers, Henry of Lancaster's return from exile was precipitate.

The part played by parliament in Richard's deposition enhanced in the eyes of historians, if not in those of contemporaries, the myth of the "constitutional" zeal of the house of Lancaster. This myth was sedulously fostered around Earl Thomas' opposition to the crown and the future Henry IV's record as an "appellant" against the friends of Richard II in 1387–88. Powerful as magnates, the Lancastrians were woefully weak as kings: hence their "constitutionalism." Henry V alone had the strength to rule; and his marriage to the daughter of the mad Charles VI of France did not improve his son's chances. Henry IV had founded his title to the throne on the descent of Lancaster from Henry III in order to avoid the greater claim of the heirs of Gaunt's elder brother Lionel, duke of Clarence; in the end his grandson was defeated by the heir both of Clarence and of Gaunt's younger brother Edmund,

Genealogy of the House of Lancaster



duke of York. Ultimately the only remaining fragment of title was that which Henry VII derived through Gaunt's legitimized bastard line, the Beaufort family. By the time Henry VII had inaugurated the Tudor monarchy, the lands of Lancaster were firmly in the hands of the crown (although still administered separately) and any reality there might have been to the myth of Lancastrian constitutionalism had long departed.

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LANCASTER, EDMUND, EARL OF (1245–1296), fourth but second surviving son of Henry III (*q.v.*), king of England, and Eleanor of Provence, founded the house of Lancaster. His nickname "Crouchback" ("Crossback," crusader) enabled his descendant, Henry IV, in claiming the throne (1399) to assert that Edmund was really Henry III's eldest son but had been disinherited as a hunchback. Born on Jan. 16, 1245, Edmund received the Sicilian kingdom from Pope Innocent IV (March 1254), but Alexander IV canceled the grant (Dec. 1258). Edmund spent the Barons' War in exile in France (Oct. 1263–Oct. 1265), but after the royalist victory he received (Nov. 1265) the forfeited Montfort earldom of Leicester with the stewardship of England and (1266) the forfeited Ferrers earldom of Derby. The new earldom of Lancaster was added (1267), and he obtained the earldoms of Aumale and Devon by marrying Aveline de Forz (April 1269), thus acquiring the greatest accumulation of titles and lands since 1066. Edmund commanded the ineffective operations against remaining rebels at Kenilworth until the lord Edward arrived in June 1266. He took the cross (1268) and went to Acre without achieving anything (1271–72). He married Blanche of Artois, dowager countess of Champagne (*c.* Dec. 1275), and governed Champagne intermittently as a vassal of Philip III of France until the marriage (1284) of Blanche's daughter Jeanne. In the Welsh war of 1277 Edmund, as lord of Carmarthen and Cardigan (since 1266), commanded Edward I's southern army successfully, but surrendered his Marcher lands to the king before Nov. 1279. He was regent while Edward was in France (1286–89) and suppressed the revolt of Rhys ap Mareddud (1287). He conducted Edward's negotiations over Gascony in Paris (1293–94) and was tricked into surrendering the duchy which Philip IV then refused to restore. In the ensuing war Edmund led one of Edward's invading armies but died at Bayonne on June 5, 1296. Easygoing, trustful, generous and knightly, politically ineffective and unambitious, he remained constantly loyal to Edward I.

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LANCASTER, HENRY, 1ST DUKE OF (*c.* 1300–1361), son of Henry, earl of Lancaster, great-grandson of Henry III and grandfather of Henry IV, was one of Edward III's ablest captains and his most trusted counselor. Created earl of Derby (1337), he succeeded to his father's earldoms of Lancaster and Leicester in 1345. In 1349 he was made earl of Lincoln, and in 1351 duke of Lancaster with palatine powers.

In the early part of the Hundred Years' War Henry campaigned in Scotland, Aquitaine, Brittany and Normandy. He served in the two naval battles of Sluis (1340) and les Espagnols sur Mer (1350). Lieutenant and captain of Aquitaine (1345–47), he was again Edward III's commissioner in France in 1360 and was largely responsible for negotiating the treaty of Bretigny. Henry's experience as an ambassador was wide, including missions to Portugal, Spain, Flanders, Germany, France, Scotland and the papal court at Avignon. Earlier he fought as a crusader in Prussia and stayed with Casimir III the Great of Poland.

A founder-member of the Order of the Garter, Henry of Lancaster was unquestionably the greatest magnate in England. He founded a religious house, Newark college, at Leicester, and in London he built the palace of the Savoy, which John of Gaunt, who married Henry's daughter Blanche, inherited together with the Lancastrian titles and wealth. Within 40 years of Henry's death at Leicester on March 24, 1361, his grandson Henry IV was established on the throne. (I. P. S.)

LANCASTER, HENRY, EARL OF (*c.* 1281–1345), was the second son of Edmund ("Crouchback"), earl of Lancaster, and the brother of Earl Thomas. After his brother's execution (1322), he was so little suspected that he was allowed possession of another of the family titles, the earldom of Leicester (1324). Henry held lands adjacent to the increasing possessions in south Wales of Edward II's favourites, the Despensers, and in Sept. 1326 he joined Queen Isabella and Roger Mortimer after their return from France to depose the king. Henry captured Edward II at Neath abbey and took him from there to Kenilworth where Edward remained in his keeping. He was a member of the deputation which informed the king of his deposition. In 1327 he was made chief of the council of regency, and after entering a petition in parliament he was reinstated to much of the Lancastrian inheritance and allowed the title of earl of Lancaster. He soon quarreled with Mortimer. Lancaster complained that the council of regency was ignored and refused to attend the Salisbury parliament of Oct. 1328. He gathered troops at Winchester but was compelled to make peace. In 1330 he was one author of the plot which, with Edward III's approval, overthrew Mortimer. About this time his eyesight failed, and after Mortimer's fall he retired from public life and died on Sept. 22, 1345. (J. TA.)

LANCASTER, SIR JAMES (*c.* 1554–1618), English merchant in command of the first English vessel to sail to India by the Cape route, was born *c.* 1554 at Basingstoke. He went to Portugal where he served aboard Portuguese vessels but returned to England by 1587. In 1588 he served under Sir Francis Drake, commanding the "Edward Bonaventure" in the fleet against the Armada. In 1591, in command of the same ship, he sailed on the first English expedition to the East Indies with George Raymond and Samuel Foxcroft. On April 10 they left Plymouth in the "Edward Bonaventure," the "Merchant Royal" and the "Penelope," and reached Table bay on Aug. 1. From there the "Merchant Royal" returned to England with bad cases of scurvy; the other two continued the voyage, but on Sept. 12 the "Penelope" sank in a violent storm. On Sept. 16, the "Edward Bonaventure" was struck by lightning with considerable loss of life. Lancaster refitted his ship at Zanzibar (Feb., 1592). Rounding Cape Cormorin in May, he reached the Malay peninsula in June. Later he visited Ceylon. He returned to England in May 1594 and the following October sailed in command of an expedition, fitted out by a group of London merchants, to raid Pernambuco. In the spring of 1595 the Englishmen reached the Brazilian port which they then took.

In 1601, Lancaster commanded the East India company's first fleet which sailed from Torbay. Going by the Cape route, he visited the Nicobars, Sumatra and Java and established the first English trading post in southeast Asia—at Bantam in Java. He returned to England in Sept. 1603 and was knighted in October. He remained one of the chief directors of the East India company until his death. He directed several of the English voyages in search of the northwest passage. (In July 1616, William Baffin named Lancaster sound [74° N., 84° W.] after him.) Sir James died at London on June 6, 1618.

See Sir William Foster (ed.), *The Voyages of Sir James Lancaster to Brazil and the East Indies, 1591–1603,* Hakluyt Society (1940). (E. M. J. C.)

LANCASTER, JOHN OF GAUNT, DUKE OF (1340–1399), fourth but third surviving son of the English king Edward III and Philippa of Hainaut, exercised a moderating influence in the political and constitutional struggles of the reign of his nephew Richard II. He was born at Ghent in March 1340; and it is some tribute to Shakespeare's powers as a popular historian that the name given him in *Richard II,* derived from his birthplace and never used after he was three years old, should be the one most familiar today. In other matters, however, Shake-

speare's assessment of him has been challenged: historians since Bishop William Stubbs (d. 1901) have preferred to believe the calumnies of chroniclers and have allowed to Gaunt no greater attribute than an amiable mediocrity.

Gaunt's early military career was not particularly distinguished, though in some campaigns he did not do badly and his military reputation may some day be rehabilitated. But he was more than a soldier and a commander; he was the son and uncle of kings, and from the 1370s onward his military activities in the north and in France formed only interludes in a busy and often nerve-racking political life. He was created earl of Richmond in 1342 and in 1359 married Blanche (d. 1369), daughter and eventually sole heiress of Henry, 1st duke of Lancaster; and with her a great inheritance came into his hands. He was created duke of Lancaster in 1362 and 15 years later he was granted the palatine powers in Lancashire that his father-in-law had held; in 1390 the grant was made hereditary. Great possessions in the north, the midlands and Wales provided solid grounds for power; and the administrative organization of his estates provided him with loyal and committed servants who formed the core of an "affinity" or following that increased both his prestige and his authority. Gaunt's early ventures into politics, from the crisis of the Good parliament of 1376 to the Peasants' Revolt of 1381, were not on the whole very successful; but the failure of an obscure plot against him, developed under cover of the uprising, effectively demonstrated his strength: it seems clear that he successfully mobilized an army, summoned hastily from his estates in time of peace, and thereafter a subtle change seems to have taken place in his political position.

Between 1381 and 1386 Gaunt seems to some extent to have remained aloof from the growing political discord, assuming more and more the position of arbitrator between the party grouped around the adolescent Richard II and an opposition party that seems to have crystallized around Gaunt's youngest brother, Thomas of Woodstock, earl of Gloucester, Richard, earl of Arundel, and Thomas Arundel, bishop of Ely. In this position Gaunt seems to have received knocks from both sides; but his interest in internal politics, save as an impartial referee, seems to have been diminishing and by 1385, opposition at home to the project having ceased, he was at last in a position actively to pursue his claim as king of Castile and León. This claim lay through his second marriage in 1371 with Constance, daughter and heiress of Pedro I who had been displaced and murdered (1369) by his bastard half brother Henry II (d. 1379), father of John I who was now ruling in Castile. Gaunt's influence in foreign affairs had been partly directed toward realizing this claim, and his most spectacular military exploit, a cavalry raid through the centre of France from Calais to Bordeaux in 1373, may have been part of a first attempt to recover his new wife's inheritance. But his Castilian expedition of 1386–88 was a failure; by the settlement of Bayonne (1388) Gaunt renounced his claim to the Castilian throne, and his daughter Catherine and John's son Henry (afterward Henry III of Castile and León) were married and their claims conjoined. Gaunt himself received substantial compensation.

In 1389 he returned to his original occupation as a peacemaker in England. While he had been away there had been a major contest for power between Richard and his opponents. The king was saved from a possible deposition between Christmas 1387 and new year 1388 by the insistence of Gaunt's son Henry, afterward Henry IV, that his father's claim as substitute must be preferred to that of Gloucester. Gaunt was, however, far too loyal to rebel; and it was his loyalty that helped to keep Richard on his throne until, after Gaunt's death, he was at last finally deposed by Henry himself in 1399. Gaunt was created duke of Aquitaine in 1390 but apart from some 15 months there (1394–95), he remained in England. He easily weathered an attack by the earl of Arundel in 1394; his illegitimate children by his third wife Catherine Swynford were legitimized in 1397; and when Gloucester, Arundel and Thomas Beauchamp, earl of Warwick, the three senior of the "appellants" who had attacked Richard in 1388 made an ultimate onslaught on the king in 1397, Lancastrian power helped to defeat it. Not long after his son's banishment following his mysterious quarrel with the other junior appellant, Thomas Mowbray, duke of Norfolk, Gaunt died, on Feb. 3, 1399.

If Gaunt was not "outstanding" in affairs, he was not called upon to be so; and his personal qualities, loyalty to those above him and below, moderation and a certain human kindness, well outweigh any vices chroniclers complained of in his early years. In Aquitaine he did as well as he could; the Black Prince had done worse. His Castilian dream was impracticable but Gaunt himself at least did not come out of it too badly. In English politics he was the long-suffering target of politicians who sought a more naked power than his. His refusal to emulate them, a refusal which makes it easy to charge him with mediocrity, in fact gave his country what political peace it had during the reign of his hysterical nephew.

See also references under "Lancaster, John of Gaunt," in the Index.

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LANCASTER, JOSEPH (1778–1838), English educator, who developed the system of mass instruction identified with his name, was born in London in 1778. The monitorial or "mutual" approach employed brighter or more proficient children to teach other children under the direction of an adult master or teacher. During the early 19th century the system, as developed by Lancaster, Andrew Bell (*q.v.*) and Jean Baptiste Girard, became perhaps the most widespread means of providing the rudiments of education for children of the common people on the continent and in England and North America, and helped pave the way for universal education supported and controlled by the state.

Lancaster originally planned to become a Calvinist minister, but his religious views changed and he joined the Society of Friends. In 1789 he obtained from his father, an army pensioner, the use of a room in which to keep a school for poor children. Crowds of children came to him, and as he did not have money to hire assistants, he had his pupils teach each other, working out a plan whereby this could be accomplished very cheaply. His school, his lectures and his pamphlet *Improvements in Education as It Respects the Industrious Classes of the Community* (1803) attracted the attention of philanthropically minded people and even the royal family, and he felt encouraged to expand the school and found others. Vain, rash and extravagant, he soon was heavily in debt; in 1808 friends of the school paid his obligations, became its trustees and organized the Royal Lancasterian institution, later known as the British and Foreign School society.

Relations between the trustees and Lancaster becoming strained, he severed his connection with the enterprise and conducted his own school. This venture ended in bankruptcy, and in 1818 he emigrated to the United States, where his work and plan were well known and where Lancasterian schools had already been established in some cities.

Lancaster's reception in the United States was warm. He lectured extensively and wrote public letters to Pres. James Monroe and other prominent officials urging that his system be applied to higher as well as elementary education and to the education of the Indians. Nothing came of his projects, and in 1825 he went to Venezuela to recover his health and disseminate his method. He quarreled with Simón Bolívar and, returning north, he spent the last decade of his life in Canada and the United States, undertaking various experiments with his system and living on the bounty of admirers. He died in New York on Oct. 24, 1838, having been struck by a carriage as he crossed the street after visiting a school.

The use of children to teach other children was not new, but Lancaster took the approach and developed it into a systematic plan of education. From 200 to 1,000 children were gathered in one room and seated in rows, usually of 10 pupils each. An adult

master taught the monitors and then each monitor taught his row of pupils the lesson in reading, writing, arithmetic, spelling or the higher branches.

Besides monitors who taught, there were monitors to take attendance, monitors to examine and promote pupils, monitors to rule writing paper and check slates and books, and, over all the monitors, a monitor general.

Schoolroom activity proceeded with military precision, according to directions laid down in minute detail by Lancaster and from which his followers were not to deviate by a hair's breadth.

The defects of this system arose not from the principle that children can or should learn from each other—they do so anyhow—but from Lancaster's overelaboration and distortion of it. To achieve mass results and mass economies, the adult teacher was relegated to the position of bystander and inspector, learning was debased to drill and memorization and the matter to be learned was reduced to particles of information and sequences of habit. The whole process of teaching and learning was routinized and formalized to a point where opportunities for creative thinking, individual initiative and truly co-operative social learning scarcely existed.

Nevertheless, Lancaster and his system contributed substantially to educational progress. They made education and the means of education subjects of widespread interest and discussion, not least because of the violent public controversies waged by Lancaster and Bell and their followers in the British and Foreign School society and in the National Society for the Education of the Poor in the Principles of the Established Church. Experience with the monitorial system demonstrated too that even with the most economical instruction that human ingenuity could devise, private effort still was not equal to the task of universal education. Thus Lancaster's work brought nearer the day when the state would assume the responsibility of providing for all children the education needed in the urban, industrial and more democratic age that was emerging during his lifetime.

See also ELEMENTARY EDUCATION. (R. L. McC.)

LANCASTER, THOMAS, EARL OF (*c.* 1278–1322), a grandson of Henry III, was the principal figure in the baronial opposition to Edward II. Though he was an opponent of royal power, his opposition to Edward II derived more from personal ambition than from a desire for political reform.

Thomas of Lancaster was the eldest son of Edmund, earl of Lancaster, by Blanche of Artois, widow of Henry, count of Champagne and king of Navarre. He was related to the ruling houses of France and Navarre, and was the cousin of Edward II. In 1298 he inherited through his father the earldoms of Lancaster, Derby and Leicester, the latter carrying with it the office of hereditary steward. Through his wife Alice, the daughter and heiress of Henry de Lacy, earl of Lincoln, Lancaster later acquired the earldoms of Lincoln (1311), and Salisbury (between 1306 and 1310). Lancaster's great possessions assured his political prominence. Despite Adam Banaster's revolt (1315) against Sir Robert Holland, Lancaster's chief steward, the Lancastrian estates increased, and the earl disposed of a considerable private army.

Lancaster came into politics with the controversy over Piers Gaveston (*q.v.*). In 1308 he was one of the earls who demanded the favourite's banishment, and in 1310 he was a member of the baronial committee which again demanded his banishment in the ordinances of 1311. After Gaveston's return to England in Dec. 1311, Lancaster with other barons formed a confederacy for the defense of the ordinances. In the ensuing conflict it was on Lancaster's territory that Gaveston was executed (1312). After protracted negotiations Lancaster submitted to the king and received Edward's pardon (Oct. 1313). Edward's defeat by the Scots at the battle of Bannockburn (1314), where Lancaster was not present, increased the earl's influence in England. At the York parliament of 1314, he forced changes in the royal household, and in 1315 England was virtually under his control. Lancaster's defects of character now appeared. He was suspected of intriguing with Robert I, the Bruce, and his failure of statesmanship led to a new baronial grouping which by the treaty of Leake (1318) effected a formal reconciliation between Lancaster and the king.

The rise of the Despensers as royal favourites (1318) renewed Lancaster's quarrel with Edward. In an effort to rouse northern opinion, Lancaster called various assemblies until, after the banishment of the Despensers (1321), Edward took up arms on their behalf. Lancaster, who had been abandoned by Sir Robert Holland, was defeated by the king's forces at Boroughbridge, and was executed (March 22, 1322) near his own castle of Pontefract. His tomb at Pontefract became a centre of pilgrimage.

See M. McKisack, *The Fourteenth Century* (1959). (J. TA.)

LANCASTER, a city, municipal borough and the county town of Lancashire, Eng., is 231 mi. N.W. of London by road. Pop. (1961) 48,235. It lies at the head of the estuary of the Lune river, mainly on its south bank, 7 mi. from the sea. The site slopes sharply up to an eminence, crowned by the castle and the church of St. Mary, and overlooks the rich valley and Morecambe bay. St. Mary's church, founded in the 11th century by Roger of Poitou, has a Decorated doorway, but is mainly 15th century, with a tower built in 1754–55 and a clock dated 1759. The castle occupies the site of a Roman castrum. The Saxon foundations remain, and the tower at the southwest corner is supposed to have been erected during the reign of Hadrian. The Dungeon tower, also supposed to be of Roman origin, was taken down in 1818. Of the old portion of the present structure, the keep was built by Roger of Poitou, who used some of the Roman towers and the old walls. In 1322 much damage was done to the castle by Robert I, the Bruce, but it was restored and strengthened by John of Gaunt, who added the greater part of the Gateway tower. A turret built on the Norman keep or Lungess tower is called "John o' Gaunt's chair." During the Civil War the castle was captured by the parliamentarians. Shortly after this period it was put to public use and now, largely modernized, contains a library and the assize courtroom (Shire hall). St. Peter's Roman Catholic cathedral was built in 1859. The Storey institute, with art gallery, technical and art schools, museum and library, was presented to the borough by Sir Thomas Storey in 1887. An observatory stands in Williamson park. There is a city and regimental museum in Market square. The Ashton memorial in Williamson park was built by Lord Ashton (1842–1930) as a family memorial and the municipal buildings were given by him in 1909. The grammar school was endowed in the 15th century, although there is evidence that it existed as early as the 13th century. In its former Jacobean house the philosopher William Whewell and the biologist Sir Richard Owen were educated.

The chief industries of Lancaster are linoleum making, cotton, rayon and silk spinning, engineering, dyeing and cloth printing and the making of special fabrics such as book cloth, table baize, matting and knitwear. Among other products are furniture, footwear and beer. Glasson dock, 5 mi. down the Lune, with a graving dock, is accessible to vessels of about 700 tons. The Kendal, Lancaster and Preston canal crosses the Lune by an aqueduct and the river also is crossed by a well-designed bridge built in 1788. Lancaster has a covered daily market and, in Church street on Wednesdays and Saturdays, a fruit and vegetable market, granted in 1336–37.

Lancaster was an important Roman station, and traces of the Roman fortification wall remain. The runic cross is Anglo-Saxon, but the Danes left few memorials of their occupation. At the Conquest the place became a possession of Roger of Poitou, who founded or enlarged the castle and founded St. Mary's priory as a cell of his Benedictine priory. The town and castle had a somewhat checkered ownership until 1267 when they were granted by Henry III to his son Edmund, 1st earl of Lancaster, and since have been part of the duchy of Lancaster. A town had grown around the castle by 1193 when John, count of Mortain (afterward king), granted its first charter, and another in 1199 after his accession. John of Gaunt in 1362 obtained a charter for the exclusive right of holding the sessions of pleas for the county in Lancaster itself, and up to 1873 the duchy appointed a chief justice and a puisne justice for the court of common pleas at Lancaster. The town was raised to the status of a city in 1937.

In 1322 the Scots burned the town, the castle alone escaping. The town was rebuilt but moved from its original position on the hill to the slope and foot. In 1389, after the battle of Otterburn, it was destroyed again by the Scots. At the outbreak of the Civil War the burgesses sided with the king, and the town and castle were captured in Feb. 1643 by the parliamentarians. In March 1643 Lord Derby assaulted and took the town, but the castle remained in the hands of the parliamentarians. In May and June, 1643 and in 1648 the castle was again besieged, but each time in vain. During the rebellion of 1715 the northern rebels occupied Lancaster for two days. Prince Charles Edward's army passed through the town in its southward march during the 1745 rebellion, and again in its retreat, but the inhabitants stood firm.

A merchant guild that existed in Lancaster was ratified by Edward III's charter (1362), and in 1688 six trade companies were incorporated. The chief manufactures at one time were sailcloth, cabinet furniture, candles and cordage. The borough returned two members to parliament from 1295 to 1331. It renewed its privileges in 1529, returns again being made from 1547 until 1867, when it was merged in the Lancaster division of north Lancashire.

LANCASTER, a city of Ohio, U.S., 30 mi. S.E. of Columbus, on the Hocking river; the seat of Fairfield county. Among its municipal parks is Rising park, surrounding Mount Pleasant, a striking rock formation rising abruptly nearly 300 ft. above the surrounding plain. It was a well-known landmark to the Indians, explorers, traders and early settlers. Lancaster is the trade centre of a region producing principally dairy products, swine and beef cattle. Glass, shoes and machinery are also manufactured there. The town was founded in 1800 by Ebenezer Zane of Wheeling, W.Va. (then a part of Virginia). Following the treaty of Greenville in 1795 which made settlement within Ohio safe and legal, Zane in 1797 blazed Zane's trace from Wheeling to Limestone, Ky., a distance of 266 mi., the first road of any consequence in Ohio. In payment Zane received three tracts, one of which became the site of Lancaster. The first settlers came over the trace in 1798; many of them were Germans from Lancaster, Pa., for which the new town was named. It was incorporated in 1831. Gen. William T. Sherman was born in Lancaster, as was his brother, John Sherman, sponsor of the Sherman Anti-Trust act; their birthplace is a state memorial. Lancaster is well known for its well-preserved early homes located on a hill in the heart of the city.

For comparative population figures *see* table in OHIO: *Population.* (H. M. Tu.)

LANCASTER, a city of southeastern Pennsylvania, U.S., 65 mi. W. of Philadelphia; the seat of Lancaster county. Pop. (1960) city, 61,055; standard metropolitan statistical area (Lancaster county) 278,359. (For comparative population figures *see* table in PENNSYLVANIA: *Population.*)

The city had its beginnings with the creation of Lancaster county (named for the English city and shire) in 1729. Commissioners selected the site of Hickory Town or Gibson's pasture on Conestoga creek as the county seat of justice; and in 1730 the town was laid out by James Hamilton. Population grew rapidly, and Lancaster became a borough in 1742 and a city in 1818. An important trading and manufacturing centre, it produced in the 18th century the famous Conestoga wagon and the Pennsylvania rifle, both of which played important parts in American frontier history. There in 1763 William Henry experimented unsuccessfully with a steamboat. During the American Revolution, the continental congress, fleeing from Philadelphia, held a one-day session in Lancaster on Sept. 27, 1777; and the supreme executive council of Pennsylvania made the city its headquarters for nine months in 1777–78.

Lancaster was one of the sites considered for the new national capital in 1790, and in 1799 it became the capital of Pennsylvania, remaining such until 1812 when the state government moved to Harrisburg. In 1794 the 69-mi. stone-surfaced turnpike from Lancaster to Philadelphia was completed and its success began an era of turnpike building.

Lancaster was the home of James Buchanan, 15th president of the U.S., and of Thaddeus Stevens, noted abolitionist congressman; both are buried there.

Lancaster and Lancaster county have a prosperous and diversified economy based upon agriculture, trade and manufacturing. Located in a fertile country with stone farmhouses and huge bank barns, the county is one of the most highly cultivated areas in the nation, its products including livestock, dairy products, poultry, wheat, corn, hay, tobacco and eggs. The city is one of the most important cattle markets in the east. Industry is diversified and highly skilled, producing watches, linoleum, electrical appliances, television tubes, farm machinery and a variety of other products.

The population is varied in origin, but is predominantly of Pennsylvania-German stock. Many Germans belong to the "plain sects" (Amish, Mennonites, and Dunkards), who are distinguished by their black, buttonless attire and because of religious beliefs do not use automobiles and other modern devices.

Lancaster has numerous public and private schools, a public library, several municipal parks, a symphony orchestra, a historical society and museum and many other cultural and recreational facilities. Franklin and Marshall college, a men's liberal arts college chartered in 1787 and affiliated with the United Church of Christ, is located there and maintains the North museum and its planetarium. Nearby are Millersville State Teachers college chartered in 1854, and Elizabethtown college, a Church of the Brethren institution established in 1899. Also near the city are the Pennsylvania Farm museum and the famous Ephrata cloister, the site of a German Seventh-Day Baptist monastic community (now dissolved) founded in the 1730s. (S. W. Hm.)

LANCE, a form of spear used by cavalry. It usually consisted of a long wooden shaft with a sharp metal point. The date of its introduction into civilized armies is difficult to trace, but its employment can definitely be traced to the Assyrians and Egyptians. The Greeks and Romans also used lances. Despite the lack of stirrups, which do not appear until the 6th century A.D., the heavy cavalry of the ancient world depended on the lance for shock effect at the crisis of battle.

During the middle ages the lance was the favourite weapon of armoured knights on barded horses who sought to unseat a mounted opponent. Medieval battles usually disintegrated into hundreds of such single combats, the opponents holding their lances level and charging at each other. Shafts as long as 16 ft. were used, the butt end being couched in a leather rest attached to the saddle. The comparable weapon for foot soldiers was the halbert (*q.v.*).

With the introduction of firearms, the mounted man-at-arms and his lance became outdated. Troops armed with pikes, or infantry spears, were drawn up to protect musketeers from the charges of horsemen; the cavalry was generally recognized as effective only against broken infantry or in pursuit of an enemy.

When the bayonet (*q.v.*) superseded the pike, the lance was revived to give the cavalry a weapon useful for shock tactics. If the first charge did not prevail, however, the lance was obviously awkward to handle in a melee, and the horseman carried a sword and pistol as secondary weapons.

Eastern Europe and Russia led in this revival of lance tactics. A regiment of Polish lancers formed by Napoleon in 1807 was the forerunner of many others in his armies. His growing preference for cavalry shock over fire effect was shown four years later when he converted nine dragoon regiments into lancers. The British in turn were impressed by the weapon at Waterloo and in 1816 organized their first regiments of lancers.

Carbine and pistol were preferred to the lance in the United States, where the terrain was seldom suited to cavalry charges. Raiding and observation were the chief missions of Civil War horsemen who often dismounted and used dragoon tactics in a fight.

The vogue of the lance lasted throughout the 19th century in Europe largely because there was no severe or prolonged test of its effectiveness. The shaft, ranging from 9 to 12 ft. in various armies, was made of ash impregnated with linseed oil and tar, or of bamboo or other wood. The butt was carried in a leather "bucket" attached to the stirrup.

In time of peace no weapon contributed more to the pomp and pageantry of war, and the sight of a column of lancers, with steel points flashing and pennons flying, was a memorable spectacle.

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LANCERS OF THE GERMAN ARMY DURING WORLD WAR I

Moreover, the weapon was sometimes effective against savage or semicivilized opponents in colonial wars. A notable example was the charge of the 21st Lancers at Omdurman in 1898.

At the late date of 1889, despite several unhappy experiences with long-range, rifled firearms in the Franco-German War, Germany converted all its remaining cavalry regiments into lancers known as Uhlans. In 1914 they carried their medieval weapons into a machine-gun war as did the French and British until a few bloody encounters taught discretion. Even after the tank proved itself in 1917, some British staff officers still envisioned a pursuit by the lancers. Not until 1927, in fact, was the lance finally abolished in the British army except for ceremonial purposes. By that time it was recognized everywhere as a relic of the military past.

See also TACTICS: *The Cavalry Cycle.* (T. J. E.; LN. MS.)

LANCELOT (LANCELOT DU LAC; LANCELOT OF THE LAKE), the son of King Ban of Benoyc; one of the greatest knights in Arthurian romance (*see* ARTHURIAN LEGEND); the lover of Guinevere and the father of Galahad. He does not appear in Geoffrey of Monmouth's *Historia regum Britanniae* or in Wace's *Roman de Brut,* two early sources for Arthurian material. It was Chrétien de Troyes (*q.v.*) who first named Lancelot du Lac in a list of Arthur's knights in *Erec* (*c.* 1170), and then, as with Perceval (*q.v.*), made him the hero of a verse romance, *Le Chevalier de la Charette.* This tells the story of the abduction and rescue of Guinevere (*q.v.*), of which there was an already existing tradition. It seems probable that Chrétien was responsible for making Lancelot the rescuer and lover of Guinevere; he also mentions briefly that Lancelot was brought up by a fairy in a lake. An account of this fairy upbringing is to be found in *Lanzelet,* a German translation by Ulrich von Zatzikhoven of a lost French book brought to Germany by Hugo de Morville in 1194. According to this somewhat confused poem Lanzelet's father is driven from his kingdom and dies. The queen, while tending her dying husband, lays the child by the lake, and a fairy rises from the water and carries him off to her mysterious kingdom inhabited by 10,000 maidens. She brings him up and sends him to Arthur's court to be knighted so that he can avenge her on an enchanter who has imprisoned her son. Lanzelet does this, learns his name, performs a number of exploits and falls in love with a number of ladies. He is not the lover of Guinevere, and, although the queen's rescue from a magician, Falerin, is described, Lanzelet plays no leading part in it.

These two 12th-century themes—Lancelot's upbringing in a lake and his love for Guinevere—are further developed in the French prose *Lancelot* or Vulgate cycle of Arthurian romances at the beginning of the 13th century. Chrétien had used the story of Guinevere's rescue to express in narrative form the ideas which inspired the courtly love lyric and to show Lancelot, the ideal lover, humble and submissive, but inspired to great deeds by the power of love. In *Lanzelet* the fairy prepares the child as well as she can for his mission, although it is not possible for him to receive a full knightly training in the lake. The theme of the first part of the prose *Lancelot* is to show how the Lady of the Lake's protection and careful education of Lancelot in chivalry combines with the inspiring force of his love for Guinevere to produce a knight who is the flower of earthly chivalry, equaled by no other knight in the world. But this theme of Lancelot as the perfect representative of an earthly chivalry, who draws his strength from courtly love, is, in the later branches of the Vulgate cycle, set against the two other great themes of Arthurian romance, that of the Grail (*see* GRAIL, THE HOLY), and that of the end of the Arthurian kingdom. Lancelot is surpassed by his own son Galahad, and the very love which had inspired him to rise to such heights causes him to fail in the greatest adventure of all, the Quest for the Holy Grail, and sets in motion the fatal chain of events which bring about the death of Arthur and the destruction of the Round Table. In Sir Thomas Malory's *Morte Darthur,* where the withdrawal of the Grail is not directly linked with the final disaster, it is essentially the conflict between Lancelot's knightly service as a lover to his lady and his knightly loyalty to his lord which leads to Arthur's "dolorous death and departing out of this world."

BIBLIOGRAPHY.—The most important medieval texts in which Lancelot plays a leading role are: Chrétien de Troyes, *Le Chevalier de la Charrette,* ed. by W. Foerster as *Der Karrenritter* (1899) and by M. Roques (Classiques Français du Moyen Age, 1958); Ulrich von Zatzikhoven, *Lanzelet,* ed. by K. A. Hahn (1845), Eng. trans. by K. G. T. Webster (1951). The French prose *Lancelot,* generally known as the Vulgate cycle, was first printed in 1488. The only modern edition of the complete cycle is by H. O. Sommer, *The Vulgate Version of the Arthurian Romances,* 8 vol. (1908–16). There are more recent editions of parts of the cycle: *Le Conte de la Charrette,* ed. by G. Hutchings (1938); *La Queste del Saint Graal,* ed. by A. Pauphilet (Classiques Français du Moyen Age, 1923); *La Mort Artu,* ed. by J. Frappier (1936; 1954). *The Works of Thomas Malory,* ed. by E. Vinaver (1947), also contains an important discussion of Malory's sources for his Lancelot material. For critical studies *see* J. Frappier, *Chrétien de Troyes* (1957) and *Étude sur la mort le roi Artu* (1936); F. Lot, *Étude sur le Lancelot en prose* (1918). For further discussion and bibliography *see* J. D. Bruce, *Evolution of Arthurian Romance to 1300,* 2nd ed. (1928); *Arthurian Literature in the Middle Ages,* ed. by R. S. Loomis (1959). (E. M. K.)

LANCELOT, CLAUDE (1616–1695), French Jansenist who introduced a new method of teaching languages, was born in Paris at the beginning of 1616. In 1637 he put himself under the direction of St. Cyran (Jean Duvergier de Hauranne) and became one of the first *solitaires* (hermits) of Port Royal (*q.v.*). After holding various tutorships he taught in the Petites Écoles which were organized at Port Royal from 1646. Jean Racine was his pupil there. Lancelot's teaching experience led to his publication of *Méthode latine* (1644; definitive edition, 1655) and *Méthode grecque* (1655), in which the rules of grammar are explained in French rhymes. His famous *Jardin des racines grecques* (1657), an alphabetical vocabulary of Greek words with French translation in rhyming octosyllabic verse divided into 226 stanzas, remained in use for two centuries. His great innovation was to use the French language instead of Latin as the medium for teaching Latin and Greek. In 1660 he published *Méthode espagnole, Méthode italienne* and *Méthode de plain-chant.* Finally he produced *Grammaire générale et raisonnée* (1660), which contains the theories of Antoine Arnauld (*see* ARNAULD). After the dispersal of the Petites Écoles in 1660 Lancelot returned to Paris as sacristan of Port Royal. During the great persecution of the abbey (1664–69) he was a trusted intermediary, and visited Nicolas Pavillon, Jansenist bishop of Alet (Languedoc) in 1667.

From 1669 to 1672 he was the tutor of the young princes de Conti and completed his *Mémoires,* which he had begun in 1663 (they were not published till 1738, with various omissions). He then joined the Cistercian abbey of St. Cyran, but in 1679 he was exiled for his Jansenist views to the Benedictine abbey of Ste. Croix at Quimperlé in Brittany, where he died on April 15, 1695.

See L. Cognet, *Claude Lancelot* (1950). (L. Co.)

LANCET, in architecture, a form of pointed arch in which the centres from which the curves of the arch are described are outside the base of the arch, so that the arch is high and narrow; also a window with such an arch at the top. As this type of arch is the dominant form in Early English Gothic architecture, that style is sometimes known as the lancet style. *See* ARCH AND VAULT; EARLY ENGLISH PERIOD.

LANCET FISH, the name for elongate, compressed, silvery fish of the genus *Alepisaurus,* species of which may reach a length of six feet. The mouth is very large with unequal, formidable, knifelike teeth, suggesting those of a barracuda. A very high fin, suggesting that of a sailfish, extends along most of the back; between this dorsal fin and the forked tail is a small adipose fin like that of a trout or salmon. The few species of lancet fishes are much alike and not well known. They swim at a considerable depth in the ocean and are occasionally cast up on beaches. The Pacific lancet fish (*A. borealis*) is rather common in Aleutian shore waters and not infrequently becomes stranded, very likely in pursuit of smaller fishes. The commonest North Atlantic species is *A. ferox.* (J. T. N.; X.)

LANCEWOOD, a term of confusing extension applied to the straight-grained, tough, light, elastic wood obtained from several different trees. The true lancewood (*Oxandra lanceolata*), of the West Indies and Guiana, furnishes most of the lancewood of commerce. It is brought into trade in the form of taper poles of about 20 ft. in length and from 6 to 8 in. in diameter at the thickest end. Lancewood was formerly used by carriage builders for shafts. The smaller wood is used for whip handles, for the tops of fishing rods and for various minor purposes where even-grained elastic wood is desired. The black lancewood or carisiri of Guiana (*Guatteria virgata*) grows to a height of 50 ft. and is of remarkable slender form, seldom more than 8 in. in diameter. The yellow lancewood tree (*Duguetia quitarensis,* yari-yari, of Guiana) is of similar dimensions, found throughout Guiana and used by the Indians for arrow points as well as for spars and beams. Trees of the genus *Rollinia* of Guiana are also called lancewood. Lancewood of Australia is derived from several species of *Backhousia.*

LAN-CHOU (LANCHOW), the capital city and industrial centre of the Chinese province of Kansu, on the right bank of the Yellow river about 5,200 ft. above sea level (36° N. and 104° E.). The river in this part of its course is navigable only for small junks. The historical function of Lan-chou from earliest times was to serve as a bridge point on the chief avenue of overland approach into China from the west. With World War II Lan-chou became a vital station on the Sinkiang route for Soviet war supplies and Chinese exports, a stopover on the air route to the U.S.S.R. and a military air base. It is the western terminus of the Lung-hai railway, and the start of the Sinkiang railway, on which work began in 1952 and continued into the 1960s. The city also is a major highway centre, both for transport and maintenance.

In 1952 major industrial development of Lan-chou began. Petroleum refining, oil field equipment, cement, woolen textiles and leather goods were the chief lines of production, supplemented by light industrial activity and agricultural processing. The population of Lan-chou was 397,400 in 1953; the development program caused marked increases and the reported total in 1957 was about 699,000. *See* also KANSU. (J. E. Sr.)

LANCIANI, RODOLFO AMADEO (1847–1929), Italian archaeologist and authority on ancient Rome, was born in Rome on Jan. 1, 1847. He was educated in that city and in 1872 became secretary of its archaeological commission. In 1878 he was appointed director of excavations and professor of ancient topography in the University of Rome. He made important discoveries in the House of the Vestals, the Basilica Julia, the imperial palace on the Palatine, the baths of Caracalla, the temple of Jupiter Capitolinus, Ostia, Trajan's harbour at Porto and Hadrian's villa below Tivoli. In 1911 he was created a senator.

His works, some of which were written in English, include: *Ancient Rome in the Light of Modern Discoveries* (1888); *Pagan and Christian Rome* (1892); *The Ruins and Excavations of Ancient Rome* (1897); *Destruction of Ancient Rome* (1899); *New Tales of Old Rome* (1901); *Wanderings in the Roman Campagna* (1909); *Ancient and Modern Rome* (1925). He died in Rome on May 21, 1929.

LANCISI, GIOVANNI MARIA (1654–1720), Italian anatomist, physiologist, pathologist, physician, surgeon and botanist, the greatest Italian clinician of his time and the first modern hygienist, was born Oct. 26, 1654, in Rome and educated there. He was associated with S. Spirito hospital from his student days until his death. As a physician, he rapidly became eminent and was physician to Popes Innocent XI, Innocent XII and Clement XI.

Lancisi was a great epidemiologist. His monographs on influenza, cattle plague (rinderpest) and malaria were masterpieces. Malaria, he pointed out, was prevalent in swampy districts where mosquitoes were numerous; he advocated drainage for its prevention and quinine for its cure. In 1706 the pope, alarmed by an increase of sudden deaths in Rome, asked Lancisi to investigate the cause. Lancisi's monograph on sudden death pointed out that the deaths were due mainly to dilatation and hypertrophy of the heart and vegetations on the heart valves. In a later treatise on aneurysms, he pointed out their syphilitic nature and also described syphilis of the heart. These monographs on sudden death and aneurysms remain classics. Lancisi accumulated a valuable library which he willed with all his property to S. Spirito hospital. He died Jan. 20, 1720.

See Pietro Capparoni, *Profili Bio-Bibliografici di medici e naturalisti celebri italiani* (1932); Arturo Castiglioni, *A History of Medicine,* tr. by E. B. Krumbhaar (1941). (R. H. Mr.)

LANCRET, NICOLAS (1690–1743), French painter, who became a brilliant depicter of light comedy which reflected French society under the regent Orléans, was born in Paris on Jan. 22, 1690. Lancret's first master was Pierre d'Ulin but he left D'Ulin (*c.* 1712) for the atelier of Claude Gillot (1673–1722) where he met and was advised by another of Gillot's students, Antoine Watteau (1684–1721).

Lancret was much admired as a decorator and executed numerous commissions for the mansions of many great collectors. Among his favourite subjects were balls, fairs and village weddings. In 1719 Lancret was received into the Royal Academy as a painter of *fêtes galantes.* The total number of his paintings has been estimated at 787. Lancret died in Paris on Sept. 14, 1743.

LAND. The total area of the earth's surface has been calculated to be 196,950,000 sq.mi., of which 57,666,000 sq.mi. is land. The distribution of land over the globe, in square miles, is as follows: Europe, 2,718,000; Asia, 18,506,000; Africa, 11,733,000; North and Central America, 9,362,000; South America, 6,879,000; Oceania, 3,302,000; and Antarctica, 5,165,000.

Much of the land surface of the earth is not suited for human habitation because of a permanent cover of ice and snow, permafrost zones, rugged highlands, deserts or excessive rainfall. Land that is habitable by human beings and has physical and climatic conditions permitting the growth of crops comprises not more than two-fifths of the earth's total land area. It has been computed that of the 16,000,000 sq.mi. of the earth's cultivable land, between 5,000,000 and 6,500,000 sq.mi. have been cultivated. The difference between the amount of land that is cultivable and the amount that is actually cultivated is accounted for, in varying degrees in particular areas, by economic conditions, population pressure, technological practices and cultural influences. An overall view of the world's land use is indicated by the following estimated distribution: arable or cropped, 10%; meadow and permanent pasture, 18%; forest and woodland, 29%; unused but potentially productive, 3%; built over, wasteland and other uses, 40%.

The use of land by human beings depends upon soil fertility, location, climate, topography and population pressure on the land.

The distribution of natural resources such as minerals, water, soil types, native plant and animal life, as well as the locations of population centres and industry, also affects the distribution of land use among agricultural and other human pursuits. Technological advances, land reclamation and irrigation have influenced land use and have resulted in increased productivity of land in agricultural uses.

The meaning of "land" differs among disciplines. In law, it refers to any ground, soil or earth regarded as the subject of ownership. In economics, land represents all the elements in the wealth of a nation furnished by nature independent of the activities of man. On such basis, economists view the supply of land to be fixed, a characteristic that influences the land rent imputed or paid for its use. The payment is also affected by legal and institutional systems, as in land tenure, as well as the price system. In most areas, the government holds the rights of escheat, eminent domain, police power and taxation, all of which affect land tenure conditions.

Different land areas have different qualities or characteristics which affect their value in alternative uses. While both fertility and location are significant in affecting the value of farmland, location may be the sole basic determinant of value for urban land. With population expanding, the land-people density increases. This, coupled with political, economic and social alterations in various regions, results in problems of how land should be used and how rights to land should be distributed. The extent to which such problems are met by individuals making decisions through price and tenure systems, by government action, or by both, varies among countries and regions.

See AGRICULTURAL ECONOMICS; LAND RECLAMATION; LAND REFORM; *see* also references under "Land" in the Index.

BIBLIOGRAPHY.—Roland R. Renne, *Land Economics,* rev. ed. (1958); U.S. Department of Agriculture, "Land," *The 1958 Yearbook of Agriculture* (1958); Land Economics Institute, University of Illinois, *Modern Land Policy* (1960). (SY. H.)

LANDAU, EZEKIEL (1713–1793), rabbi and author of *responsa* (decisions on questioned points of the Law), was born at Opatow, Pol., on Oct. 8, 1713, son of Judah Landau, rabbi and member of the Council of Four Lands. In 1734 Ezekiel Landau was head of the rabbinical court of Brody, and in 1745 he became rabbi of Jampol, Podolia. There he gained fame during the Emden-Eybeschütz controversy by rendering a moderating compromise opinion (*see* EYBESCHÜTZ, JONATHAN). In 1755 he went to Prague as rabbi, and remained there till his death, on April 29, 1793.

In his collected halakic decisions, in two cycles, entitled *Noda Biyehudah,* Landau's critical-analytical mind and his careful examination of sources are revealed. He was an implacable opponent of the two great movements which arose in his generation, Hasidism and Haskalah (Enlightenment), fearing the effects of nationalistic philosophy and the excesses of popular mysticism. On the other hand, he did not oppose Cabala or the attempt to integrate the Jews into the general community.

A list of Landau's works is found in S. M. Hones' *Toledot Haposekim,* pp. 144–155 (1911).

See the introduction to Landau's *Noda Biyehudah* (1810–11); Y. J. Kamelhar, *Mofeth Hador* (1903). (S. K. M.)

LANDAU, LEV DAVIDOVICH (1908–), Soviet theoretical physicist, whose contributions to the understanding of condensed states of matter (particularly liquid helium) earned the 1962 Nobel prize for physics, was born at Baku, Azerbaijan, in Russian Transcaucasia, on Jan. 22, 1908. Son of a physician mother and an engineer father, Landau displayed early mathematical talents, entered Baku university at 14 years of age and completed studies at Leningrad university at age 19. A residence at the Institute of Theoretical Physics in Copenhagen as guest of Niels Bohr (*q.v.*), whom Landau called his teacher, culminated his early developmental period. After five years at the Ukrainian Physical and Technical institute at Kharkov, Landau went in 1937 to Moscow, where he headed the theoretical section of the Institute for Physical Problems and also was made professor of physics at the University of Moscow. In 1946 he was elected to the Academy of Sciences of the U.S.S.R.

Academician Landau extended quantum mechanics to many-particle situations with eminent success. Most notable was his explanation of superfluidity (*q.v.*) in the enigmatic liquid helium II, encountered below about 2.2° K. Landau's quantum hydrodynamics identified superfluid helium (*q.v.*) as a quantum-mechanical ground state coexistent with a spectrum of elementary excitations (phonons and higher-order excitons termed rotons) and enabled him to predict a new form of wave motion called second sound. Originally controversial, Landau's formulation of second-sound propagation has received full experimental verification (*see* LOW-TEMPERATURE PHYSICS: *Areas of Low-Temperature Research: The Behaviour of Liquid Helium*).

Although recognized primarily for achievements in low-temperature physics, he contributed actively to a wide range of other areas; in collaboration with E. M. Lifshitz, he published a well-known series of physics textbooks. Landau was awarded the Stalin prize on three occasions, and was honoured by election to the Danish, Dutch and U.S. academies of science, as well as the Royal Society (London). In Jan. 1962 he was critically injured in an automobile accident.

See *Current Biography,* 24:7 (1963); J. R. Pellam, "Nobel Awards—Physics," *Science,* 138:3541 (1962). (J. R. PE.)

LANDAU, a town of Germany which after partition of the nation following World War II became part of the *Land* (state) of Rhineland-Palatinate in the Federal Republic of Germany. It is situated on the Queich, under the slope of the Haardt mountains, 59 km. (36 mi.) S.W. of Mannheim by road. Pop. (1961) 28,725. Landau was founded in the mid-13th century and became an imperial city in 1291. From 1680 to 1815 it was occupied by the French. The Gothic Evangelical church dates from 1309, the chapel of St. Catherine from 1344 and the church of the former Augustinian monastery from 1405. Landau has many high schools and is an important centre of culture. It has several fine parks and a zoo (the only one in the Rhineland-Palatinate) with many exotic animals. Historic buildings include the old Deutsches Tor and Französisches Tor and remains of the old fortress, built by Sebastien de Vauban at the end of the 17th century. Railways run to Germersheim, Neustadt an der Weinstrasse, Karlsruhe and Saarbrücken. Manufactures include cigars, footwear, hats, furniture and machines, and there is commerce in wine, timber and cereals. Cattle and other markets are held there.

(H. W. ME.; X.)

LAND DESCRIPTION. At what remote time in history land description was first used may never be known, but such use must have been coincidental with man's earliest assertion of the right to the exclusive use or occupancy of an identifiable part of the earth's surface. It may be assumed that with the advance of knowledge descriptions became more important, more accurate and more definite. Descriptions, some much like those of today, were in use in China, Egypt and Rome long before the birth of Christ.

The purpose of a description of a tract of land, such, for example, as "the SW $\frac{1}{4}$ of Section 10, T. 2 S, R. 75 W of the 6th P.M." or "Lot 6 Block 10, Bakers Addition to Denver" or "the 80-ac. tract south of Dever's Corner known as Mill's Farm," is not, strictly speaking, to identify the land but rather to furnish a means or formula by which the tract in question can be identified and distinguished from all other tracts of land wherever they may be. Just as a name will not serve to identify a certain person until someone has pointed him out or has said where he can be found, so a land description will not serve to identify the tract until it is related to known points or monuments on the earth's surface.

By use of the description, plus available written or oral evidence, which may consist of local knowledge, a government survey, a town or city plat or the location of fixed monuments, the lines which indicate and fix the boundaries of the property are ascertained, and its size, shape and location are thus determined.

UNITED STATES

In the United States land is sometimes located by means of its popular description, such as "Smith's farm," "the Lazy S ranch," "the house and lots commonly known as 1302 Wingate street" or "the Tierra Amarillo grant." Sometimes, also, a general descrip-

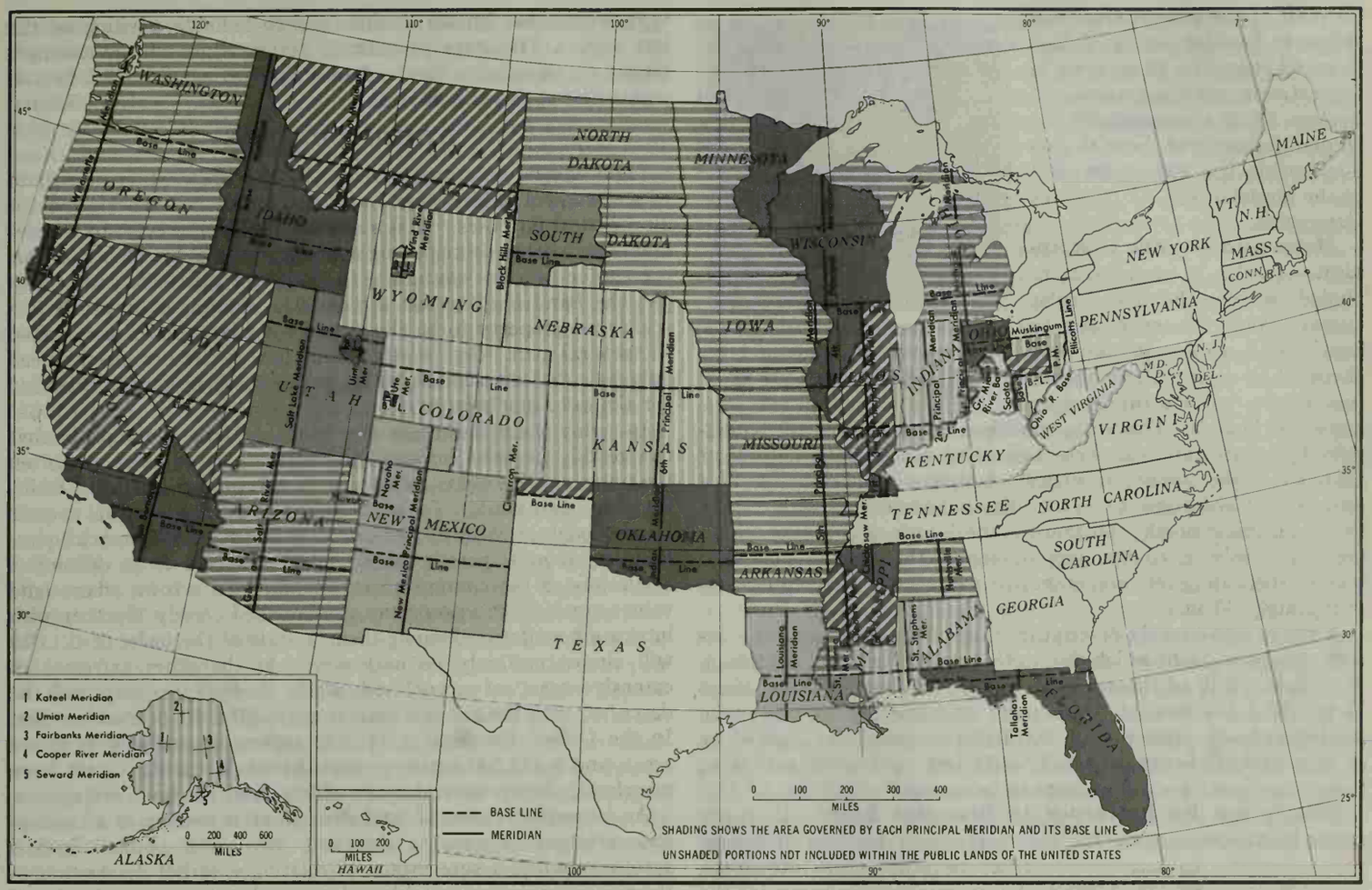

FIG. 1.—PRINCIPAL MERIDIANS AND BASE LINES OF THE U.S. FEDERAL SYSTEM OF RECTANGULAR SURVEYS

tion may be used, such as "the home place" or "all my land in Kern county, Calif." Such descriptions in legal instruments are good if, with the aid of extrinsic evidence, the tract in question can be located exactly and its boundaries clearly defined. These descriptions, however, must be distinguished from legal descriptions, such as ordinarily are used in U.S. patents and other legal documents in county records and by surveyors.

The principal types of legal descriptions in common use in the United States are: (1) by government subdivision; (2) by metes and bounds; and (3) by reference to a map or plat of town or city additions or subdivisions. In some cases a description may contain elements of all three of these types, and any or all of such descriptions may in turn be related to the state co-ordinate systems of the U.S. coast and geodetic survey.

Description by Government Subdivision.—With the exception of those states shown in fig. 1 as not included within the public lands of the U.S., and small portions of western lands originally included within Mexican grants, nearly all land in the United States, including Alaska, has been surveyed and usually is described in accordance with the rectangular system established by act of congress, all lines of which are established with reference to meridians of longitude and parallels of latitude.

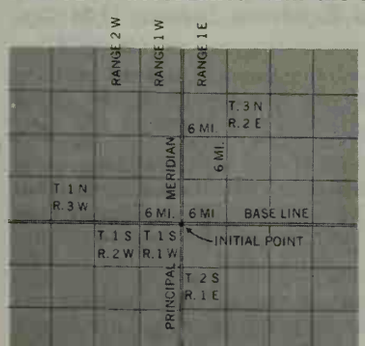

FIG. 2.—ARRANGEMENT AND NUMBERING OF TOWNSHIPS (T.) AND RANGES (R.) WITH RESPECT TO A PRINCIPAL MERIDIAN AND BASE LINE

The application of this system may be illustrated in a general way by showing how the division into townships and sections was made for the area comprising Kansas, Nebraska, Wyoming and most of Colorado. The east–west reference line for this area, called the base line, extends from the western boundary of Colorado to the eastern boundary of Kansas along the 40th parallel of latitude. The north–south reference line, called the 6th principal meridian, at longitude 97° 23′ 0″ W. of Greenwich, intersects the base line at a point on the northern boundary line of Kansas about 150 mi. north of Wichita. Beginning at this principal meridian (fig. 2) and proceeding toward the east and west, north–south lines six miles apart were laid out, dividing all the land under survey into strips six miles wide running north and south, called ranges, numbered consecutively from the principal meridian. Thus the first range to the west is Range 1 West, the second Range 2 West, etc., and the first range to the east would be Range 1 East, etc. Likewise, beginning at the base line, parallel east–west lines were laid out at six-mile intervals, intersecting the range lines and thus dividing the whole area into blocks approximately six miles square, which are called townships. These townships contain 36 sq.mi. or 23,040 ac., "as near as may be," and are numbered consecutively, the first tier of townships north of the base line being Township 1 North, the second tier Township 2 North, etc., and the townships south of the base line Township 1 South, Township 2 South, etc.

Normally, each township is divided into 36 sections by parallel lines run from south to north and from east to west at one-mile intervals. These sections, each containing 640 ac., are the basic units of the system and are numbered as shown in fig. 3. The sections themselves may be subdivided into half sections, quarter sections and smaller areas (fig. 4).

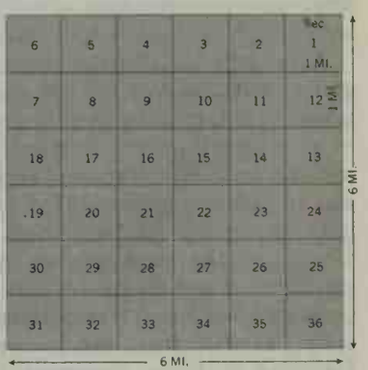

FIG. 3.—DIVISION OF A TOWNSHIP INTO SECTIONS

By reference to the section, township, range and principal meridian, the location of any section can be fixed; thus if a farm is described as "NE ¼ NE ¼ Section 12, Township 2 North, Range

70 West of the 6th principal meridian, in Boulder county, Colo.," it would refer to a 40-ac. tract in the extreme northeast corner of Section 12 in a township in the second tier north of the 40th parallel and in the 70th range west of the meridian 97° 23′ 0″ W. of Greenwich.

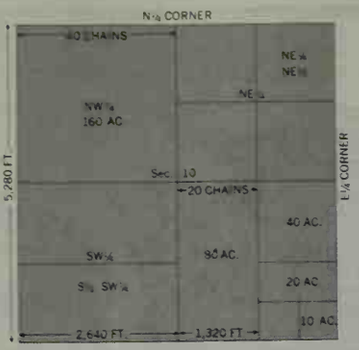

FIG. 4.—SECTION OF LAND, SHOWING LENGTHS OF VARIOUS LINES AND DIFFERENT TYPES OF SUBDIVISIONS

Metes and Bounds Description.—In the 18 states not included within the rectangular survey, and wherever survey areas are irregular in size and shape, it is common and proper practice to describe the land by metes and bounds. This is accomplished by running out the boundaries by courses and distances and fixing monuments, natural or artificial, at the corners or angles. A course is the direction of a line, usually with respect to a meridian but sometimes with respect to the magnetic north. Distance is the length of a course, measured ordinarily in chains, feet or some other well-known unit, but in Mexican grants sometimes in varas (one vara equals approximately 33 in.).

A metes and bounds description might be as follows: "Beginning at a point from which the north quarter corner of Section 4, T. 1 N., R. 70 W of the 6th P.M. in Boulder county, Colo., bears N 45° W 1,320 feet, at which point of beginning an iron stake has been placed; thence south 600 feet to a point also marked by an iron stake; thence N 45° W 700 feet to a large oak tree; thence northeasterly to the point of beginning." (*See* fig. 5.)

Description by Reference to Recorded Plats.—In many states provision is made for the mapping or platting of towns, cities or other corporate areas, the process usually being for the owner to prepare a plat or map dividing a tract into lots, plots, blocks or squares, with intersecting streets and alleys, and giving the area a name, such as Stiles Addition. After approval by the requisite municipal authorities the map or plat is recorded, and the land is properly described by reference to the map or plat rather than to the government subdivision or other large tract of which it was a part. Typical, for example, would be a conveyance of Lots 1 and 2, Block 10, Stiles Addition to the city of Blue River.

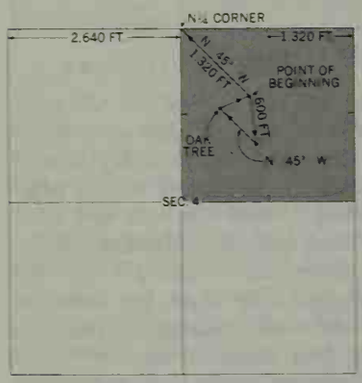

FIG. 5.—SECTION, SHOWING A METES AND BOUNDS DESCRIPTION

The State Co-ordinate Systems.—When any survey is made, its accuracy will depend upon the reliability of the monument representing the point of origin. A former difficulty was that monuments in the form of stones, iron stakes, trees, concrete posts and the like had been obliterated or destroyed with the passage of time. This required restoration of monuments by local surveys, sometimes aided by court decree. Accuracy tended to diminish with each restoration.

A remedy for this condition was provided by the U.S. coast and geodetic survey, which, for nearly a century, had been engaged in determining precise geographical positions of thousands of monument points distributed throughout the country. The method took into account the spheroidal shape of the earth and was so highly specialized that the data could not be used by ordinary surveyors. In 1935 these data were made available to surveyors by the establishment of the state co-ordinate systems, providing a system for each state. In each system the geodetic positions had been transformed into co-ordinates on plane surfaces, so that their use involved only the usual methods and formulas of plane surveying (*q.v.*). When all surface marks at a station have disappeared, it is possible to reproduce by surveys from other known stations the co-ordinate position of the lost point. The state co-ordinate system thus affords a simple means of utilizing accurate data in retrieving old stations and points that apparently are lost. (E. C. Kg.)

OTHER COUNTRIES

Land can be described verbally by the preparation in writing of a document, which may constitute a sufficient description for all practical purposes. It is generally better, however, to supplement the written description by means of a map or plan, and this is common practice nowadays. In England and Wales, for example, the Land Registration act of 1925 requires description of a registered property to be illustrated by a large-scale plan, called the general map. On the other hand, unregistered properties need only a verbal description, although a plan is generally provided for the sake of clarity and convenience.

In many countries there are available large-scale plans that can readily be used for land description. Such plans are often the outcome of a cadastral survey (a survey carried out to facilitate land taxation). To be of use, a plan must be on a scale large enough to show all the relevant details of the area in question, and it must permit the boundaries thereof to be defined as accurately as the circumstances warrant. In a town where land values are high and properties are crowded closely together with intricate boundaries dividing them, a scale of the order of 1:1,000 will almost certainly be necessary. At the other extreme, an extensive tract of unenclosed ranch land might very well be described with the aid of a map at 1:10,000 scale or even smaller. In the United Kingdom a 1:1,250 survey is available in urban areas, and a 1:2,500 survey covers the whole country apart from moorland; these two scales are widely used for land description.

An important aspect of land description is the use of a co-ordinate reference system to designate any given point. Such a system provides a sure means of relating a verbal description to the corresponding map and has obvious advantages in undeveloped country or in places where similarity of terrain makes it difficult to identify particular ground features without ambiguity. It also enables a remote point to be designated rapidly and certainly without tedious reference to other detail.

A rectangular co-ordinate system is simple to apply and is widely used. It is customary, though not essential, for the two axes to run roughly north–south and east–west, and ordinates and abscissas are then referred to as northings and eastings respectively. The square mesh of straight lines that represent constant northing and easting values is called a grid. Such a grid may be drawn on the map and the lines numbered. The co-ordinates of a point on the map may then be read off and used as a unique reference to that point.

In Great Britain the survey is based upon the transverse Mercator's projection, and the national maps bear a grid, known as the national grid, which corresponds with the rectangular co-ordinates of that projection. Each 100-km. grid square is designated by two letters; within that square, a point is defined by co-ordinates referred to the southwest corner of the square as origin. (For a full description of the national grid and its use for reference purposes, see *The Projection for Ordnance Survey Maps and Plans and the National Reference System*, H.M.S.O., 1960.) (B. S. I.)

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LAND DRAINAGE: *see* Land Reclamation.

LAND ECONOMICS: *see* Agricultural Economics.

LANDEN, JOHN (1719–1790), English mathematician, was born at Peterborough, in Northamptonshire, on Jan. 23, 1719, and

died on Jan. 15, 1790, at Milton. He became known as a mathematician by his essays in the *Ladies' Diary* for 1744, and was elected fellow of the Royal society in 1766. He made important researches on elliptic integrals, being remembered for Landen's point and Landen's transformations. He produced the theorem known by his name (found in complete form in Landen's memoir of 1775, and reproduced in the first volume of his *Mathematical Memoirs,* 1780–89) for the expression of the arc of a hyperbola in terms of two elliptic arcs.

His other works include papers in the *Philosophical Transactions* (1754–85), *Discourse Concerning the Residual Analysis* (1758); *Mathematical Memoirs Respecting a Variety of Subjects,* two volumes (1780, 1789); *Mathematical Lucubrations* (1755). (O. Oe.)

LANDER, RICHARD LEMON (1804–1834) and **JOHN** (1807–1839), English explorers of the Niger, were sons of a Cornish innkeeper at Truro. At the age of 11 Richard went to the West Indies in the service of a merchant. Returning to England after an absence of three years, he served various travelers. He was Hugh Clapperton's devoted servant and companion on his second expedition to West Africa, and on Clapperton's death near Sokoto in April 1827 Richard Lander, after visiting Kano and other parts of the Hausa states, returned to the Guinea coast through the Yoruba country, bringing with him Clapperton's journal. To this on its publication (1829) was added *The Journal of Richard Lander From Kano to the Sea Coast,* and in the next year Lander published *Records of Captain Clapperton's Last Expedition to Africa . . . With the Subsequent Adventures of the Author.* The British government then decided to send him out to determine the course of the lower Niger, a matter as much in dispute as was the question of the Nile sources. He was accompanied by his brother John. The brothers landed at Badagry on the Guinea coast on March 22, 1830, and traveled to Bussa on the right bank of the Niger. Thence, after exploring upstream for about 100 mi., they began the descent of the river, accompanied by a few Negroes, their only scientific instrument a common compass. They discovered the Benue river. On their entrance to the delta they were captured by the Ibos, from whom they were ransomed by "King Boy" of Brass Town; by him they were taken to the Nun mouth of the river, whence a passage was obtained to Fernando Po, reached on Dec. 1. The Landers were thus able to lay down the lower course of the Niger showing that the "Oil Rivers," which had long been known to traders, were really the delta of the river. The story of the expedition is told in *Journal of an Expedition to Explore the Course and Termination of the Niger,* three volumes (1832). Richard went to Africa again as leader of an expedition organized by Macgregor Laird and other Liverpool merchants, and while going up the river in a canoe was attacked by the natives on Jan. 20, 1834, and wounded. He died at Fernando Po on Feb. 6. John Lander died in London on Nov. 16, 1839.

See H. W. Tregellas, *Cornish Worthies,* ii (1884). (Ja. S.)

LANDES, a *département* of southwestern France fronting the Bay of Biscay over a distance of nearly 70 mi., was formed in 1790 from parts of the ancient provinces of Guienne, Gascony and Béarn (*qq.v.*). Area 9,364 sq.km. (3,615 sq.mi.). Pop. (1962) 260,495. It is bounded by Gironde on the north, Lot-et-Garonne and Gers on the east and Basses-Pyrénées on the south. Most of the *département* consists of a monotonously flat, sandy plain known as Les Landes which extends behind the straight, dune coast between the mouths of the Adour and the Gironde (*see* Landes, Les). Natural drainage is poor because of the lack of slope and the prevalence of an impermeable, hard ferruginous pan (*alios*) at a slight depth below the surface. Stagnant pools are numerous and there are large lagoons behind the sand dunes of the harbourless coast. In the extreme south of the *département* is the dead port of Capbreton, whence the discoverers of the Canadian island of that name set out. It was then situated at the mouth of the Adour, but the river has since been diverted farther south to become the outlet of the port of Bayonne. Near the market town of Dax (*q.v.*), famous in Roman times for its thermal springs, salt is worked. The railway and road from Bordeaux to Bayonne cross the *département* from north to south.

Mont-de-Marsan (*q.v.*) is the capital of the *département* which comprises the two *arrondissements* of Mont-de-Marsan and Dax. It forms the bishopric of Aire in the archbishopric of Auch and comes under the court of appeal at Pau and the *académie* (educational division) of Bordeaux. (Ar. E. S.)

LANDES, LES, an extensive, flat, low-lying region in southwestern France, lies behind the straight, sand-dune coast south of the Gironde estuary in the *départements* of Gironde and Landes. The region forms a triangle between the coast, the Adour river and the lower Garonne, with its inland apex near Nérac, and occupies an area of about 14,200 sq.km. (5,500 sq.mi.). Drainage from the interior is unable to find free access to the sea across the coastal dunes, and there are extensive lagoons (Lacanau, Carcans, Sanguinet, Parentis). The sand that covers the area is cemented below the surface by iron oxide, forming a hard impermeable layer (*alios*), which was responsible for the numerous meres and marshes that rendered the area malarial. When, in the late 18th century, the engineer N. T. Brémontier began the work of fixing the encroaching sands of the coastal strip by planting pines, the whole area, apart from some patches of poor woodland on ancient dunes, was a sandy heath, the *landes de Gascogne,* grazed by flocks of sheep under the care of shepherds perched on stilts. The major phase of reclamation by afforestation awaited the drainage work of F. J. H. Chambrelent after the middle of the 19th century. The natural drainage has been improved by cutting large canals (*crastes*) to the lagoons, and great areas have been planted with maritime pine, so that the once treeless waste has become the largest forest of France, yielding great quantities of resin and timber. On some cleared areas, where the soil is now enriched with humus, farms have been established, with good pasture for dairy cattle. Although still sparsely inhabited, Les Landes is the only extensive area of southwest France where population has grown since the mid-19th century. An important new source of wealth in the form of mineral oil, discovered in 1954, is being developed at Parentis-en-Born. The coast is devoid of natural harbours and has few settlements, but Mimizan Plage and Arcachon are bathing resorts and the latter, with a channel cut from lagoon to sea, is a fishing port as well as an important centre of oyster culture. Pit props, telegraph poles and other forest products are exported through Bayonne and Bordeaux. (Ar. E. S.)

LAND-GRANT COLLEGES AND UNIVERSITIES. This group of U.S. institutions was established to carry out the purposes of the first Morrill act (1862), by which public lands were donated to the several states. (*See* Morrill, Justin Smith.) Proceeds of the sales of this land were to be used in the state as a perpetual fund, the interest from which was to be appropriated for the support "of at least one college where the leading object shall be, without excluding other scientific and classical studies and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

The origins of these colleges and universities are found in the efforts of groups of individuals in Michigan, Pennsylvania and Illinois in the 1850s to establish schools and colleges of agriculture and industry. The appeal of these groups to the federal government for assistance resulted in the federal donations of public lands. With this aid the states undertook to develop this practical form of education "in the several pursuits and professions in life," and by the 1890s it was well under way.

By the second Morrill act (1890) congress began to make regular appropriations for the further support of these institutions, and these appropriations were increased through legislation passed in 1907, 1935, 1952 and 1960. The appropriations under the acts of 1890 and 1907 are continuous; they amount to a total of $2,550,000 annually. The acts of 1935, 1952 and 1960 authorize annual appropriations, the congress making an appropriation each year; the amount authorized annually is $11,950,000.

In addition to appropriations for the instruction of students on campus, mentioned above, the federal government makes appropriations to the land-grant colleges for two other purposes. In 1887 the Hatch act initiated appropriations for agricultural experiment stations, these stations to conduct research in agriculture and to acquire and diffuse "useful and practical information on subjects connected with agriculture." The Smith-Lever act, approved in 1914, provided for agricultural and home economics extension work to be carried on by the land-grant institutions in co-operation with the United States department of agriculture, largely through county agricultural, home demonstration and boys' and girls' club agents (*see* COUNTY AGENT). Federal funds for agricultural research and co-operative extension work were greatly increased through additional legislation. In the 1960s the institutions received annually more than $30,000,000 for research in their experiment stations and more than $56,000,000 for co-operative extension work.

The states and territories carried out the mandate of the Morrill act either by establishing separate institutions for instruction in agriculture, mechanic arts and military tactics, or by organizing such instruction as a part of a university, usually the state university. By the 1960s there was one land-grant institution in each of the states and a second one in Massachusetts, all participating in the federal appropriations. Each of 16 states in the southeast also maintained an additional land-grant college or university established originally for the separate education of Negroes. These institutions were titled variously university, college or institute. Many of them were large, with enrollments above 10,000; a few had less than 1,000 enrollments.

The fields of study in which the land-grant institutions have had a unique role are agriculture and veterinary medicine. About 78% of the bachelors' degrees and 98% of the advanced degrees conferred in agriculture are awarded by these institutions. Among those that maintain outstanding colleges of agriculture are the state universities of Illinois, Minnesota and Wisconsin, Iowa State University of Science and Technology, Michigan State University of Agriculture and Applied Science, Cornell university, Ohio State university and Pennsylvania State university, all of which offer programs of education in agriculture leading to the doctor's degree. Of the 17 schools of veterinary medicine in the United States in the 1960s all but two were in land-grant colleges and universities.

Engineering is another field of study that has been well developed. Land-grant institutions confer about two-fifths of all the engineering degrees conferred in the United States. Among the institutions that are widely known for their instruction and research in this field are the universities of California, Illinois and Wisconsin, Purdue university, Massachusetts Institute of Technology, and Cornell, Ohio State and Pennsylvania State universities.

The land-grant institutions also make a notable contribution to education in home economics, conferring almost 51% of all the degrees awarded in this field. In military education the contribution of the land-grant colleges and universities has likewise been outstanding. From their beginning they made military tactics an essential feature of their programs. Generally they require at least two years of military training of all undergraduate male students. Nearly all of them maintain reserve officer training corps units.

The educational service of the land-grant institutions is by no means limited to the five areas of study mentioned. Education in the arts and sciences is found in all of them; the great majority confer degrees in chemistry, economics, mathematics, music, physics and sociology; other subjects are also well represented in their educational programs. A goodly number prepare students for the professions of architecture, dentistry, journalism, medicine, nursing and pharmacy.

The Association of State Universities and Land-Grant Colleges, established in 1887 as the Association of American Agricultural Colleges and Experiment Stations, is the oldest and one of the leading higher education associations of the country.

Land-grant institutions are managed and largely supported by the states but they conform to certain broad policy stipulations of federal law. They make annual statistical reports to the federal government—the department of health, education and welfare and the department of agriculture—which two departments administer the federal funds appropriated to the land-grant colleges and universities. The U.S. office of education publishes an annual report on the institutions.

About 46% of the funds which the land-grant institutions have available to spend for general and educational purposes are appropriated by the state governments and somewhat more than 30% are from the federal government, mostly for research. Only 10% of the funds come from tuition and other fees paid by students. The remainder is derived from private gifts, local governments, endowment earnings and miscellaneous sources. *See* also AGRICULTURAL EDUCATION AND RESEARCH; AGRICULTURE: *United States;* TECHNICAL EDUCATION.

See U.S. Department of Health, Education and Welfare, Office of Education, *Statistics of Land-Grant Colleges and Universities* (annual).

(L. E. BH.)

LANDGRAVE, a title of nobility in Germany, dating from the 12th-century efforts of the German kings to strengthen themselves by setting up "provincial counts" (*Landgrafen*) over whom the dukes would have no control and who would have rank and authority equivalent to those of dukes (*see* COUNT; DUKE; GERMANY: *History*). Later the title was sought by counts in order to assert their own immediate dependence on the king, against other princes' claims of suzerainty. The first landgraviate was Thuringia (*q.v.*). The title survived into the 20th century in the house of Hesse (*q.v.*) and also in a branch of the house of Fürstenberg, which acquired the landgraviate of Stühlingen in 1639.

LANDINI (LANDINO), **FRANCESCO** (1325–1397), Italian composer and organist, the most brilliant representative of a large group of *trecento* musicians whose work was mainly confined to secular forms. Born at Fiesole in 1325, he was blind from childhood, but neither his musical studies nor his knowledge of the seven liberal arts suffered from this setback. When he visited Venice in 1364 his poetry earned him a crown of laurel, which was presented by King Peter of Cyprus. Remembering Venice, Landini wrote a motet in honour of the doge Andrea Contarini, but the great majority of his compositions (more than 150 items) make use of the secular *ballata* and madrigal forms. Their luminous two- and three-part texture is usually set out for solo voices and unspecified instruments, the latter almost certainly including the *organetto,* which Landini played so well and which is depicted in the miniature portrait of the composer found in the Florentine Squarcialupi Codex. He died in Florence on Sept. 2, 1397. The complete works of Landini were edited by Leonard Ellinwood (1939) and later by Leo Schrade (1958). (D. W. ST.)

LANDIS, KENESAW MOUNTAIN (1866–1944), U.S. judge and first commissioner of baseball, was born at Millville, O., Nov. 20, 1866. He was named after a mountain near Atlanta, Ga., where his father, a Union soldier, was wounded in the Civil War. He was graduated from the Union College of Law in Chicago in 1891, practised law there and was appointed U.S. district judge in 1905. He won nationwide fame in 1907 when he imposed a $29,000,000 fine on the Standard Oil company, although the verdict was reversed by higher courts. During World War I he presided at the sedition trials of socialist and labour leaders. Following the world series baseball scandal in 1919, involving the bribing of players, Landis was offered the post of baseball commissioner, in 1920, and took office Jan. 12, 1921. Previously, baseball had been run by the National Baseball commission, a three-man group of baseball officials. Landis' greatest trait was the absolute finality with which he dealt with those guilty of dishonesty. His decisions were never reversed. He served as commissioner for 24 years. Judge Landis died in Chicago on Nov. 25, 1944. *See* also BASEBALL: *Organized Baseball.* (J. D. MCC.)

LAND LAWS: *see* REAL PROPERTY AND CONVEYANCING, LAWS OF.

LÄNDLER (from *Landl,* "little land," the provincial name for Upper Austria), a traditional pair dance in triple measure properly belonging to alpine Austria and Bavaria. Characteristic of the

dance are complicated turns with the partners holding hands. Some of the hand holds have names depicting the action, such as "windows," "spinning wheels," "over the step." Belonging to the Ländler family are many variants, including the Steyrischer in Styria, in which the men improvise satirical verse followed by syncopated hand clapping, and the well-known Schuhplattler in Bavaria, which calls for acrobatic displays by the men. Musicians on the Danube barges early in the 19th century carried Ländler airs to Vienna, where they became exceedingly popular. The tradition is that the city folk discarded all but the last figure of the dance, which became the famous Viennese ballroom waltz, but this origin of the waltz has been much disputed. Concert forms of Ländler airs were composed by Mozart, Schumann, Beethoven and others. (V. AL.)

LANDLORD AND TENANT. In modern English law, the relationship of landlord and tenant is confined to cases where one person (the lessee or tenant) holds from another person (the lessor or landlord) an estate in land, less than freehold, under a lease or tenancy. Such leases show an interesting historical development. Initially, a lease was regarded as giving the lessee a mere personal right against the lessor, and conferred no right on the lessee to recover the land against any third party who dispossessed him. Leaseholds were thus classified as personal property and not as real property, for the lessee could not recover the *res* (*i.e.*, the land) itself. U.S. law (*see* below) derived from English law and is substantially the same.

ENGLISH LAW

When in the late 15th century the courts for the first time enabled the lessee to recover the land, and so treated a leasehold interest as an interest in the land, the classification of leaseholds as personalty had become too firmly established to be altered. In the 20th century, legislation not only removed a number of the legal differences between realty and personalty but also did much to protect specified classes of tenants against landlords, and freedom of contract was to a substantial extent replaced by statutory safeguards which went far toward conferring a protected status upon tenants. In short, the movement was from contract via estate toward status.

Power to Lease.—Generally speaking, the power to grant a tenancy is coincident with the general powers to make dispositions of land. Subject to certain disabilities, any owner of an interest in land may grant a valid tenancy for any estate less than his own. By statute, however, certain persons with only limited interests in land may grant leases binding on all persons interested. Thus a tenant for life of settled land may grant leases for any period not exceeding 999 years for building or forestry, 100 years for mining and 50 years for other purposes (Settled Land act, 1925, s. 41). A person who has merely a tenancy himself may grant a subtenancy for any period shorter than his tenancy. Indeed, if a person with no interest at all in land purports to grant a tenancy of it, that tenancy, though ineffective as against the true owner of the land, will be a good "tenancy by estoppel" as between landlord and tenant, for by granting and accepting the tenancy the parties to it will be mutually estopped from denying its validity.

Forms of Tenancy.—The principal forms of tenancy are as follows: (1) Lease for a fixed period. A tenancy may be granted for any fixed and certain period, whether as short as a week or less or as long as 3,000 years or more. Apart from a limited statutory exception (Validation of War-Time Leases act, 1944), a lease for an uncertain period, such as the duration of a partnership, is void. Leases for life or lives, however, used to be valid even at common law, but for various reasons went out of favour during the 19th century, and most of those remaining were converted by the Law of Property act, 1925, s. 149 (6), into leases for 90 years determinable by notice after the dropping of the lives. Except for agricultural and business tenancies (*see* below), tenancies for a fixed period end automatically with the expiration of the period. (2) Periodic tenancies. Yearly, quarterly, monthly, weekly and other periodic tenancies continue indefinitely until ended by a notice to quit given by either landlord or tenant. Unless otherwise agreed, the requisite notice is that of a period of the tenancy, expiring at the end of a complete period. Thus for a weekly tenancy running from a Monday, notice must be given on or before one Monday to expire on the following Monday. However, four weeks' notice is the minimum for dwellings (Rent act, 1957, s. 16), and yearly tenancies are determinable by half a year's notice expiring at the end of a year of the tenancy; *i.e.*, two quarters' notice if the tenancy runs from one of the usual quarter days, and otherwise 182 days' notice. (3) Tenancies at will. A tenancy at will endures at the will of both landlord and tenant. Accordingly, the tenancy determines if either gives notice to the other, or dies, or assigns his interest in the land, or does any act inconsistent with the continuance of the tenancy. Such tenancies are comparatively rare, but are sometimes used to meet mere temporary necessities. If rent is paid and accepted on a periodic basis, it will usually be inferred that a corresponding periodic tenancy has been substituted for the tenancy at will; thus from rent paid on a monthly basis, a monthly tenancy will be inferred. If no rent is agreed upon, the landlord is entitled to compensation for use and occupation. (4) Tenancies at sufferance. When a lawful tenancy ends and the tenant holds over (*i.e.*, remains in occupation) without the assent or dissent of the landlord, the tenant is a tenant at sufferance and not a trespasser. Tenancies at sufferance, like tenancies at will, are readily converted into periodic tenancies, and the tenant is similarly liable to pay compensation for use and occupation. By giving the tenant written notice to quit, the landlord can in most cases make him liable, if he still fails to go, for double the annual value (Landlord and Tenant act, 1730, s. 1), while if the tenant has given written or oral notice to quit, he will become liable for double rent (Distress for Rent act, 1737, s. 18).

Formalities.—With one exception, a lease or tenancy agreement cannot create any legal estate in land unless made by deed. The exception is a tenancy for a term not exceeding three years which takes effect in possession (*i.e.*, begins forthwith) and is granted at the best rent reasonably obtainable without taking a premium. Such a tenancy can be granted even orally (Law of Property act, 1925, ss. 52, 54, replacing in an extended form the Statute of Frauds, 1677, s. 1). However, even if a lease was void at law for noncompliance with these formalities, equity would usually enforce it if it was sufficiently evidenced by writing or part performance; and for most practical purposes an equitable lease is as good as a legal lease. At law, a legal tenancy can be assigned only by deed even if it was created orally (Law of Property act, 1925, s. 52), although in equity an informal assignment will be effective if sufficiently evidenced by writing or part performance. In addition, no tenancy can arise unless the tenant obtains the right of exclusive possession of the land. If the landowner remains in general control, no tenancy has been granted but a mere licence. For example, whereas the occupant of a furnished flat is often a tenant, a resident in a hotel or lodging house is normally a licensee.

Determination of Tenancies.—The following are the principal ways in which a lease or tenancy may come to an end: (1) By expiration of the fixed term for which it was granted; (2) By expiration of notice to quit (these two heads have already been mentioned). (3) By forfeiture. It is usual to insert in a lease an express provision for forfeiture of the lease if the tenant fails to pay the rent or breaks any of his covenants. If a right of forfeiture arises it lies with the landlord to decide whether to enforce it. If with knowledge of his right the landlord nevertheless treats the lease as still existing, as by accepting rent in respect of a period subsequent to the act giving rise to the forfeiture, he is said to have waived the forfeiture and cannot thereafter enforce it, although this does not affect any subsequent rights of forfeiture which may arise (Law of Property act, 1925, s. 148). Where a landlord enforces a forfeiture for nonpayment of rent, the court may restore the lease to the tenant if he pays all that is due, with costs, and applies for relief within six months of the forfeiture. In the case of other forfeitures, the landlord is in most cases required to serve on the tenant a notice specifying the breach, requiring it to be remedied, if possible, and requiring compensation, if desired. If the notice is not complied with within a reasonable

time, the landlord may proceed to enforce the forfeiture, although at any time before the forfeiture is complete (but not afterward) the court may grant the tenant relief against it (Law of Property act, 1925, s. 146). (4) By surrender. If the tenant surrenders his tenancy to his landlord, either expressly or by operation of law (*e.g.*, where the landlord grants the tenant a new tenancy), the tenancy determines. (5) By merger. A tenancy is merged in the landlord's estate in the land if the tenant or some third party acquires both the tenancy and the landlord's estate.

Rights and Duties Under a Tenancy.—In the absence of any agreement, the obligations of landlord and tenant to each other are few. The landlord is under an implied obligation to give the tenant quiet enjoyment (*i.e.*, freedom from adverse claims to the land), and not to derogate from his grant (*i.e.*, not to do any act making the premises less fit for the purposes for which they were let). Under a lease of a dwelling granted after Oct. 24, 1961, for less than seven years, the landlord must also repair the structure, exterior and service installations (Housing act, 1961, ss. 32, 33). The tenant must pay the rent, rates and most taxes, and is liable for voluntary waste (*i.e.*, acts damaging the property) and permissive waste (*e.g.*, failure to repair), though the liability of periodic tenants under the latter head is limited to keeping the premises wind- and watertight. But in most cases, the lease or tenancy agreement contains express provisions imposing extensive obligations, mostly on the tenant; *e.g.*, to pay rent, rates and taxes, to repair, to insure, not to use the premises except for certain specified purposes and not to assign or sublet without the landlord's consent. There is also a proviso for forfeiture on breach of covenant, and sometimes a "break clause" allowing the tenant to give notice determining the lease at some specified periods during its currency. (*See* DILAPIDATION.)

Liability of Assignees and Subtenants.—(1) As between the original parties, every lawful provision in the lease or tenancy agreement is enforceable, for it constitutes a contract between them, and so there is "privity of contract" between them. Such liabilities continue for the entire period of the tenancy, even if the lease or the landlord's estate in the land (the "reversion") passes to some other person. Thus, although after the tenancy has been assigned the landlord will normally look to the assignee in whom the tenancy is vested for payment of the rent and performance of the covenants, he may if he wishes hold the original lessee liable although, if he does so, the lessee has a right to claim indemnity from the assignee. (2) As between the landlord and tenant for the time being, there is "privity of estate," and all covenants "touching and concerning the land" (*i.e.*, affecting the landlord qua landlord or the tenant qua tenant) are said to "run with the land" (or with the reversion) and thus to be enforceable. For example, a covenant to use the premises as a private dwelling house only is one which touches and concerns the land, whereas a covenant not to keep a public house within half a mile of the property leased does not, and is merely collateral. (3) If there is privity neither of contract nor of estate, then in general no covenants in the lease are enforceable. If the tenant grants a subtenancy, there is no privity either of contract or of estate between the landlord and the subtenant, although to protect himself the tenant will usually insert in the subtenancy covenants at least as stringent as those which bind him. However, although in general the landlord has no direct right of action against the subtenant on the covenants of the head tenancy, he may indirectly enforce them against the subtenant by threatening to enforce them against the tenant, and if the covenants are negative or restrictive in nature, he may be able to enforce them directly against the subtenant under the equitable doctrine relating to restrictive covenants. (*See* also EJECTMENT.)

MODERN ENGLISH STATUTES

General Reforms.—During the 20th century a number of general reforms in the law of landlord and tenant were made. The Law of Property acts, 1922 and 1925, removed a number of archaic rules, and the Landlord and Tenant act, 1927, effected certain reforms of substance. Thus by s. 19, notwithstanding any provision to the contrary, if a lease contains a provision against assigning or underletting without the landlord's consent, or against making improvements without his consent, the provision is deemed to be subject to a proviso that such consent shall not be unreasonably withheld, although this does not absolve the tenant from seeking consent; and any covenant against altering the use of the premises without consent is deemed to be subject to a proviso that no money penalty shall be payable for such consent. Again, by s. 18, damages for breach of a repairing covenant are limited to the diminution in the value of the reversion and are excluded altogether if the premises are to be pulled down. But even more important than these general reforms was the emergence of a piecemeal series of statutory provisions for the protection of tenants of certain specified types of property.

Agricultural Holdings.—The Agricultural Holdings act, 1948, was the lineal descendant of a series of statutes beginning with the Agricultural Holdings (England) act, 1875, designed to protect farm tenants. Each successive act conferred a greater degree of protection. The principal features of the act of 1948 (which in general prevails notwithstanding any agreement to the contrary) are as follows. All agricultural tenancies continue until determined by a year's notice to quit expiring at the end of a year of the tenancy. If within a month of receiving a notice to quit, the tenant serves a counter notice claiming the protection of the act, in most cases the notice to quit becomes invalid unless the minister of agriculture, fisheries and food allows it to remain effective, and he can do this only on certain limited grounds (ss. 24, 25, as amended by the Agriculture act, 1958). If the tenancy is determined, there are elaborate provisions for securing compensation to the tenant for improvements effected by him, while the landlord may claim compensation if the holding has deteriorated in the hands of the tenant. The parties are free to agree upon whatever rent they please, but not more frequently than once in every three years either party may refer the amount of the rent to arbitration. (*See* LAND TENURE: ECONOMIC AND AGRARIAN ASPECTS.)

Unfurnished Dwelling Houses: the Rent Acts.—The complicated body of law found in the Rent and Mortgage Interest Restrictions acts, 1920–39, as subsequently amended, began with the short Increase of Rent and Mortgage Interest (War Restrictions) act, 1915. With a number of variations, the principles of the acts were adopted by many jurisdictions throughout the world. The basic idea of the acts was that the rent of every dwelling house within the acts should be restricted to the rent being paid at a particular date (the "standard rent"), with certain permitted increases, and that no landlord of such a house should be able to obtain an order for possession against the tenant except on certain limited grounds. The acts apply to every house or part of a house "let as a separate dwelling" (a phrase so complex in its evolution that even the word "as" requires more than three pages of a textbook to explain it), provided the ratable value in April 1939 did not exceed £100 in London and £75 elsewhere. There are a number of exceptions to this rule, such as agricultural holdings, houses controlled by local authorities, public houses, parsonage houses of the Church of England, tenancies at less than two-thirds of the ratable value or for over 21 years, and premises let with attendance or use of furniture of a substantial value to the tenant, or with board.

The acts empower a tenant to hold over as a "statutory tenant" notwithstanding the determination of his lease or tenancy, but enable the court to make an order for possession on various grounds if it is reasonable to do so. These grounds range from misconduct of the tenant (*e.g.*, nonpayment of rent, breach of covenant or nuisance) to cases where no person is at fault; *e.g.*, where suitable alternative accommodation is available, or where the tenant was the landlord's servant and the landlord requires the premises for another servant, or where the landlord requires them for occupation by himself or his near relations and the tenant cannot show that to make the order would cause greater hardship than to refuse it.

The Rent act, 1957, drastically revised the operation of the acts. First, subject to certain temporary restrictions, it excluded from the acts not only all tenancies of dwellings with a ratable

value exceeding £40 in London and £30 elsewhere but also nearly all new tenancies of other dwellings; in short, only the "sitting tenants" of small dwellings were still protected. Second, it controlled rents by reference not to individual standard rents and permitted increases but to ratable values, as recently revised on a nationwide basis. In general, "the rent limit" (*i.e.*, the maximum rent which must not be exceeded) is the gross yearly value of the premises in 1956, multiplied by a factor which varies from four-thirds to two, depending on the extent of the tenant's repairing obligations. The Rent acts also rigidly prohibit the payment of any premiums for the grant or assignment of any tenancy within the acts.

Furnished Dwellings.—Certain provisions of the Rent acts attempted to restrict the rents of furnished dwellings, but these were so ineffective that the Furnished Houses (Rent Control) act, 1946 (as amended), set up rent tribunals, consisting of three members and in some cases containing no lawyers. These tribunals were empowered to reduce the rents of premises let with either furniture or services or shared with the landlord (for, not being let as "separate" dwellings, these were not within the provisions of the Rent acts). But the Rent act, 1957, restricts this jurisdiction to dwellings within the limits of ratable value under that act.

There is only a limited and ill-drafted provision for security of tenure: if the landlord serves a notice to quit after a reference to the tribunal has been made, it cannot take effect until three months after the decision of the tribunal. The tribunal may, however, extend the period of three months unless the landlord refrains from serving any notice to quit until the initial three months has expired; if the tenancy, being for a fixed period, determines without a notice to quit, the act of 1946 confers no security of tenure.

Business Premises.—The Landlord and Tenant act, 1927, part i, enabled a tenant of business premises, on quitting them, to recover compensation for improvements which he had carried out, provided he had first given the landlord three months' notice of his intention to effect them, and made a formal claim in due time. The act also contained relatively ineffective provisions enabling a tenant to claim compensation for goodwill when his tenancy ended, or a new lease in lieu thereof, but these were superseded by the Landlord and Tenant act, 1954, part ii.

Under that act, a landlord cannot determine a business tenancy by notice to quit, and if the tenancy is for a fixed term, it continues automatically for an indefinite period. A landlord can determine such tenancies only by giving at least six months' notice in the statutory form, expiring not earlier than the tenancy could have been determined or would have expired. If within two months of receiving this notice the tenant gives notice that he is unwilling to give up possession, he may then apply to the court for a new tenancy. There are only seven grounds on which the landlord may oppose the grant of a new tenancy (*e.g.*, substantial breaches of terms of the tenancy, or the offer of suitable alternative accommodation, or the landlord's intention to demolish or reconstruct the premises or to occupy them himself). If the landlord's opposition fails, the court must order the grant of a new tenancy, for not more than 14 years, on such terms as it thinks fit, and further new tenancies may be obtained repeatedly. A business tenant thus has a prima-facie right to remain indefinitely in his premises, and although his initial rent is unrestricted, the rent on any renewal is controlled by the court.

If a new tenancy is refused on grounds other than the tenant's default or the provision of alternative accommodation, the tenant is entitled to compensation equal to the ratable value of the premises, or twice that sum if he has been there for 14 years or more. (R. E. My.)

SCOTS LAW

Conditions of Lease.—Under the old common law of Scotland a lease was a personal contract binding only on the lessor and his representatives and not on creditors or purchasers from him. The act of 1449, c. 17, however, which applies to leases of lands, houses, mines and salmon fishings, created a real right in the tenant, provided the conditions of the act are complied with, viz., the lease (if for more than a year) must be in writing, there must be a rent, an ish (term of expiry) and the tenant must have entered into possession.

The equivalent to possession is provided by the Registration of Leases (Scotland) act, 1857, which applies to leases which are for 31 years or more or contain an obligation of renewal so as to endure for that period. In the case of mining leases (commonly for such periods as 99 years or more) there is no limit as to acreage; in other cases the size must not exceed 50 ac. Such "long leases" may be recorded in the Register of Sasines, and when that is done they are effective in questions with singular successors; *i.e.*, purchasers or creditors. Under the Long Leases (Scotland) act, 1954, some lessees were enabled to convert their leases into feu-rights (*see* FEU).

The rights and obligations of the lessor and tenant are similar to those under English law. In Scotland rates were until 1957 assessed partly on the owner and partly on the occupier. They are now wholly payable by the occupier, and assessments are based on figures fixed by the assessor for rating purposes and not, as formerly, on the actual rent paid. The tenant is not entitled, without the landlord's consent, to change the character of the premises let. There is an implied condition that agricultural and residential premises are reasonably fit for their purpose and will last the period of the lease. Complete destruction, where a house is burned down or a farm reduced to sterility by flood or hurricane, discharges the tenant from his obligation to pay rent. It is a question of degree whether he can abandon his lease, but if not maintained in full possession he is entitled to an abatement of rent. It is implied that a lease of extraordinary duration is assignable and that the premises can be sublet, subject always to the terms of the contract, and the same applies to leases of urban or country property where the main object is residence and not cultivation of the ground. Agricultural leases, whether arable or pastoral, and leases of shootings or fishings are not assignable. In the absence of an express contrary provision a lease passes to the trustee in bankruptcy of the tenant, but he is not bound to adopt the lease. A lease is heritable in the succession of the tenant. When a lease comes to an end and without either party giving notice, it is continued for a further period on the same terms by "tacit relocation." Notice (usually in writing) must be given (1) in the case of houses, shootings and fishings let for a year or more, 40 days before the terms of Whitsunday (May 15) or Martinmas (Nov. 11); (2) in leases for less than a year, 40 days before the ish; (3) in leases of less than 4 months, one-third of the period of the lease; (4) in leases of all dwellings, not less than 28 days; (5) in all agricultural leases, not less than one year, and not more than two years. Theoretically rent is not due for an agricultural holding until a crop has been harvested, but there are conventional terms of payment and some rents are payable backhand (after they would normally be due) and some forehand (before they would normally be due). Entry to a farm is usually at Martinmas in pastoral leases; in arable farms there is commonly a double entry; *e.g.*, at Whitsunday as to houses and grass and Martinmas or separation of crop as to the land in grain crop. Different arrangements prevail about the disposal of the last (waygoing) crop, which is often delivered to the landlord or incoming tenant at valuation. A lease may also be terminated by the enforcement of an irritancy (*i.e.*, a right to terminate a lease summarily), which may be either legal or conventional. The legal irritancies relate to nonpayment of rent, and agricultural or industrial leases frequently provide that breach of important conditions will give rise to an irritancy. In certain cases the landlord has a limited right for recovery of his rent, known as hypothec, in addition to his ordinary remedies as a creditor.

Rent Restriction Acts.—These, which apply to many dwelling houses and control the amount of rent chargeable, provide tenants with a large measure of security of tenure. The Rent act, 1957, applies to Scotland, and all houses rated at more than £40 are decontrolled as are all new lettings. The Rent of Furnished Houses Control (Scotland) act, 1943, affords protection to tenants of furnished houses against excessive charges for rent. The House Letting and Rating (Scotland) acts, 1911 and 1920,

make provision for the landlord who is liable for the collection of the occupiers' rates and lay down certain conditions for the protection of tenants of small houses.

Agricultural Leases.—Many leases of farms in Scotland are for 14, 15 or even 21 years with breaks in favour of either party to enable the lease to be terminated at intervals of 5 years. Modern statutory law, which applies to practically all subjects used for the business of agriculture, is consolidated in the Agricultural Holdings (Scotland) act of 1949 and the Agriculture act, 1958. The most important provisions deal with the following: (1) compensation for statutory improvements on termination of tenancy; (2) freedom of cropping; (3) restriction on notices to quit (security of tenure); (4) compensation for disturbance on dispossession; (5) adjustment of terms of leases in certain cases by arbitration; (6) the provision of, and repairs to, fixed equipment in all new leases; (7) variation of rent by arbitration; (8) bequest of lease by tenant; (9) making of records of the condition of farms and fixed equipment; (10) notices to quit; (11) settlement of all disputes by a single arbiter. The tenant has a statutory right under the Ground Game act, 1880, to kill ground game; *i.e.*, rabbits and hares.

Small holdings and crofts are the subjects of special statutory provisions. The principal acts are the Small Landholders (Scotland) acts, 1911 and 1931, and the Crofters (Scotland) acts, 1955 and 1961. The latter apply only in seven highland counties. The small holder or crofter who has erected or improved the buildings on the holding or croft has a right to compensation for their value at the end of the tenancy. A "fair rent" of the holding is fixed by the land court. The tenant has security of tenure and can only be removed on certain statutory conditions, such as nonpayment of rent, failure to reside on or cultivate the holding, etc., and the holding passes to his heirs according to the rules of heritable succession. In addition to those known as small holders there are certain "statutory small tenants," who would be landholders but for the fact that the buildings and other improvements have not been provided by them or their family predecessors. In general these statutory small tenants have the same rights as the small holder. (C. G. C.)

UNITED STATES LAW

Since the law of landlord and tenant in the United States developed from the English law, it is substantially identical with that law without the later statutory modifications of the latter. Certain statutory changes, however, have been made in the various states and there has been a growing tendency to treat the relation between landlord and tenant more as one of contract and less as one of distinct and separate property ownership as was the traditional common-law view. Statutes usually permit a letting for a period of one year or less by oral agreement. A lease for a longer period must be made by a formal instrument of conveyance, subject to the rule, as in England, that an oral contract of lease may be ordered specifically to be enforced if there has been part performance by the person seeking the remedy. Many state statutes also provide that a holding over by a tenant after the expiration of his lease shall only constitute a holding from month to month or at will and not, as at common law, for a like period as the original letting. The length of the notice necessary to terminate periodic tenancies, such as those from year to year or month to month, is usually governed by specific statutes, considerable variation existing among the several states. Thus, the period required varies from 30 days to 6 months for year-to-year tenancies and from 1 week to 1 month for month-to-month tenancies. It is common also for statutes to require notice of some length to terminate a tenancy at will. The landlord is generally given a statutory remedy of a summary nature for quickly ejecting a tenant who has failed to perform the obligations of his lease or whose lease has terminated. The ancient remedy of distress whereby the landlord may enter, seize and retain personal property in the possession of the tenant until arrears of rent are paid is still available in some states, usually with statutory modifications, but in a considerable number it has been abolished, leaving as the landlord's remedies only the ordinary legal processes for the collection of a debt and the summary procedure for ejection of the tenant. The landlord frequently is given a statutory lien, enforceable by legal process, for rent on crops raised on the premises, and sometimes on personal goods of the tenant, and to that extent is a preferred creditor (*see* LIEN).

Covenants.—The law concerning covenants contained in the lease is similar to the English law, but there are a few differences. Covenants seem to be held more freely assignable than in England. Many states hold a covenant by a landlord not to enter into a competing business with that of the tenant to be enforceable by an assignee of the tenant. The English "implied warranty of possession," under which it is the duty of the landlord to deliver possession of the leased premises to the tenant, is enforced in many states though denied in others. There is a conflict of authority whether, as under the English law, there is an "implied warranty of habitability" or "implied covenant of fitness" of furnished premises let for dwelling purposes. Thus tenants have been excused from accepting premises infested by cockroaches or other bugs or rats. The rule is, however, denied in some jurisdictions. There is also a greater tendency than in England to treat the promises of each party as mutually dependent, so that nonperformance by one excuses performance by the other. For example, there is considerable authority in the United States to the effect that failure by a landlord to perform his covenants to repair or heat the premises excuses the tenant on his part from performance of his covenants and justifies him in refusing to pay rent or in abandoning the premises. More often similar results are achieved by applying the doctrine of "constructive eviction," whereby a tenant may treat as an act of eviction by the landlord any act of the landlord on neighbouring premises such as conducting a nuisance or creating a disturbance, or any omission of the landlord to perform a duty assumed by contract or otherwise which renders the premises unfit for the tenancy. The tenant is, however, required to abandon the premises within a reasonable time or else no such eviction is shown. If the tenant abandons the premises without cause and refuses to pay rent, the lessor generally is permitted, in accordance with the doctrine of anticipatory breach of contract, to sue for complete damages without waiting until the end of the term. Beyond these situations the doctrine that a lease is more a contract than a conveyance has not as yet found complete acceptance. Thus, if a part of the premises is destroyed, the tenant in the absence of agreement must still continue to pay rent and to perform his covenants. This rule has, however, been changed by statute in several states, and it is not applied to a lease of rooms in a building. The tenant is excused from further obligation under his lease by total actual eviction by the landlord, or by eviction by title paramount, or by taking by eminent domain. Where the eviction is from only a part of the premises, the tenant may, if it is by act of the landlord, either abandon his lease or remain in possession without paying rent. But where it is by title paramount he is not entitled to abandon his lease and must pay a proportionate part of the rent. The authorities are conflicting, where there is partial eviction by eminent domain, as to whether the tenant should pay rent and claim compensation for the taking, or receive a reduction in his rent without any share in such compensation.

Between World Wars I and II.—A number of problems in the law of landlord and tenant arose or became more significant during World Wars I and II and in the period between. The shortage of housing facilities during both wars resulted in some government regulation of rents. Federal regulations adopted pursuant to the Emergency Price Control act of 1942 fixed maximum rents in defense-rental areas and permitted tenants to remain in possession after the expiration of their leases by paying the established rent. These regulations and later laws of similar nature were designed to operate only temporarily during an emergency. On the same theory, New York and a few other states controlled rents for a time after the federal law expired. Situations presenting problems of illegality and "frustration of purpose" had a more permanent effect on legal doctrines. The 18th (prohibition) amendment to the U.S. constitution gave rise to numerous lease cases involving questions of illegality. Where the lease expressly limited the

use of the premises to saloon purposes, most of the courts held that the lease terminated when that use became illegal. The tenant was relieved from liability to pay rent and the landlord could recover possession. But a statement that the premises were let for saloon purposes was held not to be a designation of an exclusive use, and the lease was still effective, the premises being available for other uses. Wartime government restrictions on the use, sale or manufacture of certain products also tended to reduce the business of many tenants—of gasoline filling stations, for example—and make operations unprofitable although not illegal. In a large number of cases tenants sought to have their leases declared terminated by application of a doctrine of frustration of purpose. The decisions followed the same course as in the prohibition cases and refused to relieve the tenant if the lease permitted him to engage in another unrestricted business or if the government restrictions did not completely prevent him from doing business. Leases for the duration of the war also presented a problem because of a common-law rule regarding certainty of the term. Many courts recognized the practical need for such leases and gave them effect as intended by the parties—a result that could be obtained under common-law rules by a careful drafting of the lease.

Waste.—The law of waste by a tenant is similar to the English law, except that in certain parts of the country it may be considered good husbandry for a tenant to cut trees in order to develop the land. The tenant may work open mines or cut timber where the land has been so used prior to the execution of his lease. No technical distinction is made between voluntary and permissive waste; either may be actionable. Ancient statutes coming from the English law providing for treble damages for waste are usually strictly limited by the courts as not being applicable to modern conditions. The implied duty which a tenant has at common law to make minor repairs arose out of his duty not to commit waste. In a few states statutes, some of which are limited to "multiple dwellings" or "tenement" houses, place on the landlord a duty to keep premises leased for dwelling purposes in good repair, thus changing the common-law rule. (C. E. Cl.; H. H. Lr.)

OTHER COUNTRIES

It is virtually impossible to describe the law of landlord and tenant in other countries except by means of the broadest generalizations. It is true to say that the general principles of English law are in force in most English-speaking countries. Thus the commonwealth countries, with notable exceptions such as part of Canada and Ceylon, substantially follow English law as does the Republic of South Africa. India and Pakistan retained local customary and religious law upon which were imposed statutory modifications that had the effect of applying, so far as possible, English principles.

To take an example, the Transfer of Property act, 1882, and the Indian civil code of 1908 applied, among other things, the British conception of leases. British colonies, generally speaking, retain their original systems of law, but these have been modified by the application of English law to a large extent. Of the exceptions referred to above, the Republic of South Africa applies Roman-Dutch law and the remaining areas apply the Napoleonic code.

The greater part of the rest of the world applies codes of one kind or another. These are, generally speaking, influenced to some extent by the Roman law of the Byzantine empire to be found in the *Corpus Juris*. Thus in France the source of the whole of the substantive law, including that of landlord and tenant, is the Napoleonic code; while in Germany the code is contained in the *Bürgerliches Gesetzbuch*. There are similar codes in Austria, Scandinavia and Switzerland. These codes were all promulgated at the beginning of the 19th century and were applied, wholly or partly, throughout the world—in Europe and in Asia, in the western world and in the east: Turkey, China, Japan and Thailand (Siam) all adopted such codes. One of the countries to adopt such a code was imperial Russia (1833). Subsequent to the Revolution of 1917, on Nov. 30, 1918, all prerevolutionary law was abolished and by art. 21 of the civil code land became the property of the state and could not be the subject matter of private commerce. Possession of land is permitted only on the basis of rights of enjoyment. There is an exception to this principle, however, made by a decree of 1948 permitting a Soviet citizen to own a residence of one to five rooms. The land upon which this stands remains in the ownership of the state, and the owner must occupy the residence personally. The underlying principle is that no profit may be made by anyone out of the letting of land or buildings. The Soviet system has been applied in varying degrees to the countries of eastern Europe after World War II.

The continental codes, generally speaking, have certain conceptions in common. A distinction is drawn between the letting for hire of houses—*bail à loyer* in France and *Miete* in Germany—and the letting to farm of agricultural properties—*bail à ferme* in France and *Pacht* in Germany. The codes, as one would expect, provide for the concepts known to all systems of law. The concepts provided for are, among others: the manner in which tenancies are to be proved, whether by words or writing, and the effect of part performance; the manner of giving and the effect of notices to quit; the procedure and result of subletting and assigning; liability for waste and the obligation to repair; the duty of the landlord not to derogate from his grant and to give quiet enjoyment of the demised property; rights of indemnity for defects in the property leased; the destruction of the subject matter of the lease by accident or other causes; the duty of care in the use of the demised property; inventories to be drawn up upon the letting of property; loss or damage by fire; the vicarious liability of a tenant; holding over and the effect of death upon a contract of letting. It is indeed remarkable how systems emanating from completely different historical backgrounds converge.

A word must be said about the Muslim countries. There is, of course, a body of law derived from religious sources, but most of these countries have adopted the principles of the European codes. Turkey and Pakistan have already been mentioned. Egypt promulgated the mixed code application to foreigners in Egypt in 1875 and this code in modified form was applied to Egyptians in 1883. It was based on the Napoleonic code and takes into account the pre-existing Islamic law. *See* also references under "Landlord and Tenant" in the Index. (P. E. L.)

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LANDO (Landus) became pope in July or Aug. 913 and died early in 914 after a pontificate of six months and a few days that was dominated by the house of Theophylact.

LANDON, ALFRED MOSSMAN (1887–), governor of Kansas and Republican candidate for president of the United States in 1936, was born Sept. 9, 1887, at West Middlesex, Pa. At the age of 17 he migrated with his parents to Independence, Kan. After receiving a law degree from Kansas university in 1908 he went into the oil business. In 1912, he attended the Bull Moose

convention and campaigned vigorously in Kansas for the Progressive party candidate, Theodore Roosevelt. Thereafter, his political affiliation remained with Kansas progressivism.

In World War I Landon entered the U.S. army chemical warfare service and after the war returned to his oil business and Kansas politics. Ten years later, his election to the chairmanship of the Republican state central committee testified to his rapid rise to Kansas political prominence. He was elected governor in 1932 despite a bitter interparty factional struggle, and his re-election in 1934 aroused widespread interest because he was the only Republican gubernatorial incumbent to win that year. This fact led to the "Landon boom" and to his presidential candidacy in 1936. Although nearly 17,000,000 Americans voted the Republican ticket the final tally showed Landon had won only the electoral votes of Maine and Vermont. Following the campaign, Landon continued to participate in Kansas politics but did not again play an important part in national affairs. (GE. W. R.)

LANDON, LETITIA ELIZABETH (1802–1838), English poet and novelist, better known as "L. E. L." and well known in 19th-century literary circles, was born in Chelsea, London, on Aug. 14, 1802. While living at Old Brompton she was noticed by William Jerdan, who introduced her poetry into the *Literary Gazette,* which later she helped him edit. In financial straits, she poured out verse for a variety of periodicals and annuals; between 1821 and 1839 she published nine volumes of poetry, including *The Golden Violet* (1827), and three novels. She was somewhat spoiled by flattery and at times moved in dubious circles. Malicious gossip caused her to break off an engagement to John Forster; soon after she married George Maclean, governor of Cape Coast, West Africa. Shortly after arriving there, she died in mysterious circumstances, supposedly from accidental poisoning by prussic acid, on Oct. 15, 1838.

Her poems were extremely popular for their fluency and sentimentality. Touches of genuine poetic insight occur but her verse is diffuse and poorly organized. Of her novels, *Ethel Churchill* (1837) succeeds within the narrow limits of exploring intense feminine sentiment. For this Christopher North (the Scottish critic, John Wilson) made the celebrated remark "I love L. E. L."

BIBLIOGRAPHY.—*Poetical Works,* 2 vol. (1850). *See* also *Life and Literary Remains of L. E. L.,* ed. by S. L. Blanchard, 2 vol. (1841); Sarah Hale, *Woman's Record* (1853). (W. L. G. JA.)

LANDOR, WALTER SAVAGE (1775–1864), English writer, a considerable poet and a master of English prose, who was best known for his series of dialogues, *Imaginary Conversations,* was born at Warwick on Jan. 30, 1775. He was educated at Rugby school and at Trinity college, Oxford, both of which he left prematurely after disagreements with the authorities—early signs of his vehement and uncompromising character, which later involved him in various disputes and two libel cases. He inherited a substantial fortune on the death of his father in 1805, with which he purchased the Llanthony abbey estate in Monmouthshire. Landor spent three months in Spain in 1808, serving as a volunteer in the war against Napoleon and paying the expenses of his troop himself. He continued to give active support to revolutionary and patriotic movements throughout his life. After marrying Julia Thuillier in 1811, he settled at Llanthony and put in hand large-scale improvements which subsequently involved him in financial difficulty. Local quarrels, however, forced him to leave in 1814 and after brief periods at Tours, Como and Pisa, he lived in or near Florence until 1835. Landor's marriage did not prove happy and, despite his devotion to his three children, he separated from his family at this time and returned to England. He settled at Bath in 1838 and remained there until 1858, when he again left the country after being convicted of libel. After a brief and unsuccessful reunion with his family, he passed the last few years of his life at Siena and Florence under the protection of Robert Browning. One of his last visitors was the young Swinburne. Landor's literary powers remained unimpaired almost to the end. He died at Florence on Sept. 17, 1864.

Despite his impetuous nature, Landor was a man of great generosity and warm courtesy; though his conduct was often unwise, his motives were habitually disinterested. He knew most of the important literary figures of his time, and his many friends included Robert Southey, Lady Blessington, John Forster (his first biographer) and Dickens who, in *Bleak House,* portrayed some of his mannerisms in the character of Boythorn.

Poetry and Plays.—Landor's literary works are both voluminous and various. His first major poem was *Gebir,* published anonymously in 1798; written in blank verse and divided into seven books, it deals with the invasion of Egypt by the Iberian prince Gebir and his fatal love for the Egyptian queen, Charoba, and was intended as a protest against colonization. It was favourably reviewed by Southey, while Shelley and Coleridge were among its earliest admirers. A Latin version, *Gebirus,* followed in 1803; many of Landor's poems were first written in Latin, and were later translated by him into English verse. The first edition of his collected works appeared in 1846; the most important of his later volumes of verse are *The Hellenics* (1847) and *Heroic Idylls* (1863). These contain principally poems of medium length on classical and mythological subjects, an idyl being defined by Landor as "a smaller picture of some great picture"; these narrative episodes—details from the larger canvas of Greek literature—represent some of his best work, in which Landor came nearest to fulfilling his ambition of writing as "a Grecian would have written."

His first attempt at the drama was the tragedy *Count Julian* (1812), the subject being drawn from Spanish history. A dramatic trilogy—*Andrea of Hungary, Giovanna of Naples* and *Fra Rupert*—appeared in 1839 and 1840. Despite isolated passages of some power, these plays are too faulty in construction and deficient in characterization to be actable; they belong to the library, not the theatre. There is more dramatic impact in the *Five Scenes* on the fate of Beatrice Cenci (1851) and in *Antony and Octavius* (1856).

Landor produced much minor and occasional verse. Many of the best of these poems, such as "Past ruin'd Ilion Helen lives," were addressed to "Ianthe" (Mrs. Sophia Jane Swifte), but other much-anthologized pieces include the quatrain "I strove with none, for none was worth my strife" and the lyric "Rose Aylmer," while in such verses as "Dirce" ("Stand close around, ye Stygian set") he perfectly catches the spirit of the Greek epigram. Landor's poetic language has a dignified directness and a classical refinement, but he is rarely able to sustain the tone of his best work; the part is always superior to the whole. In the longer pieces, the verse has nobility but also monotony; there is a lack of verbal energy, and this gives his poetry an arrested, remote quality, while his efforts to compress his expression sometimes result in obscurity. The structure and organization of both the dramas and the major poems is uncertain. Nevertheless, the purity and dignity of Landor's diction at its finest has aroused the admiration of fellow poets from Shelley to T. S. Eliot.

Prose Works.—Landor, however, is probably best remembered for his prose. He published the first two volumes of his *Imaginary Conversations* in 1824 and added a third in 1828. By the end of his life he had written about 150 of these dialogues, and in them he found the ideal medium of expression. The variety of his interests and the scope of his reading were fully turned to account in these conversations between characters of all periods, from antiquity to Landor's own time. Although the speakers are nearly always historical figures, the talk between them is generally discursive, not dramatic. The *Imaginary Conversations* show an astonishingly wide range: there are found Epicurus expounding his philosophy, Dante praising Beatrice, Sir Philip Sidney considering happiness, George Washington and Benjamin Franklin discussing the U.S. constitution, Richard Porson attacking and Southey defending the poetry of Wordsworth. The mood changes according to the subject and the setting, and may be philosophical, pathetic, analytical, satirical or idyllic. By the fortunate discovery of this genre, Landor was able to deploy the full resources of his mind without being hampered by the demands of a preconceived form. The prose itself is carefully varied in style, but always exhibits a lucid formality and at times is deliberately elevated. Such celebrated passages as that beginning "Laodameia died;

Helen died; Leda, the beloved of Jupiter, went before," from the conversation between Aesop and Rhodope, have a cultivated sonority, a calculated rhythm and a heightened tone rarely found in prose later than the 17th century. Other important prose works by Landor include *Pericles and Aspasia* (1836), a series of imaginary conversations in letters which aims to give an impression of the golden age of Greek culture, and *The Pentameron* (1837), five dialogues between Petrarch and Boccaccio.

Reputation.—Landor is an isolated figure in English literature. He was idiosyncratic rather than profoundly original. He belonged to no school and stood apart from the main intellectual currents of his time; the writer with whom he had most in common was perhaps his friend Southey, whose work he greatly admired. He was not in sympathy with the literary revolution brought about by the romantics, however generously he praised younger poets such as Shelley and Browning. On the other hand, he came too late to be able to draw on the neoclassical tradition of the 18th century. Landor's achievement was therefore fragmentary and dispersed; he was left stranded by the literary tide. But his very remarkable literary gifts, in both poetry and prose, are likely to be remembered with deep and continued respect.

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LANDOWSKA, WANDA LOUISE (1879–1959), Polish-born harpsichordist who initiated the revival of the harpsichord in the 20th century. Born July 5, 1879, at Warsaw, she studied composition under H. Urban in Berlin in 1896, and in 1900 went to Paris where, influenced by her husband, Henry Lew, an authority on folklore, she made researches into old music and keyboard instruments. She taught at the Schola Cantorum, first played the harpsichord in public in 1903 and in 1909 published, with her husband, *Musique ancienne,* a study of 17th- and 18th-century music. She remained until the beginning of World War II the principal exponent of 17th- and 18th-century harpsichord music, particularly that of Bach and Couperin, on whose works she wrote several studies. In 1925 she founded a school for the study of old music at Saint Leu-la-Forêt, near Paris, and in 1941 settled in the United States. She died at Lakeville, Conn., Aug. 15, 1959. Among the modern works she inspired were the harpsichord concertos of Manuel de Falla and Francis Poulenc. At the beginning of the 20th century her theories of technique were the basis of contemporary harpsichord playing.

See A. Schaeffner, "Wanda Landowska et le retour aux humanités de la musique," in *La Revue musicale* (June 1927); B. Gavoty, *W. Landowska* (1956).

LAND RECLAMATION is the process of improving lands to make them suitable for a more intensive use. Reclamation efforts may be concerned with the improvement of rainfall-deficient areas by irrigation, the removal of detrimental constituents from salty or alkali lands, the diking and draining of tidal marshes, the smoothing and revegetation of strip mine spoil areas and similar activities.

RECLAMATION OF ARID LAND

In the United States, the most extensive reclamation activities are those concerned with irrigation. To a marked extent, reclamation has come to mean irrigation in the western United States. The United States bureau of reclamation has as its central purpose the construction of dams, canals, pumping systems, etc., to bring irrigation water to arid, semiarid or subhumid lands in the 17 western states. The National Reclamation association is a group interested primarily in irrigation, and the Federal Reclamation act provides for governmental development of irrigation systems.

Other extensive areas reclaimed from a desert or near-desert status by irrigation are found in Israel, Egypt and other countries of the middle east, India, Mexico, Peru and the Soviet Union. (*See* separate articles on states and countries.)

Irrigation of arid lands has been practised in the middle east for thousands of years and extensive irrigation projects were developed in what is now southwestern United States by the Indians before Columbus. The real impetus to reclaim the arid western United States by irrigation, however, came about the middle of the 19th century when the Mormons established their settlements in the Salt lake basin, and settlers drawn to California by the discovery of gold turned to irrigation in order to supply themselves with food.

A further incentive to irrigation was brought about by the passage of the Federal Reclamation act in 1902. This act led to the formation of the bureau of reclamation in the United States department of the interior. Major provisions of the reclamation act called for federal construction of irrigation works, required repayment of the costs of the works by the water users, and limited the amount of land any one individual could irrigate with water provided by a federal reclamation project. This maximum amount of land was set at the amount considered to be sufficient to support a single family.

In the early 1960s the bureau of reclamation reported that on about 75 reclamation projects approximately 6,500,000 ac. of land received either full irrigation service or supplemental water. This land was divided into approximately 127,000 farms. The total acreage of irrigation land in the 17 western states was estimated at 27,500,000 ac. by the United States department of agriculture.

Water for reclamation of land by irrigation in federal projects has largely been obtained through storage dams and diversion on snow-fed rivers of the west. Pumping from ground waters also is a major source of water, especially in privately developed reclamation enterprises.

The extent to which land is improved by irrigation is related to the aridity of the land in its natural state. The deserts of the middle east, the alluvial valleys of the central Asian region of the U.S.S.R., the Imperial valley of California and the Columbia basin are examples of areas reclaimed from a near-desert state to a highly productive intensive agriculture. Land reclamation by irrigation is, however, not limited to desert regions, and in the period from 1939 to 1949 irrigated land in the 31 eastern states of the United States about doubled, from about 740,000 ac. to 1,500,000 ac. and reached 3,000,000 ac. by 1959.

Much of the land irrigated in humid areas throughout the world is used for the production of paddy rice, although irrigation of vegetable crops, usually with overhead sprinkler systems, also is practised on a considerable acreage.

Many irrigation projects have failed because of salt accumulations in the irrigated soils or the silting in of reservoirs and irrigation canals. These failures have led some to believe that no permanent civilization could be founded on irrigation agriculture. This belief is contradicted by the long history of irrigated areas of the middle east and the Nile valley. It is essential, however, that provision for drainage of the irrigated lands be considered in the planning of all irrigation reclamation projects, and that water relatively free from dissolved salts be used.

Reclamation of land by irrigation has been extensively developed by the Soviet Union. By the late 1950s the Soviets reported a total of about 11,000,000 ha. (1 ha. = 2.471 ac.) under irrigation, about one-half of this being in the middle Asian republics.

The Syr-Darya and Amu-Darya rivers are the principal sources of irrigation water in this area. Inasmuch as these rivers carry a heavy load of sediment, the structures through which irrigation waters are diverted from the rivers are engineered so as to minimize the amount of silt entering the irrigation canals.

Another important irrigation development in the U.S.S.R. is found along the Volga-Don canal and in the area below the Tsymlanky reservoir which supplies water to the Volga-Don canal. In the U.S.S.R., as in most other parts of the world, hydroelectric power is frequently developed at irrigation water storage dams.

RECLAMATION OF SALT-AFFECTED SOILS

In the arid regions of the world, and along coastal areas subject to periodic inundation by sea water, soils may have such a high

BY COURTESY OF THE U.S. DEPARTMENT OF AGRICULTURE

FARM IN DELTA, UTAH, AREA ABANDONED BECAUSE OF THE ACCUMULATION OF SALTS IN THE SURFACE SOIL

content of soluble salts that production of economic plants is not possible.

The salts found in soils are generally the chlorides, carbonates, bicarbonates and sulfates of sodium, with lesser amounts of potassium, magnesium and calcium salts.

Normally the salt is carried into the soil by water, either by upward moving saline ground waters or by saline irrigation or flood waters. As the water evaporates from the soil or is transpired by plants the salt is left behind. Unless provision is made for removing it from the soil by flushing with nonsaline waters, the salt will accumulate until plant growth is inhibited. Thus, salts tend to accumulate in poorly drained soils where water does not move down through the soil profile and out in the drainage water, and in soils of arid areas where the annual addition of nonsaline water to the surface soil in the form of rain is insufficient to wash the salts downward. Since all irrigation waters carry at least some salt, irrigation may hasten the process of salt accumulation in soils and reclamation of arid lands by irrigation may be followed by a need for reclamation of salty lands by drainage and leaching.

The salt in soils dissolves in the soil water and damages plant growth by preventing the plants from getting needed water from the soil, since the energy required to remove a given quantity of water from a salt solution increases as the salt concentration of the solution increases. In some cases, the dissolved salts may be toxic to plants when taken up by the roots.

In addition to their detrimental effects on plants, sodium ions from the dissolved salt may become adsorbed by the clay particles of the soil and render the soil very sticky when wet and hard and cloddy when dry. Soils containing significant amounts of adsorbed sodium are nearly impervious to water and roots. These detrimental accumulations of sodium are formed through a process called cation exchange.

Most productive soils have calcium cations adsorbed on the surfaces of the clay particles. But when such a soil is treated with a salt solution high in sodium and low in calcium, sodium cations from the salt solution replace the calcium cations held by the soil and a so-called "sodic soil" results. These cations of sodium remain adsorbed by the soil after the salt solution is drained away. Whenever sodium cations are in excess of about 10% of the total amount of cations held in adsorbed form by the soil, a sodic soil of undesirable physical properties results.

The reclamation of salt-affected soils follows the exact reverse of the process by which they are formed. The first step is to improve the drainage so that upward movement of ground water to the soil surface ceases and water applied to the surface can move down through the soil profile. Then fresh, nonsaline water is applied to the surface by irrigation. This fresh water washes out the excess salts and they are carried away in the drainage water. In the case of sodic soils, amendments that will supply a fresh source of soluble calcium to replace the sodium adsorbed by the soil are added and leaching is carried out until the replaced sodium is removed. Gypsum (calcium sulfate) is the most common amendment used to supply calcium for the reclamation of sodic soils.

Procedures for the diagnosis and reclamation of salt-affected soils, developed through research at the United States Salinity laboratory at Riverside, Calif., are generally used for planning this type of reclamation activity throughout the world.

Saline and sodic soils are found in extensive areas in the U.S.S.R., Pakistan, Egypt and other countries of the middle east, north Africa, Spain and in the western United States. In the U.S.S.R. sodic soils are designated by the term solonetz soils. Deep tillage to break up the horizons high in adsorbed sodium is a common technique used there for the reclamation of these soils.

RECLAMATION OF SWAMPY LANDS

Where excess water accumulates in and on the soil, the land is rendered unfit for production of many crops. Even where the wet condition is of fairly short duration, cultural operations required for crop production may be delayed past the optimum planting date or crops already planted may be drowned out.

The reclamation of such wet areas is centred on means of removing the water from these areas more rapidly than it is removed in their natural condition. This process is termed drainage.

The first requirement of a drainage project is an outlet for the water. One of the most common means of providing this outlet is to dig a ditch from the swampy area to a river, sea or other natural body of water. Frequently this ditch is constructed by large power shovels. The size of the ditch is determined by the amount of water to be carried and the gradient of slope along the ditch.

The topography of the land, the amount of water to be removed in a given time (called the drainage coefficient) and the distribution and nature of underlying strata are factors determining the design of the drainage systems for moving the water from the land to the outlet.

Of particular importance is the permeability, or ability to transmit water, of the soil and underlying strata. If the soil and underlying strata have a low permeability, frequently found in clay soils, the excess water must be removed by surface flow. This may require regularly spaced small ditches throughout the area to be drained, and a land forming or grading operation to provide slopes toward the field ditches and to eliminate low spots between ditches.

If the soil is permeable, the excess water may be removed through tile lines installed beneath the surface of the soil. The tiles are usually made of fired clay or concrete. The spacing of the tile lines is governed by the permeability of the soil. The more permeable the soil, the farther apart the tile lines. The tile lines may be installed in a regular pattern in large wet areas or in a random pattern where critical wetness is confined to scattered spots in the area. Tile drains have the advantage over open ditch drains in that farm operations can be conducted across the tile lines, making it possible to use larger and more efficient fields, with no loss of land occupied by ditches.

BY COURTESY OF FLORIDA DEVELOPMENT COMMISSION

LEVEES CONTROL RECURRENT FLOODING OF RECLAIMED MARSHLAND IN BROWARD COUNTY, THE FLORIDA EVERGLADES

Occasionally underground drains are constructed without use of tile by drawing a bullet-shaped tool through the soil at 1½ to 3 ft. depth. This bullet-shaped tool leaves a channel through the subsoil that may serve the same drainage function as a tile line. This practice of forming unlined underground drains is called mole drainage. After a period of time, depending upon the stability of the soil, the unlined channels collapse and the mole drainage operation must be repeated. With the development of low-cost flexible plastic materials, devices for lining mole drains with perforated plastic liners to increase the life of the drains were developed.

If a permeable strata such as gravel underlies the area to be drained, widely spaced open ditches dug into the permeable strata usually provide effective drainage.

Frequently, poorly drained swampy areas are occupied by soils very high in organic matter, called peats and mucks. When these organic soils are drained, the improved soil aeration brings about an increase in the rate of oxidation of the organic material, resulting in a loss of the soil material itself. This leads to a subsidence of the land surface and in some cases the land surface may sink several feet. Subsidence of drained organic soils is more rapid in warm climates than in cooler areas. Appreciable subsidence has taken place in the reclaimed organic soils of the Everglades of Florida.

Some areas are too wet for crop production because of recurrent flooding from adjacent rivers and creeks. Reclamation of this type of wet land is usually effected by building levees along the stream to keep it confined in its channel. If necessary, excess water originating in the protected area is lifted over the levee by pumps. An extensive area of land is protected by levees in the lower Mississippi valley of the United States.

Extensive projects for the reclamation of land by drainage are found in England, Europe and the eastern United States. Large areas of organic soils have been reclaimed by drainage near Minsk in Belorussian Soviet Socialist Republic. Mole drainage is used in England, in New Zealand and in Australia. Reclamation of wet land by drainage is an ancient practice, having been used by the Romans along the Tiber river.

RECLAMATION OF COASTAL AREAS

Where offshore lands or tidal marshes are covered by shallow water, and additional land is critically needed, the offshore lands have been reclaimed by construction of dikes roughly parallel to the shore line, followed by drainage of the area between the dikes and the natural coast line.

Where a sediment-laden stream can be diverted into the area between the dikes and the shore line, the sediment from the stream may be used to build the diked-off land to a higher level, thus facilitating the drainage operation.

Occasionally, reclamation of tidal marshland can be accomplished by closing the mouth of tidal estuaries by dikes. Where the land surface is above low-tide level, a dewatering system based on tide gates which discharge water into the sea at low tide and automatically close to prevent re-entry of sea water at high tide may be used. In other instances, pumps have been used to lift water over the dikes. The use of pumps permits the reclamation of lands that are below low-tide level.

The most notable example of reclamation of coastal lands is the polder (tract of artificially drained land) system developed adjacent to the Zuider Zee in the Netherlands. Other examples of this type of reclamation are found in England. During the colonial period, extensive areas of tidal marsh were reclaimed for rice production in the Carolinas and Georgia in the United States. The systems of dikes used in reclaiming marshlands in the Carolinas and Georgia were not maintained and most of the diked-off land again reverted to tidal marsh.

Areas newly reclaimed from inundation by sea water contain so much salt that most plants will not grow. For this reason the procedures for reclamation of salt-affected soils (*see* above) must be used in addition to diking and draining in order to develop productive agricultural land.

Some marshlands formed in brackish water are very high in sulfides. As long as air is excluded from the soil because of saturation with water, these sulfides are stable and the soil will produce marsh plants. But when the soil is drained, the improvement of soil aeration brings about an oxidation of the sulfides to sulfates, and if the soil is low in basic constituents free sulfuric acid is produced, making the soil too acid for any plants to grow. Marsh soils high in sulfides are termed cat clays by the Dutch. Very large quantities of lime are required to neutralize the sulfates and make the soil suitable for crop production. Unless the sulfide containing sediments naturally contain sufficient lime to neutralize the potential sulfate content, drainage and reclamation are rarely attempted and these areas are left as wildlife reservations.

BY COURTESY OF NETHERLANDS INFORMATION SERVICE

EASTERN FLEVOLAND POLDER OF THE ZUIDER ZEE WORKS, THE NETHERLANDS

The only feasible method of producing crops on cat clays is to grow rice using cultural methods that provide for planting and harvesting the rice without draining the land. Inasmuch as these methods preclude the use of modern machinery, the use of cat clays for rice production is confined to southeast Asia and similar areas where the supply of farm labour is abundant in relation to the supply of available land.

RECLAMATION OF STRIP-MINE SPOILS

Where mineral deposits are near the surface of the earth, frequently they are exposed for mining by excavating the entire overburden with power shovels. This process is called strip mining and is widely used as a method for mining coal in the Ohio river valley and in England. This technique is also used for mining phosphate deposits, gypsum, gravel, limestone, copper, iron and other minerals.

The overburden removed to expose the mined deposit is dropped by the power shovel in a series of generally conical mounds. Normally, the mining operation is conducted so as to deposit the overburden material in a previous excavation left after the mined deposit is removed. The final excavation is not filled.

The strip-mined area is then left as a series of piles of overburden, called spoil banks, with a deep trench at the side where operations ceased. The piles of overburden are generally loose and porous, but barren of plant life and only slowly revegetated by natural processes. With the increased popularity of strip mining, there was increased interest in the problem of more rapidly reclaiming and revegetating the spoil-bank areas. By 1950 the states of Pennsylvania, West Virginia, Ohio and Indiana had enacted legislation requiring strip-mine operators to replant or smooth and replant strip-mined areas.

The problem of revegetation is complicated by the irregular, frequently steep topography of the spoil-bank area and the raw, infertile nature of the spoil material. Smoothing of the area is likely to result in excessive compaction of the spoil material, rendering it less suited to plant growth. For this reason, reclamation of spoil banks is generally confined to reforestation, to development of grazing land or to reclaiming for recreational areas. Reclamation to the point where cultivated crops can be produced is rare.

Materials overlying coal deposits are often high in iron sulfides. Under the well-aerated conditions present in loose spoil-bank

FROM "ATLAS VAN NEDERLAND EN DE WERELD," J. M. MEULENHOFF, PUBLISHERS, 1962

LAND RECLAMATION PROJECTS OF THE NETHERLANDS

material, these sulfides are oxidized, and highly acid conditions may develop in the spoil. The process is similar to the development of acidity in cat clays in reclaimed tidal marshes. In strip-mine spoil, however, drainage is generally good and the acid constituents will be removed by leaching in a period of years. In some states of the U.S. the legislation governing strip mining requires grading of the spoil areas to form water-retaining benches to hasten the leaching process. Pine trees are frequently used to reforest spoils high in sulfides because of the acid tolerance of the pines.

RECLAMATION OF ERODED LANDS, INFERTILE AREAS AND "NEW" LANDS

Where soil erosion is severe, a land area may be denuded of topsoil and interlaced with a dendritic, or branched, system of steep sided watercourses called gullies. These areas are generally devoid of vegetation and sediment eroded from them may menace lower lying lands or water retention structures.

In humid regions these eroded areas are usually reclaimed by reforestation accompanied by exclusion of livestock from the area. Where the subsoil material is friable and fertile, the land may be graded to obliterate the gullies and permit production of pasture or other close growing crops. In the southeastern United States, kudzu, a leguminous vine, has frequently been used to stabilize gullied areas.

If the gullied area is not large and topographic conditions permit, a diversion ditch to prevent runoff from higher lying areas from entering the gullied area may hasten the reclamation process. Natural plant invasion and succession may revegetate eroded areas if they can be protected from the cause of the accelerated erosion.

One of the most striking instances of reclamation is offered by certain hill areas of New Zealand. There, areas covered by unproductive vegetation have been converted to highly productive pasture through fertilization with phosphorus and cobalt, liming, seeding of clovers and grasses and poisoning of rabbits. Many of the materials added to the land to improve it for grazing have been dropped from airplanes.

The development of farming on new lands in the Kazakh Soviet Socialist Republic and Siberia is frequently considered a reclamation process. In this case, however, no engineering works or chemical modification of the land was generally required. The process included colonization, selection of most promising soils, plowing of the native grass sod and planting of crops. The principal crop produced is spring wheat. By the late 1960s, large sections of new land were brought into production in the Kazakh Soviet Socialist Republic by this process.

See also FORESTS AND FORESTRY; IRRIGATION; NETHERLANDS, THE: *Physical Geography;* ROTATION OF CROPS; SOIL.

See J. A. Steers, *The Sea Coast* (1953); J. van Veen, *Dredge, Drain, Reclaim,* 4th ed. (1955). (W. H. A.)

LAND REFORM. This term is usually defined as meaning efforts to bring about more effective control and use of land for the direct benefit of the agricultural population and for the indirect benefit of the community as a whole. For example, land reform includes the redistribution of agricultural land among existing or new owners, including consolidation or subdivision; development or settlement of holdings; adjustment of rental charges; compulsory reimbursement of costs incurred by the tenant for improvements made on the land he cultivates; increase in the security of tenure; adjustment of policy and procedure in the taxation of agricultural land; and the adjudication and registration of land and water titles.

Land reform may also embrace improvements in the entire agrarian structure, such as agricultural or general education of rural populations; improvement of working conditions and the social status of all classes of farm workers; improvement of farm credit conditions; the establishment of industries or co-operative societies for the production, processing and marketing of farm products and for the purchase of farm supplies; technical advice to farmers; and numerous other types of farm community or individual services. "Basically," states Isador Lubin, "land reform comprises improvement in all the social and economic institutions surrounding farm life." (*Land Reform: A World Challenge,* Department of State publication 4495, Economic series 29 [Washington, D.C., 1952].) Thus, if there is a consensus, it invariably merges the meanings of the terms land reform and agrarian reform.

Renewed emphasis on land reforms under the initiative of the United Nations at mid-20th century may have obscured the fact that such reforms have been one of the dominant themes of history, and, from antiquity, the cause of many political and military conflicts. In the 7th century B.C. Solon introduced limitations on the amount of land that could be held by an individual Athenian. The history of Athens and the other city-states of Greece was marked by bitter struggles between the landless and the landowners up to the time of the Roman conquest. In England one of the guarantees forced from King John in 1215 by the Magna Carta was that religious bodies, which had been accumulating lands at a rate that alarmed the barons, would not be allowed to acquire more.

At the same time, the burdens imposed on tenants were somewhat relaxed by more clearly defining their obligations to their feudal lords. Among the many clashes due to the demand for land reforms were the peasants' revolt led by John Ball and Wat Tyler in 1381, the rebellion led by Robert Ket (Kett) in 1549 and the quickly suppressed uprising of 1830. The United States was partially insulated from the ancient problem while free land was available; but agrarian discontent has been nevertheless a major factor throughout U.S. history. (*See* LAND TENURE: ECONOMIC AND AGRARIAN ASPECTS.)

Population Pressure and Tenancy in the Orient.—Assessment and collection through intermediaries of the ancient king's share of the proceeds of agriculture originated the fundamental features of the land tenure system in south Asia. It evolved in ancient times under the Hindus and later under the Muslims and

the British to become the oppressive landlord system that characterized the Indian land tenures of the first half of the 20th century and that resulted, finally, in the demand for reform in modern India and Pakistan. Although there is indication in the Islamic sacred law that peasants could inherit and transfer certain rights in the land by sale, gift or mortgage, the concept of ownership in land as it is thought of in modern times probably did not emerge in India until the decay of Muslim rule in the 17th century. A weakening of the central government is said to have been brought about by the extent to which peasants were absconding because of the oppressive demands upon them. Gradually property rights in a land and landlord-tenant system emerged. Also out of the confusion of the 17th and 18th centuries came a class of individual holders, a type of collective ownership and grant lands upon which the government assessment was lower because of some service or merit of the original possessor. These types of tenure, in the absence of inheritance control, together with increasing population pressure, resulted in the extremely small and fragmented holdings characteristic of contemporary south Asia.

In primitive China, as in Hindu and Muslim India, farm lands owned by the state were allocated to the tillers of the soil from whom the government's share was collected either directly by officers of the state or through intermediaries. The Shang dynasty (about 1700 B.C.) introduced land reforms which matured during the Chou dynasty (about 1100 B.C.) as the *ching t'ien* tenure. Under this system, which endured for many centuries, arable lands were divided into ching. In each ching, comprising at different times from 630 to 900 mu of land (one mu is now commonly equivalent to about 807 sq.yd., but this varies locally), a group of eight farmers tilled their own lands individually; they farmed collectively for the ruling lord a ninth allotment, on which they lived. In time these exact dimensions became blurred, and after a period of disintegration and feudalism, Shih Huang Ti (221–210 B.C.) abolished the *ching t'ien* tenure system. He established private property and a free land market in which small holders sold their farms to rich landlords who operated their large holdings under a harsh tenancy system.

In A.D. 9 Wang Mang nationalized the land, returned to *ching t'ien* tenure, limited the size of holdings and prohibited purchase and sale of land. The reform failed because of political pressure; private ownership, large holdings and exchange of property were resumed. Repeated attempts to return to *ching t'ien* tenure failed until in 624 a reform by Kao-tsu of the T'ang dynasty promulgated the *tsu yung tiao* system. Under one of the provisions of this system land allotments under onerous tax burden were made to male adults for a limited period of time; the allotments reverted to the state upon the death of the holder. Again, under political pressure the system failed in China, but not before it had become incorporated in the Taika reforms (645) in Japan. After a generation or two in Japan, this imported system gave way under corrupt government to a manorial system which was abolished in 1868.

After the abolition of feudal tenures in Japan and unsuccessful attempts at reform in China, the contemporary oriental tenure pattern evolved. An active commercial land market and an inheritance system free from any form of entail, combined with population pressure upon land resources, reduced the landholdings into tiny scattered fragments subject to an intensive competition that invited fraudulent exploitation and encouraged tenancy. The end product was a complex system of ownership by individuals, families, clans and other groups; its essential feature was a combination of tenant- and owner-operated plots of ground incapable of economical operation. This system of land tenure was marked by an increase in the percentages of tenancy and the numbers of landless labourers; insecurity of tenure; inequitable distribution of income among numerous middlemen; oppressive rents; chronic indebtedness and high interest rates; primitive methods of farming with heavy expenditure of labour; short seasons of employment; and a high degree of illiteracy among rural populations.

In turning to contemporary reform measures, it is important to note that the countries of the orient fall into two groups—those with a high population density and those with a lower population density.

Land Reform in Areas of High Population Density.—India, Pakistan, Ceylon, Korea, Taiwan (Formosa) and Japan are areas of very high population density. High-density areas occur in a number of the other countries of Asia, but they are offset by extensive areas offering opportunity for development and settlement. In the countries listed, opportunities for reclamation and land settlement are limited. Public lands available for distribution and development at the close of World War II were soon exhausted. Large estates with land suitable for development or intensification were not sufficient in areas to suggest expropriation, subdivision and settlement as expedient means of relief. The possibilities inherent in irrigation and intensification of farming were limited. Shifting the population into industrial and commercial employment, as some proposed, involved many complex and uncertain factors.

Modern reform programs of countries in this group included only a limited amount of reclamation and land settlement in the initial stages. The major reforms eliminated intermediary rent receivers, usually with compensation, and provided for purchase by the tenant of the holding which he occupied, subject to resumption by the landlord of a limited area for personal cultivation. Reforms also included establishment of permanent occupancy rights and minimum lease periods with definitions of the legal bases for eviction. Efforts were made to set maximum rents, establish cottage and small-scale industries, encourage co-operative systems of cultivation on consolidated holdings and limit the subdivision of land through sale or inheritance below a minimum size. Land reform programs might also include improved credit facilities, minimum interest rates, community development and agricultural advisory services.

As a result of ten years of land reform, following approximately the above pattern, Japan and Taiwan by the 1960s had increased the proportion of farmers operating their own farms to approximately 90% and 75% respectively. But a high population-to-land ratio and therefore a distressingly small farm size still remained in both countries. Taiwan's former landowners, aided by the terms of payment for their lands, became investors and proprietors in Taiwan's growing industries.

Land Reform in Areas of Low Population Density.—The absence of land reform programs at mid-20th century in such countries as Laos and Cambodia may be explained by their low population density and low percentage of tenancy, and in such countries as Afghanistan by their extensive mountainous areas. On the mainland of China, however, important possibilities exist for expanding agriculture and increasing production through drainage, flood control and irrigation. Land reform programs were well under way in China before the advent of the Communist government made the country inaccessible to western observers. Thailand, Burma, the Philippines, Malaya, Vietnam and Indonesia also are in the group with lower population density. The important difference between land reforms of this group and those of the high-density countries is that the former are more likely to place major importance upon expropriation and redistribution of land in possession of absentee landowners, land reclamation and subdivision of large holdings. Where such reform programs are involved, great expenditures of capital and the application of the highest quality of experienced technical skill are required. Political forces opposed to reform, regardless of the balance between costs and benefits, frequently use these heavy capital outlays as arguments for defeating reform proposals.

Latin America.—As in the orient, population density helps to shape the plans and programs of agrarian reform in the countries of South and Central America, including the islands of the Caribbean sea.

Countries of Low Average Population Density.—Countries of low average population density have a number of characteristics in common. Each country has extreme geographical differences in population density within its borders, and has areas of underdeveloped lands with varying degrees of suitability for development and use. These countries also have large underdeveloped

estates held under a land tenure system inherited indirectly from the ancient Roman empire by way of Spain and Portugal, reflecting in greater or less degree the influence of precolonial Indian agrarian institutions or of European immigration and settlement. They have a multitude of farms operated by owners, tenants, squatters or serfs and varying from large commercial farms to small subsistence farms.

Most of the countries of this group have undertaken some kind of land settlement, public and private, on public lands. Guatemala, Colombia, Venezuela, Cuba, Peru, Argentina, Paraguay, Bolivia and Mexico had inaugurated plans during the 20th century for breaking up the large underdeveloped estates within their borders. In only two of these countries, Mexico and Bolivia, had land reform programs been in operation long enough by the 1960s to indicate most of the inherent problems and future prospects. The major features of the reforms in both these countries were the following: expropriation of large holdings and their redistribution to landless persons and "little landers" under restrictions to insure permanence of the reform; emphasis upon community ownership of land and freedom of choice for individual or cooperative cultivation. These reforms were the outcome of a class struggle between the few great landowners and the numerous landless tenants that has raged for centuries with bloodshed and continued poverty, illiteracy and degradation of the masses.

After nearly a half century of land reform, Mexico had distributed a little more than 100,000,000 ac. of land among settlers of communal groups or *ejidos* and was enjoying an upward trend in industrialization. But Mexico was still a country dominated by large landholdings. In Bolivia the immediate results of land reform were a decline in the area and volume of agricultural production, an increase in agricultural imports, a general deterioration of the country's economy, and a political situation bordering on revolution. Mexico had been through a similar experience in the earlier decades of the land reform. By 1959 Bolivia's agricultural production had turned upward, and more than 2,000,000 ac. of land had been redistributed among 45,588 individuals and communes.

Areas of High Average Population Density.—The countries of high average population density of Latin America are islands and some coastal areas bordering the Caribbean sea. These countries are characterized by teeming and rapidly growing populations; latifundia (large landed estates) worked by tenants and owned by absentee landlords; plantation systems of cultivation dominated by sugar-production economy under manager operation; multitudes of landless agricultural labourers; and countless primitive farms of the subsistence type. The Indian population long ago disappeared under the land grant and encomienda forced-labour systems of the Spanish colonial period, and Africans took their place. Puerto Rico has attempted to solve this problem by the introduction of the "proportional profit farm" (a type of cooperative), and by family farms, organized rural communities and rural education.

Mediterranean Countries.—In Greece, Egypt and Lebanon, population pressures created problems and directed land reform legislation into forms similar to those of south Asia. In other Mediterranean countries, although other reforms were introduced or proposed, land acquisition, redistribution, development and settlement were the major objectives in making reform appropriations.

In Italy, especially, the completeness of development and its expeditious execution have been impressive. But costs per hectare (about 2½ ac.) were high, including as they did expenditures for (1) farm development, including houses, preparation of the land, plantings, farm roads; (2) farm capital such as machines, power equipment, livestock and forage supplies; (3) public works, including roads, complete villages with public buildings, aqueducts, off-farm agricultural processing industries benefiting the populations of the entire locality; (4) social facilities such as co-operatives, schools, professional instruction and many other community services; and (5) program administration. The high cost of these facilities, exclusive of the price of land, required generous public subsidies and thus provided ammunition for the political enemies of the reform administrations. As late as 1964, however, the Italian land reform had withstood all political pressures.

The results of the Italian reform in 1960 after 10 years of intensive development may be summarized as follows:

1. The disappearance of the extensively cultivated large properties of the poorer regions of Italy.

2. In the eight land reform areas of Italy, including Sicily, 610,693 hectares (1,508,412 acres) has been assigned among 108,430 assignees. Slightly more than half of these assignees were operators of new farms, while the others received small additions to existing farms. The area distributed was roughly in the proportion of 80% as new farms and 20% as additions to existing farms.

3. Unlike many other land reform experiences, Italian agricultural production actually increased during the period of development while production per hectare and per worker was higher than on similar existing farms.

4. Benefits of agricultural advice and assistance to farmers within the land reform areas have been extended by example to older farming areas outside the boundaries of the reform project.

5. By investing huge sums of money in reclamation, irrigation, land improvement, machines, animals and fertilizers, Italy has directed new capital into retarded districts. The populations of these areas, which as a rule have a high rate of illiteracy, have been invested with a multitude of new activities; their lives have been radically transformed and their personalities enriched.

6. While the above enumerated results pertain to the agrarian reform as a whole, it must be emphasized that there are great differences from area to area. There are some areas which have not been able to obtain a satisfactory return to labour and others where the increase of income of labour will depend upon increasing unit production through changes in farm organization.

7. The agrarian reform has not been exempt from a general exodus of populations from agriculture characteristic of areas outside the reform and in other parts of Europe. In some cases this mobility of farm workers will require consolidation of farms and the workers leaving the farms will be freed for the production of nonagricultural wealth and for providing other services.

Family Farms v. Collective Farming in Eastern Europe.—Most of the countries of eastern Europe experienced two major land reforms after 1918. Emerging from World War I, a great part of their lands were in large holdings, held so by ancient systems of entail and operated by tenants whose social and economic status was little better than that of serfdom—remnants of a feudal system imposed by many conquering armies representing many racial and political entities. The resettlement of confiscated lands of former enemies introduced land settlement as a major feature, but these countries continued to be areas of high population density.

The first reforms were called failures because they were not complete, but they succeeded in breaking up many of the large holdings into peasant farms.

After World War II, under communistic domination, new reforms were promulgated in which upper limits in size of 20 to 50 hectares on all agricultural holdings were imposed and redistribution was made. Because of high population densities, holdings were too small for efficient operation. As a solution, co-operative farms having various degrees of collectivization were introduced. Complete compulsory collectivization was said to be the ultimate goal of communist land reform. The individual small holding was said to be the first step in this direction. Experience in the U.S.S.R. was offered in support of these assertions.

The countries discussed are the major problem areas of the world calling for land reform or, possibly more wisely, for family-size limitation of farms with gradual improvement in land tenure, more efficient production methods and expansion of agrarian institutions.

For early land reforms, *see* also SOLON: *Social and Economic Reforms;* and ROMAN HISTORY. For modern land reforms, *see* accounts in the articles on specific countries.

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LAND REGISTRATION: *see* TITLE TO LAND.

LANDRU, HENRI DESIRÉ (1869–1922), French murderer sometimes referred to as the "modern Bluebeard," died on the guillotine for the murders of ten women and one boy. Landru was born of working-class parents in Paris; nothing known of his childhood gives warning of his subsequent career. Before completing his schooling he was conscripted into the French army and while in the service married a second cousin. Five children were born to the marriage.

Upon his return to civilian life, Landru held a number of minor commercial positions. When about 30 years of age he appears to have turned abruptly to a life of crime. Between 1900 and 1914 he was convicted at least seven times for frauds and swindles. About 1910 he began to direct his criminal activities to middle-aged women of modest means, and, under various aliases, succeeded in defrauding at least 283 such victims. He was arrested in 1919 upon complaint of a woman whose sister had disappeared after having been seen last in Landru's company. In a notebook kept by Landru were found the names of ten women and a boy, all of whom had disappeared after being lured by him to various locations in the Paris area.

Landru was charged with the murders of these persons. His trial in 1921 was one of the most bizarre in modern history. The case against him was wholly circumstantial; although personal effects of the victims were found in Landru's possession, none of the bodies was ever discovered. The prosecution theorized, but did not clearly establish, that he burned the remains in a kitchen stove. Although Landru consistently protested his innocence he was found guilty and sentenced to death. He was executed at the Versailles prison on Feb. 25, 1922.

BIBLIOGRAPHY.—An extended account of the Landru case may be found in W. Bolitho, *Murder for Profit* (1926). *See* also W. Cuppy, (ed.), *Murder Without Tears* (1946); A. W. Pezet and B. Chambers, *Greatest Crimes of the Century* (1954). (F. A. A.)

LANDSCAPE, MINIATURE: *see* MINIATURE LANDSCAPE.

LANDSCAPE ARCHITECTURE. The concept of landscape architecture has broadened in a way not possible in any other art and now embraces projects not even contemplated at the opening of the 20th century. In the 18th and 19th centuries the work was confined to "landscape gardening" which was privately commissioned. In the early part of the 20th century the accepted definition was that of Charles Eliot, then president of Harvard: "Landscape architecture is primarily a fine art, and as such its most important function is to create and preserve beauty in the surrounding of human habitations and in the broader natural scenery of the country; but it is also concerned with promoting the comfort, convenience and health of urban populations." By the second half of the 20th century, landscape design was concerned "to make the earth hospitable to man" by co-ordinating the varied constructions of man, such as industrial plants, engineering works, spreading cities, new towns and sports areas of all kinds, with those of nature, left partly or wholly in a primitive condition.

The scope of modern landscape architecture is vast, ranging from the harmonious planning of a geographical region and all its component parts down to the layout of a small site adjoining buildings. The history of landscape design is a study of primitive emotions and their consequences, of buildings and scenery created by architects, builders and gardeners as well as by landscape designers, but which have influenced and formed the concepts of beauty of the periods succeeding them. It is a great loss to human knowledge that the landscape of any period is so vulnerable to decay, alterations and destruction, for the landscape of a civilization is a reliable and comprehensive statement of its history.

This article is divided into the following main sections:

I. History
1. Primitive to A.D. 300
2. From 300 to 1500
3. From 1500 to 1700
4. From 1700 to 1900
II. 20th Century
1. Gardens
2. Housing and Town Planning
3. Cemeteries and Crematoria
4. The Park
5. The National Park
6. Health and Education
7. Industry and Engineering
8. Reclamation
9. Roads and Parkways
10. The International Exhibition
11. Regional Planning
12. Professional Training
III. Theory and Technique of Design
1. Unity of Design
2. Scale and Proportion
3. Space Division
4. Land Form
5. Time
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7. Texture
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9. Wind Shelter
10. Trees and Shrubs
11. Plant Material
12. Water
13. Sculpture and Stonework
14. Walls, Terraces and Steps
15. Boundaries
16. Ground Pattern

I. HISTORY

It would seem that there are three main sources of inspiration of landscape design: Mesopotamia (the "Persian" garden), China and Greece. The Persian garden is based on mathematical uniformity; a characteristic plan is the square, a shape that never occurs naturally and yet is enjoyable in any landscape or climate, and that has had almost universal appeal for its tranquillity. The Chinese garden, on the other hand, is inspired by natural forms; its composition is subsidiary to the land, water and tree forms among which it is set. The third source has a somewhat later historical beginning, in classical Greece. This is the idea of individuality, the idea that each man has a mind of his own and that it is like that of no other man: the work in this tradition owes its character to the mind of each individual designer working within the framework of a grand philosophy. The Greek conception of life is in direct opposition to the so-called Persian, and it is interesting to note that classical Greece has been the only major civilization resolutely to resist the square plan form.

The great civilizations of antiquity were fairly evenly disposed about the 30° parallel, but only those north of this line seem to have been an active source of inspiration to modern times. To the south, the ancient civilizations of India, Egypt and the Americas have had to date little more than academic influence upon subsequent history.

In the 5th century B.C. each of the three historic civilizations reached its culmination and the individual styles of each had been evolved by the influence of geography, climate and geology of its area. At this time the traditions of Persia and Greece were in opposition, while China was wholly cut off by geography. When the silk road north of the Himalayas was opened from China to the west, the worlds of western and oriental antiquity became linked, only requiring time in which to circulate ideas as well as goods. It was not until the 18th century that the three converged and mingled, and the task of the 20th-century landscape designer is to hold them in proper balance, finding inspiration by the combination of the three.

Although the west and east have usually been separated in the conventional study of history, the method used here will be to consider them concurrently. For convenience the historical section has been divided into periods, the first roughly up to the death of Constantine (A.D. 337), the second roughly to the fall

of Granada and the discovery of America (1492), the third to 1700 and the fourth up to the opening of the 20th century.

1. Primitive to A.D. 300.—Monumental landscape architecture as it is now recognized undoubtedly began in the Nile valley, where the pyramids of Giza, built before 2500 B.C., together with the sphinx, form a group the scale of which has never been surpassed. Homes and gardens were also brought to a high degree of civilization and for the following 20 centuries the art of Egypt appears to have admirably resolved the superhuman and human scale. Yet the Nile valley had no serious influence on the development of landscape; this colossal architecture was more an expression of the grandeur of the dead than buildings erected to house the living.

Babylon, situated in the fertile alluvial plains of south Mesopotamia between the Tigris and the Euphrates, can be claimed to be the mother city of gardens; north of Babylon was a traditional site of the legendary Garden of Eden. Babylon became capital of an empire about 2000 B.C. and the city already under Hammurabi must have been magnificent. The fertility of the land depended upon a complete system of irrigation, which was not destroyed until the Tatar invasion in the 13th century A.D., and without which the land was to return to desert and unhealthy marsh. A feature of this flat landscape was the pyramidal ziggurat or temple tower. The horse was domesticated under the Assyrians and the vast enclosed park for hunting began to develop, the trees being planted at regular intervals in an otherwise barren landscape. Under Nebuchadrezzar, Babylon itself entered the period of its "hanging gardens," which were later counted as one of the seven wonders of the world. Within the mighty walls were broad raised processional ways, and countless palaces and gardens. The hanging gardens featured full-sized trees growing upon lofty vaults, the roots feeding on soil packed between the outer curves of the arches. Water was engineered to great heights for fountains and irrigation.

By the 5th century B.C. the Persian empire was the greatest the world had seen at that time; by previous and contemporary standards it was benevolent, civilized and generous. Because it was safe internally, it became possible to combine lowland and highland living, and Xerxes would spend the cool winter in the plain at Babylon and the summer in the mountains at Ecbatana. Until that time the practical, mathematically planted trees had almost governed the evolving landscape, but then flowers were cultivated in addition for their beauty. The official capital of the empire was Persepolis (*q.v.*), an astonishing composition of those square shapes that seem to symbolize all Persian landscape. The concept of design of the Persian garden is that of a fertile square set in a barren landscape. In order to keep it fertile, it was enclosed, irrigated and planted for shade. The plants were diverse and individual; the architecture was enriched with glazed tiles which gave permanent colour. Each of the elements was endowed with a certain significance; *e.g.*, the cross canals represented the four rivers of paradise, the cypress stood for eternity, fruit trees for life, etc. The garden was designed above all as a place for contemplation and meditation. Always simple and geometric, it gave its name and design in due course to the Persian paradise carpet.

In classical Greece there were no individual gardens, only groves of trees, and it was not until the flowering of the Renaissance in Italy that the artistic implications of Greek thought became manifest in garden design. In Athens in particular the Greeks created a landscape which was at once sublime and yet not formally organized. The typical Greek temple was placed picturesquely and not formally in such a way that it complemented the scenery and gave meaning to its environment of mountains, hills, valleys and above all to the rocky coast line and innumerable islands. While Athens remains supreme, the landscapes of mountainous Delphi, peaceful Olympia and Delos "the floating island" are each suggestive of their purpose. Great constructions like theatres and stadiums are built into the landscape and not upon it, as they were to be in Roman times.

Under Alexander the Great a new aspect of landscape entered the world: that of organized town planning and the rational approach to the disposition of landscape. The Roman empire carried this sense of organization still further and accomplished massive feats of engineering, such as vast barrel vaults, aqueducts and paved roads. In Rome itself the engineer's hand lay heavy upon the Palatine; the placing of the buildings such as the Colosseum (A.D. 75–82) is insensitive; the details of Hadrian's nearby magnificent villa at Tivoli (A.D. 117–138) are spectacular but crude. Imperial Rome created more fine landscape in the desert than in Italy, in such places as Baalbek and Palmyra in Syria, built during the 2nd century A.D., or Timgad in north Africa where town and desert are in splendid accord. Rome's greatest contribution to landscape was undoubtedly the city of Pompeii, whose siting, layout, architecture and wall paintings are superb. The city was destroyed in A.D. 79, but modern excavation enables a study to be made of the complete synthesis that existed between home and environment, of which the link is the open patio garden, rich with plants and sculpture. Pliny the Younger wrote a valuable description of the less-known Roman villas, and other literary remains such as Horace's description of his Sabine farm enable one to appreciate that under the apparent forcefulness of the Roman empire there was in fact a gentle sensitivity to landscape.

China, totally isolated from the west, came under the influence of Confucius in the 5th century B.C. and brought its arts to perfection under the Han dynasty (202 B.C.–A.D. 221). It is only remotely that either architecture or landscape of this period can be appreciated, for the buildings were invariably timber and have disappeared. Little or nothing is known of any ground modeling that might still exist. The serpentine line of the Great Wall (*c.* 221 B.C.) alone survives to remind one of the scale of Chinese activities; the wall has been described as the only work of man that could be seen from the moon. It can be concluded, however, that Chinese art was wholly original and complementary to those of Persia and Greece. It was an art that placed the buildings secondarily in a landscape of idealized nature, whether it was the compact symbolic square of a fortified city, or, more important, a sequence of small buildings set among trees and hills and water. The Chinese regarded themselves as a part of nature and the laws of nature as orderly, peaceful and helpful to humanity. They did not attempt to impose architectural forms on growing material, for their landscape was an organic projection of nature upon themselves instead of the reverse, as in the west. Stimulation came from the perpetual accidents such as waterfalls, caverns, surprises and incidents of all kinds. The art reached a climax and tended to remain in principle unchanged until disturbed by the impact of the west. Probably the greatest understanding of this ancient and significant art can be found in the following instructions in painting given by a master to his pupil. The date is A.D. 1026 but the art was certainly practised 1,000 years previously:

> Never paint even a stone without spirit; if you do, it will seem dead. Your painting must always show these things: the movement of the spirit through everything, the true form and colour of each thing that you paint, and the relation of things to each other. If a great mountain is the most important part of your picture, that mountain must seem like a host and the other hills and the trees like his guests. Look even at a flower: the blossom is a lovely lady and the leaves are her servants. So there must be a relation between all parts of your picture.

2. From 300 to 1500.—Christian architecture began secretly in the catacombs under Rome, and this introvert quality was continued when churches could be built above ground; the simple exteriors do not suggest the rich internal decoration of mosaic and make only a small contribution to the landscape. In A.D. 330 the capital of the Roman empire was moved to Byzantium (modern Istanbul) but even in the majestic dome of Hagia Sophia, begun in A.D. 532 and the culmination of architecture jointly of east and west at the time, the majesty is in the interior rather than the exterior. It was not until the expansion of Muslim power from the 7th century onward that the love of creation of pure landscape for its own sake was reawakened.

From A.D. 622, the year of the prophet's flight from Mecca to Medina, Islam spread with fury west along the shore of Africa to southern Spain, and east to northern India, where the Indian

"Palace by a River" painted by Li Ssu-hsun. An example of Chinese naturalism with a series of small buildings in an idealized landscape of hills, trees and water

A CHINESE LANDSCAPE PAINTING

BY COURTESY OF THE BRITISH MUSEUM

LANDSCAPE ARCHITECTURE

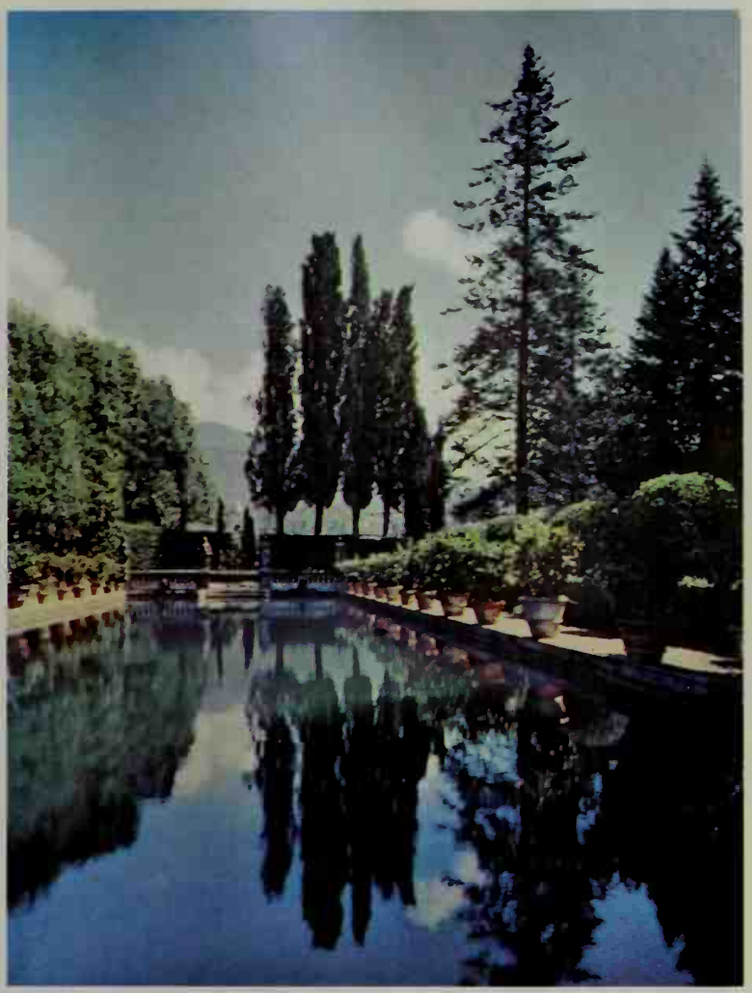
Villa Capponi, at Arcetri near Florence, Italy (1572); Italian Renaissance. A walled garden with geometrical flower beds and vine covered wall, it is designed to blend with the distant landscape

The Petit Trianon, Versailles, France (1766); English style garden featuring a circular pool

RENAISSANCE AND ENGLISH LANDSCAPE ARCHITECTURE

PHOTOGRAPHS: (TOP) SUSAN JELLICOE. (BOTTOM) LES ARCHIVES PHOTOGRAPHIQUES D'ART ET D'HISTOIRE

The garden of Villa La Pietra, overlooking the city of Florence, was built in the 15th century by Francesco Sassetti. It represents the purest style of Italian landscaping, having a simple, classic formality with evenly tapered cypresses and yew trimmed like classic urns



The pool is one of the oldest sections in the gardens of Villa Torrigiani near Lucca. It was built in the 17th century by a member of the Santini family. Statues of Roman gods line the balustrade in the background. At right is a row of lemon trees

The broad terrace at Montalto Pavese, an 18th-century garden overlooking the Po valley between Milan and Genoa, has intricate patterns characteristic of the ornateness that appeared in Italian art following the Renaissance. The hedge around the garden is made of yew; the clipped bushes inside are box. Small box are used to outline the fancifully shaped flower beds in which are planted geraniums, begonias, ageratums and coleus

ITALIAN GARDENS

PHOTOGRAPHS, DMITRI KESSEL FROM "LIFE" © 1950 TIME INC.

LANDSCAPE ARCHITECTURE

Aarhus university, Denmark. The architecture of the buildings on the campus was planned to blend with a natural site of undulating slopes

EDUCATIONAL AND COMMUNITY LAND-SCAPING

Vällingby, near Stockholm, Sweden. A pedestrian centre planned for a residential area of tall apartment buildings

BY COURTESY OF (TOP) C. F. MØLLER, PHOTOGRAPH, (BOTTOM) TONI SCHNEIDERS

Schönbrunn palace garden, one of the best preserved examples of the French palace garden, slopes up to the gloriette, a colonnade with a superb view of Vienna

Statues of Tyrolese marble near the terrace on the gloriette slope of the Schönbrunn palace

SCHÖNBRUNN PALACE GARDEN

PHOTOGRAPHS, INGE MORATH—MAGNUM

LANDSCAPE ARCHITECTURE

House in the Colorado desert near Palm Springs, Calif., with a panoramic view of San Jacinto mountain in the background. Features of the design are a shading roof and movable and closable vertical louvers which protect the gloriette terrace from sun radiation and from desert sandstorms. It was designed by Richard J. Neutra in 1944

MODERN LANDSCAPE ARCHITECTURE

BY COURTESY OF (BOTTOM) THOMAS D. CHURCH AND ASSOCIATES; PHOTOGRAPHS (TOP) RICHARD J. NEUTRA, PHOTOGRAPHY BY JULIUS SHULMAN, (BOTTOM) MORLEY BAER

Swimming pool and garden (1962), designed by Thomas D. Church and Associates for Mr. and Mrs. Dewey Donnell, Sonoma, Calif.

landscape art was to culminate in the 16th century under the Mogul dynasty. The Muslims were not themselves creative in landscape, but they were able to absorb the civilizations they conquered and in particular they were great carriers of knowledge. In the Koran, heaven and the paradise garden of the Persians are closely associated. In the middle east little remains of the magnificent "Arabian Nights" palaces that are recorded in history, but the Ottoman Turks have left a memorable landscape in the old 15th-century capital of Bursa in Anatolia. There city, fertile valley and mountains are comprehended in a single view, and the innumerable domes repeat the rounded hills. Another great monument of Muslim civilization is the Alhambra (*q.v.*), built by the Moorish rulers of Granada in southern Spain. It consists primarily of a sequence of enclosed courtyards, with glimpses through the surrounding walls to the city below and view beyond. The space design is reminiscent of desert oases, with their inspiration of foliage and cool depths and running waters; the detail throughout is exquisitely related to plant form. The whole city of Granada, including the old town, the hillsides enriched with buildings such as the Generalife, and the mighty and shapely wall and towers of the Alhambra itself, is still reminiscent of the Moorish period.

In Christian Europe the history of landscape is very different. Romanticism probably begins with the hermit living apart and inaccessible. The monasteries followed this example and are often set upon rocky crags such as those of Athos (Salonika), Subiaco (Italy), or Montserrat (Spain). The intellectual form of the Byzantine dome, its shape symbolic of rationalism, gives way to towers and spires that grow out of the landscape rather than sit upon it, as in classical architecture. Gradually the monasteries become little organized townships; one of the earliest surviving plans is that of St. Gall (900) in Switzerland which already contains a complete enclosed garden system. Contact with the vigorous Muslim world was either via Cordoba or through the crusades (11th–13th centuries), and it is interesting that the square cloister garden may be traced back through the cloisters of Tarragona in Spain or Monreale in Sicily to the original Persian garden of contemplation. In due course it came to inspire the shapes of the university colleges of the new learning.

The chief inspiration of all medieval landscape would appear to be its organic nature and its lack of conscious design. Venice and San Gimignano are examples of beauty of scenery arising from conditions of defense and ultimate survival. In Holland the towers and spires of one city were lent charm when they were seen across the flat geometrical landscape one from another. In England, however, buildings in the cultivated and friendly undulating countryside often showed conscious mastery of grouping in the landscape as at Fountains abbey (1132 *et seq.*), a source of inspiration to both 18th-century and modern romantics.

In India, Ceylon, Burma and elsewhere in Asia, there developed a complex society that has left rocklike and exuberant monuments of architecture and sculpture, of which Angkor Wat in Cambodia (*q.v.*) (A.D. 1112–52) is the most overwhelming.

In China, the arts of landscape continued equably. The first pagoda was said to have been built on the site of the present Nanking in A.D. 265. The first real knowledge to be received by the west was brought back by Marco Polo after his visit in 1278 to Hangchow, the capital of the great Kublai Khan. He described canals with "Twelve hundred bridges so lofty that a fleet could pass between them." Within the city there was a lake 30 mi. in circumference on whose shores were magnificent palaces and cloisters for silent monks; this majestic scene was called the Hangchow gardens, "above is heaven, below is reflected Hangchow." Peking itself, a city today the equal in beauty to any in the world, was founded by Kublai Khan in 1270. The first Ming emperor extended it after 1368 and it reached its zenith in the first half of the 15th century. The Manchus in the 17th century added to, but did not alter, the basic design. The interlocking of geometry and natural form in the plan shows a harmony with nature lacking in classical design until the 18th century in England.

Japan accepted Buddhism in the 6th century A.D. and thereafter received and absorbed the arts of China in its own way. The contribution of China was the regional or natural landscape on a grand scale; that of Japan was the development of the domestic unit as an art in itself. Within the confined space of a single house are contained the elements of the universe, symbolic as well as physical. The informal interlocking of house and garden, the dwarf plants to increase the feeling of extent, the symbolic stones, the mysteries of foliage and water, all combine to create a microcosm of the world in which the imagination can run free. Because it has no visible boundaries, the Japanese garden gives a feeling of the infinite and limitless: it is an art that has not yet been fully explored by the west. Kyōto is a city of such gardens. (*See* JAPANESE GARDEN.)

3. From 1500 to 1700.—The period opens with the rise and expansion of national power in Europe and a change of balance in the creative forces of landscape. Constantinople fell to the Ottoman Turks in 1453 and the domes and minarets of Suleiman the Magnificent were to alter its silhouette during the next century into the Muslim city of today. In northern India there was a final glorious flowering of Persian art under the Moguls, culminating in the Taj Mahal (*q.v.*) at Agra (1632–43), one of the wonders of the world. India, China and Japan were carrying on their earlier traditions at this time and not developing anything new.

There has been nothing in the world's history to compare in abundance and originality with the flowering of the so-called Renaissance in Europe. The germs of the Renaissance can be traced to Sicily and were probably stimulated by Arab contacts. The true beginning is in Florence. Petrarch and Giovanni Boccaccio first described the wonder of the living world, and slowly men's minds were drawn from the contemplation of the future world to appreciate the pleasures of the present. Enclosed gardens became open, and the garden became an extension of the geometry of the house into the landscape. The inquiring and inventive individual mind whose origin can be traced to the Greeks now produced an overwhelming number of original designs in space. The idea fundamental to the Renaissance was that man was the centre of the universe and all his art, essentially assured and finite, was a projection of this idea. This art provided complete satisfaction for the next five centuries and its values were not questioned until the 20th century. The materials of the gardens were evergreens, stone and water; flowers played no part; it was primarily a garden for dappled sunlight playing upon beautiful geometric proportions of space.

The famous gardens of the Italian Renaissance cannot here be enumerated in full. In Florence the house and terrace of the Villa Medici at Fiesole overlooking the city were started as early as 1458. Elsewhere in or round the city are the Boboli gardens (1550), the Villa Capponi at Arcetri (1572) and the Villa Gamberaia at Settignano (1610), a garden with almost as large a range of different moods as the human character possesses. The variety of sensation cannot be overstressed and ranges from the great extrovert terrace, overlooking splendid landscape, to the introvert *giardino segreto,* secret even from its own villa. In Rome the Renaissance began later and was more under the influence of classicism. The Villa Madama (1516–20) was designed by Raphael as a Roman villa. The most dramatic garden in existence is probably the Villa d'Este at Tivoli (1550) composed of terraces and great volumes of organized waterfalls and fountains; but the climax of the Renaissance design is undoubtedly the two works of Giacomo Vignola. The Casino of the Palazzo Farnese at Caprarola (completed 1587), a kind of monumental *giardino segreto,* is a masterpiece of pure delight; the Villa Lante at Bagnaia (begun 1564), with its square pool divided by bridges from the centre into four smaller pools, is a direct descendant of the paradise garden. Countless villas and their gardens were made throughout Italy, but it is two landscapes on the mainland of Venice that were to have most significance for future development. The first is the Villa Capra ("La Rotonda") (1550–53) by Palladio. A wholly symmetrical building set without formal gardens on the hillside near Vicenza, it relies for its effect on its perfect proportions and its elevated position from which the eye is not distracted by any garden. Taking its inspiration from the Greek

temple and deriving its effect in the same way, the Villa Rotonda was the main source of inspiration of the later English Palladian landscape. The second is the Villa Dona dalle Rose, Valzanzibio (begun 1690), which has the elements of domestic rather than monumental planning. There was much beautiful conscious urban landscape: the development of Venice and its seascapes; the fountains and co-ordinated improvements in Rome; the countless piazzas of small towns. Detail ranged from the very simple fun of soaking visitors with secret water jets to architectural shapes echoing the movements of water. The baroque age in Italy was highly theatrical and produced such magnificently romantic gardens as that of the Isola Bella on Lake Maggiore (1630). Outside the villas there was no organized landscape, although the sequence of great villas of Frascati may give such an impression.

In Spain the 16th century began auspiciously for the west with the fall of Granada and the subjection of the Arabs. Christian and Arab jointly created the gardens of the Alcázar at Seville, which with their Persian plan and detail (such as the coloured tiles) and Renaissance elements, are of interest to the historian. Later, Spain and Portugal made many pleasant gardens, among them La Granja in 1724, mainly under the influence of France or Italy.

In France there are two distinct and glorious periods of landscape: that of the Loire valley under Francis I, and that of Louis XIV and his landscape architect, André Le Nôtre (*q.v.*), at Versailles. The river scenery of the early 16th century consciously restored the romance of the middle ages, enriched by detail from Italy; no more remarkable water scenery exists than the bold conception of the chateau of Chenonceaux (1515) stretched on arches across the river Cher, for no other reason than for pleasure. From the Loire, the French court moved to Paris; from 1643 to 1715 Louis XIV was the leader of European politics and manners and set the fashion for landscape as for all the other arts. The first and still in many ways the most accomplished work of Le Nôtre was Vaux-le-Vicomte (completed 1661) for the unfortunate Nicolas Fouquet (*q.v.*). Thereafter, besides Versailles, Le Nôtre created masterpieces at Chantilly, Marly-le-Roi, Fontainebleau, Sceaux, Saint Cloud and elsewhere around Paris. The elements of design seemed based upon the formal principles of classical and contemporary Rome combined with the long straight avenues of the French hunting forest. Open parterres are combined with recessional views of almost unlimited extent; intersecting avenues, or *allées*, through woodland offer a series of vistas marked by axially placed fountains. These landscapes show a mastery of formal space design allied to experience of optical illusion that has not been surpassed, and inspired western town planning in the organization of landscape until the beginning of the 20th century. Pierre L'Enfant's noble plan for Washington, D.C., with its diagonal avenues converging on Capitol hill, imposed on a gridiron pattern of streets, with squares and fountains in the intersections, is a direct descendant from Le Nôtre. These great gardens and landscapes were, however, for the entertainment of the multitude of a court rather than for the individual. With their grand sense of scale and massive effects, they reflected the age of the absolute monarch and their emotional content is inadequate to meet the more human requirements and domestic scale demanded in the 20th century.

In Europe the influence of Versailles was paramount. In Germany modern cities, such as Karlsruhe, Mannheim, Bonn, Stuttgart and many others, owe their spaciousness to the fact that they have developed from the original stately avenues and open spaces of the 18th-century Schloss park. Poland, Scandinavia and Russia show French and Italian influence. Holland created an essentially domestic character based on brick architecture, canals and enclosed formal gardens. England showed many influences from abroad, but the beginning of a pure indigenous art of landscape is best studied at Bingham's Melcombe in Dorset (16th century *et seq.*). The elements are the enclosed sweet-smelling walled gardens, the open bowling green, clipped yew hedges, arbours, kitchen gardens, orchards and meadows. The Stuart garden is exemplified by Hatfield house, where the geometry of each façade is projected into the surroundings. As the 18th century proceeded so did the planting of avenues, a symbol of the historical character of the authority emanating from Versailles.

4. From 1700 to 1900.—The beginning of the century saw the completion of Peking under the Manchu-Tatar dynasty, carrying on original principles of Chinese art now tending to decline. In Europe, French formality was still the major influence, but this did not preclude considerable individual originality. In Italy the formal garden reached a climax in the Villa Caserta near Naples. In Austria a brief outburst of joy following the raising of the siege of Vienna from the Ottoman Turks in 1683 gave rise to superb Austrian baroque landscapes in the Belvedere in Vienna, the palace of Schönbrunn and romantically set monasteries such as that of Melk. The independent states of Germany each made their original contribution, of which the rococo Zwinger palace and gardens at Dresden (1711) are among the most interesting. The cascade at Wilhelmshöhe is the unfinished half of the mightiest single element of landscape conceived at that time, the climax of a prodigious landscape design that even today comprehends the adjoining town of Kassel. In Holland the characteristic Dutch garden was friendly and domestic, consisting of mainly high buildings and walls, topiary and canals. In England, Hampton Court was enlarged and Greenwich palace and many country houses were laid out under joint Italian, French and Dutch influence. In America a graceful new timber architecture on the east coast was creating a colonial tradition of white buildings set spaciously among great trees. Williamsburg, the restored old capital of Virginia, gives a unique idea of an elegant contemporary town built under Dutch and English influence, using brick for the principal buildings.

While classicism dominated the western world, however, a new romantic movement was germinating in England, a movement which has continued to influence the world into the 20th century. There appear to be two main roots of the English school of landscape gardening. The first can be traced through such European painters as Claude Lorraine and Nicolas Poussin to romantic Italian landscapes such as the falls and temple of Vesta at Tivoli and perhaps to the partially discovered wall paintings at Pompeii. The second undoubtedly came from China and became popular after Sir William Chambers (*q.v.*) had published *Designs of Chinese Buildings* in 1757, and laid out part of Kew gardens in the pure Chinese style. The Chinese approach to gardening, in which forms were suggested by nature rather than imposed on it, thus merged with the Persian and Greek traditions. The English landscape school originated as a literary movement against formality in gardens, pioneered by Addison and by Pope, who wrote in the *Moral Essays* to Lord Burlington:

> Grove nods to grove, each alley has a brother
> And half the platform just reflects the other

The first classical architect to be affected by the new movement was Sir John Vanbrugh (*q.v.*). His most significant work is Castle Howard in Yorkshire (1710 *et seq.*), where both the transition of styles and the organization of landscape on a great scale can be seen together; the strict formality near the house gives way to grand informality as the garden merges into the park, drawing out the qualities of the English scene of green fields, undulating land and round-headed hardwood trees. Another great work was Stowe in Buckinghamshire (1714 *et seq.*) begun by Vanbrugh and continued by others, which created an idealized landscape of great variety and nobility set without conflict in the English pastoral countryside. There it was that Charles Bridgeman made the first ha-ha or sunk fence, which dispensed with garden walls and hedges and allowed the eye to pass into the park beyond, thus making the park part of the garden.

William Kent (*q.v.*), architect and painter, was the first pure landscape gardener of the English school and was probably the most accomplished. It was he who, according to Horace Walpole, "leapt the fence and saw that all nature was a garden." His garden masterpiece is Rousham in Buckinghamshire (1740) but his most comprehensive landscape is probably that of Chiswick House (1734 *et seq.*), a direct descendant of the Rotonda of Palladio, built for his friend and patron, Lord Burlington.

The essential quality of this landscape is that of a beautifully

proportioned Palladian mansion set in a park of boundless extent, and from which all mortal endeavours were kept out of sight. There were no visible fences or boundaries and no arable land; deer took the place of cattle; there were church spires rather than farm buildings; approach roads were to be kept out of vision, and their indirect approach was therefore winding and screened by contrived natural obstructions. Within the whole there were unending variations and surprises: temples, grottoes, waterfalls, ruins, leafy glades with sculpture, and such features as would set the imagination off on journeys in time as well as space. Although this new-found art found close sympathy with Chinese experience, it was not pure Chinese. It appears that even in the largest palaces of early China the buildings comprised small units rather than a single massive establishment; the 18th-century English landscape-loving landowner still remained a classical aristocrat.

The landscape movement coincided with England's rise to world power and English landscape and ideas were predominant until the beginning of the 20th century. The influence abroad of the *jardin anglais* was considerable, for England gave back to Europe a tradition of informality as strong as the tradition of formalism she had received. In France the contrast between formal and informal is most complete at the Petit Trianon (1774), where the romantic hamlet set in its "Anglo-Chinese" scenery adjoins the classical palace, while other examples are the Parc Monceau in Paris and Rousseau's island tomb at Ermenonville. In Germany the prodigious romantic structures at Wilhelmshöhe were in scale with the great incomplete cascade, while English influence is seen at Schwetzingen, Weimar and elsewhere. As far north as Stockholm romantic structures were being erected to appear as anything from medieval ruins to Persian or Chinese pavilions, but very few of these landscape compositions had the peculiar quality of organized design that was so paramount in England. France, however, never fully embraced the romantic movement and continued in its own classical tradition; it is worthy of note that the open plan of modern Paris, extending from the Tuileries to the Arc de Triomphe, is based on the original design of Le Nôtre.

The forests had been cleared in England by 1550 and an even balance between trees and agriculture was maintained until around 1750, when tree denudation became serious because of the Industrial Revolution and because of the increase of population. At that date an air view would have shown the countryside dotted with hundreds of parks. The greatest exponent of park planning was Lancelot Brown (*q.v.*) called "Capability" for his reference to the "capabilities" of a site. Brown's masterpiece was the landscape at Blenheim palace (1760), mainly created by damming a small stream to give the illusion of a broad river running to infinity; of Blenheim, Brown said "Thames, Thames, wilt thou ever forgive me?" Brown's method of design was so rationalized, with the use of tree groups or clumps and meadowland and the design of water, that he could apply his principles at immediate notice and with remarkable perception to any given site. Though Brown's legacy of landscape is admired today, his method was not approved by contemporaries, who considered that he missed the finer points of design. Among the more masterly designs by amateurs are Stourhead, Wiltshire (1740), and Pains Hill, Surrey. The latter, by Charles Hamilton, is sadly neglected but nevertheless conveys, like no other western garden, the idea of an unfolding and contrasting sequence of views reminiscent of a Chinese scroll. Humphrey Repton (1752–1818) succeeded as the dominating professional and to him is owed the most remarkable analysis of the English school yet made, *Sketches and Hints on Landscape Gardening,* first published in 1794, and the basis of study even in the 20th century.

By the early 19th century romantic castle settings such as that of Arundel or of Windsor (James Wyatt) inspired copies on a gigantic scale and by the middle of the century Queen Victoria's fondness for Balmoral (1855) in Scotland made this type of highland landscape, with conifers and romantic buildings of granite, fashionable. Indeed it is curious to note the gradual move northward of creative ideas in landscape: Scotland was the last place to nurture an art whose life force had passed through the centuries from the warm climate of the middle east to this outpost of western civilization. The 19th century ended an epoch in landscape and thereafter this life force was disseminated and reappeared all over the globe.

Toward the end of the 18th century the planning of towns began to be influenced by landscape. John Wood, with early experience in the grounds of Bramham park, Yorkshire, drew up plans for Bath in which the contrast of open and enclosed spaces created a new concept of urban planning; his son, also named John Wood, continued the work, building the Royal Crescent between 1767–75, and created a new street form. The plan by James Craig for the new Edinburgh was adopted in 1767, and remains one of the grandest combinations of complementary classical and romantic scenery. In London Repton and the architect John Nash (1752–1835) together created Regency London from St. James's park to Regent's park as a single idea. The country was now firmly installed within the urban envelope, for the essential quality of the London park is sense of space and remoteness from town. On the south coast the new towns of Brighton and Hove created a gracious classical sea scenery, enlivened with the eastern domes and minarets of the pavilion. The spa, indeed, was the inspiration of many tree-filled new towns such as Cheltenham and Leamington. By 1840 the original creative force was spent and the art of landscape planning, as opposed to gardening, was not to revive decisively for at least 100 years.

The impact of flowers on garden design was felt after Trafalgar (1805) which opened the way to explorers and naturalists in all parts of the world. The Royal Horticultural society had been founded in 1804. New species of trees, especially conifer, shrubs and flowers, poured into England and altered the traditional scene. The conservatory made its appearance. The architect was first overwhelmed by the horticulturalist and then responded with a return to the Italianate gardens of the Renaissance in such great houses as Trentham in Nottingham (1850) by Sir Charles Barry. The Crystal palace (1851) marked a new era in urban landscape when Sir Joseph Paxton, with the aid of new engineering techniques, used a steel and glass conservatory to house men instead of plants. In 1883 there was a revolt against all things foreign, especially plants, heralded by the publication of *The English Flower Garden* by William Robinson. This revolt began a return-to-nature movement and ultimately led to the garden city, first established at Bournville by the Cadbury brothers in 1895. The designing of the domestic house and garden, based on historical tradition, was brought to a fine art by Sir Edwin Lutyens and Gertrude Jekyll working in combination.

The Industrial Revolution, which began in the 18th century, gathered momentum in the 19th and 20th centuries and left its mark on landscape in both Europe and America; new towns, factories and ports spread and railways cut across the country, leaving in some places magnificent viaducts reminiscent of Roman aqueducts. The engineers I. K. Brunel and Thomas Telford stand supreme in this field in which Clifton suspension bridge, designed by Brunel in 1831, is a fine example.

In North America modern landscape history begins with Frederick Law Olmsted (1822–1903), who originated the title and profession of "landscape architect." In 1857 he became responsible for New York's 840-ac. Central park, whose design was inspired by the English school but adapted for a public park capable of absorbing a multitude of city dwellers and providing some privacy for them. Here too is an early example of segregation of pedestrian and vehicle which was to preoccupy the next century. By the end of the 19th century, organized American landscape planning was established, and was seen especially in universities, expositions and in parks of all kinds—most particularly in the creation of the first national parks, a new phenomenon.

The sign of comprehensive planning appeared at the Chicago exposition of 1893, but for boldness of visual conception there was nothing to equal the Paris exhibition of 1889, when the Eiffel tower ignored the academic tradition of planning of the École des Beaux-Arts and gave a silhouette to Paris a century in advance of its time. The initiative for material development from this time onward lay with the United States, but the art impulse of the

20th century undoubtedly germinated in the French capital.

II. 20th CENTURY

By 1900 a potentially vast field for landscaping opened and the necessity for co-ordinated design grew with the rise in population, the increased wealth of the community, the demand for amenity and the general pressure on land which began to be in short supply. Instead of continuing the orderly evolution of a western tradition, the subject breaks into national subdivisions, in which the United States, Great Britain, Germany, Switzerland, and the Scandinavian and South American countries make their own contribution. There was also activity in Japan, though in the early 1960s it was too early to see if the work was original or too much under the influence of the west. In Russia, a country that has always borrowed its landscape designs from the west, there was great activity but little creative design.

In the 20th century landscape architecture lagged far behind painting, sculpture and architecture in experimenting with new forms, although there are historic precedents for the use of abstract art in landscape; the most famous is probably the 15th-century sand and rock garden at the Ryoan-ji temple, Kyōto, in Japan. A simple 20th-century illustration in landscape is the artificial hills at Harwell, Eng., which the eye sees as an outcrop of the Berkshire hills but which are clearly designed to appeal to the subconscious.

It was not until the painter-landscape architect Roberto Burle Marx completed designs in Brazil that consciousness of the significance of abstract forms in environment was first appreciated. In England the influence of such artists as Paul Klee, Graham Sutherland, Henry Moore, Victor Pasmore and Ben Nicholson has been paramount in pioneering the new aesthetic.

1. Gardens.—At the beginning of the 20th century the prestige of England was still supreme. Gardens were first either dominated by magnificent horticultural planting such as at Bodnant in Wales or by the architectural tradition which might resuscitate any style from Elizabethan or Georgian to Italian (for which historical ornament was sent from Italy). From 1918 onward, however, gardens tended to grow smaller and were planned for economical maintenance; inspiration was sought from other countries, especially from Scandinavia. There the relation between informal house and garden is gentle and close, an example being the home of Sven Markelius at Kevinge, Stockholm, where low buildings are set among trees with beautifully modeled ground undulations made from spoil from foundations. In the United States the early works of Frank Lloyd Wright, such as "Fallingwater," helped to break down tradition. The highest level in co-ordinated house-and-garden design has undoubtedly been reached in California by such practitioners as Richard Neutra, Thomas Church and Laurence Halprin. Partly, no doubt, because of association with Japan and China, the conception of a home is far removed from the traditional western "box" of pronounced contrast between open and closed. The new science of heating has created a closer relation between homes and garden. In the design of plants the influence of William Robinson and Gertrude Jekyll is still felt.

2. Housing and Town Planning.—Moved by a social conscience outraged by the slums and desolation of the 19th century, England created the garden village. The philosopher of the new age was Patrick Geddes (*q.v.*), followed by the American Lewis Mumford, who remains a world influence. The basic idea was that every family of every degree was entitled to certain amenities previously denied, such as garden space. Ebenezer Howard's conception of the garden suburb of Hampstead and the garden cities of Letchworth and Welwyn were in advance of anything yet imagined: each house was to have a garden, the whole to be romantically grouped and surrounded by an agricultural green belt. In the United States the green-belt towns were attempted as a unified landscape. Clarence Stein and Henry Wright made landscape-planning history at Radburn, N.J., soon after 1930 when they segregated car and pedestrian traffic in a residential area. In 1941 Baldwin Hills Village, Los Angeles, for which Stein was a consultant, developed further the design of "back access" for vehicles only, leaving the fronts for communal gardens. (*See* GARDEN CITY.)

In the early 1960s England had virtually completed 15 "new towns" projected after World War II, the patterns of which had been designed by the town planner and landscape architect in joint consultation. Of these, Harlow New Town, by Frederick Gibberd, is a single concept of design comprising many square miles in which groups of buildings called "neighbourhoods" are separated by green areas one from another. The planned densities of population have since been considered too low and the projected layout for the "new town" of Hook for the London county council, later abandoned, suggested a more compact town surrounded by a green belt, excluding landscape from the central area. In Sweden the new town of Vällingby, near Stockholm, is more dramatic, being based on tall apartment buildings grouped round a centre reserved for pedestrians. In Finland Tapiola, near Helsinki, is a superb landscape conception of modern architecture grouped among conifer forests with distant water scenery. At Stuttgart in south Germany the replanning of the central area, including the Schloss park, has produced a remarkable urban landscape. The emotional content of the plan of Chandigarh, capital of the Punjab, India, by Le Corbusier, recalls old Peking in its formal and informal landscape values, and is designed to be part of a scenery that includes the adjoining Himalayan mountains. In all modern town planning the work of the landscape architect has its place, whether it is in the initial sketch plans of the shape of the town in relation to environment; or the design of public open spaces or street vistas; or the consideration of planting or seats or pavings or fencing or the use of odd corners and land "left over." To all this he will bring a study of human behaviour, patterns and experience of climate, of plant behaviour and of hard materials. (*See* also CITY PLANNING.)

3. Cemeteries and Crematoria.—By the 19th century in England and some other European countries the tradition of the cemetery had become disturbing in its wilderness of marble tombstones. In the United States, Forest Lawn, Los Angeles county, Calif., was planned as a series of smaller units within a landscape whole while Graceland cemetery, Chicago, Ill., by O. C. Simonds, was in the tradition of the public parks. In Sweden Gunnar Asplund's Woodland crematorium near Stockholm is one of the finest achievements of the landscape architect; the artificially constructed hill, grass-covered and tree-crowned, contrasts with the geometry of the buildings and forms a scene that remains all the more memorable for its call upon the imagination.

4. The Park.—The 19th century saw the establishment of the town park all over the world. Under modern town planning the parks are usually linked in idea as a complete system of planned avenues and regulated green spaces, of which the city of Washington, D.C., is probably the most splendid example. The tradition continues, but mainly because of the mobility of the car, has burst out of the city into the countryside. In Switzerland delightful new bathing places such as at Tiefenbrunnen at Zürich by Hans Nussbaumer, are primarily landscape parks. Seafronts have been replanned as a total landscape to comprise view terraces for cars as well as for pedestrians. In Norway the towns are surrounded with ski parks, catering for the national sport, and at Trondheim the landscape architect has planned a ski-way, green in summer, direct into the heart of the city. The projects of the landscape architect include children's play areas, old peoples' gardens, the car park and its concealment or otherwise, the problem of replanting old avenues, etc., as in the London parks, the placing of the monument and public fountain, swimming pools and lidos, and so forth. The most advanced of town parks are probably those on the bombed sites of western Germany, such as that at Cologne. Of amusement parks, the finest existing is probably the Tivoli gardens at Copenhagen, of which the mid-20th century flower garden with circular pools can rank as high as any in history.

5. The National Park.—The United States has led the world in the creation of national parks, not only in initiative, number and selection of area, but in the controlled exploitation of the area by the tourist. Although the Hot Springs region in central

Arkansas was reserved as early as 1832, the modern system of the national park service was formed only in 1916. The largest is the Yellowstone National park, northwestern Wyoming, 3,348 sq.mi. in extent; the most famous is the Grand canyon of Arizona, described as "the greatest example of erosion and the most sublime spectacle in the world." The example of the United States has been followed elsewhere in the world, notably in Canada and in the game reserves of Africa. England only created a national park system in 1949 and, after the passing of the act, has become concerned with the preservation not only of natural scenery but also of such agricultural landscapes as parts of Dorset, which are designated areas of high amenity. The national parks movement springs from the realization that men cannot live a full life if permanently out of contact with nature, and that if steps are not taken to preserve it, there may be no significantly large and easily accessible areas left in which such a contact can be made. The creation and maintenance of a national park calls for the greatest care and modesty on the part of the landscape architect, for, unlike most ordinary works of art, it must not express a human personality. (*See* NATIONAL PARKS AND NATURE RESERVES.)

6. Health and Education.—The modern tendency to separate more and more the functions of the specialist is shown in the functional design of the average hospital. It was only after World War II that consideration of the effect of environment upon the mind began to influence the shape, disposition and setting of the modern hospital, although the restorative effect of a pleasant environment was recognized long ago by the Greeks, in the health resorts and sanatoria of the island of Cos, for example. In some countries, however, and in Switzerland especially, care and money are expended to design buildings and landscape as a single pleasurable unit; a good example is the hospital at Waid, near Zürich, by Gustav and Peter Amman. In school building the advantages of gracious surroundings have always been recognized, reaching their zenith in the English public school, such as Charterhouse, in the 19th century. The 20th-century school is in the same tradition but, following the general trend, the buildings are designed as small units that merge informally into a landscape of trees and playing fields. In the United States the design of the university campus has tended to follow the formal tradition, but at Aarhus in Denmark (landscape architect, C. T. Sørensen) the beautiful site undulations have inspired the grouping and detail of buildings into a composition that is significant in its informality. (*See* EDUCATIONAL ARCHITECTURE.)

7. Industry and Engineering.—In the 19th century, in England especially, the owner-manufacturer appeared to have believed "where there's muck, there's money." By mid-20th century there were two pressures on the industrialist, apart from self-esteem, to create an agreeable environment: that of the planning authority who might impose the employment of a landscape architect as a condition of approval of a new development, and that of the employee who was increasingly demanding pleasanter working conditions and social and sports facilities.

In England large-scale works need to be reconciled with the small scale of existing landscapė; good examples are the nuclear power stations of the Central Electricity Generating board. To overcome a clash of ideas the consultant landscape architect and engineer may be appointed in advance of the construction firm. Successful landscaping may be seen at Trawsfynydd in north Wales (Sylvia Crowe). In the United States the General Motors Technical centre designed by Eero Saarinen combines buildings and water on a heroic scale.

Great engineering projects can be a magnificent addition to a scene; one of the greatest landscapes is the Golden Gate bridge (1933–37), at San Francisco, which is seen against a bay of the Pacific and the rolling hills beyond; O. H. Ammann was the consultant. Robert Maillart has designed many fine bridges in France and Switzerland such as Le Châtelard bridge above Martigny and the Salginatobel bridge near Schiers. The successful relationship between such great and efficient works of man and those of nature is fundamentally a relation in scale. One of the world's most impressive spectacles is the curving Hoover dam on the Colorado river, its superhuman simplicity of scale echoing that of the surrounding natural scenery. Man the individual has no place in this scene, which resembles, in this respect, the landscape of ancient Egypt.

8. Reclamation.—The Netherlands and Israel lead the world in the creation of wholly new lands, the one from the sea and the other from the desert; such works can create a new man-made landscape of the greatest beauty; *e.g.*, the North East Polder. In North America parts of southern California and New Mexico have been attractively reclaimed. In Florida landscape architecture inspired in 1905 the artificial and commercially successful island in Miami bay and also the lagoons and building plots of the Cocoa Islands (1959) by Eugene R. Martini and associates.

The denudation of the land of its trees all over the globe has been a destructive legacy, and a great task still lies ahead in the planting of woods and forests. In England serious aesthetic problems arise when a modern economy calls for the softwood rather than the hardwood tree, and the countryside is subject to mass conifer planting, killing most animal and plant life as it comes. Thetford forest in East Anglia and Eskdale in the Lake District are examples of compromise jointly studied by the forestry commission and the Council for the Preservation of Rural England. In the United States the forest service is authorized to reserve and tend portions of forest, notably in Michigan, Minnesota, Pennsylvania and Washington. In industrial Europe the pressure on land has made the reclamation of waste areas, dumps and so forth economically desirable, for instance in the Ruhr of West Germany and elsewhere. Probably the most systematic plan in England is that of the landscape architects in the County Planning office in Durham. In Swansea in south Wales a special research team of consultants is studying total reclamation of backland and foreshore.

9. Roads and Parkways.—Roads of the 19th century throughout the world were satisfactory for horses and horse-drawn vehicles but the coming of the motor altered road design and introduced the idea of landscape seen in motion. The United States, where the pioneer has been Gilmore D. Clarke, has made the greatest contribution to road design; a successful example is the Connecticut turnpike. In particular, the United States evolved the parkway, a broad, tree-planted road that appeared to bring the countryside into the city. The study of road design introduced a new field for the landscape architect, for the engineering and social problems had to be linked to the aesthetic problem of moving scenery. Germany followed the United States in the 1930s with the Autobahnen, probably the first roads in Europe to exclude all but fast-moving vehicles, and remarkable examples of coordinated engineering and landscape design; the pioneer has been Alwin Seifert. The work of the landscape architect is to advise on the initial route, help soften the contours and curves, use waste soil creatively, adjust the boundaries and harmonize with the adjoining countryside and plant for variety of light and shade and protection against dazzle and wind.

10. The International Exhibition.—The exhibition is intended to display the best achievements of national design and has therefore been a stimulus to landscape architecture. The late 19th-century tradition was followed particularly in the United States by such great co-ordinated planning projects as the Louisiana Purchase exposition, St. Louis, 1904 (Olmsted brothers), the Panama-California exposition, San Diego, 1915 (B. G. Goodhue), and others, all of which tended to be based on the classical planning precepts of the École des Beaux-Arts. The first great world fair finally to break with this tradition was the Festival of Britain, London, 1951 (Sir Hugh Casson). Among the most beautiful of smaller exhibitions have been those of Switzerland and Scandinavia, such as Halsingborg, 1955. The Brussels exhibition of 1958 in its section of foreign pavilions demonstrated how buildings of a diverse nature could be united and harmonized by informal landscape; of the many individual buildings the pavilion of the Federal Republic of Germany by Egon Eiermann and Sep Ruf provided a broken grouping through which the landscape appeared to flow uninterruptedly.

11. Regional Planning.—The concept of the co-ordinated planning of a great area is by no means modern, but it is only

in the 20th century that such comprehensive planning has been generally accepted as essential. Among the team of specialists is the landscape architect; in England he accepts the over-all leadership of the county planning officer but he remains on terms of equality with the surveyor and engineer. He sees and assesses the value of individual buildings in the scene as a whole, and will work with the architect who is responsible for the execution of these buildings. In making the initial plan he must assess the qualities of the existing country, including the ecology. He must know the aesthetic impact of the multitude of features of the modern world such as the pylon and advertisements, and he must co-ordinate these into a picture with sensibility. Probably the greatest achievement of such comprehensive planning is that of the Tennessee Valley authority in the United States, which has covered an area larger than England. Buildings and services are not only planned in balanced groups but a harmonious relationship is achieved between the different groups and the river. It is works like these that are especially a source of inspiration to both the underdeveloped and overpopulated countries throughout the world. To the landscape architect they are at once an inspiration and a challenge. (*See* also REGIONAL PLANNING.) (G. A. JE.)

12. Professional Training.—The profession of landscape architecture was developed in the 1890s and early 1900s in the United States and, with the possible exception of West Germany, no country has the same degree of educational organization. The American Society of Landscape Architects was founded in 1899 and later organized into chapters in various regions. Admission is controlled by an examining board. A committee of education acts on behalf of the society, setting the professional standard and working with institutions offering landscape design in their curricula. The basic curricula requires a student to spend roughly one-third of his time on landscape design and professional practice, one-sixth each on landscape construction and on architecture and rather less than one-sixth on the study of plants.

The first professional degree course was established at Harvard university in 1900. Others followed at Cornell university, the University of Illinois and the University of Michigan. In the early 1960s there were 17 full-time university degree courses at California State Polytechnic college, the University of California, the University of Georgia, Harvard university, the University of Illinois, Iowa State university, Louisiana State university, the University of Massachusetts, Michigan State university, the University of Michigan, New York State College of Forestry, North Carolina State college, Ohio State university, the University of Oregon, Pennsylvania State university, the University of Pennsylvania and the Rhode Island School of Design. Courses normally require four years with one to two additional years for an M.L.A. degree.

Landscape architecture became established in Germany, Sweden, the Netherlands and Japan in the early 1900s. In Germany, societies of landscape architects were founded in the early 20th century, the Deutsche Gesellschaft für Gartenkunst and the Bund Deutscher Garten-und-Landschaftsarchitekten. Professional training is offered at the Institut für Offentliche Grundplannung und Garten-gestaltung der Technischen Hochschule, Hanover, Technische Hochschule, Munich, and the Technical University of Berlin. The Swedish Föreningen Svenska Trädgaardsarkitekten was founded in 1921. A special course for landscape architects at the horticultural training college was started in Alnarp Trädgaardsinstitut in 1933. The Bond van Nederlandse Tuinarchitecten was organized in 1922. The highest training in professional landscape architecture offered in the Netherlands is at the Agricultural university. The Japanese Institute of Landscape Architects maintains professional standards in Japan. Training is offered at the Universities of Tokyo and Kyōto. Part-time courses are given at the Universities of Chiba, Hokkaido, Osaka Furitsu and Tokyo. A magazine has been published since 1925.

There was no organized profession in Britain until 1929 when the Institute of Landscape Architects was founded. Professional training began in the same year with a one-year postgraduate course at Durham university. In the early 1960s Durham university offered a four-year course on land use and an additional postgraduate year in landscape architecture. In 1960 Edinburgh university initiated a two-year postgraduate course, while Gloucester College of Art, Cheltenham, began a three-year undergraduate course. Part-time courses are given at the Universities of London, Leeds, Birmingham, Nottingham and the College of Arts, Dundee.

The Association Belge des Architectes de Jardin was formed in 1930. Training courses are available at École d'Horticulture Vilvorde-les-Bruxelles and the Rijkstuinbouwschool at Melle-les-Gent.

The Dansk Havearkitektforening was organized in 1931 and assumed publication of the periodical *Havenkunst*. A professional course is offered in the horticultural department of the Royal Agriculture-Veterinary Medicine College of Denmark. Norway's professional association is the Norske Hagearkitektlag. A curriculum is offered by the Institute of Landscape Architecture, Agricultural College of Norway.

The Société Française d'Architecture de Jardin was formed in France. In 1946 l'École Nationale d'Horticulture, at Versailles, established a special section devoted to landscape and the art of gardens.

The Italian Landscape institute was founded in 1938 and professional courses are given in the architectural schools at the Universities of Florence, Venice and Rome.

The Austrian Verband Österreichischer Garten und Landschaftsplaner was founded in 1946. Seminars in landscape training are offered in the agricultural departments of Vienna university and the Vienna Technical college.

In the Iberian peninsula the Portuguese Centro de Estudos de Jardinagem y Arte Paisagista and the Spanish Instituto de Estudios de Jardinería y Arte Paisajista were both organized in 1953. A five-year course is available in the Universidade Technica de Lisboa. In Spain partial training is available in the school of architecture at Madrid, Barcelona and Seville and the Técnica Superior de Ingenieros Agrónomos in Madrid and Valencia.

Partial, but not complete, curricula are offered in Czechoslovakia at the technical universities in Brno, Prague and Bratislava, in Hungary at the College for Horticulture and Viticulture, and in Israel at the Institute of Technology, Haifa. In the U.S.S.R., courses are offered in Moscow at the Architecture institute, the Forestry Technique institute and the Building Engineering institute; in Leningrad at the Academy of Arts, the Forestry Technique institute and the Building Engineering institute. In Yugoslavia special lectures and seminars take place at the Universities of Ljubljana and Zagreb.

The International Federation of Landscape Architects was founded at Cambridge, Eng., in 1948. International conferences are held biannually. In 1960 the federation adopted the minimum standards of education of the committee on education of the American Society of Landscape Architects to serve as the educational goal of the constituent organizations. (H. B. O.)

III. THEORY AND TECHNIQUE OF DESIGN

The landscape designer has a dual function to fulfill: he must approach the problem first as a scientist, examining and analyzing all the circumstances and conditions of the site; then, as an artist with a profound knowledge of his living materials, he must be able to create a landscape, working within a given framework. This may be on as large a scale as the plotting of a site for a new town or the planning of the most suitable course for a new highway, or as intimate as the designing of a garden for a town house or the playspace for a kindergarten.

In many large-scale undertakings, such as the planning of new towns, parks, highways, etc., the landscape architect will be working as one of a team of consultants, which may include architects, civil engineers, town planners and traffic experts, and it is important that someone should take the lead in these projects. In regional planning it is the town planner; in great functional programs like roads, bridges and power stations, it is the engineer; in projects centred on buildings, it is the architect; in the planning of parks, the landscape architect is in charge.

The preliminary conditions to be considered include the use for

which the site is intended; topographical factors; climatic and geological factors such as temperature, wind, soil and moisture conditions; historical factors; and lastly economic factors which modify the effect of all the others.

The most important single factor governing the design is the use to which the site is to be put. The landscape designer must be prepared not only to study the client's instructions and the aims of his project, but if necessary to clarify them and supply the imaginative ideas. It is important to make a thorough survey of the site, exploiting existing topographical features, and also to note the salient points of the surrounding neighbourhood. In many cases, for instance, the landscape architect can save the client unnecessary expense by judicious siting or by foreseeing possible surplus soil and making use of it.

Climatic factors are also of fundamental importance and should be considered together with the geology of the area; for example, the effects of a high rainfall differ on sandy and on heavy soils By judicious planting of windscreens it is sometimes possible to produce a "micro-climate."

Historical factors which derive both from artistic and scientific sources may contribute to the final design; vistas may be influenced by some local feature of historical interest, such as a Roman road or a historically significant building.

Economic factors include the cost of construction and maintenance and in some cases, a possible income to be derived from the use of the land. Where the use is to be profitable a higher outlay on construction may be justified. Formerly the great majority of landscaping was done for private clients who generally wished to see some immediate effect for their outlay; in modern times public bodies and corporations have taken over so much development that a longer-term approach is possible and effects may be planned for the benefit of posterity.

The larger problems having been enumerated, the principles of design may now be considered.

1. Unity of Design.—The most important principle of design is unity. To obtain it, it is essential to have an over-all plan which should have character, coherence and a continuity of scale, the parts being subordinated to the whole. One part of a garden affects another even though the two may not be seen together. The paper plan is the projection of the total effect upon the mind. In architecture, a good plan has an underlying harmony between all its parts, but may have also a contrast between one group of parts and another; this also applies to landscape planning.

The great gardens of the world all demonstrate a unity of conception and execution which gives them their individual style; one theme dominated the mind of their designers, for example, water in the Villa d'Este, classical grandeur in the composition of Le Nôtre, and a glorification of nature in the sweeping landscapes of "Capability" Brown and Repton.

Sylvia Crowe in *Garden Design* (1958) said: "This difference between the introvert garden, to be experienced from within, and the extrovert garden, to be admired from without, is a psychological factor of design whose influence has varied from age to age. The Baroque were the most extrovert of gardens, but even in them a *giardino segreto* or *Kamer Garten* was felt necessary in which to find intimacy and seclusion. . . . The introvert influence reached its zenith in the deep shady walks, the mysterious caves and dark ravines of the romantic period."

The need of 20th-century society is for diversity; parks and gardens are no longer the preserves of the privileged few, but must satisfy many. The private garden, by contrast, should represent the character and needs of the owner, and thus fill its historic role of compensating the individual for the incompatibilities of the outside world; but if this need is developed with sincerity and sensitivity to the environment, it is likely also to give pleasure to others.

"There are, however, two types of pattern which may be considered typical of the 20th century. One is the composition of free forms floating over each other and interlocking in different planes to form the rhythmic pattern of the abstract garden," as exemplified by some of Burle Marx's gardens in Brazil; "the other is the cellular honeycomb design which has been developed to a high degree in Scandinavia." (Sylvia Crowe, *Garden Design,* 1958.)

2. Scale and Proportion are fundamental to a general unity of design, but in landscape design one element of the scale is the limitless expanse of sky and horizon. In the private garden the scale must be related to that of the human body; in town parks to that of the surrounding buildings and the crowds likely to use the open space. On parkways and highways the scale is affected by the rate at which the viewer is traveling, so that the road landscape must be designed for high speeds; *i.e.,* there must be great simplicity and breadth of effect, a streamlining of the road. Those effects which the eye has always enjoyed, the passing from light to shade, the contrast of closed and open views, the framed view, the focal point, the rhythmic line of swept contours, have all to be translated to the new scale of speed. Another factor is that distant views become more important than near ones, therefore wherever possible the sides of the road should form quiet unobtrusive foreground to distant views. Where there is no distant view, the roadside should still be peaceful and rely for pleasure on long-sustained effects.

3. Space Division.—In designing a large or small area it will generally be found desirable to emphasize a sense of free movement, with the space flowing from one area to another. The definition of the lesser spaces needs to be logical and clear so that changes of mood, brought about by alterations of scale, colour and mode of treatment, may be fully appreciated. The great landscape schools of the past differed in their treatment; the French tradition of a symmetrical series of spaces enclosed by trees or hedges may still be seen in many town gardens. Orchards and woodland gardens, with their pattern of mass and open spaces flowing into each other, echo the Alhambra garden with its colonnades, whereas in Scandinavian gardens the columns of tree trunks are often used as a framework to contain focal points in the form of buildings or sculpture. The Japanese garden has a compact and severe form, and since the beginning of the 20th century has been much imitated when a small space is to be planned; but the asymmetrical grouping of the main mass must be as definitely proportioned as the composition of the classic formal garden.

4. Land Form.—Inspired use of land form is the basis of most great gardens. Some communities have been particularly sensitive to their environment and have felt the need of contrasting shapes; thus arose the ziggurat and pyramid in the flat lands of Mesopotamia and Egypt, the Greek temple on a rocky height and the high brick churches of Holland. Hills have inspired men of different races to use them for worship and contemplation, from the early Chinese mountain monasteries to the Monte Sacro of Italy and the sacred processional stairway up to the hill gardens at Braga and Lamego in Portugal.

The Italian garden evolved from the terracing of the hillside; some classical French gardens used the valley and crossfall of the site, while the English park idealized and accentuated the undulations of the ground to form a composition of gentle hills crowned with trees or temples overlooking lake-filled valleys.

The eye tends to follow long, continuous lines, such as a valley, and this can be encouraged by framing the view on either side. Ground falling away to one side of the view tends to distract the eye and a counterpoise is required to guide the eye back to the centre. An alternative tendency, to look straight down the side of a hill across the contours, has been used as the basis of both formal and informal designs.

Artificial hills have been made since prehistoric times. In the 20th century, with modern earth-moving machinery at his disposal, the landscape architect has made use of it in forming hills to screen power stations, etc., and also for leveling when reclaiming ground after strip or opencast mining operations, or naturalizing tips on industrial wasteland.

In Copenhagen C. T. Sørensen constructed an amphitheatre as a setting for tall apartment buildings. A good example of contouring on more natural lines is the artificial hill in Gunnar Asplund's Woodland crematorium near Stockholm.

When artificial lakes are to be made, intelligent use of contours is essential. "Capability" Brown made his slopes flow gently and continuously down to the water, which was always situated at the

lowest point in the view, sometimes a small stream being dammed up to form a lake. Informal contouring can help to blend buildings into the natural surroundings on hilly sites and some Swiss and Swedish designers have used this method with conspicuous success.

Sometimes a small level garden may be made more interesting by raising the sides and back into a horseshoe formation, but the shaping of the ground should not conflict with the immediate surroundings of the house; for example, a classical terrace would need a formal grass bank to support it.

5. Time.—In landscape design time plays a greater part than in any other art, but a well-proportioned design in which the land form, existing trees and architecture have been duly considered will be pleasing even in the early stages of plant growth. Gardens which rely only on the beauty of the plants for their effect are the most vulnerable to time and neglect.

6. Light and Shade.—The use of light and shade is closely related to that of mass and open space. The need for shade in hot countries, and for sunlight in the northern ones, has influenced the development of national styles. In designing special features the position of the light should always be a consideration; texture and modeling are only effective when light falls onto them; silhouetted form such as wrought iron should be seen against the light.

7. Texture.—The importance of texture in a garden design increases as the pattern becomes more elusive, and here again the Japanese garden with its contrast of plants, rocks, sand and water, has provided a model. Many Californian gardens have imitated these effects with modern man-made materials.

8. Tone and Colour.—Many of the old European gardens had their own characteristic colour scheme: the Italian contrasted black and white (black cypresses with white statuary, steps and fountains); the French were subdued in tone with dark trees and hedging against a lighter green ground pattern; in English gardens the green of the grass predominates, and not all colours are compatible with it; for example, golden or purple-leaved trees must be used with restraint. In all but severe climates there is a modern tendency to use gray-leaved shrubs and plants as a background to diverse colours, but this treatment is only successful in small-scale projects.

9. Wind Shelter.—On windy sites, shelter is often more important than shade, and its provision will enable greater use to be made of the garden or park. The width of the shelter belt needed varies with the strength of the prevailing wind. In exposed coastal districts the windbreak should be wedge-shaped to deflect the air currents upward, with the taller-growing trees on the leeward side, and an outer embankment of closely planted shrubs.

Under normal inland conditions a wall or hedge will provide adequate shelter in depth of five times its own height. Protection from late spring frosts is a matter of aspect and contour rather than wind; a great deal of research has been carried out on this problem. It has long been known that cold air flows slowly downhill, resting in hollows on still days and forming a "frost pocket." The cold stream of air may be deflected by planting above the site, and the lower end should be kept open so that cold air can drain away.

10. Trees and Shrubs.—In the provision of sites for school and sports grounds allowance should be made for tree planting. Too often in towns they are bare, open spaces; if they are to provide for something beyond mere physical exertion, they need only a little extra ground for planting to make them pleasant places with a setting of fine trees and green foliage. Where trees or hedges are to be used for space division, the primary needs of the design must be kept in mind.

In the open country in the past, clumps of trees on high ground were preserved or planted as landmarks for the surrounding district, and an ugly urban skyline can often be redeemed by the planting of tall trees.

In large towns, tree belts or parkways with ample planting may serve to divide the different districts, separating the industrial area from the residential, etc., giving each greater individuality and a pleasant setting, and checking the spread of smoke, dust and noise. Wherever possible such planting should be sited on rising ground in order to make the most of the land forms. The parkway system, as it has been developed in the United States, causes the open spaces to become central features of each town. It also makes possible the interlocking of buildings and green spaces throughout the built-up areas.

In large towns or cities where there are many open spaces, each park should possess individuality and should be well balanced to meet the needs of the population in that area. For instance, a park near educational centres or in a factory area might devote a large space to athletics and games grounds, whereas another in a residential area might cater for old people, small children and those in charge of them. The purpose of the different parks can be stressed by the details of the planting: the domestic park can take on the character of a garden, with smaller divisions of space and richer planting, whereas the play park calls for taller trees and bold foliage effects to define the various sections.

Where expense is not a consideration, it is now possible to plant nearly full-grown trees. The technique of tree transplanting was perfected in the United States and is now being used in Europe. In England the Civic trust is operating a philanthropic program for supplying large woodland trees for planting on old bombed sites and open spaces in overcrowded towns. Such trees necessarily demand more after care than smaller specimens specially grown in a tree nursery.

Some trees are at their best in masses and as backgrounds, others as single specimens and foreground groups. Examples of foreground trees are Scots pines, silver birch, cedar of Lebanon and ailanthus; all are open-textured and can be used to frame views of buildings beyond. Oaks, sycamore, yews and spruce are suitable for backgrounds because they have dense foliage. The extreme shapes such as weeping, fastigiate and tabular, should only be used where special emphasis is needed. Coarse-textured and strongly patterned trees such as the horse chestnut and catalpa must be seen at close enough range for their pattern to be appreciated.

The detailed use of flowering shrubs and herbaceous plants is too complicated a problem to be dealt with here, but the same general principles apply to them. Not only the colour of the flowers should be considered, but the form and texture of the whole plant. The modern practice is to plan mixed borders of shrubs and perennial plants, the latter generally being in large groups of the same species for a bold effect. This kind of border requires little attention; the kind of planting needing most upkeep is that of beds of annuals, or "bedders," or a rock garden. Both in the United States and in England garden labour has now become scarce. Many gardens are no longer maintained by full-time gardeners but by a periodic visit from a nursery firm equipped with mechanized tools. With this in mind, large easily mowed lawn areas may be planned with isolated shrub beds or trees set in ovals rather than rounds. Tall hedges for shelter may easily be trimmed into either the formal wedge shape, or more interesting rounded organic forms, by means of electric trimmers.

11. Plant Material.—To choose aright from the great diversity of plant material now available, one must know which plants are hardy to the climate, and how much sun or shade, dryness or moisture they need to flourish; also whether they are suited to the soil, acid or alkaline, heavy or light. The modern nurseryman's catalogue, which has reached a very high standard, can be most helpful in answering these questions. Planting may be either part of the structure of a landscape plan, or its interior decoration. It may give shelter, shade and protection, and also provide texture, framing, background, tone and sculptural form. Plants must be chosen which are suitable both for colour and texture and also for shape and size. In planning the gardener must also calculate how long a plant will take to attain its full size. (*See* HORTICULTURE.)

12. Water.—The element of water in any landscape scene focuses the attention; moving water, as in playing fountains or fast-running streams, brings a feeling of life and movement, while an expanse of still water gives a sense of space and unity. In a hot climate such as that of Italy, water was used in innumerable

ways to refresh and delight the onlooker; in Spain where water is scarce, it was made to splash onto coloured tiles and used again for irrigation. Nowadays the same water can be used over again by means of an electric pump and a large water supply is unnecessary for the creation of fountains.

If water is designed to reflect the sky, then it must lie still, and be up to the brim of its containing basin or banks. In designing informal water effects it is important to ensure that it lies naturally in the land form and takes the shape which the lay of the ground suggests; a pond should always be placed at the lowest level if it is to appear natural. Concrete construction is most often used for pools, and its special effects have been exploited by Thomas Church in many of his modern gardens.

13. Sculpture and Stonework.—Statues have been used for centuries to humanize the landscape scene, and today, whether used as the terminal feature of a vista, or the focal point of a small garden, sculpture is still of importance. Gardens or parks present more opportunities for siting sculpture than any other environment, and ideally there should be complete unity of intention between the sculptor and the designer. The abstract forms of modern sculpture in a suitable setting of contrasting foliage achieve their effects in the same way as the carefully selected stones in the garden compositions of Japan.

In countries with severe winters the statue may need protection, as only granite and lead are frostproof.

14. Walls, Terraces and Steps.—In dealing with walls, terraces and steps landscape architecture links up with architecture, and only general rules for guidance are justifiable. A study of photographs of old Italian villas and gardens will be rewarding (see *Bibliography*). Walls and terraces are extensions of the building into its surrounding landscape, and in order to link up successfully they should partake either of the character of the house or the landscape, or in some way blend the two. An alien material should not be introduced such as rough stone in a rockless landscape. Frank Lloyd Wright and other architects in the United States, South America and Sweden have shown how the rock and vegetation of the surrounding land can be brought up to the base of the house itself, and this treatment relies for success on perfect relationship between building and site. These buildings appear to have grown naturally from their surroundings rather than having been imposed on them.

Steps may be broad, easy and inviting, such as shallow turf steps leading up from a lawn to a wild garden, or they may create an exciting effect by being steep and narrow. With materials such as stone, brick or concrete, an easy proportion for steps with a leisurely ascent is a riser of 4½ in. and a tread of 17 in.: a useful guide is that twice the riser plus the tread should equal 26 in. The possibilities of free-soaring flights of prestressed concrete have only begun to be exploited.

15. Boundaries.—The boundary should always be considered as an integral part of the design; it can be a visual barrier or inconspicuous.

In the 18th-century landscape was brought into the garden by the use of the ha-ha, or sunk ditch, and this still has its uses. Water used as a boundary gives dignity to large buildings, as can be seen at the Royal Shakespeare theatre at Stratford, and round the town hall in Stockholm; it can also be used for industrial plants where cooling requirements make water available. A colonnade, or spaced tree trunks, gives a visual barrier where a physical one is not required. Apart from hedges, the best background foil for plants is a very simple fence, though a strong vertical pattern is helpful. Thomas Church in California developed a range of fencing which is both effective and attractive.

16. Ground Pattern.—Grass is essentially a ground covering which acts as a foil emphasizing the shape of the earth beneath it, but it will stand up to only a certain amount of wear, so paths must be made where they are most needed. Where grass will not flourish, as under trees, etc., the carpeting can be provided by suitable low-growing plants. In hot, dry countries gravel, sand and paving are used and Spain and Portugal provide many examples of intricate pavement patterns. These show how a change in the design or material can give directional pattern to paths, and the method has been successfully imitated in some Oxford college quadrangles where stone paving slabs, granite setts and cobbles have all been used.

Areas of concrete can be made more interesting by using the concrete as panels combined with cobbles, bricks, slates or setts, or by varying the texture by using an exposed aggregate. In many situations gravel remains the best of all path surfaces and with the use of modern weed-killers can be trouble-free. Tar macadam and bitumen surfaces can be improved also by surfacing with stone chips or pea gravel. Whatever may be used as surfacing, the important point is the pattern which each path and space contributes to the design as a whole. (AN. M.)

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LANDSCAPE PAINTING may have originated in the attempt of the earliest painters to give a sense of background to representations of men and animals. Ancient Egyptian and Cretan painters often depicted natural settings but in highly conventionalized terms with spatial recession expressed by elements superimposed from bottom to top of the image. Much of this convention persists in Persian manuscript illumination of about the 14th century (*see* PERSIAN ART), and still later in Indian art (*q.v.*) of the Mogul period.

Chinese artists painted landscape with brush and ink on silk as early as A.D. 400. During the T'ang and Sung dynasties they achieved some of the most sophisticated effects in all landscape art in their treatment of atmosphere and of mists in distant valleys, and in their meditative spirit in the presence of nature. Among the most famous were Li Ch'eng (about 950), Chao Po-chü (about 1150), Hsia Kuei, Ma Yuan (both about 1200) and Mu Ch'i (about 1250). (*See* also CHINESE PAINTING; JAPANESE PAINTING AND PRINTS.)

Ancient Rome.—In western art, little is known of landscape painting before ancient Roman times. Roman art, like other Roman developments, may be assumed to have had precedents in late Greek art. The Augustan age produced the celebrated *Odyssey* landscapes, illustrating scenes from Homer's great epic. These wall paintings were found on the Esquiline in Rome in 1848, and are now in the Vatican library. They are primarily landscapes with deep spatial and atmospheric effects; the figured subjects are relegated to a subordinate role though they occupy the foreground and front planes. Equally remarkable are the pictures of a garden painted on the four walls of a room in the Villa of Livia at Prima Porta, outside Rome. These are often associated with an artist named Studius (or Ludius, or Tadius), mostly because Pliny (*Natural History*, 35, 116) called him the inventor of garden and villa landscape and described just such scenes as these.

Middle Ages.—Between ancient Roman and Gothic times, landscape art was restricted to manuscript illumination, where it appears primarily as simple backgrounds to figured themes. Occasionally, as in the 10th-century Paris Psalter (Bibliothèque Nationale, Paris), they are sufficiently elaborate to suggest Roman or near-Roman models. In Gothic manuscripts, landscape extensions of religious and secular images developed very rapidly, until by the early 15th century nothing stood in the way of a full-fledged landscape art except custom and patronage. The so-called *Boucicaut Hours* (Musée Jacquemart-André, Paris) is the most spectacular. Through such works the way was paved for the Limburg brothers, notably in the illuminations of the *Très Riches Heures du duc de Berry* (Musée Condé, Chantilly) of about 1415, and Hubert and Jan van Eyck, founders of the Flemish school of painting, whose art is known to have originated in manuscript illumination.

A few water-colour studies by Albrecht Dürer (1471–1528) are generally considered the first pure examples of landscape art. These views of Trento, Innsbruck and the Tirol (at Bremen, Vienna, Oxford and the British museum) were probably made on Dürer's first trip to Italy in 1495, and were entirely personal notations. The point is important, because they resemble Flemish landscape backgrounds of nearly a century earlier, minus the foreground figures which gave them their public sanction. It would not be too much to say that Dürer's personal sketches were almost as fully developed as early 19th-century landscapes, and that nothing except other purely personal sketches rivaled them in the intervening centuries. But they were little known until the 19th century itself, when scholarship joined with the prevailing romantic interest in nature to resuscitate them.

As regards public works of art, an extraordinary series of frescoes was painted by Ambrogio Lorenzetti (*c.* 1300–48) on the walls of the Palazzo Pubblico in Siena. These represent the "Effects of Good and Bad Government in the City and in the Country." While the allegorical, or even propagandistic, intent is perfectly clear in the paintings, they represent an achievement in the art of landscape that equaled and surpassed that of ancient Roman times and was never rivaled in the intervening millennium. Their influence was very great, as may be seen in borrowings in French and Flemish art during the next 50 to 75 years. A natural link with Italy, especially Siena, was provided by the papal court at Avignon, where Simone Martini (*c.* 1285–1344), Siena's chief painter, spent the final four years of his life. Throughout the early 14th century, Sienese art, in its interest in *mise-en-scène* both in interiors and in landscapes, differed from Florentine art, as it was best represented by Giotto.

Renaissance.—Florentine Renaissance artists, who were primarily interested in the human figure, and in landscape only as incidental background, seldom approached the understanding of landscape shown by the earlier Sienese. Leonardo da Vinci (1452–1519) was the great exception, in this as in virtually every other respect; but as in Dürer, his excursions into landscape appear in personal sketches and in his notebooks more than in his public painting. Such 15th-century Sienese masters as Sassetta (1392?–1450) and Giovanni di Paolo (1403?–1482) continued to outstrip their Florentine contemporaries as regards landscape art. Six panels from the "Life of St. John Baptist" (Art institute, Chicago) are among the most inventive of Giovanni di Paolo's works, with dynamic and whirling space, curved horizons, and fantastic rock formations no less extraordinary than those dimly visible in the distances behind Leonardo's "Mona Lisa," of 50 years later.

16TH CENTURY

Northern Europe.—In the Gothic north, which was relatively untouched by the humanist culture of Renaissance Florence, painters continued to develop landscape backgrounds for religious scenes. Often these were wild and violent, as in the Hell scenes and in the "Temptation of St. Anthony" (National museum, Lisbon) by Hieronymus Bosch (*c.* 1450–1516), and in the multipaneled Isenheim altar (Museum, Colmar) by Mathias Grünewald (*c.* 1480–*c.* 1530). In the work of both of these artists nocturnal effects abound, and light becomes expressive of mystical rapture. The cultural distance which separated these attitudes from that of the Italian Renaissance may be suggested by the fact that the Isenheim altar (*c.* 1513) was contemporary with Michelangelo's Sistine ceiling.

Dominated by the more moderate art of Dürer, landscape art in central and southern Germany appeared in the backgrounds of works by such painters as Albrecht Altdorfer (1480–1538) and Lucas Cranach the Elder (1472–1553) and in etchings by Altdorfer, Augustin Hirschvogel (1503–53) and Hans Sebald Lautensack (1524–61/66). As prints were made in some quantity and sold at cheap prices, they were important in the popularization of pure landscape. There was a similar development in Flanders toward the middle of the 16th century, especially in the work of Pieter Brueghel the Elder (*c.* 1525–69), whose landscapes and marines, usually engraved by professional craftsmen from the master's designs, rival his more celebrated paintings. Among the latter, the series of landscapes of the seasons (most of them at Vienna; "Summer" at the Metropolitan Museum of Art, New York city) may be thought of as a magnificent extension of the calendar scenes in late Gothic Books of Hours. In Brueghel's work, weather itself is a protagonist, and the art of Vincent Van Gogh is already foreshadowed in it.

Venice.—With the decline of Florence in the early 1500s, Venice began to vie with Rome for leadership in Italian painting. The salt air condemned fresco painting to a brief life span in Venice, so the introduction of oil painting from Flanders opened up new possibilities. Intensely mundane and with little taste for Florence's antique-inspired masters, Venice commissioned paintings expressive of its own lavish mode of life. It should not be forgotten that Titian was born at Cadore in the Dolomites, nor that these mountains are visible from Venice on a clear day. Landscape painting thus offered a natural departure from Venice's sea-bound horizons. Although it was generally restricted to background or religious and allegorical compositions in the work of Giovanni Bellini, Giorgione, Titian and Tintoretto, it appeared occasionally in a pure state. Moreover, Titian made designs for woodcut landscapes to be executed by others, one of them a huge composition in 12 sheets representing "Pharaoh's Army Submerged in the Red Sea" (1549). Another Venetian painter important to the development of landscape was Lorenzo Lotto (*c.* 1480–1556). The sulfurous and often violent settings of Tintoretto (1518–94) for his religious pictures, as in the remarkable series in the Scuola di San Rocco in Venice, were the basis of the landscape art of El Greco (1541–1614). This solitary genius from Byzantine Crete studied painting in the studio of the very aged Titian, but he was obviously attracted to the art of Tintoretto. El Greco's "View of Toledo" (Metropolitan Museum of Art, N.Y.) is Byzantine in space, Tintorettolike in dramatic energy, Spanish in theme, and Spanish again in its accentuation of flat planes; yet it is unified by deep personal feeling. Its livid greens do not exist in Toledo; they originated in El Greco's mind.

17TH CENTURY

Rome.—By 1600 Rome had become the acknowledged world centre of art, and its several colonies of painters included many from northern Europe. Among these the German Adam Elsheimer

"View of Innsbruck" by Albrecht Dürer, 1495. 5 × 7⅜ in.

"The Flight into Egypt," miniature from the *Boucicaut Hours*, early 15th century. In the Musée Jacquemart-André, Paris. 7 × 4½ in.

"Ulysses in the Land of the Laestrygones," one of the Roman murals illustrating Homer's *Odyssey*, now in the Museo Profano, Vatican. 45¼ × 59 in.

EARLY LANDSCAPES

The earliest known Western paintings to include landscapes were Roman wall paintings. Among the finest of these were the Augustan murals illustrating scenes from the *Odyssey* of Homer (above). During the Middle Ages, brilliantly coloured views of town and country life appeared in the backgrounds of manuscript illuminations, as in the scene at left from the *Boucicaut Hours*. The "View of Innsbruck" by Albrecht Dürer (top) is one of three water colours probably painted in 1495 on the artist's first trip to Italy and generally considered the first pure landscapes

BY COURTESY OF (TOP) THE ALBERTINA, VIENNA, (BOTTOM LEFT) THE MUSÉE JACQUEMART-ANDRÉ, PARIS; PHOTOGRAPHS, (BOTTOM LEFT) JACQUELINE HYDE, (RIGHT) SCALA

LANDSCAPE PAINTING

"Good Government in the Country," one of a series of frescoes by Ambrogio Lorenzetti in the Palazzo Pubblico, Siena, 1339

"John in the Wilderness" by Giovanni di Paolo, c. 1450–1460. 27 × 14½ in.

SIENESE LANDSCAPES

Two of the greatest Italian masters of landscape, Ambrogio Lorenzetti and Giovanni di Paolo, came from Siena. In the detail from Lorenzetti's monumental fresco series, "Effects of Good and Bad Government in the City and in the Country" (above), there may be seen the 14th-century artist's awakening concern for accurate perspective and the convincing rendering of space. The "Life of St. John the Baptist" by Giovanni di Paolo, a large 15th-century altarpiece of which one of the ten known panels appears at left, includes highly dramatic landscapes of tortured rocks and hills

BY COURTESY OF (LEFT) THE ART INSYITUTE OF CHICAGO, MR. AND MRS. MARTIN A. RYERSON COLLECYION; PHOTOGRAPH, (RIGHT) FOTO GRASSI

"The Harvesters" by Pieter Brueghel the Elder, *c.* 1565. 46½ × 63¼ in.

16TH-CENTURY LANDSCAPES

Together with four other extant works, "The Harvesters" (above) by Pieter Brueghel the Elder belongs to a series that may once have included 12 paintings representing the months of the year. "The Harvesters" probably represents July, one of the months when wheat was harvested in Europe. El Greco's dramatic "View of Toledo" (right) owes much to the violent settings of the works of the Venetian master Tintoretto, whom El Greco admired.

"View of Toledo" by El Greco (1541–1614). 47¾ × 42¾ in.

BY COURTESY OF THE METROPOLITAN MUSEUM OF ART (NEW YORK CITY), (TOP) ROGERS FUND, 1919; (BOTTOM) BEQUEST OF MRS. H. O. HAVEMEYER, 1929. THE H. O. HAVEMEYER COLLECTION

LANDSCAPE PAINTING

"Landscape with Obelisk" by Rembrandt van Rijn, 1638. 18 × 23 in.

"Landscape: the Marriage of Isaac and Rebekah ("The Mill")" by Claude Lorrain, 1648. 58¾ × 77½ in.

17TH- TO EARLY 19TH-CENTURY LANDSCAPES

In Rome two 17th-century Frenchmen, Claude Lorrain (left) and Nicolas Poussin (below), painted landscapes which, by their air of serenity and careful ordering of nature, foreshadowed the work of Camille Corot and Paul Cézanne. The 17th-century landscapes by the Flemish master Peter Paul Rubens (bottom left) and the Dutch master Rembrandt van Rijn (top), when exhibited in London in 1815, deeply influenced two English artists, John Constable (Plate V, top) and J. M. W. Turner (Plate V, bottom) in painting their own romantic landscapes

"The Castle of Steen" by Peter Paul Rubens, 1636. 54 × 92½ in.

"Summer, or Ruth and Boaz" by Nicolas Poussin, painted between 1660 and 1664. 45½ × 62 in. In the Louvre, Paris

BY COURTESY OF (TOP) THE ISABELLA STEWART GARDNER MUSEUM; BOSTON, (CENTRE; BOTTOM LEFT) THE TRUSTEES OF THE NATIONAL GALLERY, LONDON; PHOTOGRAPHS, (CENTRE; BOTTOM LEFT) JOHN R. FREEMAN AND CO., (BOTTOM RIGHT) GIRAUDON

"The Hay Wain" by John Constable, c. 1821. 51¼ × 73 in.

"Grand Canal, Venice" by J. M. W. Turner (1775–1851). 36 × 48⅛ in.

BY COURTESY OF (TOP) THE TRUSTEES OF THE NATIONAL GALLERY, LONDON, (BOTTOM) THE METROPOLITAN MUSEUM OF ART (NEW YORK CITY), BEQUEST OF CORNELIUS VANDERBILT, 1899

LANDSCAPE PAINTING

"Town on a Cliff" by Camille Corot (1796–1875). 15 × 22 in.

"Gare Saint-Lazare" by Claude Monet, 1889. 16 × 20 in.

19TH- AND 20TH-CENTURY LANDSCAPES

Camille Corot (above) and Gustave Courbet (bottom left), deeply influenced by English romantics such as Constable (Plate V), were, in turn, important influences on Impressionists such as Claude Monet (left), whose experiments with light and colour owe much to their example. The shore scene by Winslow Homer (below) is typical of the best work of this gifted U.S. painter. The landscapes of Vincent van Gogh (Plate VII, top) reach a high emotional pitch rarely found in landscape painting. The view of Mont Sainte-Victoire (Plate VII, bottom) is one of many versions of this scene which Paul Cézanne painted in repeated efforts to understand and organize its essential forms and planes. On Plate VIII are two 20th-century landscapes: a delicate and dreamlike fantasy by Paul Klee and a forceful Fauvist view of the Thames by André Derain

"Sea and Rocks at Étretat" by Gustave Courbet (1819–77)

"West Wind" by Winslow Homer (1836–1910)

BY COURTESY OF (TOP) SMITH COLLEGE MUSEUM OF ART, NORTHAMPTON, MASS. GIFT OF D. W. TRYON, 1924. (CENTRE LEFT) THE FOGG MUSEUM, HARVARD UNIVERSITY. (BOTTOM LEFT) THE CLEVELAND MUSEUM OF ART, GIFT OF THE ESTATE OF CHARLES F. BRUSH. (BOTTOM RIGHT) PHILLIPS ACADEMY, ANDOVER, MASS

"Field with Cypress Trees" by Vincent van Gogh, 1889. 28½ × 36 in.

"Mont Sainte-Victoire" by Paul Cézanne, *c.* 1886–88. 26 × 35⅜ in.

BY COURTESY OF (TOP) THE TRUSTEES OF THE NATIONAL GALLERY, LONDON. (BOTTOM) THE COURTAULD INSTITUTE, LONDON; PHOTOGRAPHS, JOHN R. FREEMAN AND CO.

LANDSCAPE PAINTING

"Landscape with Yellow Birds" by Paul Klee, 1923. 14 × 17 in. In a private collection

"Blackfriars Bridge" by André Derain, 1906. 26 × 39 in.

BY COURTESY OF (BOTTOM) THE MUSEUM OF MODERN ART (NEW YORK CITY), GIFT OF MR. AND MRS. CHARLES ZADOK, 1952; PHOTOGRAPH, (TOP) COLORPHOTO HINZ, BASEL, © BY S.P.A.D.E.M., PARIS, AND COSMOPRESS, GENEVA, 1967

(1578–1610) and the Fleming Paul Bril (1554–1626) exerted a powerful influence on the growing popularity of landscape art. Elsheimer passed along this interest to Annibale Caracci and through him to Guercino, both of them figure painters from Bologna who also worked in Rome. One of Bril's pupils, Agostino Tassi, was the teacher of Claude Lorrain (1600–82). With Claude, a Frenchman whose entire career was spent in Rome, landscape achieved a definition which was hardly to be challenged until the 19th century, and even the Impressionists were to some extent his disciples. Nicolas Poussin (1593/94–1665), the great French figure painter who also lived in Rome, met Claude's challenge late in his life by turning to landscape. Together, they foreshadowed Corot and Cézanne: Claude in his effects of tender light and his quality of reverie, Poussin in bringing nature's disorder to an order like that of architecture. Compare Claude's "Landscape: the Marriage of Isaac and Rebekah," also called "The Mill" (1648; National gallery, London), with Poussin's "Summer, or Ruth and Boaz" (1660–64; Louvre, Paris). In both, the story is told by figures in the foreground, but both can be approached as landscape in its purest sense.

Flanders.—In the north, landscape art made great strides, both in painting and in the graphic arts. In Flanders, Peter Paul Rubens (1577–1640) turned his abundant energies in his final years to compositions based on the scenery near his country residence, the Castle of Steen, outside Antwerp. The tremendous sweep of these pictures, together with their progression of colour from warm earth-brown foregrounds to ice-green distances was probably suggested by the work of Pieter Brueghel and other Flemish precursors, but Rubens replaced their crisp line with washes of paint suggestive by their very texture of torrential powers. John Constable later said of him: "In no branch of art is Rubens greater than in landscape painting . . . . Rubens delighted in phenomena, rainbows in a stormy sky, bursts of sunshine, moonlight, meteors and impetuous torrents mingling their sounds with wind."

Holland.—In Holland, Protestant opposition to church adornment and the commercial interests of the republic discouraged painters from attempting religious subjects and led them to turn to secular ones. Wealthy burghers built handsome town residences, and a demand for small paintings quickly developed. Curiously, landscape was not popular. The poverty of Dutch landscapists was proverbial; Meindert Hobbema (1638–1709) gave up painting to take a municipal post, and he died a pauper. Landscape art therefore represented a high water mark of idealism, since painters without prospect of profit were seeking to express their knowledge and love of nature.

Among the earliest landscapists of the 17th century, Hercules Seghers (1589/90–*c.* 1638) may be considered a Dutch equivalent of Rubens, though his art was touched with an air of foreboding suggestive of Van Gogh. He was both a painter and an etcher who made some 60 experiments in printing in colour. Rembrandt admired and owned some of his work. The three outstanding specialists in Dutch landscape were Jan van Goyen (1596–1656) of Leiden and The Hague; Jacob van Ruisdael (1629–82) of Haarlem and Amsterdam, pupil of his less profound uncle, Salomon van Ruysdael; and Hobbema of Amsterdam, who was trained by Jacob van Ruisdael. Van Goyen excelled in monochromatic effects of harbours and estuaries; van Ruisdael, in panoramic effects across fields and dunes, and also in rugged forest scenes; and Hobbema, in quieter rustic compositions of humble dwellings set in a clearing in the woods. There were many others: Philips de Koninck, with his large panoramas of the lowlands; Aelbert Cuyp, sometimes called the Dutch Claude because of his radiant light; and the marine painters Jan van de Capelle, Adriaen van de Velde, and his brother Willem. Jan van der Heyden, the painter of city views, and the rare cityscapes of Jan Vermeer, especially his crystalline "View of Delft" (The Hague, Mauritshaus), should be mentioned.

Rembrandt van Rijn (1606–69) did not specialize in any one kind of painting; his painted landscapes hardly number more than a dozen. "Landscape with Obelisk," a rather early work (1638; Gardner museum, Boston), is one of the finest. Taken together, his many wash drawings and his etchings, notably the "Three Trees" (1643), indicate his complete mastery of the theme. As always, he mastered it in the sense that he bent it to his own needs of personal expression. Rembrandt's landscapes are the least "documentary" among Dutch works of the kind. Even more than van Ruisdael's, however, they are documents of the spirit, now lonely, now ominous, now quiescent, always restless and charged with tension.

18TH CENTURY

Italy and France.—In the 18th century, landscape painting was dominated by the growing demand for views of famous places, Venice and Rome above all. Works of Antonio Canale, called Canaletto (1697–1768), and Francesco Guardi (1712–93), both native Venetians, are superficially similar, but careful observation reveals the crisp draftsmanship of the former and the more "painterly" eye of the latter. Guardi in particular used a palette with pinks and pale blues generally similar in tone to those of the art of rococo Paris, which increasingly dominated the art of the century. Bernardo Bellotto (1720–80), the nephew and pupil of Canaletto who also used his uncle's name, extended Venetian landscape art to Germany, Austria, Poland and Russia. Canaletto himself traveled to England and remained there more or less continuously from 1746 to 1755. In Rome, the honours were shared by Giovanni Paolo Panini (1691–1765), a painter whose undoubted gifts gradually succumbed to the demand for accurate and meticulous representation, and Giambattista Piranesi (1720–78), a Venetian stage designer who became caught up in the current enthusiasms for the archaeology of Rome. Piranesi's production of views of Roman ruins was prolific. His large etchings are often marked by a sense of vanished grandeur, expressed through rich contrasts of light and dark which were unusual in the art of his century.

More characteristic of the age, but less deeply felt, are the landscapes with ancient ruins by Hubert Robert (1733–1808), who enjoyed an immense vogue in France. His art contrasts considerably with the exquisite and nostalgic park scenes of Jean Antoine Watteau (1684–1721), and the brilliant rococo inventions of François Boucher (1703–70) and Jean Honoré Fragonard (1732–1806). The line of historical development from Watteau to Boucher or Fragonard and then to Robert approximated cultural changes in France and in Europe as a whole from the Régence to the reign of Louis XV and then to that of Louis XVI. It is a sequence from the period of gentle release from the formalities of the age of Louis XIV, to the full rococo age, to that of incipient neoclassicism, spurred by the writings of Winckelmann and Lessing.

England.—In 18th-century England, despite the growing force of the romantic attitude toward nature, landscape painting had no status, and it was not possible to make a living by practising it. Romanticism was, in its early stages at least, a literary movement; its full impact on the visual arts occurred in the 19th century. Nevertheless, England produced two very gifted landscapists in the age of Enlightenment; their careers help us to understand that this age, like others, had its rim of darkness. Thomas Gainsborough (1727–88), England's most accomplished portraitist, might very well have devoted his career to landscape had there been any demand for it. In many portraits he enveloped the figure, as much as he dared, in the mists of foliage of Britain's great parks. He drew landscape constantly, and he left a brilliant series of oil compositions which brought English painting as close as it ever came to the subtleties of Watteau. Richard Wilson (1714–82) is justly called the "father of English landscape painting." A prosperous portrait painter, he visited Italy, fell hopelessly in love with the work of Claude, and abandoned his former work to face starvation and experiment with a new manner of painting almost a century ahead of his time.

Rembrandt's "Mill" (National gallery, Washington) and Rubens' "Castle of Steen" (National gallery, London), which were both shown in a loan collection in England in 1815, had a profound effect upon Joseph M. W. Turner (1775–1851) and John Constable (1776–1837). These two pictures and other 17th-century Netherlandish landscapes, together with the daring examples of Wilson,

Gainsborough and Thomas Girtin, who was Turner's boyhood friend and a brilliant experimenter in water-colour, formed the basis of Turner's and Constable's remarkable break with tradition. With them, romantic art was born; without them, developments in Europe would have lacked a major stimulus. Turner was fortunate in finding an impassioned critic to support him. In *Modern Painters,* John Ruskin summarized his work: "He saw that there were more clouds in every sky than had ever been painted, more trees in every forest, more crags on every hillside, and set himself with all his strength to proclaim the great quality of the universe." Constable took much longer than Turner to find himself, but succeeded by a singular persistence that carried him through years of public neglect. He painted with a deep understanding of his beloved countryside. If Turner suggests the wild power of Byron or the aerial flights of Shelley, Constable is an exact visual counterpart of Wordsworth.

19TH CENTURY

France.—To a considerable extent French romantic landscape was liberated by the exhibition of British landscapes at the Salon of 1824, in particular Constable's "Hay Wain" (National Gallery, London). Its moist, laden pigments, suggestive of a green out-of-doors, flatly contradicted the rigours of Jacques L. David's neo-classical doctrines. It threw younger French painters into a fever of excitement, and Eugène Delacroix is said to have repainted the whole landscape background of his "Massacre of Scio" in the brief period between the hanging of the pictures and the public opening of the Salon. The whole Barbizon movement in France (Théodore Rousseau, J. F. Millet, C. F. Daubigny, N. V. Diaz de La Peña, and others in the period 1830–60) may be thought of as a Dutch-influenced French variation of the art of Constable and his English rivals; it was named after a village in the forest of Fontainebleau to which these artists retired from what they considered to be an unsympathetic metropolitan environment.

The greatest French landscapists of the mid-19th century were unquestionably J. B. C. Corot (1796–1875) and Gustave Courbet (1819–77). In his youth Corot rediscovered the light of the Roman Campagna through his study of Claude, and strengthening it with the organizing principles of Poussin, he returned to his native land to paint a long series of images at once restrained, aloof, crystalline and sure. They have the same ring of inevitability that one feels in the finest Greek art. None of this was appreciated in Corot's time, and so he developed a very different feathery style, based on the surface values of romantic photography, which gained him both recognition and a fortune. But he continued to paint in his earlier vein, gradually deepening its emotional impact. He was instrumental in turning Courbet toward landscape painting; he was perhaps the most important single source of Impressionist landscape, and through Pissarro he deeply affected the art of Cézanne. One may safely say that Corot was the greatest force in the most crucial theme of painting in his century. As one critic phrased it, he had the power to destroy the proscenium and to guide the spectator to a fresh view of nature, unimpeded by convention.

In his own time, Courbet was damned as a "naturalist" for much the same reasons as Zola was excoriated by critics of literature. It is true that Courbet often failed to master his subject, so intent was he on defying convention by painting shocking themes. In landscape, however, to which he increasingly turned, there was no such conflict. In paint he mastered the elements: great cliffs of his native Jura or of the Norman seacoast, massive waves and massive banks of cloud, trees gigantic in trunk and foliage, the source of a stream as it emerges from a wall of rock, and, most surprising of all, marine views toward endless nothingness, but a nothingness dense with atmosphere ("Infinity" is one title). Without Courbet, it is unlikely that Monet and Cézanne could have formulated their styles.

Impressionism.—Much has been written about the scientific pretensions of the Impressionists. It is true that they studied and discussed the researches into the nature of colour by physicists like M. E. Chevreul and O. N. Rood and sought to challenge the rainbow by eliminating neutral tones and juxtaposing unmixed pigments of high intensity. Following Courbet in a pragmatic reduction of the themes of painting to that which is observable in the outer world, they nevertheless sought a world different from Courbet's. Landscape was their essential subject, but it was a landscape of joy: boats on the river, fields in flower, Paris in the spring, all were populated by Renoir with the denizens of a glamorous Bohemia. Impressionism developed in and around Paris from just after 1870 to about 1885. The group of participants numbered over 30. They were of extremely varied temperaments, sharing a common fate of rejection from the Academy-dominated Salons and a common love of colour. The name Impressionism was an accident: a hostile critic coming into their first group show in 1874 picked out Monet's "Impression of a Sunrise" and used it as the butt of his jibes. The name stuck. Many other labels of artistic movements were born of derision (baroque, Gothic, medieval, Cubist, Fauvist, Mannerist) and all of them eventually lost their sting.

The leading Impressionist landscape painters were Claude Monet, Pierre Auguste Renoir, Alfred Sisley and Camille Pissarro. All but the last were born about 1840; Pissarro, ten years older, became a sort of kindly patriarch, enduring his poverty with extraordinary dignity. All were excited by the art of Delacroix as well as by his observations of colour faithfully set down in his journals; and they were enthusiastic students of the early 19th-century English landscapists, notably Constable, Turner and Richard P. Bonington. Monet, a Norman, was temperamentally akin to Courbet; he too painted the cliffs of Étretat along his native coast. He gradually developed into what might be called an Impressionist mural painter, for his late works (after 1900) frequently present forms dissolved almost beyond recognition on great yardages of canvas. Thus while Impressionism has lost its appeal for advanced modern sensibilities, Monet's late style inspired a whole movement called Abstract Impressionism among painters in New York city in the middle 1950s.

Postimpressionism.—Pissarro was deeply devoted to the art of Corot, who generously supported him. Compared to Monet's his gift was limited, though sure. But he was enormously influential as a teacher. Paul Cézanne (1839–1906), Paul Gauguin (1848–1903), Vincent Van Gogh (1853–90) and Henri de Toulouse-Lautrec (1864–1901) all mastered Impressionism through his guidance. His impact on Cézanne was especially strong, and through it Cézanne learned to clarify his spatial organization and eliminate detail by seeking out the controlling planes of a form. After 1880 Cézanne succeeded in turning the passing show, so greatly beloved by the Impressionists, into what he called "something durable, like the art of the museums." The same could be said of Georges Seurat, whose "Sunday Afternoon on the Grande Jatte" (1884–86; Art institute, Chicago) is much closer to Poussin and to early Renaissance painting than its subject might suggest.

With Gauguin and Van Gogh, the intense, broken colour of Impressionism took a radical turn in the direction of vehement personal expression, often with symbolic overtones. The association of these two artists at Arles in 1888 (Gauguin lived a few months with Van Gogh in the latter's little yellow house) was one of the most wildly improbable in the history of art. Gauguin was arrogant, vain, and publicity-minded even in his final years in the south seas; Van Gogh, an apparent failure, was pathetically diffident in Gauguin's company, though his letters show him to have been far more brilliant and penetrating. Both disavowed Impressionism as emotionally superficial, but in their search for a deeper reality in the painting of landscape, Van Gogh was the more authentic primitive. Gauguin turned his back on western civilization and in so doing he released a world of new colour for the 20th century; but his primitivism was thoroughly self-conscious, and to the very end recognition in Paris was his goal. Van Gogh was, on the contrary, a true child of nature; a disappointed, yet confirmed, evangelist, he found his soul by losing it in the contemplation of landscape, and the sermons he could never preach eventually spoke to all mankind through his brush. His biography is one of the great human tragedies; his art, one of the great triumphs.

20TH CENTURY

Since landscape was the greatest achievement in painting during the 19th century, and 19th-century landscape painting outstripped that of all previous times, it is not surprising that in the 20th century it went into a decline. There have probably been more landscape painters than in any previous age, but the creative force has moved elsewhere, and most of the practitioners have coasted on the work of previous artists or contented themselves with making careful documents in competition with other reproductive media. Early in the century in Paris, however, *Les Fauves* ("Wild Beasts," as a critic tauntingly labeled them) carried Van Gogh's passion and Gauguin's colour to new conquests of nature. Henri Matisse, André Derain and Maurice de Vlaminck prepared the way for such German Expressionists as Emil Nolde and Ernst Kirchner. The colour-improvisations of Wassily Kandinsky (1866–1944) gradually emerged from his earlier landscapes of the Bavarian Alps just prior to the outbreak of World War I. Cubism introduced a new concept of movement in space and while it is hardly relevant to the subject of landscape, its thin, overlapping planes seem to have originated in Picasso's studies of the hill towns of his native Spain. "The Reservoir of Horta de Ebro" (1909) was once owned by Gertrude Stein, who made this observation about the landscape origins of Cubism in her book on Picasso. A more conservative painter, Roger de la Fresnaye (1885–1925) was also a Cubist.

In the interim between the two world wars, the most significant landscapes were perhaps those of the Swiss-German painter Paul Klee (1879–1940). Highly imaginative and personal, they are exquisite divagations on the theme of nature, rather than records of the outer world. In the 1940s and 1950s the Austrian landscapist, Oskar Kokoschka (1886–) painted an impressive series of large "portraits" of European cities.

United States.—Charles Demuth (1883–1935) adapted the forms of Cubism to a fresh view of nature; he caught the prim elegance of Puritan America in some of his architectural compositions. Marsden Hartley (1877–1943) and John Marin (1870–1953) employed some of Cubism's shorthand to give a modern flavor to representations of the New England seacoast based directly or indirectly on the art of Winslow Homer (1836–1910). Homer is generally regarded as America's most gifted landscape painter, a judgment that does not overlook the sensitive, but somewhat effete London nocturnes of his contemporary, the expatriate James A. McNeill Whistler (1834–1903). His early work "Coast of Britanny" (1861; Wadsworth Atheneum, Hartford, Conn.) has much of Homer's strength; his native American idiom was refined by his association with the Impressionists, especially Degas, from whom he learned much about pictorial composition. *See* also references under "Landscape Painting" in the Index.

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LANDSEER, SIR EDWIN HENRY (1802–1873), foremost English animal painter, was born in London on March 7, 1802, the third son of John Landseer, the engraver and writer. He learned drawing from his father and became considerably proficient. At the age of 13 he drew a St. Bernard dog so finely that his brother Thomas engraved and published the work, and in the same year (1815) he exhibited "Portrait of a Mule" and "Portrait of a Pointer Bitch and Puppy" at the Royal Academy, where he became a student in 1816. Under B. R. Haydon's guidance, he studied the Elgin Marbles, the animals in the Tower of London and the Exeter exchange, and dissected every animal whose carcass he could obtain. His sense of humour already began to appear in animal portraits, and "The Cat's Paw," shown at the British institution in 1824, brought his name before the public. In that year also he made the first of many visits to the Scottish Highlands, painting "Taking a Buck" (1825) from his experiences there. This work, on a larger scale than previous pictures, was broadly painted and much less emphasis was put on elaborate draftsmanship and careful modeling. "Chevy Chase" (1826, Birmingham Art gallery) is one of his few history pieces, painted with great force and directly inspired by Rubens.

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"SHOEING" (1844) BY SIR EDWIN HENRY LANDSEER. IN THE TATE GALLERY, LONDON.

The healthy animation of Landseer's early works was gradually displaced by an unfortunate sentimentality, so that the animals depicted became invested with near-human emotions of pathos or humour, as in "High Life" and "Low Life" (both 1829, Tate gallery, London) and "Dignity and Impudence" (1839, Tate gallery). This anthropomorphism gradually sapped away the vigour of his work, and although he enjoyed enormous popularity in his day and long afterward, Landseer's true qualities of brilliant dexterity and sound anatomical knowledge have largely been obscured by this jarring element. Wherever this is absent, as in "Shoeing" (1844, Tate gallery) or in the "Rout of Comus" (1843, full-scale study, Tate gallery) painted for the garden pavilion of Buckingham palace, he ranks among the great 19th-century animal painters.

Landseer was elected Royal Academician in 1831, and was knighted in 1850. At the Paris Exposition Universelle of 1855 he was awarded the gold medal. His work in his last years was impaired by failing health, and by 1860 his mind began to fail him so that in 1865 he was obliged to refuse the presidency of the Royal Academy. He managed to complete the great sculpture commission of the four bronze lions at the base of the Nelson monument in Trafalgar square, London, which were unveiled in 1867. He died in London on Oct. 1, 1873.

JOHN LANDSEER (1761 or 1769–1852), father of the foregoing, is known chiefly for his topographical engravings, and for his writings on archaeology, lectures on engraving and art criticism. He exhibited at the Royal Academy from 1792 onward, was elected a fellow of the Society of Antiquaries and became engraver to William IV. A man of wide culture, his *Fifty of the Earliest Pictures in the National Gallery* (1834) marked a new phase of critical appreciation backed by scholarship. He died in London on Feb. 29, 1852. His eldest son, THOMAS LANDSEER (1795–1880), became well known for his engravings after Edwin Landseer pictures, as well as for the engraving after Rosa Bonheur's "Horse Fair." His own designs included illustrations to S. T. Coleridge's "Devil's Walk" (1831), and he wrote *The Life and Letters of William Bewick* (1871). He died in London on Jan. 20, 1880. CHARLES LANDSEER (1799–1879), John Landseer's second son, a history and genre painter ("Clarissa Harlowe in the Sponging House," 1835, Tate gallery), became an Academician in 1845 and keeper of the Royal Academy in 1851. He died on July 22, 1879, bequeathing £10,000 to the Academy to found the Landseer scholarships.

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LAND'S END, a Cornish peninsula, Eng., known in classical times as Bolerium and later as Penwith, lies west of a line from Hayle, at the head of St. Ives bay, to Marazion, on Mounts bay. It is the most westerly of the granite masses of the mainland of Devon and Cornwall. The southwestern tip of the peninsula, in 50° 04′ N. 5° 43′ W., also constitutes the westernmost point of England lying approximately 873 mi. by road from John O'Groats (*q.v.*). Formerly known to the Cornish as Pedn-an-Laaz (end of the earth), it is a modern tourist attraction. While the headland near "The First and Last House" stands at 233 ft., the cliffs themselves are little more than 60 ft. high. Erosion of the columnar granite gives the coast a rocky and crenulate character. Natural arches and stacks abound. The headland itself is pierced by a cave 150 ft. long, known as Land's End hole. The

larger stacks have names such as Enys Dodman, the Irish Lady and the Armed Knight. Logan (rocking) stones occur at Bosistow, Zennor and Treryn. The latter is the largest and best known. Dangerous reefs lie offshore and one group, a mile from the mainland, is marked by the Longships lighthouse. (C. Ki.)

LANDSHUT, a city of Germany which, after partition of the nation following World War II, was in the *Land* (state) of Bavaria in the Federal Republic of Germany. It is situated on the Isar river, 72 km. (45 mi.) N.E. of Munich. Pop. (1961) 49,514. The old city, which retains many of the aspects of a medieval capital, is surrounded by modern suburbs. It is dominated by the castle of Trausnitz (13th–16th centuries) and by the Gothic St. Martin's church, with the world's highest (436 ft.) brick steeple. Other buildings include the Renaissance ducal palace (1536–43); the Cistercian convent of Seligenthal (founded 1232) with a rococo church; and the former monastery of the Dominican friars, which was the seat of a university from 1800 until it was moved to Munich in 1826. The town hall contains murals depicting the wedding of Duke George the Rich to the Polish princess Hedwig in 1475, re-enacted every three years in all-day plays with casts of about 1,000. Landshut contains several trade schools, a city museum, an art gallery and an adult education centre. It is an important road junction and has rail connections with Munich, Regensburg, Deggendorf, Passau and Salzburg, Aus. Following World War II the influx of over 12,000 refugees gave impetus to new industries, including electrotechnics and machinery. Older industries are brewing, milling, textiles, furniture, paint, chocolate and tobacco processing. Landshut was the residence of Bavarian dukes from 1204 until 1503. (T. K. He.; E. C. St.)

LANDSKNECHT, a German mercenary foot soldier of the 16th century. The name (German for "man of the plains") was given to mark the contrast between the force composed of these soldiers, formed by the emperor Maximilian I about the end of the 15th century, and the Swiss, the "men of the mountains," at that time the typical mercenary infantry of Europe. After the battles of Marignano and Pavia, where the military reputation of the Swiss had been broken, the Swabian *Landsknechte* came to be considered the best fighting troops in Europe. Though primarily a German force and always the mainstay of imperial armies, they served in organized bodies as mercenaries elsewhere in Europe.

In fact *Landsknecht,* and more particularly its French corruption *lansquenet,* became in western Europe a general term for mercenary foot soldiers. It is because of the *lange Spiess* (long pike or lance), the typical weapon with which they were armed, that the corrupted French form, as well as a German form, *Lanzknecht*, and an English form, lance-knight, came into use.

The *Landsknechte* were raised by colonels (*Obersten*), to whom the emperor issued recruiting commissions corresponding to the English indents; they were organized in regiments made up of a colonel, lieutenant colonel and regimental staff, with a varying number of companies, colours (*Fähnlein*), commanded by captains (*Hauptleute*); subaltern officers were lieutenants and ensigns (*Fähnriche*). In thus defining the titles and duties of each rank, and in almost every detail of regimental customs and organization, discipline and interior economy, the *Landsknechte* may be considered as the founders of the modern military system on a regimental basis. *See* further Army and Infantry.

LANDSKRONA, a port in the *län* (county) of Malmöhus, Swed., located on the Sound, 40 km. (25 mi.) N.N.W. of Malmö by road. Pop. (1960) 28,820. The 16th-century castle and fortress include a construction of earthen walls, the largest of its kind remaining in Europe. There are several buildings in the French classical style. The town is a popular summer resort and has regular ferry connections with Copenhagen. The excellent harbour is rarely obstructed by ice. Principal industries include shipbuilding, machinery, metalwork, production of artificial fertilizers, tanning and food processing. On the island of Ven (Hven), now a part of the city, the astronomer Tycho Brahe built his famous observatory of Uraniborg, the ruins of which are still standing. Landskrona, founded by Eric of Pomerania, king of Sweden, Denmark and Norway, is first mentioned in 1412.

(Ha. N.; W. N.)

LANDSLIDE. Downward mass movement of earth or rock on unstable slopes includes many forms resulting from differences in rock structure, coherence of material involved, degree of slope, amount of included water, extent of natural or artificial undercutting at base of slope, relative rate of movement, relative quantity of material involved, etc. Many terms cover these variations. Among them is landslide or landslip. Creep, earth flow, mudflow, solifluction, debris avalanche, etc., are related forms in which mass movement is by flowage.

The slump landslide is usually the consequence of removal of buttressing earth at the foot of a slope of unconsolidated material. It commonly involves a shear plane on which a back tilting of the top of the slumped mass occurs. The plane is slightly concave upward and outward and separates the slump block from unslumped material of the same character. If shearing movement occurs on a surface of consolidated rock, the dislocated mass is a debris slide. Cliffs may become so steepened through undercutting by rivers, glaciers or waves that masses of rock will fall freely and constitute a rockfall type of landslide. *See* also Geology.

(J. H. Bz.)

LANDSTEINER, KARL (1868–1943), Austrian scientist, discoverer of the four primary human blood groups, and Nobel prize winner in medicine, was born in Vienna on June 14, 1868. He received the degree of doctor of medicine from the University of Vienna in 1891, later returning there to teach pathology (1909–19). In 1919 he moved to the Netherlands, and three years later accepted an invitation to go to New York city as a member of the Rockefeller Institute for Medical Research.

Karl Landsteiner's discovery in 1901 that human bloods are of different types led to the practice of using only similar blood types for transfusions, thereby eliminating much of the danger of that operation (*see* also Blood). In pursuance of his studies in this field, Landsteiner worked out the mechanism causing paroxysmal hemoglobinuria. His principal work and interests were in immunology, bacteriology and pathology, but he also carried on researches in virus diseases and, in connection with work on poliomyelitis, succeeded in transmitting the disease to monkeys. He was awarded the Nobel prize for medicine in 1930 and also won the Paul Ehrlich medal and the Dutch Red Cross medal.

Landsteiner, a naturalized citizen of the United States, died in New York on June 26, 1943.

LANDSTURM, the army reserve category in German-speaking nations comprising the oldest age classes. Literally the "territorial assault force," the term originally implied a general levy of all able-bodied citizens in time of war. The Prussian Landsturm was given a legal basis in 1813 in preparation for the war of liberation against Napoleon which culminated in the battle of Leipzig. All men not serving in the regular army or the Landwehr (*q.v.*) were called upon to harass the enemy in their local districts with all available means, operating on the model of the Spanish guerrillas. In imperial Germany the Landsturm comprised both trained and untrained men from 17 to 45 who were considered not fully fit for service in the field and were to be used only for local garrison duty in case of dire necessity; but in World War I many such men were incorporated into the field forces. Hitler's defense law of 1935 defined the Landsturm as the reserve category comprising all men from 45 to 55; in World War II they were initially assigned to local defense battalions but were later used in occupation duties and ultimately in line units.

In the Austro-Hungarian monarchy the Landsturm included all male citizens who were fit but were not serving in either the active forces or the first-line reserves. Men from 19 through 37 comprised the first ban, and those from 38 through 42 the second ban; except for the Tirolese units, no peacetime training was received. Swiss regulations, as revised in 1949, assigned men from 43 to 48 to the Landsturm. They were intended for use in local home defense units in time of war. (P. N. T.)

LAND SYSTEM (U.S.). The early development of the land system of the United States illustrates both the continuity of history and economic determinism. On the side of historical continuity the key fact is the feudal land system in Europe out of which the new world's tenure arrangements grew. On the side

of historical determinism the most significant point to note is the failure of feudalism to strike deep roots in North American soil.

Under feudal land organization complete ownership of property was unknown. All land was held "of" the supreme ruler: great lords held titles subject to the prior rights of the king, lesser lords owed similar obligations to the great lords, and serfs had to meet the conditions laid down by the lesser lords (*see* LAND TENURE: ECONOMIC AND AGRARIAN ASPECTS).

Colonial Period.—With the discovery of America, vast land resources came into the possession of various European monarchs to do with as they would. Overwhelmingly, the pattern followed was the granting of vast tracts to particular persons or groups of persons with all of the rights and responsibilities then accruing to manor-holders in the mother country. Indeed, in numerous instances, for example Maryland and Pennsylvania, the grantees were even given a right which was no longer permitted in England —the right of subinfeudation (that is, the right to establish lesser manors).

However, because the receivers of these huge grants were typically absentee owners, because these lands were virtually valueless unless manpower could be made available, and perhaps especially because these resources were part of a vast, unexplored wilderness occupied by uncivilized peoples, it turned out to be very difficult actually to transplant feudal institutions to the new land. And this, of course, was the point at which economic determinism began to challenge the influence of historical continuity.

This conflict made itself felt from the beginning. Under its 1612 charter, for example, only five years after the first settlement, Virginia began officially to drift away from the intentions of its founders. Originally a trading company organized on the basis of no land distribution to settlers, this lone British colony in North America soon felt compelled to bargain with potential colonists by offering them land of their own. This was the origin of the famous headright system, the dominant method of land distribution in the southern colonies and a method which found some use in every one of the original 13. Under that system anyone responsible for bringing one or more settlers into the new world was given land in proportion to the number of people thus added to the population. Land distributed in this way continued to be encumbered by some of the ancient feudal restrictions, but tenure conditions were already beginning to be more free than in Europe.

The predominant pattern of land distribution was very different in early New England. Here the principal settlement agency did not function on an absentee basis; the governor and council of the Massachusetts Bay company brought their documents with them and operated on the spot. Furthermore, New England settlers were far more apt to be self-sufficient, and therefore not in debt for passage and subsistence on arrival. Here the pattern was to grant land to a group of reputable citizens who had declared their intention to found a town at some specified point. These men as the new town's chief citizens and ruling group then parceled out the available territory to actual settlers. Understandably under these circumstances certain elements of the inherited feudal pattern also quickly dropped away. Thus quitrents, an arrangement whereby the holder of a particular plot of land must in perpetuity pay a "rent" to the grantor, were much less characteristic of land distribution in New England than in the south.

By 1681, the year William Penn became the largest private landowner in the world, another method of distributing land was becoming popular. As one way in which his vast holdings were to be disposed of Penn listed the method of sale, and this device became the primary distribution procedure in Pennsylvania. Nor was this approach any more successful in resisting the erosion of feudal relationships than New England and Virginia programs. On one hand, the policy of selling land in large, manor-size units even more pointedly than heretofore taught the lesson that old world citizens would not brave the elements in the new world at the price of an indefinite period of servitude. And on the other hand, because there was much resistance to the payment of quitrents, Penn inaugurated the practice of giving a purchaser the option of paying a higher initial price and reserving no quitrent.

Dramatically illustrative of the fact that a new form of land tenure was indeed growing up in America is the experience in Georgia under the trustees. The last of the 13 colonies to be officially launched, Georgia's charter provided explicitly for an ownership arrangement known as "tail male"—requiring that ownership units could not be subdivided and could pass by inheritance only through male issue. However, so intense was settler objection to these restrictions that before the charter was ten years old "tail general" had been substituted for "tail male," and by the end of another ten years this requirement had in turn given way to a form of tenure closely approximating the modern fee-simple arrangement.

Period of National Independence.—But if there was a steady, even irresistible, movement toward freer tenure conditions, it is nonetheless true that it took the American Revolution to complete this work. As a part of the revulsion of feeling against the mother country after 1776, quitrents and primogeniture and entail laws were eliminated on a wholesale basis. With the settling of this issue, however, a closely related conflict promptly took the centre of the stage, a controversy which had all along given some difficulty. That question was whether land should be distributed in the first instance to the many or to the few, and this issue was to dominate the evolution of the land system for more than a century.

Though it was not realized at the time this decision had already basically been made; historical continuity was to rule in this sphere. And the decision was that a continuous battle would be waged between proponents of both these approaches, with neither winning a clear-cut victory. Just as in the New England township system a number of large grants were made side by side with the many grants of small farms to actual settlers, just as under Virginia's headright procedure a few financiers and ship captains secured sizable holdings, and just as in Pennsylvania small grants were intermingled with the majority of larger ones—so in the new nation were both the yeoman group and promoter-speculators accorded concessions in the policy actually worked out.

Because there was in this important sense no real change in policy, the key difference after the Revolution was that a uniform policy law had to be worked out within the framework of the new national government. In the course of the actual fighting each of the seven states that claimed land to the west beyond its own boundaries was compelled to surrender this land to the central government as a major condition of the acceptance of that government by the other six. Moreover, during the next three quarters of a century the government in Washington was given the responsibility of disposing of the Floridas plus all of North America west of the Mississippi river between Mexico and Canada. Most of the pressures relating to land policy which had earlier raged in the capitals of the several colonies now converged on the nation's capital.

As it began to wrestle with the problem of administering a vast public domain, the central government first decided that these lands were an important resource from which the state should derive a revenue. Accordingly a policy of sale was inaugurated, though on terms rather more favourable to speculators than to settlers. The smallest quantity of land that could be sold was a full section of 640 ac., and the only points at which purchase could take place were land offices located in the east.

From this time onward until the American Civil War land legislation was progressively liberalized to promote settlement—because western political pressure became almost irresistible, because tariff revenue was so great as to lessen the need for revenue from land sales, and because eastern manufacturers saw in cheap land a way of reducing agitation for tariff reduction. Three events especially illustrate this evolution. As early as 1796 the government began to open up sales offices located much closer to the actual frontier. In 1820 a movement to reduce the minimum quantity that could be bought reached its climax in a law specifying only 80 ac. And in 1841 by far the most important victory to date of settler over speculator was won in the form of the Pre-emption act. Under the terms of this law anyone locating himself on public land not yet surveyed was permitted when his plot was surveyed to buy this land at the $1.25 per acre minimum price, even if some land company did get to the land office first. After the Civil War the situation changed markedly. Though in 1862 the west won what

seemed at the time to be its greatest public land victory, the sequel to that success pointed a quite different moral.

The Homestead act was in concept a settler's dream. Under its terms any individual might obtain 160 ac. of the public domain merely by living on this plot and working it for five years. In practice, however, the dream did not remain intact for long. The earlier policy of disposition by sale was not wholly discontinued. Tens of millions of acres were given to corporations to encourage the building of railroads. A commutation clause in the Homestead act itself, specifying that after six months an entrant might buy his quarter section at the pre-emption price, was an open invitation to speculators aided by dummy homesteaders. Other post-Civil War land legislation intended to complement the Homestead act actually permitted individuals to violate the spirit of these laws by securing land under several acts. The entire network of legislation was badly administered. All in all, it is not surprising that by 1890 a pathetically small quantity of land had in fact been disposed of by way of the homestead route.

In short, by the end of the 19th century, just as the opportunity to use a vast rich public domain to shape the nation's land policy was nearly past, it had become apparent that a fee-simple land tenure arrangement is no guarantee of an agriculture of free farmers. The evidence of this sobering fact, moreover, was dramatically advertised when in 1880 the bureau of the census first included farm tenancy in its survey of U.S. agriculture. To be sure, a large part of the tenancy problem centred around the south's crop-lien system—a semifeudal relationship growing out of the abolition of slavery in which the operator furnished only labour, borrowing everything else from the owner on terms that made it very difficult ever to get out of debt. The fact that the tenancy rate was more than 25% even in the upper Mississippi valley region gave much cause for concern.

Thus made sharply aware of a trend which seemed to be running directly counter to the American creed, the nation took a long look at the federal government's responsibility for the land system that was emerging. Put differently, as the federal government (with the end of the frontier now in sight) lost the power to promote a vigorous farm-owning group by means of public domain distributions, pressures developed for accomplishing this objective in other ways.

The numerous techniques actually employed can be summarized under four principal headings. Before the turn of the 20th century the federal government had commenced a program of agricultural research and experimentation linked with a network of farmer education endeavours designed to place modern science at the disposal of even the smallest operators. Shortly after the 20th century began, congress authorized the expenditure of government funds for large-scale irrigation projects to reclaim otherwise unusable land for the nation's farmers, this effort greatly broadening during and after the 1930s into a massive program of soil conservation available to all farmers.

Toward the end of World War I a farmer complaint that had been loudly heard since the beginning of the nation became the subject of major legislation. That was the cry for more adequate credit resources. This beginning evolved into the farm credit administration which became the basis of the farm credit structure, providing government assistance to farmers in this field on a very wide front. And finally, the great depression of the 1930s launched the federal government into the business of placing a floor under the prices of many farm products in order to protect the income especially of farmers in the lower-income brackets. For discussion of these four principal approaches *see* AGRICULTURAL EDUCATION AND RESEARCH; IRRIGATION; AGRICULTURAL ECONOMICS: *Agricultural Credit Systems; Agricultural Prices and Incomes.*

See also FARM TENANCY; HOMESTEAD AND EXEMPTION LAWS.

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LAND TAX. The traditional land tax may be defined as a tax based on the productive capacity of land or on standards devised to represent such capacity. The oldest and most prevalent forms of this tax have been the farm output tax and the land tax proper. The farm output tax in the form of the religious or political tithe (*see* TITHE) was collected in the middle east in the biblical and Islamic periods; in India, especially under the Hindu regime; in ancient China; and in medieval Europe. China developed a system of farm-output tax based on the total summer harvest (major crop), computed annually for each holding on the spot and collected usually in kind by the government. The land tax, on the other hand, was usually based on the presumptive assessment of land income (annual or capitalized) according to the cadastral (land) survey for one specific year or for an average of a number of years. The amount of tax determined on the basis of such assessment usually remains fixed for a period of years. This type of land tax can be traced to ancient Egypt and India, but it found extensive use only in Europe in the 19th and the early 20th centuries. It was applied extensively in some of the former British dependencies (*e.g.*, India and Burma), and in modern times has been widely used in the so-called underdeveloped countries.

Theoretical Analysis.—The pragmatic concepts of land taxation have been haphazard and the theoretical speculations manifold. The tax, rent and cultivator's income are the three criteria for the sharing of the (net) produce of the land. A variety of theoretical discussions deal with the nature and fairness of such distribution among the sovereign, the owners and the cultivators in the light of definition, significance and place assigned to each of these elements in the prevailing political, religious and economic thinking. In the ancient and medieval periods most discussions were devoted to the juridical base for land-tax liability. The tax was regarded as a payment to the sovereign in whom the ownership of land was vested in exchange for the use of the land. This was the basic concept behind the feudal system of land tenure.

In countries where the emphasis was on the communal character of landholding (*e.g.*, India and parts of China), the land tax was considered as a payment for the protection given by the sovereign or the conqueror, the ownership of land according to this concept being retained by the community. But as the concept of individual ownership developed in these countries, the rights on land gradually passed into the hands of the proprietors. Where the sovereign is regarded as the owner of the land, as in the case of government domain, the total payment to the sovereign takes the form of a combination of rent and tax. Where the ownership is vested in the cultivator, he, as the owner, pays only the tax, and the rest of the (net) output represents a combination of rent and the cultivator's share.

A new phase of the evolution of the land-tax doctrines found its impetus in the French Revolution. Economic, administrative and social reforms were influenced by the attention that the leading economic and social thinkers gave to the significance of agriculture and the concept of land taxation. The French physiocrats of the 18th century had laid the doctrinary groundwork for the preponderant role assigned to the taxation of land (*see* PHYSIOCRATIC SCHOOL). The theoretical concepts of land rent were further developed by David Ricardo and other economists of the 19th century. In the second half of the 19th century Henry George of the United States became the leading exponent of the land tax as a single tax (*q.v.*) and influenced the adoption of new tax measures in certain states of the U.S. and even in Australia and New Zealand.

Decline of Land Tax.—A decline of the land tax occurred as industrialization progressed and industrial and commercial sources of income accounted for higher proportions of the national income. The growth of income and sales taxes after World War I eventually made the taxation of land lose its primary significance in all highly developed economies. It had, however, considerable ancillary significance in connection with the postwar capital levies in Europe, and in connection with the revised property taxes in Scandinavia and the Netherlands. This was, however, the taxation of land through new methods and not the traditional land tax. With the growth of income taxation and with the commercialization of agricultural exploitation, the problem of taxing agricul-

tural income on the same basis as other income arose everywhere. Concepts of equity became predominant as the tax burdens grew in volume and scope. Special provisions for taxation of agriculture continued to prevail, however, even in countries which applied a general income tax with equal rates to income from all sources. In Latin countries, which have a tradition of schedular income taxation applying different rates to incomes from different sources, the problem became acute when transitions were made to the general income tax plan as used in Italy and France. In these, as in other cases; agricultural income, while no longer taxed at differential rates, was taxed on a different base. The nature of the agricultural activity, the methods of production, the role of consumption in the agricultural community and the uncertainty of crops require a special approach.

In less-developed countries, agricultural income was often excluded from the general income tax even where this tax had been in existence for a long time. In India and Pakistan, for example, land taxes were continued, partly as a substitute for personal income tax payments by landowners. In the greater part of Asia one of the real problems has been the case of submarginal farmers and tenants who often are in extreme difficulty and unable to pay any tax at all.

In some states of India income derived from land exempt from the general income tax was made subject to an independent system of progressive agricultural income taxation complementary to the prevailing land tax. In other countries, a shift was made to the taxation of agricultural commodities when marketed so that the difficulty of the cadastral revision and assessment could be eliminated. In these countries land taxes were abolished and taxes were introduced on products marketed for domestic consumption or for export. Such types of taxes can be regarded as a variation of the farm-output taxes, although the bases—the total farm output as contrasted with only that part delivered to the market—differ significantly.

Assessment Problems.—Under the traditional land tax, the theoretical assessment base is the productive capacity of land, which is not easy to determine. Productive capacity measured in terms of net output requires determination of gross output by direct inspection of farms, especially at the time of harvest when the crop is piled in the field, or indirectly through evaluation of factors such as yield, area, rent, etc., and the determination of the cost of production. Productive capacity measured in terms of cash values requires valuation of net output on the basis of prevailing prices after deducting the cost of transportation and other incidental charges. For those types of agricultural production such as plantation and large-scale farming, for which accounting records are kept, the tax administration can avoid intricate computations by relying on the tax declarations based on income records. In the majority of agricultural exploitations, however, such records are not available.

Small-scale agricultural production is a mixture of business and a way of living in which the keeping of accounts and ascertainment of profit and loss are not as vital as in other businesses. In these cases, the tax administration usually makes its own computations. It is interesting to note that even in the case of advanced nations presumptive assessment has been used for estimation of the agricultural incomes subject to the income tax. Finland, for example, established a system of presumptively determining agricultural income on the basis of the actual yield of yardstick farms operated by the government.

Presumptive assessment is usually simplified by the adoption of one or a few standards as the tax base. These take a variety of forms depending on the nature and characteristics of agricultural production, marketing and ownership of agricultural land. In some states of the U.S. (Vermont and North Carolina) and in some Latin-American countries (Argentina and Brazil), the area of holdings was made subject to taxation. In the middle east, in Iraq, the method of irrigation such as pump machines or manual wells was made subject to taxes; in other countries, certain types of land, such as "wet" or "dry" areas, are taxed at specific rates. In Egypt and Great Britain, land is assessed on the basis of rent. Presumptive earnings, fertility and type of production were used as the assessment basis in the states of Connecticut and Ohio. Land tax has been used theoretically in the form of a percentage of the net rental or the net (or gross) output in India and Pakistan, depending upon whether the land was settled by landlords or owner-cultivators.

Land tax in the form of real property tax usually has as its base the capital or sales value of the land, as in most states of the U.S. and in some cantons of Switzerland. For lands which yield revenue (*e.g.*, agricultural land) such revenue is directly or indirectly used as a criterion for the determination of capital value in addition to other standards such as cost or market value. For lands yielding no recurring income (*e.g.*, certain city sites and plots), determination of capital value is based on a number of other valuation methods, namely the prospective value appreciation, social utility and prestige value of the land, all of which are usually expressed in terms of sales value. In most states of the United States, land and other forms of real estate are subject to the general property tax whether they yield a return or not. In this system, land-tax assessment is based on the classification of land according to use or other criteria. (*See* TAXATION.)

The rigidity of the land-tax structure contributed to the gradual decline of this type of taxation in the revenue composition of a great number of countries. The tax liability, usually determined in fixed charges, became extremely low in real value as prices followed upward trends. In order to reduce such rigidity in some systems the assessment is based on the average price and output of five to ten years; and, when the actual prices or output fluctuate beyond a certain limit of the standards used, revision is allowed either at the request of the taxpayer or according to the discretion of the tax administration. In other systems only output is determined on the basis of previous experience, and prices are calculated annually according to the market conditions before the taxes are determined. Furthermore, the tax liability in some years is multiplied by a coefficient without resort to cadastral revision.

The land-tax rigidity is nonexistent in the case of taxes levied in kind and also under systems whereby the cadastral records refer only to the revenue capacity of the holding. The amount of tax is then calculated and announced annually on the basis of the prevailing prices. In the case of the latter two systems, the decline of the significance of the land tax in terms of relative yield is the result of increase of receipts from taxes levied on other sources of income. The land-tax rigidity and proportionality is to some extent overcome in those tax structures in which progressive taxation of agricultural income is given full treatment. To further develop tax equity and to improve land utilization, special taxes, separate or in the form of surcharges, have been levied on uneconomical use of land and undesirable forms of ownership. A number of experiments in using land taxation for nonfiscal purposes were attempted in Canada, where uncultivated but arable land was taxed at special rates in some provinces, and especially in Australia and New Zealand, where until about 1952 land taxation was widely used with the intention of discouraging absentee ownership of large estates and encouraging agricultural improvement.

Both penalization through heavy taxation and incentives through tax remissions for desirable economic activity were resorted to in a number of systems. Large holdings are made subject to heavy taxes in some states of Argentina by surcharges, and in other countries the rates progress as the total value of holding or area increases. In Argentina and Brazil surcharges are applied to absentee landlords. The above aspects of land taxation have received important consideration in the land reform measures undertaken in many countries of Asia and the middle east.

Urban land is usually taxed by the municipalities and a share is given either to the central government or, in the United States, to the state government. In the case of rural land the tax is administered and shared by the counties and states in countries with a federal form of government; in countries with a unitary form of government such taxation is administered directly by the central government, although some of the revenue may accrue to subordinate governmental authorities.

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(H. S. BH.; N. D. G.)

LAND TENURE: ECONOMIC AND AGRARIAN ASPECTS. The word "tenure" (Lat. *tenere,* "to hold") probably derives from the feudal system, the basis of which was that all land was "held" by one individual from another and none was absolutely owned (*see* REAL PROPERTY AND CONVEYANCING, LAWS OF). Great Britain, in about 900 years, escaped from feudalism and from 1875 onward steadily built up legal safeguards for the protection of tenants. These have been studied throughout the world and their history is traced in this article which also surveys economic and agrarian aspects of land tenure in various other countries. For a review of land tenure systems and customs in primitive societies *see* LAND TENURE, PRIMITIVE and for historical developments in the United States *see* LAND SYSTEM (U.S.). *See* also AGRICULTURAL ECONOMICS; FARM TENANCY; HOMESTEAD AND EXEMPTION LAWS; LAND REFORM; PUBLIC DOMAIN and articles on individual countries.

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I. ENGLAND: THE DEVELOPMENT OF LEGAL SAFEGUARDS

1. Feudalism.—After the Norman conquest in 1066, all land in England was held by tenants from feudal lords upon various forms of feudal tenure, with the king as the lord paramount and the manor as the most important unit of ownership. The principal classes of tenant were free tenants, villeins (who became copyholders by the end of the 14th century), serfs and cottars. Free tenants, the yeomen of English history, at first rendered military or agricultural service, but later this was commuted for a quitrent. Sometimes their land was in a separate holding but much more frequently it was a part of the open common fields.

Serfs and cottars were occupiers of a cottage and garden and perhaps five acres of arable land, with grazing rights in the common fields, but they had to depend for their livelihood mainly on labour for the lord (in addition to their obligatory services) or for the tenants. The status of the villeins was at the outset one of modified servitude. They were unfree in that they were tied to the manor and were subject to the will of the lord. But each held an allotment in the common field with rights over the common pasture and the waste or woodland surrounding the manor. He paid rent to the lord, mainly in the form of labour, being under obligation to give so many days' service on the lord's demesne during the year.

The arable land of the manor was divided into strips of an acre, or in some cases, half an acre, separated by balks, or ridges, of turf, but otherwise unfenced and in large open fields. Every villein held a number of these strips distributed in various parts of the two or three open fields, and not adjoining. The extent of the holding differed but the hide (*q.v.*), or "family land," of 120 ac. appears to have been the conventional holding of the free tenants. Each villein usually had a yardland, conventionally a virgate of about 30 ac., or ¼ hide, but varying according to the soil. Each cultivator had a number of working oxen proportionate to his holding, eight being regarded as forming a plow team for a hide of land.

The manorial organization had no sooner attained these apparently rigid lines than it began to be modified. The villeins struggled continually to secure greater freedom. By the 15th century most of them paid a rent in lieu of services and had become personally free (*see* COPYHOLD). The "custom of the manor" became established and eventually became binding on the lord as well as the tenants. For the history of the manorial system and its slow dissolution *see* MANOR. (*See* also COMMONS; SMALL HOLDINGS.)

2. Leases.—By the end of the 15th century a large part of the agricultural land was let to tenants on lease either for a term of years, or for life, at fixed rents generally established on the basis that the owner provided the land, house and necessary buildings, while the tenant supplied the livestock and working capital. The terms on which the farm was let were minutely set out in the lease, the landlord binding the tenant by strict and detailed conditions, the main object of which was to maintain the fertility of the land and to bind the tenant to farm in accordance with what were then considered the principles of good husbandry.

By the latter part of the 18th century leases for 7, 14 or 21 years were offered. The lease for 21 years was popular in the eastern counties and it was also adopted in Scotland. Leases fell into some disfavour during the period of the Napoleonic Wars, but when conditions became more stable they again prevailed generally until the depression of the 1880s. Leases are still common in Scotland, but throughout England and Wales tenancies from year to year (continuing until notice of termination is given) have long predominated.

Both the common law and the superior bargaining power of most landlords weighted the scales against tenants, and in the 19th century there was prolonged agitation for reform. The Landlord and Tenant act, 1851, was the first fruits of this, and then the Agricultural Holdings act, 1875, was followed by a series of similar statutes, notably in 1883, 1923, 1947, 1948 and 1958. The tendency was for the statutory control of agriculture to become more detailed and stringent. In very general terms, for these purposes the 19th and 20th centuries may be said to fall into four main periods. First, before the act of 1875, the predominant features were freedom of contract and the rule of common law. Second, after the act of 1875, there was an era of increasing statutory protection for the tenant against the landlord. Third, World War II brought emergency regulations, later made statutory by the act of 1947, which gave the state powers in the public interest to control and evict inefficient farmers. Fourth, the act of 1958 repealed these powers but continued the protection of tenants in an improved form.

3. Protection of Tenants.—At law, everything that was put into the soil or was attached to the land became the property of the landlord without recompense to the tenant, unless otherwise agreed. Tenants claimed that as a matter of justice they should receive compensation for the residual benefit of any improvements that they had made to the holding, and in many districts custom in some degree mitigated their position. But their main protection was to come from statute. Under the act of 1851 (and ultimately the act of 1923) tenants were enabled, subject to certain restrictions, to remove agricultural fixtures and buildings which they had affixed or acquired. But many other improvements (*e.g.*,

to the land) were naturally irremovable. The act of 1875 gave tenants the right to compensation for the unexhausted value of improvements made by them, but this proved of little value because it was subject to any agreement to the contrary, and most landlords accordingly contracted out of the act. The act of 1883 in effect invalidated contracting out unless the lease gave the tenant terms not less favourable than the statutory provisions. With subsequent legislation, tenants received further protection, the Agricultural Holdings act, 1923, representing the culmination of a period during which freedom of contract had been progressively modified by parliament in the interests of the tenant. This act gave the tenant the right to remove fixtures provided by him; to compensation for improvements; to compensation for "high farming," that is, for adopting a standard of farming more beneficial to the farm than that required by the tenancy; to compensation for disturbance on the termination of the tenancy; and to receive at least a year's notice to quit, thus preventing termination of a tenancy while the crops were still growing. The Agriculture act, 1947, made many amendments to the act of 1923; and the revised code was consolidated in the act of 1948 and further amended by the act of 1958.

As fully developed, this system involved eight regional agricultural lands tribunals, each with a barrister or solicitor appointed by the lord chancellor as chairman and two other members, appointed by the minister of agriculture, fisheries and food, representing farmers and owners respectively.

The benefits conferred by statute on agricultural tenants may be grouped under three main heads: compensation for improvements; protection as to rent; and security of tenure.

Compensation for Improvements.—On quitting his holding, an agricultural tenant was given the right to claim from his landlord compensation for improvements based on the increase in value of the holding, or, for short-term improvements, their value to an incoming tenant. For some long-term improvements (*e.g.*, the planting of orchards) the landlord's consent was made requisite; for others (*e.g.*, the erection of buildings) the approval of either the landlord or the agricultural lands tribunal sufficed. For short-term improvements (*e.g.*, the liming of land) no approval was required.

Protection as to Rent.—The freedom of landlord and tenant to establish by agreement whatever initial rent they wish was not affected. But not more often than once in every three years either party was enabled to require the rent to be fixed by an arbitrator at the open-market rent.

Security of Tenure.—The act of 1948 preserved the former rules requiring at least a year's notice to quit and continuing a tenancy for a term of two years or more as a yearly tenancy subject to notice to quit. More important was that, with six exceptions, the act (as amended by that of 1958) enabled a tenant who received a notice to quit to nullify it by serving a counternotice on the landlord within one month. If he did this, the notice to quit had no effect unless the agricultural lands tribunal consented to its taking effect; and only in four cases was the tribunal empowered to give that consent.

The six exceptional cases, in which the tenant could serve no counternotice, were: (1) where the land was required for some nonagricultural use for which permission had been given under the town and country planning legislation; (2) where the tribunal had within the previous six months certified that the tenant was guilty of bad husbandry; (3) where the tenant had failed to comply with a notice requiring him within two months to pay his rent or remedy some breach of a term of his tenancy; (4) where the landlord's interest had been materially prejudiced by a breach of some term of the tenancy which could not be remedied; (5) where the tenant was bankrupt; and (6) where the notice was given within three months of the death of the tenant. In all these cases the notice had to state the ground on which it was given.

The four cases in which the tribunal was given a discretionary power to give or to withhold consent were (1) where the termination of the tenancy was desirable in the interests of good husbandry or sound management; (2) where the land was required for agricultural research or the like; (3) where withholding consent would cause greater hardship than giving it; and (4) where the land was to be used for some nonagricultural purpose not within the first of the six exceptions stated above.

4. The Interests of the State.—In addition to making many changes in the law of landlord and tenant, the Agriculture act, 1947, enacted an amended version of the system of controlling inefficient farming which had been imposed by emergency regulations during World War II. The dominant note was the public interest in securing the efficient use of agricultural land in a crowded island. The owner must be made to comply with the rules of good estate management; the occupier with the rules of good husbandry. To achieve this, the minister, acting in practice through county agricultural executive committees, was given the three weapons of supervision orders, directions and dispossession orders.

Supervision Orders.—If the minister was satisfied that the owner of agricultural land was not managing it in accordance with the rules of good estate management, or that the occupier was not farming in accordance with the rules of good husbandry, the minister might make a supervision order in respect of the owner or occupier, as the case might be. The order gave the minister powers of inspection, direction and dispossession, and had to be reviewed every year. The owner or occupier had to be given opportunities of making representations both before the order was made and before it was reviewed; and when the order was no longer necessary, it was to be revoked.

Directions.—While the supervision order was in force, the minister might give directions to the person affected by the order, so as to secure good estate management and good husbandry. Such directions in practice covered a wide field, from the provision of buildings and other fixed equipment to drainage works and modes of cropping. An opportunity of making representations had to be afforded before a direction was given, and disobedience to a direction was punishable by fine.

Dispossession.—If a supervision order had been in force for at least a year and the management of the land did not show satisfactory improvement, the minister might purchase the land compulsorily. The owner had first to be given an opportunity of making representations, and he might require the proposal to be referred to the appropriate agricultural lands tribunal for decision.

There were corresponding provisions where the farming did not show satisfactory improvement after a supervision order had been in force for a year. The minister might order the tenant to give up his tenancy and the owner to farm the land himself or let it to an approved tenant, and might order an owner-occupier to let it to an approved tenant. In each case, there were similar provisions as to making representations and referring cases to the agricultural lands tribunal. In case of default, the minister might take possession of the land and arrange for it to be farmed.

Repeal of Powers of State Control.—The Agriculture act, 1958, repealed all these provisions for control by the state and left the eradication of inefficient farming to the ordinary economic process. Nevertheless these powers remained significant, for they showed what might again be imposed by parliament in time of need; and their repeal showed that the future pattern of the law of agricultural holdings was intended to be one merely of legislative protection for good tenants and not one of state control.

5. Comparison With Other Systems.—The system of land tenure developed in England is unique. The outward form of landlord and tenant is preserved, but the real control of the land lies with the tenant, the landlord being little more than a recipient of rent. On the other hand, apart from communist regimes, over the great part of the world the occupiers of agricultural land are the owners of it: peasant proprietorship is predominant, and where there is a dual interest in the land, the most common system is that of some form of métayage (*see* MÉTAYAGE SYSTEM). However, in some countries a tenancy system not unlike the English system developed. In Flanders, some leases probably existed as early as the 13th century, but the earliest tenure generally adopted was métayage, which was gradually replaced by a form

of lease of stock and land known as "cheptal." Standards of husbandry were high, and in the 16th and 17th centuries they were held up as a model for English farming. By the end of the 18th century, cheptal had been replaced by the landlord and tenant system. The emphyteutic tenures of the 18th century in Belgium (long leases of 27 to 99 years under which the tenant was entitled to erect buildings at his own cost) were gradually replaced by yearly tenancies or tenancies for short terms (*e.g.,* nine years, determinable by either party at three or six years). In Denmark, on the other hand, owner-occupation was the rule and tenancies the exception, though an act of 1919 vested in the state about 120,000 ac. of land suitable for small holdings, some of which was let to tenants with absolute security of tenure as long as the holding was cultivated satisfactorily.

The French Revolution had brought the first large reform of land tenure in modern times. The advantages that came with such reform spread to central and eastern Europe. Land tenure problems and policies received particular attention after 1910 and especially after 1950. Revolutions in Mexico in 1910 and in Russia in 1917 brought changes in the agrarian structures of those countries actuated by divergent aims. In Mexico after 1916 peons were enabled to establish village communal rights to land, and in Russia there was an abolition of private property in land and the substitution of government ownership coupled with collectivistic operation. Even in countries in which differences in tenure policy have been less extreme this issue has been at the base of many social and civic as well as economic problems. Consolidation of fragmented and dispersed holdings in western European countries, for example, increased in prominence after World War II. The Organization for European Economic Cooperation, established in 1947, facilitated technical advances in that field and in 1958 the European Common Market opened the way for more income, security and opportunity for land users in several west European countries.

Systems of land tenure in feudal periods no less than in the 19th century had notably lasting effects, and the influence of custom has continued from as far back as the ancient world. Land tenure adjustments, not always by revolutionary means, have been made from time to time in nearly every country, relating the old to something new.

II. EUROPE

1. Russian Agrarian Revolution.—Steps taken following the emancipation of serfs in 1861 were but a prelude to the events in Russia immediately following World War I. Before the war, about 58% of the agricultural land belonged to the peasants: estates in possession of the imperial family, the aristocrats and the church accounted for the balance, about 42%. These estates, confiscated in 1917, did not provide farms for enough peasants. Raising the number of farms from 18,000,000 to nearly 26,000,000 between 1916 and 1928 still left many peasants inadequately equipped to farm and incapable of producing much food for the cities, to say nothing of exports.

Russia's resort to collectivized farming meant compulsory alienation of land from the peasants. Collective farms, the *kolkhozy,* were established. Barns, stables, implements, seed, livestock and forage supplies were collectivized. Government-owned machine tractor stations served the numerous collective farms and also served the huge state farms, called *sovkhozy.*

Members of the *kolkhozy* have been paid in proportion to the number of days they work, but a day's work at different jobs has been evaluated at various amounts. The pay is a residual, however, for numerous deductions are made for the government quotas, taxes, upkeep and building maintenance and improvement. The government procurement prices for the quota products have been set with other ends in view besides adequate farm family living.

Enlargement of the average *kolkhozy* has been a persistent tendency. While some features of the collective system remind one of patterns used in medieval Europe and pre-colonial Latin America, or even of some plantations operating in underdeveloped countries, the *kolkhozy* system of tenure in the Soviet Union and in satellite countries is without precedent. (*See* also FARM COLONY: *Socioeconomic;* UNION OF SOVIET SOCIALIST REPUBLICS: *The Economy: Agriculture.*)

2. Eastern Europe.—Within less than a half century after 1900, tenures of land in the countries lying between the Baltic and the Aegean seas changed from the pattern of feudalism to a status of Soviet colonialism. Some parts of this region, notably Hungary, retained elements of feudalism until about 1945. The more fertile areas were mostly in the hands of large landowners, some of them foreign citizens persistently absent from their estates. Deficiency of farming opportunity confronted the farming population not only before redistribution of land but afterward as well.

Landowners in some cases had enormous holdings; for example, 440,000 ac., part of it forest land, were held by the Swartzenberg family of Czechoslovakia, and 420,000 ac. by a branch of the Radziwill family in Poland. In nearly every country in this region the ownership of fertile land was highly concentrated. Other owners generally had tracts that were small and fragmented. From about 1919 the governments of eastern European states fostered agrarian reforms, but they were not far-reaching and between World Wars I and II land tenure conditions became even worse. Population increases brought declines in living standards. Objectives in land reform went little beyond dividing a few of the larger estates.

The second stage of agrarian reform in countries from the Baltic to the Aegean showed effects of the Russian pattern of land nationalization. After the establishment of low ceilings on size of individual farms, and some efforts through co-operatives to solve their problems, the collective pattern was pushed in the satellite countries. Large-scale collectivizations of agriculture in these countries proceeded under pressures not always local and production and investment plans in these areas were co-ordinated into the planned economy of the Soviet Union.

3. Northwestern and West Central Europe.—In this region freeholds predominate and owner-operated family farms are characteristic. With the exception of Ireland these countries are highly industrialized, and their agriculture has reached a high level of productivity. In Ireland, under land laws from 1870 to 1950, land held in large estates was gradually transferred to peasant ownership. For stability of tenure to have been established in a country so long beset by severe economic problems is an achievement of historic significance.

In Finland, redemption of leasehold farms, under a law of 1918, and colonization under acts of 1922 and 1936 have been effective. After 1940 a central problem in land tenure was that of providing for displaced farmers from the area ceded to the Soviet Union.

In Sweden under decisions made in 1947 and 1948 the parliament took steps to assure the agricultural population a reasonable level of income and participation in the rising standard of welfare.

In Switzerland agrarian measures after 1950 promoted wider opportunities of ownership, greater security of tenure for tenants and further consolidation of fragmented holdings.

4. Southern Europe.—Compared with northwestern and west central Europe the soil-climate conditions are less favourable, extended droughts are frequent and there is less industrial development. In Italy, Spain and Portugal there has been much inequality in the distribution of land ownership, huge estates (latifundia) being long established.

In Italy three laws were enacted in 1950 for land reform, which in their enforcement involved much reclamation and development.

In Spain the agrarian structure is marked by a high proportion of share tenancy in the eastern regions, high density of rural population and a high proportion of uncultivated land in the northern regions. A National Land Settlement institute has made modest progress since 1939.

In Portugal there has been excessive concentration of ownership in the area south of the Tagus, where hired workers make up a high proportion of the rural population. In the northern

region farms are very small. There have been legislative attempts since 1952 to stimulate land settlement projects.

III. THE MIDDLE EAST AND NORTH AFRICA

Countries of this group joined in examining tenure conditions at a meeting on land problems held at Salahuddin, Iraq, in 1955, under the auspices of the Food and Agriculture Organization (FAO) of the United Nations.

The land tenure patterns in the countries of the middle east and north Africa have both old and new features. In Egypt, Libya, Syria, Lebanon, Iraq, Jordan, Saudi Arabia and non-Arabic Turkey and Iran, there is similarity in the background of their tenure systems. The systems have been marked by absentee ownership of land operated through tenants and sharecroppers. The great majority of the peasants have been either very small owners of land or altogether landless.

Some of the land in Arab countries is held in absolute ownership (mulk). In the Miri Sirf (Emiri) lands, the "neck of the land," or holding right, belongs to the owner. If the owner neglects the land or fails to crop it for five years, he loses his rights and the land reverts to the state. Another type of tenure applies to mushaa land, that term implying an undefined share in a common property. Whenever owners in a village attain extremely high numbers, the grouping of one family's share in the land becomes necessary. The "neck" of the land remains in the family and the right to use it remains in the hands of the customary users. The using tenant continues to pay a share of the crops to the proprietor family.

In the inheritance of mulk land a male heir takes twice as much as a female heir. In Emiri lands, children of both sexes inherit equal shares. Trees were long regarded as absolute property of the persons who planted them, but since 1909 have been considered a part of the land.

Waqf lands are dedicated to charitable or educational institutions. This is a sort of trust system in which the title to the property vanishes, leaving only a title to use by beneficiaries. Once the property goes in, it cannot be sold. Over the centuries large areas have been so absorbed. Efficient use of *waqf* lands is rare.

On the breakdown of the Ottoman empire public lands went into the public domains of the countries subsequently established. In Iran in 1951 the shah began the distribution of crown villages among the farmers, the payment being spread over 25 years. Annual collections have been dedicated to public economic and social purposes. A supply of capital to agricultural banks, serving as rural co-operative institutions in the villages concerned, is one example of the use of these funds.

Turkey.—The Farmer's Settlement act of 1945 provided for loans for acquisition of land and purchase of farming equipment and livestock. No installments were required in the first 5 years, but in 20 years the payments were scheduled to be finished.

Egypt.—In Egypt harvests are normally taken more than once a year from irrigated land, so that each cropped acre accounts for about 1.6 ac. of crops. An average acre of farmland has carried a value equal to about 20 years' wages for the average Egyptian worker. Under the agrarian reform of 1952, there were 583,000 ac. belonging to 1,789 landowners requisitioned over a period of 5 years and distributed to 200,000 families comprising 1,200,000 persons. The expropriated land, having an upper limit of 200 feddans (1 feddan = 1.038 ac.), was distributed in holdings of from 2 to 5 feddans, the recipient farmers owning less than 5 feddans of arable land. In 1961 maximum individual holdings were restricted to 100 feddans.

After 1952 the pattern of land distribution in Egypt improved, but the picture of very low incomes for most small holders, and especially for tenants and farm labourers who constitute about 80% of those engaged in agricultural pursuits, was not greatly changed.

Israel.—Less than 10% of the land is in private hands, nearly all of that portion being in small holdings. State land is mainly concentrated in the southern Negev, but the land administered under the Jewish national fund includes a large portion of the cultivated land. The leaseholds of the Jewish national fund on rural lands have been mainly to large co-operative settlements (*kibbutzim*) and small-holder settlements (*moshavim*). Land settlement and co-operative organization have made outstanding progress. (*See* FARM COLONY.)

The Sudan.—Settlement projects in Africa provide that the land be held on long-term leases, commonly 99 years. One of the most important of these is the Gezira scheme fostered in the Sudan by the United Kingdom. The government, only a partner in 1925 when this project was begun, has since seen the commercial firm which was also a partner become nationalized. Most of the land has remained the property of small owners. The Sennar dam and the major canals were built and are maintained by the government, which takes 40% of the profits. The tenant's share is likewise 40% of the profits, thus leaving 20% to go to the agricultural manager, the Sudan Gezira board. The tenant representative council deals directly with the management.

Under the Gezira scheme a million acres have been developed with canals; over a quarter of a million acres in cotton; half as much in sorghum and half of that amount in legumes. The strict agricultural discipline applied has kept successful this outstanding example of joint land development. *See* also IRRIGATION.

IV. AFRICA SOUTH OF THE SAHARA

Many of the problems of this part of Africa differ from those in other parts of the world. In South Africa, under an act of 1913, no person other than a native could acquire land in a "scheduled" native area or enter into any agreement or transaction for the acquisition, direct or indirect, of any such land or of any right thereto, interest in or servitude over it, except with the approval of the governor general. Amendments in 1936 and 1949 created further areas of land called "released" areas, also unavailable to nonnatives, situated outside the "scheduled" areas. Segregation of properties between natives and nonnatives is a basic factor in land tenure.

Among natives, especially in Natal, the head of a kraal has custody and control of the property attaching to the houses of his several wives. A separate "house" is established for each wife and all of these houses constitute a kraal. A house is defined as the "family and property, rights and status, which commence with, attach to and arise out of, the customary union of each native woman."

Where indigenous agricultural systems are found, and more individualized forms of tenure have come to be regarded as better adapted to current economic needs, transition from the earlier tenure forms usually has proved difficult. *See* also LAND TENURE, PRIMITIVE.

V. ASIA AND THE FAR EAST

Thirteen Asian countries were represented at the 1954 sessions on land problems held in Bangkok, Thailand, under the auspices of the FAO.

Burma's Land Nationalization act of 1953 initiated the taking over of land belonging to noncultivating absentee landlords for distribution to landless peasants. This followed laws passed in 1947 and 1948 providing security of tenure and fixing a "fair" rent for tenant cultivators.

In India the first five-year plan, 1951–56, initiated changes in the highly complicated land-tenure systems, including those of an intermediary nature and *ryotwari* tenures. India is plagued by an overwhelming pressure of population upon the land, minute fragmented holdings and primitive agricultural techniques. Intermediaries affected 43% of the area before the reform, and their removal was prompt and almost universal. Measures for security of tenure and regulation of rents proceeded in most of the states under subsequent five-year plans. The movement for voluntary surrender of land by large landowners, the Bhoodan campaign started by Vinoba Bhave, had affected several million acres by the 1960s (*see* also FARM COLONY: *Socioeconomic*).

In Japan the Agricultural Land law of 1952 consolidated and

continued the reform program approved in 1946 by the Allied powers. The percentage of the arable land held by tenants had dropped from 46% in 1940, to 9% in 1952. Japan's farming units were painfully small before reform and continued to be too small. Under the old system prevalent in rural Japan the eldest son inherited the parental property and remained on the farm. Inheritance in equal shares by all heirs, so far as it displaces the former informal primogeniture, subjects the small ownership units to still further decrease.

In the Philippines the first agricultural tenancy act was passed in 1954, establishing an agricultural tenancy commission. In 1955, under the Land Reform act, the national resettlement and rehabilitation administration began the free distribution of agricultural land of the public domain and encouraged migration to sparsely populated regions. The Agricultural Cooperative Credit Fund association eliminated landlord credit as a device for maintaining control over the economic activities of tenants.

In Thailand 87% of the farmers own their land. Large paddy land holdings, however, are held by residents of big cities. Tenants who operate this land provide their own animals, implements and lodging facilities.

Mainland China.—During the first three years of communist rule, 1949–52, the goal of wiping out the economic and social power of landlords and the wealthier peasants was achieved. Under the first five-year plan, 1953–57, the goal was to destroy final traces of free agricultural and other enterprise and to put industry and transportation ahead, by such help from agriculture as might be obtained. During this period population growth at about 2.2% a year was surpassed by the increase of agricultural production. Lagging severely, however, were oilseeds and livestock. Of nine countries of Asia, mainland China continued to have the lowest total consumption of food per person per day—less than 2,000 calories. For discussion of collectivization under the second five-year plan and related production crises *see* CHINA: *China After World War II.*

Formosa.—About 14% higher in daily per capita consumption of food is Formosa (Taiwan) with an average of 2,285 cal. Scarcity of land has been a striking feature of the agrarian structure of Formosa, the pre-reform area averaging $3\frac{1}{4}$ ac. per farm household. Rents averaged from 50% to 70% of the main crop. Leases were insecure. The Land to the Tiller act, 1953, quickly achieved its goal of creating owner-farmers, diverting many landlords into nonfarm occupations.

VI. LATIN AMERICA

In Latin-American countries three main tenure patterns exist. First, there are communal tenure forms that have survived from precolonial native institutions (Aztec *calpulli* or Inca *ayllu*) involving joint management of land based on tribal bonds. Second, to the Spanish and Portuguese conquests can be traced institutions such as the encomienda, the *repartimiento* and the *merced,* out of which large estates or latifundia grew: indigenous labourers were originally bound to the land and forced to work for the owners in return for certain privileges. Third, in some regions land tenure forms developed in stricter keeping with the law and practice of the countries (mainly European) from which the migratory streams flowed.

Owner-operatorship in the west European and North American sense is not widespread in Latin-American countries. The agrarian structure is centred, on one hand, in large estates (latifundia, haciendas, fazendas, *fundos*), and, on the other hand, in very small subsistence farms (*minifundias*). Most of the marketed agricultural products come from large farms. These include livestock operations of the most extensive type, as found in Argentina or Colombia, and large-scale enterprises of an intensive type, such as the banana plantations of Central America and the sugar estates of Peru.

There is wide disparity between the relatively few landowners who control large areas of land and the vast majority of the farm population owning very small farms or no land at all. In Ecuador, for example, holdings of over 250 ac. (6% of the holdings) contain 87% of the total farm area. The pressure of the situation in Cuba, where holdings of less than 25 ac. (representing 40% of all farms) included but 3% of the farm area while holdings of 250 ac. and over (8% of the holdings) contained 70% of the farmland, was generally regarded as contributing to the revolution in 1959.

Payment of rent in the form of labour is widespread. The tenant-labourer in exchange for his services receives the usufruct of a small area of land along with such perquisites as a dwelling, some food, and grazing rights. Some features of tenancy and sharecropping are often intermixed with this system. A tenant-labourer is known by various names, such as *inquilino* (Chile), *agregado* (Colombia), *pegujalero* (Guatemala), *colono* or *yanacona* (Peru). In Argentina *agregados* are more likely to be squatters, as are *colonos* in Colombia or Costa Rica. Squatters, having no lawful tenure, bear names such as *intrusos* (Brazil), *parasitos* (Costa Rica), *precarios* (Chile) and *tolerados* (Bolivia). Squatters are sometimes invited where their presence aids an owner to sell his land to the state. Often after squatters have slashed and burned timber from land sufficiently to make the land fit for cultivation, the owner drives them off. Into the second half of the 20th century squatters operated 33% of the land in Uruguay and even larger percentages in Cuba and Panama.

Tenancy based on cash or share contracts is especially widespread in Argentina, where tenants raise about two-thirds of the principal cash crops (wheat and corn).

Communal tenures are especially prevalent among the indigenous peoples of the Andean highlands (Peru and Bolivia).

Land settlement programs of varying scope and vigour have been used in Latin-American countries to extend ownership rights to cultivators and to open up new areas, mostly on public land. Such programs, often involving groups of foreign settlers, are notable in Uruguay, Brazil, Chile and Venezuela.

A few Latin-American countries have undergone drastic land tenure reforms, involving the redistribution of privately held land. In Mexico demand for land tenure changes was a feature of the violent revolution that started in 1910, and reform principles were incorporated into the constitution of 1917. Mexican latifundia have been eliminated in favour of two types of tenure, village-communal holdings (*ejidos*) and small private farms with an acreage ceiling. *Ejidos* occupy about half of the cultivated land area. Guatemala introduced a land redistribution program in 1952 which was rather promptly revoked following a counter-revolution. The desire for land ownership has been one of the mainsprings of revolution in Bolivia, which led in 1953 to a land reform decree.

VII. CANADA, AUSTRALIA AND NEW ZEALAND

Canada, Australia and New Zealand are all countries of comparatively recent settlement, and the proportion of farms operated by tenants is small. Tenancy is an exceptional and usually temporary condition for the farm family. In Australia the greater part of the land area is owned by the public and the majority of the farmers are leaseholders on crown lands. Their security of occupancy is substantially the same as that of owners. Under a War Service Land Settlement Agreements act, 1945, the Australian commonwealth and states provided various forms of tenure: perpetual lease in Queensland and New South Wales; perpetual lease with option of freehold after ten years of outright purchase of all but improvements, the advances for which are allowed to continue, in Western Australia and South Australia; and perpetual lease with option of freehold in Tasmania.

In New Zealand the first important measure affecting the land tenure system was the reversal in 1853 of the Wakefield principles of high prices for undeveloped land, which some provinces dropped while others did not. In 1877 the sale of land on deferred payments was introduced, and, shortly after that, perpetual leases. Since 1912 freeholds have been available to those farmers who desire them. Under laws of 1894 large estates were made subject to purchase and redistribution. Most of the large pastoral holdings, especially on the South Island, are leasehold, while nearly all of the intensively farmed holdings are freehold.

In the Land act of 1948 previous legislation was consolidated.

Crown land was offered to settlers. Tenures available to them were freehold for cash; freehold, the purchase price payable in deferred payments; or lease with right of purchase over a term of 33 years, perpetually renewable.

In Canada under the Prairie Farm Rehabilitation act, 1935, directed to the drought and soil-drifting areas in the provinces of Manitoba, Saskatchewan and Alberta, much attention was given to water development programs. "Small" reclamation projects included individual farm projects and community projects involving reservoirs. Also included were projects of resettlement of farmers, and, in Manitoba and Saskatchewan, community pastures. While federally owned these community pastures are practically controlled by local farmer groups through their grazing association. For an account of land tenure under the French in Canada *see* QUEBEC: *History*. *See* also CANADA.

VIII. THE UNITED STATES

When the English colonists landed at Jamestown and Plymouth Rock, their concepts of land tenure were strictly English. Many of them were fleeing from a feudal land system as well as from religious oppression. All rights to the land of the new world were held by the English king, who assumed ownership by right of discovery and maintained control by the sword. The king granted land to large trading companies, to proprietary and corporate groups and to prominent individuals. These in turn regranted rights in the land to settlers—grants that were frequently in family-size farms but sometimes in large plantations.

The large settlement agencies held the land under the king, while the settlers held the land under the agencies, according to the common law of England. The major right which the sovereign customarily reserved in the grant, except that the land was "to be holden of us," was a one-fifth part of the precious metals—usually gold and silver—and a smaller portion of the base metals. The settlement agency customarily reserved an annual quitrent, and sometimes an additional portion of the metals. The settler-owner had to meet specific settlement requirements imposed in the grants and to conform to English land law.

The colonists found that the Indian tribes had their own land tenure ideas (*see* INDIAN, NORTH AMERICAN) but most settlers recognized the ownership-occupancy rights of the Indians. Before settling on the land, title to it was acquired through purchase, gift, treaty or lease. In some cases, however, as the white man settled an area, the red man abandoned adjacent territory. In many cases the Indians' land was actually seized.

1. The Land Tenure System at the Revolution.—Before the American Revolution the commonest rights reserved by society were the right to tax for public revenue, the right to retake for public purpose all or part of the rights with fair compensation, and the right to adjust (under the police power) the conditions under which land was held by private parties. This meant that all private rights in land were qualified and never complete or absolute.

After the war, the land that belonged to the British crown went to the 13 states. Land belonging to those who did not support the revolution had been confiscated earlier, and it had become state owned. No one questioned the right of each state to the unsettled land within its borders. However, seven of the states, Massachusetts, Connecticut, New York, Virginia, North Carolina, South Carolina and Georgia, claimed land to the west; all except New York held sea-to-sea grants under original charters from the English crown.

The fight among the states over the western lands was long and bitter; New York led the way by offering to cede its western lands to the union on Feb. 19, 1780. The last cession was ratified by the Georgia legislature on June 16, 1802. This series of cessions marked the beginning of the public domain. By several large purchases (*e.g.*, the Louisiana Purchase) and annexations, this original public domain was enlarged until it included a total of 1,309,591,680 ac., or about two-thirds of the entire land area of the U.S.

2. The Northwest Ordinances.—The federal government was forced into a vast land merchandising business with the basic objectives of getting the land settled quickly and the new states formed. The Northwest ordinances of 1785 and 1787 outlined the way the land would be alienated, the kind of tenure under which the settler would hold his land and the rules by which new states would come into the union.

Under the ordinance of 1785 it was provided that after the land was purchased from the Indians, it would be laid out in six-mile-square townships and sections of 640 ac., thus establishing the rectangular survey rather than the metes and bounds system. The first tracts surveyed would be drawn by lot for the military bounties promised soldiers and sailors under earlier legislation. Then the land would be offered for sale by whole townships and smaller lots, at one dollar per acre. Certain lands would be set aside for educational purposes, and one-third of the gold, silver, lead and copper would be reserved. The recipients of this land would hold it in fee-simple tenure and could transfer it by deeds which would be recorded locally.

The ordinance of 1787 specifically provided that, in the absence of a written will, land would descend to the children in equal parts, with the widow receiving a third portion. Wills and deeds had to be duly proved and recorded within a year in order to be binding.

The ordinance provided that resident and nonresident owners would be taxed alike, and no tax would be imposed on land held by the federal government. Regarding the taking of private land for public use, this would be done only when necessary and then only upon full compensation.

3. Alienation of the Public Domain.—From the end of the war to 1800, because of the urgent need for money, the federal government sold the public domain in 36-section townships and 640 ac. sections for a minimum of one dollar per acre to be paid within a year. Disposal was slow, and revenue was less than anticipated. As a consequence, from 1800 to 1820 the minimum area was reduced to 320 ac., and land was sold on credit at two dollars per acre, with payment extended to five years. Credit encouraged speculation, and frequent extension of the time allowed for payment spelled failure for the credit sales. This process was abolished in 1820, after 19,399,158 ac. had been sold. The 1820 act further reduced the minimum size to 80 ac. and the price to $1.25 per acre, but no credit was allowed.

The Pre-emption act of 1841 gave the squatter-settler first opportunity to buy his claim up to 160 ac. This meant the substitution of private sales for public auction. In 1854, the graduation law made land available at 12½ cents per acre after it had been on the market for 30 years. During the eight years that this law was in effect nearly 26,000,000 ac. were sold, much of it to speculators.

The sales and pre-emption era ended in 1862 when the Homestead law was enacted. This law made available to settlers 160-ac. tracts of land if they would live on them and cultivate them for five years. (For details concerning this and subsequent homestead laws *see* HOMESTEAD AND EXEMPTION LAWS.)

Several additional acts dealt with public lands. In 1877, the Desert Land act provided that a settler could buy 640 ac. of desert land for $1.25 per acre, if he would irrigate it within three years. Under the Carey act of 1894, the states acquired about 4,000,000 ac. for irrigation and settlement. Settlement of the arid west presented such formidable problems, however, that in 1902 congress passed the Reclamation act giving government support to irrigation work (*see* IRRIGATION: *World Survey: United States*).

Most of the better lands of the public domain were alienated by 1934. As a part of the rapidly growing conservation movement, it was decided that the grazing lands would be best conserved and most productive if retained in public ownership. As a consequence, the Taylor Grazing act of 1934, as amended, closed the public domain to private entry for all practical purposes. The 142,000,000 ac. of public land thus retained was placed under the administration of the department of the interior.

Interest in forest land conservation antedated withdrawal of the grazing land. In 1873, the Timber Culture act allowed a farmer 160 ac. additional land if he would grow trees on one-

fourth of his farm. The law did not yield anticipated results and was repealed in 1891 when the president was authorized to reserve portions of the public domain. Large lumber companies, however, monopolized most of 12,000,000 ac. of timberland acquired directly and indirectly under the provisions of the Timber and Stone act of 1878.

The disposition of coal lands was first regulated by general laws in 1864 and 1866. Subsequently, several enactments were designed to regularize the alienation of these lands, and in 1920 a leasing policy for such land was developed and included other minerals. Numerous acts set aside land for public parks and monuments and otherwise made special parcels of land available for public use.

4. Research, Education and Credit.—Several far-reaching programs were developed to assist the individual family farmer and to promote the general welfare. One of prime importance was a great publicly supported program of agricultural research.

The other two programs were education and credit. (For details concerning the history and operation of these programs *see* AGRICULTURAL EDUCATION AND RESEARCH; AGRICULTURAL ECONOMICS: *Agricultural Credit Systems.*)

5. The Depression Years.—During the depression of the 1930s many shortcomings of the land tenure system and related institutions became obvious. Dust storms plagued much of the Great Plains area. The denuding of forest and grazing lands increased the incidence of floods throughout the larger river systems. It was clear that man was appropriating the bounties of nature for immediate gain, and that conservation, development and improvement of landed resources did not flow naturally from the land tenure system.

The unrestrained disposal of the public domain had resulted in unnecessary hardships for many farm families. Settlement was pushed into marginal land areas, where the farmer could not eke out an existence from the unyielding soil. Scattered settlement left many farm families without schools, roads, hospitals, churches and other essential services. In grazing areas a family farm had to be many times larger than the Homestead grants of a quarter or even a half or full section. As a consequence, many farms in grazing areas were plowed for wheat, and these together with the small cattle ranches fell into financial difficulties.

The idea of placing all of the public domain in private hands had proved faulty. The forests were razed; the large lumber companies moved on immediately to virgin forest land; and the cutover areas demanded special consideration. Much of the grazing land was either given over to arable agriculture or was denuded through overgrazing. Mineral lands likewise were exploited for a quick profit, and stranded population in many communities presented difficult problems.

Short-term, oral leases fostered widespread mobility of tenant farmers. In 1930, only 26% of them had been on their farms for as long as five years. Tenant farmers put a larger proportion of their land in intertilled crops, kept less livestock and followed fewer soil-conserving practices than owners. In addition, the right to foreclose a delinquent mortgage, even during a severe depression, was so widely exercised that farmers in at least one of the better land areas finally banded together and prevented legal foreclosure sales. Likewise, the property tax system was not adapted to widely fluctuating farm incomes, and more than half of the farms in many communities became tax delinquent and tax titles to family farms were taken by county and state governments.

6. Remedial Action.—The farm credit program was expanded greatly to reduce loss of ownership by family farmers. The federal treasury stood behind tens of thousands of loans to farmers so they could pay off mortgages held by private loan companies. At the same time foreclosure moratoria laws were passed to give the farm owner a breathing spell. In addition a rural rehabilitation program was undertaken to help tenant farmers and small operators. A submarginal land purchase program was also organized to bring back into public ownership land that never should have been alienated and to make it financially possible for stranded families to locate in good land areas.

Under the Bankhead-Jones Farm Tenant act of 1937 the rural rehabilitation program was revamped and expanded, and a new credit program was set up to stop the drift into farm tenancy. This tenant-purchase program made loans for land purchase available to worthy tenants, sharecroppers and labourers who could not obtain funds from established sources. The salient features of this new type of credit were: (1) loans were made up to 100% of the purchase price of the farm, which was in sharp contrast with the 50% maximum before 1933 and even the 75% maximum possible under the government guaranteed commissioner loan; (2) loans were made for 40 years at 3%, which was in sharp contrast to the 3- to 5-year loans at 6% to 10% interest prior to the first Agricultural Credit act of 1916; (3) variable payments were added to the amortization principle so that payments could be increased in good years and reduced in years of low farm income; (4) special guidance and supervision were supplied the tenant-purchaser as double security for the loan; and (5) the recipients were selected by local committees on the basis of their personal characteristics and not their accumulated equity.

Land tenure research and educational programs were expanded greatly, with major attention centred on ways and means of accelerating progress up the agricultural ladder to ownership, improving the tenancy system and expanding the use of relatively new devices such as co-operative grazing associations, rural zoning, conservancy districts and other types of group control over private lands.

7. World War II and After.—World War II brought about feverish activity to meet the increased demands for food, fibres and vegetable oils. The various tenure-improvement programs were readjusted so that each could contribute the maximum to the war effort. In addition, postwar planning activities were established in the U.S. department of agriculture and by the Association of Land-Grant Colleges and Universities.

The suggestions to strengthen the general farm tenure situation including expanding credit for farm enlargement and intensification, reducing concentration of ownership, a special land program for returning veterans and improving the inheritance system. The family-farm idea was to be underwritten by endeavouring to keep land prices in line with farm earnings, to protect the farmer-borrower against drastic fluctuations in farm income and to reduce inequalities in the tax system. These groups also suggested improving the tenancy system through legislation, and through education to attain better farming practices on tenant farms. The sharecropper's position would be clarified by conferring tenant status upon all operators sharing the crop and other produce with the landlord.

It should be noted that these suggestions stressed the continued and expanded use of research, education and credit to improve the tenure situation of the U.S. farmer. In addition, they included adjustments, in the tenure system itself—in the laws governing the relationship among the various holders of rights in land.

In spite of improvements, many weaknesses in the tenure system still persisted in the second half of the 20th century. Only a few of the recommendations of the postwar planning groups were put into effect, and only minor adjustments were made in the basic structure of the tenure system. Major emphasis continued to be placed upon research and education; a de-emphasis of publicly sponsored credit was evident.

The varied land tenure pattern in the United States includes commercial family-type farms, subsistence units, plantations and a few holdings resembling manorial estates. Included in the land tenure structure are resident and absentee landlords, operators who own all and others who own part of the land farmed, tenants who pay in shares or in fixed amounts, some in cash, some in kind, and some in combinations. Servicing operations on farms also are sharecroppers and hired labourers, the former sometimes furnishing little more equipment than if hired for cash wages.

Terms of tenure have been largely conditioned by events outside of agriculture. Nonfarm employment opportunities have led to much part-time farming, where family energies are applied both in farm and nonfarm activity. Part-time farmers whose gross income from farming is $1,200 or more count as commercial farm-

ers in the census of agriculture. With this restriction, part-time and other noncommercial farmers, while accounting for one-fiftieth of the gross farm income, have made up nearly 30% of the farm families. Most of these noncommercial farms are operated by their owners.

When commercial farms that produce a gross income under $5,000 are contrasted with commercial farms that produce $5,000 and over, allowance must be made for 1% of the former and 2% of the latter that have special manager operation. Of income-producing farms (under $5,000 as well as over $5,000) tenants have had about equal prominence, operating 30% of the lower bracket income farms and 29% of the higher. Full-owner operators have cultivated 50% of the farms in the lower-income group and only 39% in the higher. Part-owner operators, those who hire some land from others to operate, control about 17% of the lower-income farms, but 30% of the higher. Tenants (including croppers) in the south were operating farms of every level of income production in the 1960s, but in the north and west tenant efforts were centred on farms of higher productiveness.

Acres operated under lease by part owners and by tenants reached a peak in the northeast, south and west about 1935 and in the north-central states about 1940. The proportion of the nation's farmland operated under lease by tenants decreased from 32% during the depression of the 1930s to 17% in the second half of the 20th century while the proportion so operated by part owners increased from 16% to 19%. Region by region, part owners gained relatively to other operators in control of farm area and in relative farm numbers. In the nation as a whole, there was a decrease from 44% to 36% in the proportion of farmland leased to tenants and part owners. Exceptions to the subsiding trend were portions of the mid-plains and of the corn belt, and the delta of eastern Arkansas. Heavy concentrations of leased land continued in these areas: in some counties leasing accounted for upwards of 80% of the reported capacity for farm income production, about 70% of the farm real estate values and over two-thirds of the acreage in farms. Three products—corn, cotton and tobacco—owe nearly three-fifths of their volume to operations on leased land.

The changes noted have come about during changes in totals of farms and in farm realty values. Since 1880 there has been a decline in the farm area and the number of farms in the northeast. After 1950 the same tendency marked the north-central states and the south. Increase in acres per farm occurred in areas adapted to mechanized field operations. Tenants as well as owner-operators lengthened their terms of occupancy. *See* FARM TENANCY: *The United States;* AGRICULTURE; AMERICAN FRONTIER; NEGRO, AMERICAN; *see* also references under "Land Tenure: Economic and Agrarian Aspects" in the Index.

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(R. E. MY.; C. L. ST.)

LAND TENURE, PRIMITIVE. The sociological concept of land tenure means the sum total of rights over specific areas of land. Every primitive community has some system of land tenure involving various kinds of group rights and individual rights; these systems therefore cannot be defined adequately by any single term such as feudal or communal. Where a modern administration exists alongside older traditions the legal rights of land tenure are those that are admitted by the courts; there may well be other rights not so admitted, but sanctioned by local custom.

Many primitive communities are strongly attached to their land, which they regard as closely associated with their ancestors, who by tradition have emerged from it or who have been buried in it. To the Trobriand Islanders, clan myths about the emergence of the first matrilineal ancestors from particular water holes or stone outcrops give the members of each clan and lineage group an unwritten charter for their claims to the land. A primitive people may regard productivity as a gift from its ancestors or from earth-gods, and perform sacrifices or other religious rituals to keep the soil fertile.

Rights over land are commonly exercised by individuals as members of political units or kin groups. A chief, or lineage head, as representative of his group, may be entitled to declare the land as his and to have the prestige of titular control, although the land may be in the hands of some other member of his group. It is customary in Bantu Africa for the chief to regard himself as the supreme landlord of the tribal territory; in many cases he determines the use to which land is put by allotting sections to his headmen, who then reallocate to individuals. Most chiefs regard such privileges of overlordship not only as entitling them to income, but also as imposing upon them responsibilities to see that the land is properly used. The relation of the chief to his dead ancestors, former rulers of the land, may give him a mystical relationship to the land; *e.g.,* the Bemba (*q.v.*) paramount chief should not leave his territory lest its fertility suffer. Use rights of cultivation may crystallize into permanent landholding by individuals or families; but in a primitive society a member of a group rarely has the right to refuse to other members access to lands he does not use. The interest of his kin group, and ultimately of the wider community, remains paramount. It is a well-known principle in many primitive societies that rights in land may not be alienated from the lineage, clan or other group which has ultimate enjoyment of them. In primitive conditions the only exception to the bar against permanent alienation of the land is usually gift *inter vivos,* as for a dowry or in compensation for

homicide. Where selling of land away from the community is allowed, it is mostly due to contact with European tradition. The Tallensi of Ghana believe that inherited farmland is a sacred trust from their ancestors. They even argue that to sell it would be sacrilege, punishable by death inflicted supernaturally; yet, because of hunger or pressing debt, some land sales have occurred despite the ritual sanction. Temporary alienation, however, is much more common. In west Africa, a person in want of land may borrow a cultivation area by being shown the land and compensating the owner by an initial gift and an agreed portion of the produce. Pledging or pawning of land also occurs, the reason being usually the owner's need for liquid assets. In modern conditions the pledge value may be set so high that the land may never be redeemed. Though actual foreclosure is unusual, such pledging tends to assume the character of permanent alienation and to take its place where overt sale is forbidden.

In a primitive system of land tenure, a member of a landowning group has usually a right to transmit his land interest to members of the next generation, but not necessarily to his own descendants. Where the system of inheritance is patrilineal, a man's land rights normally go to his children and are often exercised by his sons. A married daughter and her children may have rights of cultivation in such land, but these rights are often extinguished at her death. Where the system is matrilineal, rights are inherited from the mother. Often the land is actually administered by men and their rights of control then pass not to their sons but to their sister's sons. Mostly, though not always, the transmission of land rights tends to be associated with the system of descent.

In general, the more developed the technology and the more complex the productive system, the more closely land rights are defined. Among the Australian hunting and collecting tribes there was no demarcation of individual land holdings. Each patrilineal local group had its common territory marked by trees, water holes, rocks, etc., and used its simple technology with great skill to wrest a living from the harsh environment.

Among the Nuer (*q.v.*) of the Sudan, who cultivate maize and millet but are primarily pastoralists, each tribe and tribal section has its own pasture and water supplies. Since agricultural land abounds there is no need for close definition of personal rights; a man can cultivate any land not used by others. Small local groups pasture their cattle in common without individual or household grazing rights. However, when water is scarce and the Nuer have to dig wells in the beds of streams (a task of several days), each household has its own well with cattle trough; fights sometimes break out over rights to these.

Among the Tswana (*q.v.*), pastoral people of Bechuanaland, there is insufficient land to give a reasonable standard of living to all members of the tribe. Yet pasture land is not portioned out in family or individual allotments, and grazing around each cattle post is common to the group. But as technology has developed, land rights have become firmer. A man who sinks a well and so invests capital acquires preferential rights over the grazing around it. In modern times the demand for arable land for cash crops has increased, but few limitations have been placed on the amount of land that a person may work. Formerly land was cultivated by women, who owned the harvest. With the introduction of ploughs and cattle, which are handled by men, the control of fields and of crops has tended to shift into male hands. Among the Nsaw (*q.v.*) of the Cameroons, who practise subsistence agriculture in cereals and root crops, titular ownership of the land is vested in the paramount political authority (the *Fon*) and *de facto* control, subject to his approval, is in the hands of village lineage heads. As trustees, they allocate plots of land to their kin group members. This land, once allocated, tends to remain in the hands of the individual and of his descendants. The women, who are energetic farmers, have rights in farm plots similar to those of men, and a married woman holds family land separate from that of her brothers and her husband, often transmitting her rights to her sons or daughters.

In some agricultural communities, such as the Garia of New Guinea, daughters do not normally inherit any personal rights in land, which is regarded as the responsibility of their husbands. But where there are no male heirs a daughter may inherit her father's land and pass on her rights to her sons. Personal rights in land may also be transferred from a man to his sister's son in return for pigs or other valuables.

In some communities in Africa, Melanesia and Central America, titles are so carefully defined that rights to trees may be held separately from those to the land on which they stand. Some primitive communities have symbolic tokens which represent title to land. In Wogeo, New Guinea, the lashing of each rafter in a ceremonial men's house is a symbolic assertion by the man who binds it of his claim to the lands associated with that rafter. Such titular claims, or the actual land rights, often are contested bitterly and among the Siuai of the Solomon Islands there is the equivalent of litigation before an assembly of local elders to decide the issue.

Above all, commercial crops have changed primitive land rights, making for more precisely defined personal rights in land and for freer transfer of land by sale. Land has acquired commercial value and the tendency has been for individuals to assert themselves against other members of their community by converting use rights into permanent tenure. In this they have been helped by registration of title and other modern legal devices. *See* also ECONOMIC ANTHROPOLOGY; LAND TENURE: ECONOMIC AND AGRARIAN ASPECTS; COMMUNISM, PRIMITIVE.

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LAND TITLE: *see* TITLE TO LAND.

LANDUMAN (LANDUMA, LANDOMA), a Negro tribe numbering approximately 25,000 in the 1960s, located principally in the Republic of Guinea, along the border of Portuguese Guinea about 30 to 60 mi. inland. Their language belongs to the West Atlantic branch of the Niger-Congo language family and is most closely related to Temne and Baga (*q.v.*). They are agricultural; corn, millet and rice are the major food crops, and peanuts are grown both for oil and as a cash crop. Tribal organization centres in a single paramount chief. Villages are ruled by subordinate chiefs. The family unit is patrilocal; marriage is frequently polygamous. Inheritance goes to members of the mother's family. Adolescent initiation ceremonies, highly secret, introduce members of the tribe into their adult responsibilities. Burial is associated with the same tribal secrets. Religious beliefs centre strongly around the activity of departed spirits.

See G. P. Murdock, *Africa: Its Peoples and Their Culture History* (1959). (W. E. WE.)

LANDWEHR, the army reserve category in German-speaking nations comprising the intermediate age classes. Originally the term (literally "territorial defense force") denoted the entire armed citizenry, akin to the Anglo-Saxon *fyrd,* or militia. During the Napoleonic wars Austria (1808) and Prussia (1813), under G. von Scharnhorst, created Landwehr units in all provinces to supplement the standing army. Many of these took part in the decisive battle of Leipzig in Oct. 1813. Subsequent Prussian and Imperial German regulations defined the Landwehr as the body of trained or partly trained men, ages from 26 or 27 to 39 or 40, who were considered available for war service outside their home districts. Numerous Landwehr divisions were formed in World War I, primarily for garrison and occupation duties. Hitler's defense law of May 21, 1935, specified that all men would belong to the Landwehr from April 1 of the year of their 35th birthday to March 31 of the year of their 45th birthday. There were no Landwehr units designated as such in World War II; most personnel of this age group were integrated into units containing men of all ages.

In the Austro-Hungarian empire, the term Landwehr was not ap-

plied to an age category but to the territorial defense force of Austria proper as distinct from the Imperial forces of Austria-Hungary. *Honved,* a Hungarian literal translation of Landwehr, designated the similar Hungarian organization and remained thereafter the name of the Hungarian army.

The Swiss Landwehr, under revised regulations issued in 1960, consists of men between 33 and 42. They receive a small amount of "repetition" training. *See* also LANDSTURM. (P. N. T.)

LANE, ALFRED CHURCH (1863–1948), U.S. geologist and educator, was born in Boston, Mass., on Jan. 29, 1863. He was the grandson of an abolitionist and the great-great-grandson of a Concord minuteman. He graduated from Harvard college in 1883, and studied at Heidelberg, 1885–87. He received his A.M. and Ph.D. from Harvard in 1888. He was petrographer, assistant state geologist and state geologist for the geological survey of Michigan (1889–1909), professor of geology and mineralogy, Tufts college, Medford, Mass. (1909–36), resigning in 1936 in protest to a state teacher's oath, and professor emeritus (1936–48). He died at New York city on April 15, 1948.

Lane was chairman of the committee on the measurement of geologic time of the National Research council (1922–46). During this time he originated, promoted and directed—in laboratories all over the world—chemical, physical and geological research bearing on the determination of the age of the earth. (R. L. N.)

LANE, SIR ALLEN LANE WILLIAMS (1902–), English pioneer of paperback publishing, was born at Bristol, Gloucestershire, on Sept. 21, 1902. On leaving Bristol grammar school he was apprenticed to his publisher-kinsman, John Lane, at The Bodley Head, London, where he eventually became managing director. He left in 1936 to found Penguin Books, Ltd., and under that imprint began publishing paperback reprints at a price of 6*d*. Encouraged by the success of the experiment he began to add other series (at the same price). An early development was the creation of Pelican books, some of which were reprints and some original, on science, history, philosophy, politics, literature and the arts; and the Penguin family was later enlarged to include Penguin specials (on current affairs), Puffins (for young readers), King Penguins (illustrated in colour), the Penguin classics (new translations from Greek, Latin, French, Russian, Italian, etc.) and many other series. Lane's example was later followed by other publishers, both in Great Britain and elsewhere. He was knighted in 1952. (W. E. WI.)

LANE, EDWARD WILLIAM (1801–1876), English Arabic scholar, whose *Arabic-English Lexicon* has not been superseded. Born on Sept. 17, 1801, at Hereford, where his father was a prebendary, he was educated at Bath and Hereford grammar schools. In 1825 he started for Egypt in search of health. There he spent three years, twice went up the Nile, proceeding as far as the second cataract, and wrote a complete description of Egypt, with a portfolio of 101 drawings. He again visited Egypt during 1833–35, living mainly in Cairo, but retiring to Luxor during the plague of 1835. Lane took up his residence in the Muslim quarter, and under the name of Mansur Effendi lived the life of an Egyptian scholar. His *Account of the Manners and Customs of the Modern Egyptians* appeared in 1836 and became a classic. The translation of the *Arabian Nights,* with notes and illustrations, designed to make the book a sort of encyclopaedia of eastern manners, appeared between 1838 and 1840. A useful volume of *Selections From the Kur-an* was published in 1843, but before it passed through the press Lane was again in Egypt, where he spent seven years (1842–49) collecting materials for a great Arabic lexicon, which the munificence of Lord Prudhoe (afterward duke of Northumberland) enabled him to undertake. The most important of the materials amassed during this sojourn was a copy in 24 thick quarto volumes of Sheikh Murtada's great lexicon, the *Taj el 'Arus,* which, though itself a compilation, is so extensive and exact that it formed the main basis of Lane's subsequent work.

Lane returned to England in 1849 and spent the rest of his life writing his *Arabic-English Lexicon.* He was still at work on it a few days before his death at Worthing on Aug. 10, 1876. Five parts had already appeared (1863–74). A sixth part, edited by his grandnephew, S. Lane-Poole, appeared in 1877. The seventh and eighth parts appeared in 1885 and 1893, again edited by Lane-Poole, but they are incomplete, being little more than reproductions of the sketchy notes which Lane had left on this portion of the work.

The *Arabic-English Lexicon* was the first large-scale Arabic dictionary for the use of Europeans since G. W. Freytag's *Lexicon Arabico-Latinum* (1830–37). It immediately became, and remained, the standard work. It was reprinted during 1955–56. It is, in many ways, a model of how such a work should be written, and is characterized by meticulously accurate definitions. Realizing the magnitude of his task, Lane planned the work in two books; the second, the smaller by far, was to contain only very rare words and was never written. Of the first book, roughly two-thirds was completed, as far as the beginning of the letter *kaf.* After that, only sketches remain. The completion of the work, often discussed by the International Congress of Orientalists, was adjudged a matter of high priority, and Jörj Kraemer of Tübingen began his Arabic-German-English dictionary at the letter *kaf* in order to fill the gaps in Lane's work as early as possible. The first fascicule appeared in 1958.

See S. Lane-Poole, *The Life of Edward William Lane* (1877); J. Fück, *Die arabischen Studien in Europa* (1955). (J. A. HD.)

LANE, FRANKLIN KNIGHT (1864–1921), member of the U.S. Interstate Commerce commission and of Pres. Woodrow Wilson's cabinet, was born near Charlottetown, P.E.I., July 15, 1864. The family moved to California in 1871 and in 1886 Franklin graduated from the University of California.

He began his career as a newspaper reporter and continued his interest in journalism for some time. He also studied law, was admitted to the California bar in 1888 and practised in San Francisco.

Lane entered politics in 1898 when he was elected city attorney, a post to which he was twice re-elected. He ran unsuccessfully for governor of California in 1902 and for mayor of San Francisco in 1903. These campaigns brought him national recognition and in 1905 Pres. Theodore Roosevelt appointed him to the Interstate Commerce commission, where he remained throughout the administration of Pres. William Howard Taft. In 1913 he entered the cabinet of President Wilson as secretary of the interior. During his term of office the wealth of Alaska was made more accessible by the construction of a government railway (completed in 1924) between Seward and Fairbanks. He gave special attention to the Indians and opposed the policy of keeping them in perpetual tutelage. He advocated development of national resources without waste as being reasonable conservation, and earnestly urged the reclamation of land. In 1920 he resigned his post. He died at Rochester, Minn., May 18, 1921.

Lane was the author of *The American Spirit,* addresses delivered in wartime (1918).

See also A. W. Lane and L. H. Wall, *The Letters of Franklin K. Lane, Personal and Political* (1922).

LANE, SIR HUGH PERCY (1875–1915), Irish art collector, was born at Ballybrack, County Cork, on Nov. 9, 1875. After a career as an art dealer he established a gallery of modern art in Dublin, acted as adviser to the galleries at Johannesburg and Cape Town in South Africa, and was appointed director of the National gallery of Ireland in 1914. He was knighted in 1909 and died in the sinking of the "Lusitania" on May 7, 1915.

A controversy has raged over his collection of paintings, which included several fine Impressionist works. Lane bequeathed the collection to the National gallery, London, after withdrawing an offer of it to Dublin, but an unwitnessed codicil to his will restored the pictures to Dublin. As this was legally invalid, they are in London. One, Berthe Morisot's "Jour d'Été," was stolen from the Tate gallery on April 12, 1956, but was returned undamaged through the Irish embassy on April 16 of the same year. (P. J. MY.)

LANE, JAMES HENRY (1814–1866), U.S. soldier and leader of the free soil forces in Kansas during the American Civil War era, was born at Lawrenceburg, Ind., June 22, 1814. The son of an Indiana politician, he was admitted to the bar, served in the Mexican War, was lieutenant governor of Indiana, a Demo-

cratic representative in congress, and in 1855 emigrated to Kansas. There he soon became prominent in the Free State forces, both in a political and military way. He was second in command in Lawrence, Kan., during the so-called "Wakarusa war" between free and slave forces in 1855. He was also senator-elect under the Topeka constitution, one of the Free State leaders indicted for treason and a participant in the domestic feuds of 1856–57. After Kansas became a state, Lane was elected (1861) to the U.S. senate as a Republican. As a result of President Lincoln's favour he exercised vague military powers in Kansas during the American Civil War, in spite of the protests of the governor and regular departmental commanders. In the fall of 1861 he conducted a successful campaign on the Missouri border, and in July 1862 was appointed commissioner of recruiting for Kansas. Accused of being implicated in Indian contracts of a fraudulent character, in a fit of depression he took his own life, dying near Ft. Leavenworth, Kan., July 11, 1866.

See also KANSAS: *History*.

LANFRANC (c. 1005–1089), archbishop of Canterbury from 1070 to 1089, trusted assistant of William I, a native of Pavia, was a lawyer when, following probably on political difficulties, he crossed the Alps and started teaching at Avranches, in Normandy (*c.* 1039–42). He entered the newly founded Benedictine monastery at Bec and, after three years of seclusion, became prior and returned to teaching. When Berengar of Tours attacked the doctrine of transubstantiation, Lanfranc arose as the champion of orthodoxy and was with Leo IX at the councils of Reims (1049), Rome and Vercelli (1050). His tract *De corpore et sanguine domini* took form only in 1079, when Berengar had been finally condemned.

William duke of Normandy made him the first abbot of St. Stephen's at Caen (*c.* 1063), but Lanfranc had already, as prior of Bec, taken part in church politics, leading the opposition to the uncanonical marriage of the duke with Matilda of Flanders (1053), for which he had been exiled. The quarrel was settled, however, and he undertook to obtain the pope's approval of the marriage. Henceforward, Lanfranc was William's trusted counselor.

Lanfranc refused the see of Rouen in 1067 and after William's conquest of England he was nominated to Canterbury as soon as Stigand had been canonically deposed (1070). Clearly, he had thought out beforehand a plan of reorganization and reform, which he applied with remarkable success. First of all, he had to counter the claims of another Norman prelate, Thomas of Bayeux, archbishop-elect of York, who asserted that his see was independent of Canterbury and claimed jurisdiction over the greater part of midland England. Lanfranc, backed by Pope Alexander II, had the dispute settled by a national council at Winchester (1072). He carried the council's verdict upon every point, thanks to documents cunningly arranged, the so-called "forgeries" of Lanfranc, for which, however, he was probably not personally responsible. Although firmly attached to the doctrine of papal sovereignty, he still assisted William in maintaining the fullest possible practical independence of the English church. In the midst of virulent quarrels between papacy and empire, he favoured a neutral attitude and sought to extricate the English church from both royal and other secular influences. He was a generous patron of monasticism, as renewed and reformed on the model of Bec and Caen, and wrote regulations for his cathedral monastery of Canterbury. His policy, in full accord with the king, was to replace Saxon abbots and bishops by Normans. He endeavoured to enforce celibacy on the secular clergy and looked to monks to form the spearhead of church reform. His influence shaped the famous ordinance which separated the ecclesiastical from the secular courts (*c.* 1076), though he acknowledged the royal right to veto the legislation of national synods.

Lanfranc's greatest service to the king was rendered in 1075, when he detected and foiled the conspiracy which had been formed by the earls of Norfolk and Hereford. He lived on terms of friendship with Wulfstan of Worcester, the last of the Saxon bishops. On the death of the Conqueror (1087) he secured the succession for William II Rufus, despite the discontent of the Norman baronage, and in 1088 his exhortations induced the English militia to fight on the side of the new sovereign against Odo of Bayeux and the other partisans of Duke Robert of Normandy. He was firm in his relations with Rufus and never afraid to remonstrate. He died at Canterbury on May 24, 1089.

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LANFRANCO, GIOVANNI (1582–1647), Italian painter, one of the exponents of high baroque illusionism, was born at Parma on Jan. 26, 1582. He was a pupil of Agostino Carracci, but the decisive influence on his work was the illusionism of the domes in Parma by Correggio. He was a bitter rival of Domenichino, both at S. Andrea della Valle in Rome and later in Naples. The dome of S. Andrea (1621–25) derives directly from Correggio in its virtuoso use of figures floating in the clouds over the spectator's head. Lanfranco worked in Naples from 1633–34 to 1646, his best-known work there being the dome of the chapel of S. Gennaro in the cathedral (1641–46). He died in Rome on Nov. 30, 1647. (P. J. MY.)

LANG, ANDREW (1844–1912), Scottish man of letters and one of the most versatile writers and scholars of his age, was born at Selkirk on March 31, 1844, and educated at Edinburgh academy and St. Andrews university. After a session at Glasgow university he won the Snell exhibition to Balliol college, Oxford, followed by an open fellowship at Merton college, which ended on his marriage and removal to London in 1875. He speedily became famous for his literary leaders and critical articles in the *Daily News* and other papers. He showed himself a poet of unfulfilled promise with *Ballads and Lyrics of Old France* (1872), *Helen of Troy* (1882) and *Grass of Parnassus* (1888), and a novelist "for bookmen only" with *The Mark of Cain* (1886) and *The Disentanglers* (1902). He is most widely known and loved by young and old for his collections of the fairy tales of the world in 12 volumes, the first of which was *The Blue Fairy Book* (1889) and the last *The Lilac Fairy Book* (1910), his retelling of Greek legends in *Tales of Troy and Greece* (1907) and his original fairy stories *The Gold of Fairnilee* (1888), *Prince Prigio* (1889) and *Prince Ricardo of Pantouflia* (1893), which have become children's classics.

As a serious student of folklore and anthropology, Lang did important pioneer work in such volumes as *Custom and Myth* (1884) and *Myth, Ritual and Religion* (1887). Later he turned to history and historical mysteries, notably in *Pickle the Spy* (1897), *A History of Scotland*, 4 vol. (1900–07), *Historical Mysteries* (1904) and *The Maid of France* (1908).

Lang's lifelong devotion to Homer produced well-known prose translations of the *Odyssey*, in collaboration with S. H. Butcher (1879), and of the *Iliad* (1883) with Walter Leaf and Ernest Myers. He defended the theory of the unity of Homer and his *The World of Homer* (1910) is still of importance.

Lang, often referred to as "the divine amateur," was the great bookman of his time and an enchanting writer on all literary subjects. He crowned his life of "Adventures Among Books" with his *History of English Literature*, published two days after his death at Banchory, Scot., on July 20, 1912.

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LANG, COSMO GORDON LANG, 1ST BARON, OF LAMBETH (1864–1945), archbishop of Canterbury, was born at Fyvie, Aberdeenshire, on Oct. 31, 1864, of Presbyterian parentage. From Glasgow university he won a scholarship to Balliol college, Oxford (1882), was elected president of the union (1884), took a first

class in history (1886) and became a fellow of All Souls (1888). On the eve of being called to the bar he withdrew his name and entered Cuddesdon theological college. After an assistant curacy in a Leeds slum he was dean of divinity at Magdalen, Oxford (1893–96), and vicar of the university church (1894–96) before becoming vicar of Portsea, Hampshire (1896–1901), suffragan bishop of Stepney, London (1901–09), and archbishop first of York (1909–28) and finally of Canterbury (1928–42). On retirement he was created Baron Lang of Lambeth and granted a "grace and favour" house at Kew by King George V, whose close friend he had long been. Lang died at Kew on Dec. 5, 1945.

Lang was an exceptionally interesting man by reason both of the variety of his gifts and the complexity of his character. Some who did not know him personally misunderstood and criticized him, not least those who most unfairly suspected him of having conspired to bring about the abdication of King Edward VIII. Those however who penetrated through his reserve found in him a wise, understanding and very human counselor and friend. His zeal for Christian unity was one of the most notable features of his career, and the felicity that marked his speaking was not the least of his many qualifications for leadership in church and state.

See J. G. Lockhart, *Cosmo Gordon Lang* (1949). (A. C. D.)

LANG, FRITZ (1890–), Austrian-U.S. motion-picture director, often called a director's director, was born on Dec. 5, 1890, in Vienna, Aus., and educated there. Having given up the study of architecture, he started to write screen plays during World War I. From Vienna he went to Berlin to work with Erich Pommer. His first film was *The Weary Death* (1921), released in the United States as *Destiny*. *Metropolis* (1926) was an expressionistic vision of the future, and *M* (1933), his most famous German film, explored the compulsion to murder. Lang's *The Last Will of Dr. Mabuse,* in which a madman speaks Nazi philosophy, attracted the attention of Josef Goebbels, who invited Lang to supervise German films. Lang left for Paris the same evening and later moved to the U.S. *Fury* (1936), a study of a lynch mob, is his most praised American film. Others include *You Only Live Once* (1937), *Western Union* (1940), *Hangmen Also Die* (1943), *Scarlet Street* (1945), *Clash by Night* (1952). Lang has been praised for the visual texture and intellectual rigour of his films and criticized for frequent emphasis on terror and fatality. (R. D. MacC.)

LANG, JOHN DUNMORE (1799–1878), Australian ecclesiastic and political leader, a founder of the Presbyterian Church in Australia and a figure of great influence in shaping the early colonial settlement, was born at Greenock, Scot., on Aug. 24, 1799. He emigrated to Sydney in 1822–23 as a Presbyterian minister and his first crusade was to achieve state recognition for his church. However, as an ecclesiastic Lang was primarily notable as the instigator of a movement comparable to and anticipating the 1843 Disruption of the Church of Scotland (*see* Scotland, Free Church of). In politics Lang was a critic of ex-convict influence, which in the 1830s put him among the antiliberals. But this very background equipped him to lead the free-immigrant working-class movement which subsequently developed, and his election in 1850 as Sydney's representative to the local legislature dramatically proved that this element had become dominant in colonial radicalism. Lang advocated the establishment of an Australian republic and vehemently attacked the wealthier sections of the community; until his retirement from politics in 1869 he consistently upheld left-wing causes.

Of more direct help to the colonies' growth was his work in arranging immigration, preferably of upper working-class Protestants (for he was a bitter anti-Catholic). He founded the Australian college (1832–54) in Sydney, and attracted to the colony many ministers and schoolteachers who made a vast contribution to cultural development. His pen was extraordinarily fertile, producing an excellent *Historical and Statistical Account of New South Wales* (1834), poetry, propaganda, works of travel and even anthropology. Lang died in Sydney on Aug. 8, 1878.

See A. Gilchrist, *John Dunmore Lang,* 2 vol. (1951). (O. M. R.)

LANG, (ALEXANDER) MATHESON (1879–1948), a leading English romantic actor and dramatist during most of the first half of the 20th century, was born on May 15, 1879, in Montreal, Can. He came of clerical stock; a cousin, Cosmo Lang, was archbishop of Canterbury. He began his career as a Shakespearean actor in 1897, playing first with Louis Calvert, then joining F. R. Benson's company. He played Mountjoy in *Henry V* (his first London role) in 1900, Macduff and Bassanio in 1901–02 and Benedick—to the Beatrice of Ellen Terry—in 1903. His sonorous and passionate Othello was first seen in 1907 at Manchester and his highly romantic Romeo was a feature of the 1908 London season. For the next 30 years he toured the English-speaking world, acting also in grandiose plays by Temple Thurston, Rafael Sabatini and many others.

Lang's imposing presence, commanding features and fine voice were as well suited to Othello as to popular and picturesque characters like Mr. Wu and the Wandering Jew. His career also included several films, and he produced and dramatized many works. In 1914 he and his actress wife, Hutin Britton, inaugurated the Shakespeare seasons at the Old Vic theatre, London. Lang died at Bridgetown, Barbados, on April 11, 1948. (A. H. D.)

LANG, MATTHÄUS (1468–1540), German statesman and cardinal, the Holy Roman emperor Maximilian I's diplomat and intimate counselor, was born of a burgher family of Augsburg. Having studied law, graduated master at Tübingen (1490) and received licence to teach (1494), he entered the service of Maximilian I, as whose secretary he became indispensable. Maximilian ennobled him with the title "von Wellenburg" (1498) and made him provost of Augsburg cathedral, despite the resentment of the aristocratic chapter at a man of non-noble birth. He received further benefices, was made coadjutor bishop (1500) and bishop (1505) of Gurk—a diocese that he never visited—and imperial chancellor (1508). Not ordained priest till 1519, he was typical of those unspiritual, absentee bishops against whom Luther protested.

Lang negotiated the League of Cambrai with France, Spain, the Netherlands and, later, Pope Julius II, against Venice (1508). In 1511, however, when Julius, at peace with Venice, wanted imperial help in driving the French from Italy, Lang was sent to reconcile him with France and to isolate Venice. He entered Bologna in procession, scandalizing the papal *ceremoniarius,* Paride de Grassis, by wearing lay costume and refusing to deal with anyone but the pope, to whom he talked seated and with head covered. No agreement was possible, and Lang left abruptly.

Late in 1512, when Julius was prepared to pay any political price for Maximilian's adherence to the Lateran council, Lang returned. At Rome every honour was showered on him. Unable to persuade the Venetians to change their policy, Julius changed his, undertaking to unite with Maximilian against Venice and obtaining the emperor's adherence to the Lateran council and a promise of armed support. Lang's elevation as cardinal was announced on Nov. 24, 1512, the papal-imperial alliance on Nov. 25. In Dec. 1513 Lang returned to Rome, where Pope Leo X was trying to mediate between the emperor and Venice. Leo did not succeed nor grant Lang's arrogant demand to be made permanent legate in Germany.

Lang negotiated the settlement in Vienna (1515), which ultimately gave the Habsburgs the thrones of Bohemia and Hungary. He became prince-archbishop of Salzburg in 1519. Henceforth he ceased to be a Habsburg official. In the 1520s he overcame rebellions of his nobles and of the citizens of Salzburg, and, supported by the Swabian league, he suppressed a fierce peasants' rising. He maintained authoritarian conservatism in religion and government till his death, at Salzburg, on March 30, 1540.

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LANGDELL, CHRISTOPHER COLUMBUS (1826–1906), U.S. legal scholar known as the originator of the case method of teaching law, was born in New Boston, N.H., May 22, 1826, and was educated at Harvard college and Harvard law school. After a relatively obscure career as a practising attorney he became dean of the Harvard law school in 1870. During the first years

of his deanship he was chiefly known for putting legal education on a university level, with a regular progression of courses, examinations and fixed degree requirements. Later he achieved distinction for his method of instruction: believing that students should be trained to use original authorities and to derive for themselves the principles of the law, he guided them in the study of selected cases—an educational method that has imparted a peculiar vigour to the teaching of law in the United States and has exerted an influence on instruction in other subjects, notably business instruction. Langdell died in Cambridge, Mass., on July 6, 1906. The principal building of the Harvard law school is named for him, as is one of its professorships.

In a less favourable aspect Langdell is often taken as the symbol of a dryly logical mode of legal reasoning, unduly concerned with the law's internal symmetry and indifferent to its social effects. His views of proper legal reasoning were not markedly out of keeping with those of his time, while the case method, though originated by him, was a matter of gradual evolution in which others, especially James Barr Ames (*q.v.*), played an important part. His publications consisted largely of works intended for use in legal instruction; *Selection of Cases on the Law of Contracts* (1871; 2nd ed., enlarged, 1877) was the first book used as a basis for the case method. (L. L. F.)

LANGDON, JOHN (1741–1819), leader in the American Revolution, state legislator and governor, and U.S. senator, was born near Portsmouth, N.H., on June 26, 1741, the son of a farmer. After an apprenticeship in a countinghouse in Portsmouth he led a seafaring life for several years and then, assisted by his elder brother Woodbury Langdon, became a prosperous shipowner and merchant. His importance stems from his activity in the revolutionary movement in New Hampshire; his service in the second continental congress (1775–76 and 1783–84), in the federal constitutional convention of 1787, and in the U.S. senate (1789–1801); his terms as governor of New Hampshire (1805–09, 1810–12); and his leadership of the Republican (Jeffersonian) party in his state for nearly 20 years. Lacking outstanding speaking ability, intellect or force, Langdon long held high position by reason of his pleasing manners and reputation as a successful businessman of "liberal mind and a good plain understanding." Besides his more important offices, he was a judge of the New Hampshire court of common pleas in 1776–77, a member (and speaker) of the New Hampshire house of representatives (1777–82) and of the state senate in 1784–85, and was president of New Hampshire (1785–86 and 1788–89). He was also a member of the New Hampshire house of representatives in 1801–05 and its speaker in 1803–05. He declined the naval portfolio in Jefferson's first cabinet and the Republican nomination for the vice-presidency in 1812. He died in Portsmouth on Sept. 18, 1819.

See L. S. Mayo, *John Langdon of New Hampshire* (1937). (B. Kn.)

LANGE, CHRISTIAN LOUS (1869–1938), Norwegian worker for international peace, secretary-general of the Inter-Parliamentary union (1909–33), and Nobel peace prize winner, was born in Stavanger, West Norway, on Sept. 17, 1869. He graduated in languages from the University of Oslo in 1893 and in 1919 received a doctorate for a thesis on the history of internationalism. From 1900 he served as secretary to the Storting Nobel committee in Oslo, until his appointment in 1909 as secretary-general of the Inter-Parliamentary union. It was very much the result of his efforts that this organization grew and prospered, especially during World War I, when he held it together despite great difficulties. In recognition of his services, he was awarded the Nobel Peace prize in 1921 together with the Swedish statesman Hjalmar Branting. Lange was also active in the League of Nations, which he attended regularly as a Norwegian delegate, interesting himself particularly in disarmament. In 1932 he received the Netherlands Grotius medal. (O. F. K.)

LANGE, FRIEDRICH ALBERT (1828–1875), German philosopher and socialist, historically important both for his refutation of materialism and for his lasting tradition of Neo-Kantianism, was born on Sept. 28, 1828, at Wald, near Solingen, the son of the theologian, Johann Peter Lange. He was educated at Duisburg, Zürich and Bonn, where he distinguished himself by gymnastics as much as by studies. He taught in various places until 1862, when schoolmasters were forbidden political activity. He wrote *Die Leibesübungen* (1863); *Die Arbeiterfrage* (1865); *Die Grundlagen der mathematischen Psychologie* (1865); the influential *Geschichte des Materialismus und Kritik seiner Bedeutung in der Gegenwart* (1866; Eng. trans., *History of Materialism*, new ed., 1923); *J. St. Mill's Ansichten über die soziale Frage* (1866); and *Neue Beiträge zur Geschichte des Materialismus* (1867). In 1866, discouraged by affairs in Germany, he moved to Winterthur, near Zürich, to write for the democratic newspaper, the *Landbote*. He became *Privatdozent* at Zürich in 1869 and professor in 1870 but resigned because of the pro-French sympathies of the Swiss in the Franco-German War. In 1872 he became professor at Marburg, where, after establishing Neo-Kantianism, he died on Nov. 21, 1875. His *Logische Studien* were published by H. Cohen in 1877.

LANGEAIS, a town of west-central France in the *département* of Indre-et-Loire, is on the right bank of the Loire, 16 mi. W.S.W. of Tours by rail. Pop. (1962) 2,669. The 15th-century royal château was built (*c.* 1467) by Jean Bourré, governor of Langeais, on the order of Louis XI. It is a square structure with machicolated battlements flanked by conical towers, and contains 14 furnished apartments, open to the public. Charles VIII married Anne of Brittany there in 1491. In the park are the ruins of a late 10th-century keep, the oldest in France, built by Fulk Nerra, count of Anjou. There is a church with a bell tower built between the 11th and 15th centuries. There are cave dwellings in the neighbourhood and a modern camping site beside the Loire. The town is a tourist centre for a region of numerous châteaux and various beauty spots. Its industries include mushroom cultivation and dairy farming, brickmaking, tanning and the manufacture of leather goods, heat-resisting silico-aluminum products, cement pipes, dolls and tractor plows. The Loire is crossed at Langeais by a suspension bridge rebuilt several times since its first construction in 1848.

LANGHAM, SIMON (d. 1376), archbishop of Canterbury and cardinal, was born at Langham in Rutland, becoming a monk in the abbey of St. Peter at Westminster, and later prior and then abbot of this house. He was treasurer of England (1360), bishop of Ely (1361), chancellor of England (1363) and archbishop of Canterbury (1366). Langham drove the secular clergy from their college of Canterbury hall, Oxford, and filled their places with monks. He was made a cardinal by Pope Urban V in 1368. Two months later he was compelled to resign his archbishopric and went to Avignon. He was made cardinal-bishop of Praeneste in 1373. In 1374 he was elected archbishop of Canterbury for the second time, but he withdrew his claim and died at Avignon, July 22, 1376.

LANGHORNE, JOHN (1735–1779), English poet and translator of Plutarch, was born at Winton, Somerset, in March 1735. He became rector of Blagdon, Somerset, in 1766 and died there on April 1, 1779. The best of his poems is *The Country Justice* (3 parts, 1774–77), which anticipates George Crabbe in its sympathetic treatment of the humble and unfortunate. His translation of Plutarch's *Lives* (1770), undertaken with his brother William, was frequently reprinted. He contributed reviews of literary and agricultural books to *The Monthly Review* (1761–79), and edited the collected poems of William Collins (1765).

See H. MacDonald, "John Langhorne," in *Essays on the 18th Century Presented to D. Nichol Smith* (1945). (J. E. Bt.)

LANGIEWICZ, MARIAN (1827–1887), Polish patriot, the commander during the insurrection of 1863 in Russian Poland and dictator for ten days, was born at Krotoszyn, in Poznania, on Aug. 5, 1827, the son of a doctor. Educated in Poznan and Berlin, he supported himself by lecturing, but subsequently entered the Prussian *Landwehr* and served for a year as lieutenant of artillery. In 1860 he migrated to Paris and taught for a time at the Polish military school founded there by Ludwik Mieroslawski. In the same year he took part in Garibaldi's Neapolitan campaign, after which he went to teach at the short-lived Polish military school at Cuneo in Piedmont. In 1862 he entered into communica-

tion with the Central National committee in Warsaw, and when the rising began on Jan. 22, 1863, he took command of the insurgents in the Sandomir district and inflicted several defeats on the Russians. Influenced by the conservative element among the insurgents, he proclaimed himself dictator (March 10), but after the battle of Grochowiska he took refuge in Austrian Poland (March 21) and was interned at Tarnow and later at the fortress of Josephstadt, from which he was released in 1865. He then lived at Solothurn as a citizen of Switzerland. Later he entered the Turkish service as Langie Bey. He died in Istanbul on May 11, 1887. His *Relacja o kampanii wlasnej 1863 roku* ("Report on My Campaign of 1863") appeared in 1905 and his *Pisma wojskowe* ("Military Writings") in 1920. (ST. HE.)

LANGLAND, WILLIAM (*c.* 1330–*c.* 1400), is presumed to be the author of the long English alliterative poem generally known as *Piers Plowman,* from the name of a character who appears or is referred to at various turning points in the narrative.

Authorship and Nature of the Poem.—Manuscripts of the poem describe it as *Visio Wilhelmi de Petro Plowman cum vita de Dowel Dobet et Dobest secundum Wit et Resoun.* A Latin note, written *c.* 1400 in a manuscript of the poem in Trinity college, Dublin, and probably connected with the south Welsh border, states that the author was called William of Longland and was the son of Stacy de Rokayle of Shipton-under-Wychwood, Oxfordshire. Later writers associated this William with Cleobury Mortimer in Shropshire; but A. H. Bright plausibly argued (in *New Light on Piers Plowman,* 1928) that Cleobury is a mistake for Ledbury: the parish of Barton Colewall, adjacent to Ledbury, contains a field called Longland(s) from which the poet may have taken his name; and it lies just north of the Malvern hills, where he represents himself as dreaming his first dreams. The line "I haue lyued in londe, quod I, my name is Longe Wille" (from the B text [*see* below], passus xv, line 148) is usually taken as a punning allusion to the author's name; and there are cryptic references to "Wille" elsewhere. The poet-dreamer represents himself in one version of the poem (C) as dwelling in Cornhill with "Kytte" (who is referred to as his wife in B, when he speaks of his daughter "Kalote," passus xviii, line 426); as too weak and too "long" to do manual labour; and as earning a living by singing the offices of the dead—*i.e.,* as a cleric in minor orders. It would be hazardous to assume that all passages in the first person are strictly biographical—writers of dream-allegory have always been at liberty to fictionalize the dreamer's experiences—but numerous references indicate that the poet knew London and Westminster well. Certain dialectal evidence, on the other hand, suggests that he spoke the dialect of the Malvern area (southwest Midland). The enigmas of the poet's biography are matched by numerous enigmatic features in the poem itself. Yet these hardly detract from its greatness, which has been increasingly recognized during the 20th century as the allegorical meaning of the work has been more thoroughly and more sympathetically considered than heretofore. Thus it is now clear that the "satirical" passages and the vignettes of contemporary life (which for most earlier critics constituted its chief merit) must be looked at in the light of the overmastering religious impulse behind the allegory. Like the *Faerie Queene* or *Pilgrim's Progress* the poem is above all a testament of faith, not a social document or even an extended sermon in verse.

Whatever the calling or education of the author (that he was educated at Great Malvern priory is no more than an attractive conjecture), abundant quotations and allusions show that he was well-versed in the liturgy and offices of the church, in the Vulgate and in certain of the Fathers. In many ways his theology accords with the ascetic theology of St. Bernard of Clairvaux (whom he cites), with its emphasis on the necessity of self-knowledge for salvation, which is the first duty of man, and on the distinction between *studiositas* (wise choice of study, which will lead to greater knowledge of one's self, and therefore to salvation) and *curiositas* (the "curiosity" which looks outward, not inward, and therefore distracts man from achieving salvation). But his adherence to ascetic thought is not exclusive or mechanical. His signal achievement is to translate the language and conceptions of the cloister into symbols and images that can be apprehended by the layman. To this extent he does resemble an effective homilist or preacher; and he doubtless learned something both in matter and manner from contemporary manuals of instruction for parish priests and layfolk and from contemporary preachers. Residence in London would give him ample opportunity to attend the theological discourses at St. Paul's Cross (to which he alludes at passus xiii, line 65) or to hear sermons (or reports thereof) like those which Thomas Brinton, or Brunton, bishop of Rochester, preached before the king or parliament; he dramatizes just such a sermon at the beginning of passus v. In London, as in other large towns, he could have witnessed the mystery plays on the Harrowing of Hell (*see* DRAMA: *Medieval Drama*), the influence of which has been seen in his version of that event (passus xviii). Among other works that are thought to have influenced his allegory at various points are Robert Grosseteste's *Chasteau d'Amour* (in its French or its English version, *The Castle of Love*), which apparently suggested the court of Truth to which Piers directs penitents (passus v, line 594 ff.), and Nicole de Bozon's *Chanson de la Passion,* in which Christ appears as a jousting knight—a figure that Langland uses in his account of the Passion at the beginning of passus xviii. But more pervasive, and more important, than any specific literary source is the influence of the traditional exegesis of Scripture—accessible in, for example, the biblical *Glossa Ordinaria,* for which Anselm of Laon (d. 1117) was partially responsible; many of his comments and interpretations, many of the images that he applies so strikingly, are derived from patristic exegesis (*see* EXEGESIS AND HERMENEUTICS, BIBLICAL).

Manuscripts and Texts.—About 48 manuscripts of the poem are extant, most of them easily classifiable as representing one of three versions: A (consisting of a prologue and 11 passus or divisions, 8 passus devoted to the vision of Piers the Plowman, and a further 3, with another prologue, to the vision of Do-wel, Do-bet and Do-best), which is the earliest (after 1362 and perhaps as late as 1370), and shortest (2,567 lines); B, extending the original text to 20 passus (7,242 lines), with numerous changes in the early part, and probably prepared *c.* 1378; and C (7,357 lines), a revision of B extant in more than 25 manuscripts and generally dated *c.* 1394, though the evidence for such a date is not strong. Expert opinion now accepts the view—championed by R. W. Chambers and others (see *Bibliography*) against the multiple-authorship theories of J. M. Manly (*see* the *Cambridge History of English Literature,* vol. ii, 1908; and extra issues of the Early English Text society, 1908 and 1910)—that A and B are essentially products of the same hand, but some scholars are less willing to believe that this hand is responsible for all the changes in C.

The reader coming fresh to the poem will do well to begin with the B text, while noting that a 12th passus found in some manuscripts of A, and alluding to the death of "Wille," has no equivalent in the later versions. C contains several passages the tone and content of which cannot easily be matched in A or B (*e.g.,* passus vi, lines 1–110—the dreamer's apologia to Reason—and passus x, lines 71–97). The following summary of the poem is based on B, and references throughout the article are taken from it. It consists of (1) a prologue and seven passus concerned primarily with the life of man in society, the dangers of Meed (love of gain) and manifestations of the seven capital sins; and (2) 13 passus ostensibly dealing with the lives of Do-wel, Do-bet and Do-best; in effect, with growth of the individual Christian in self-knowledge, grace and charity. The A text does not proceed beyond "Do-wel," to which its last three passus are devoted.

Content of the Poem.—The whole poem opens with a prologue describing how, "In a somer seson whan soft was the sonne," the poet rests by a brook and dreams of a wilderness where all sorts of men are working and wandering. The activities of the churchmen and the religious soon absorb his attention, leading him to consider the nature of papal and of kingly power and of the "common profit," which is vividly illustrated by a topical application of the fable of the rats and mice who wished to bell the cat. In passus i appears the beautiful Lady Holychurch, who interprets this confused scene and in answer to the question "How

can I save my soul?" cites the text *deus caritas;* divine charity is shown as inseparable from "Truth," and in contrast to False and Meed—who, in passus ii, is a richly dressed woman whom her friends would like to marry to Fraud. The king proposes that she should marry his knight Conscience instead (passus iii), but Conscience will have nothing to do with Meed and prophesies a millennial time when her sway shall cease. In passus iv Reason joins with Conscience, the king at length agrees to follow their counsel, and the first dream closes (passus v, lines 1–3) with the king and his court at Mass. The second dream (passus v–vii) opens with a sermon by Reason addressed to the various grades of society. The penitents who are moved by this sermon to make confession are characterized in a series of lively autobiographies put into the mouths of the seven deadly sins, and their penitent prayers are embodied in a moving petition by Repentance addressed to God incarnate in Christ. In their search for "holy Truth" they got no help from a professional pilgrim (a palmer) who has never heard of him; but unexpectedly Truth's faithful servant Piers the Plowman comes forward to teach them the way that leads through the Ten Commandments to a court "clear as the sun" and guarded by the Virtues: Grace, Truth, Charity. In return for the guidance he proffers after making his will, they agree to help him to till his half-acre (in the medieval communal manner), though before long Piers has to call in Hunger (the famine that followed the Black Death) to deal with shirkers and malcontents.

By the beginning of passus vii it is clear that the pilgrimage to Truth is to be a spiritual journey; Truth, likened to a pope granting an indulgence, sends a pardon to Piers and his heirs on condition that they perform their duties faithfully. A sharp dispute between Piers and a priest over the text of this pardon (*"Et qui bona egerunt, ibunt in vitam eternam/Qui vero mala, in ignem eternum"*—"And they that have done good shall go into life everlasting; and they that have done evil into everlasting fire," a clause from the Athanasian Creed) awakens the dreamer and leads on to the main topic of passus viii ff.: the meaning of "Do-wel." This is slowly elucidated by means of a series of definitions offered by various interlocutors whom the dreamer meets in his next dream "under a lynde uppon a launde": Thought, Wit (Intelligence), Dame Study, Clergy (Learning) and "Scripture" (the written word).

In a dream within this dream (passus xi) Fortune shows the dreamer the Mirror of Middle-earth, and Kind (Nature) shows him the wonders of creation. Imaginatif (who in some respects resembles the faculty now called Memory) in passus xii sets the topics and problems of earlier passus in a new perspective by explaining the functions of Clergy; and later Conscience and Patience indicate the shortcomings of the Active Life as it is embodied in one Hawkin, whose cry for mercy reawakes the dreamer; he is still so preoccupied with the meaning of Do-wel that he shows little respect for the rich and great and is taken for a fool. In his next dream (passus xv–xvi) Anima, "Christ's creature," intimates that only Piers Plowman can reveal Charity: on hearing Piers' name the dreamer swoons for joy. Piers himself explains the meaning of Charity, a tree growing in his garden, but then vanishes. Setting out in search of him, the dreamer meets Abraham (Faith), Moses (Hope) and, finally, the Good Samaritan of the Gospels, who hastens away to a joust in Jerusalem, where he appears in the next dream at Easter (passus xviii) unarmed except for *humana natura*—the "arms" of Piers. There follows a memorable account of the Crucifixion and the Harrowing of Hell, and of the reconciliation of the four daughters of God: Mercy, Peace, Truth and Righteousness (*cf.* Ps. lxxxv, 10). Awakened by the bells of Easter morning, the dreamer goes to mass with his wife and daughter, only to fall asleep once more (passus xix), and dream of Piers "lyke in all lymes to owre Lord Iesu." Conscience's explanation of the names of Christ precedes a vision of Pentecost. Grace (the Holy Spirit) gives to Piers a team of oxen (the evangelists), seeds (the cardinal virtues), the cart of Christendom (the Christian religion) and the timber of the Cross with which to construct the barn of Unity ("Holychurch" in English). This barn is soon attacked by Pride who in the last dream (passus xx) bears the banner of Antichrist, whose army is dispersed by Kind only to be replaced by Lechery and Avarice. Old Age and Death draw near the dreamer, and Kind bids him enter Unity and "lerne to love . . . and to leve al elles." Finally hosts of friars enter Unity, a flatterer among them purporting to heal the wounds of Conscience's kinsman, Contrition. Whereupon Conscience sets out in search of Piers, and with Conscience's cry for grace the dreamer awakes and the poem ends.

The Poem's Meaning.—This synopsis merely indicates the framework of the poem. Thus it necessarily omits any discussion of the significance that Langland attaches to the recurring concepts of Do-wel, Do-bet and Do-best—all in the end seen as embodied in Christ; commentators usually identify them with the Active, Contemplative and "Mixed" religious life, but these should perhaps be regarded as illustrative of Langland's triad rather than as synonymous with it. For him the element of "Doing," common to them all, was of primary importance: *"Fides sine operibus mortua est"* ("Faith without works is dead"), the text quoted by Holychurch (at passus i, line 185—"That faith without the faite is rigte nothinge worthi,/And as ded as a doretree"; doorpost, *i.e.,* deadwood), is as useful a key as any to the understanding of the poem.

In its general structure the poem mirrors the complexity of the themes with which it deals—just as the sudden conclusion of the A version may indicate the poet's initial difficulty in constructing an allegorical pattern that could accommodate everything that he wished to express. As it is, he occasionally steps outside the framework of the poem to address his own strictures to the rich or wicked (*e.g.,* passus iii, line 64); but in general his digressions are deliberate and controlled. Perhaps his most characteristic device is the brief or casual introduction of a theme the full significance of which is not to be seen until it is taken up long afterward and given central importance: thus the false pardoner's bull in the Prologue is seen in retrospect as a preparation for the dispute over Piers' pardon in passus vi; and the statement that Christ's "dougtiest dedes were done in owre armes" (passus v, line 509) is not amplified until we come to the jousting at Jerusalem (passus xviii). Some critics have detected three or four levels of meaning running through the poem; but though the poet was doubtless familiar with the traditional exegetical method of interpreting Scripture historically, allegorically, anagogically and topologically, and though his allegory is often susceptible of more than one interpretation, it would not be easy to assign fourfold significance to every detail. The transformation of the Good Samaritan into the Christ-Knight is a typical example of the way in which a character in *Piers Plowman* may deepen in significance, almost without the reader's being fully aware of the change. Even when using traditional materials, Langland often adds some new detail or produces a new combination of traditional elements; and these details and combinations help to give the poem its freshness and richness.

The more the poem is studied the clearer it becomes that its author was fully committed to all the implications of Christian doctrine. His comments on the defects of churchmen and the religious in his day are quite concomitant with his orthodoxy, indeed inseparable from it; his later reputation as "a protestant by Prolepsis," in Thomas Fuller's phrase, deriving largely from a passage (passus x, lines 326 ff.) which was interpreted in the 16th century as prophetic of the dissolution of the monasteries —an act that would have horrified the poet, who thought the cloister might be heaven on earth (passus x, lines 300–301). In passus vii he stops short of criticizing the doctrine (as distinct from the misuse) of indulgences, and it is hard to find Wycliffite or Lollard influences anywhere else. His firm hold on the doctrine of the Incarnation gives him a remarkable balance and centrality, a Christian tenderness and realism. He sets the claims of authority and experience in delicate equipoise. He is never petty or parochial; he sees Christendom, and England, as a whole. He rivals Chaucer himself in his range of types and classes and mirrors the medieval English mind at its most representative; though perhaps no other medieval poet expresses Christian charity for the poor as movingly as Langland does in such typical lines as

For owre ioye and owre hele · Iesu Cryst of hevene,
In a pore mannes apparaille · pursueth us evere,
And loketh on us in her liknesse · and that with lovely chere . . .
(xi, lines 179 ff.)

Language and Style.—The language and imagery of the poem are in general simple and colloquial, reflecting the poet's concern with everyday actualities, but some of his images have a pregnancy and power that is found elsewhere only in metaphysical poetry, for example, his development of the figure of divine love as "triacle of hevene"—a healing salve or heavenly plant which is too heavy to be contained in heaven yet when it takes on flesh and blood is as light and piercing as a needle, and (like Christ's resurrected body) opens the way into heaven for mankind:

For hevene myȝte nouȝte holden it · it was so hevy of hym-self
Tyl it hadde of the erthe · yeten his fylle,
And whan it haved of this folde · flesshe and blode taken,
Was nevere leef upon lynde · liȝter ther-after,
And portatyf and persant · as the poynt of a nedle,
That myȝte non armure it lette · ne none heiȝ walles.
Forthi is love leder · of the lordes folke of hevene,
And a mene, as the maire is · bitwene the kyng and the commune . . .
(i, lines 151–158)

Nothing is more characteristic of Langland than the change of figure in this last line, where Christ's function as a mediator between God and man is expressed in terms of contemporary society. The whole passage should be compared with passus xii, lines 141–143, where it is "the high holy ghost" who cleaves heaven as love "leaps out into this low earth," to be caught by "cleanness"—the Virgin Mary.

Langland thinks of himself as a "maker" (*cf.* passus xii, line 16), and is familiar with traditional poetic craft—with the allegorical figures of medieval French and Latin poetry as well as with the native alliterative techniques that had survived in the west of England. His work shows some affinities with two much shorter and less ambitious alliterative poems that are allegorical debates in a dream setting—*The Parlement of the Thre Ages*, and *Winner and Waster* (*c.* 1352–1353?)—and he may have been influenced by the latter (as Professor Nevill Coghill thinks: see *The Pardon of Piers Plowman*, Gollancz memorial lecture, 1945), or by poems like it that are no longer extant; the short *Papelard Priest*, written in alliterative stanzas about the middle of the 14th century, shares some of Langland's phrases and sentiments but is markedly inferior in quality, as are various similar poems of a later date. Langland's manipulation of the alliterative line is distinctive and gives it a flexibility more easily illustrated than described. He moves easily from scholastic disputation to rough and racy dialogue or the expression of fervent religious feeling. And this variety of tone answers to the variety in the manifestations of Piers himself—now a plowman such as Chaucer pictures in his Prologue, now learned enough to wrangle with a priest, now "like to our Lord Jesu."

Bibliography.—The poem was first printed by Robert Crowley in 1550 from a good B manuscript no longer extant. The C text was first published by T. D. Whitaker (1813), the A text by W. W. Skeat (Early English Text Society, 1867). Skeat's parallel-text edition of all three versions, with full commentary, 4 vol. (1866–84), remains a standard work but will be superseded by an edition still in progress in 1964, under the general editorship of G. Kane, whose edition of the A text, with full critical apparatus, appeared in 1960; his collations are fuller than those in the edition by T. A. Knott and D. C. Fowler (1952; with bibliography). The 1954 reprint of Skeat's edition includes (p. xcv) a bibliographical note covering *Piers Plowman* studies since 1886; *cf.* also Morton W. Bloomfield in *Speculum*, xiv (1939).

Translations include those by Henry W. Wells (1935) and (in prose) J. F. Goodridge (1959). There are modern exegeses by D. W. Robertson, Jr. and B. F. Huppé (*Piers Plowman and Scriptural Tradition*, 1951), R. W. Frank, Jr. (*Piers Plowman and the Scheme of Salvation*, 1957), J. Lawlor (*Piers Plowman, an Essay in Criticism*, 1962), and by Morton W. Bloomfield (*Piers Plowman as a 14th-Century Apocalypse*, 1962). Briefer expositions and appraisals of the poem are to be found in R. W. Chambers' *Man's Unconquerable Mind* (1939), Christopher Dawson's *Medieval Essays* (1954), Elizabeth Salter's *Piers Plowman, An Introduction* (with select bibliography, 1962) and in the prefaces to the translations by Goodridge and Wells. The direction of recent studies is indicated by E. Talbot Donaldson, *Piers Plowman: the "C"-Text and Its Poet* (1949) and T. P. Dunning in the *Review of English Studies* (1956), pp. 225–237.

The early arguments for and against unity of authorship may be studied in *The Piers Plowman Controversy* (Early English Text Society, 1909). D. C. Fowler, *Piers Plowman. Literary Relations of the A and B Texts* (1961) brings forward new evidence and reargues the case for multiple authorship. For reasons set forth by Mabel Day and Robert Steele in the introduction to their edition of *Mum and the Sothsegger* (Early English Text Society, 1936) that poem, formerly known as *Richard the Redeless*, is no longer ascribed to Langland, though its author evidently knew *Piers Plowman;* it was probably written at the beginning of the 15th century. *Piers the Ploughman's Creed* is an early and passable imitation of *Piers Plowman* (ed. by W. Skeat, Early English Text Society, 1867; *see* also A. I. Doyle in *Speculum*, xxxiv, 1959, p. 428).

(J. A. W. B.)

LANGLEY, SAMUEL PIERPONT (1834–1906), U.S. astronomer and physicist, studied solar phenomena and pioneered in aviation. He was born at Roxbury, Mass., Aug. 22, 1834. His formal education was obtained at the Boston Latin school and at the Boston high school, from which he was graduated in 1851. He did not go to college. From 1857 to 1864 he practised the profession of civil engineering and architecture, mainly in Chicago and St. Louis.

It was on his return to Boston, in 1865, that his serious professional life began with an assistantship in the Harvard observatory. The following year he went to the U.S. Naval academy, Annapolis, Md., where he taught mathematics. In 1867 Langley accepted the directorship of the Allegheny observatory in Pennsylvania and became professor of physics and astronomy in the Western University of Pennsylvania. In 1887 he became secretary of the Smithsonian institution in Washington, D.C. He spent the last 19 years of his life as director of the institution, establishing the Washington National Zoological park and the institution's astrophysical observatory at Wadesboro, N.C. He died at Aiken, S.C., on Feb. 27, 1906.

Langley was first of all an ardent student of solar phenomena. Every student of astronomy is familiar with his exquisite drawing of the great sunspot of Dec. 1873. His main interest, however, was in the fundamental problem of meteorology; *i.e.*, the amount of heat the earth receives from the sun and the selective absorption of it by the earth's atmosphere. In 1881 he made an expedition to Mt. Whitney, Calif., accompanied by James E. Keeler, for the purpose of getting a clear sky and two points of widely differing elevation from which to measure the heat received from the sun.

Langley's study of the solar spectrum led him to the invention of the bolometer, a device which enabled him to extend the solar spectrum far into the infrared. Langley used this apparatus with great skill not only to detect the dark spaces in the solar spectrum known as Fraunhofer and telluric lines, but also to measure the intensity of solar radiation at various wave lengths.

While he was still at Allegheny, Langley made, in the field of aeronautics, some highly important qualitative experiments upon the "lift" and "drag" of a plane moving through the air at a measured speed. As early as 1896 Langley made a steam-driven airplane which flew a distance of 4,200 ft. over the Potomac river, but it carried no pilot, nor was it provided with any means of safely leaving the ground or safely alighting. His pilotless airplanes made several other successful flights. Langley was also the first to offer a clear explanation, backed by experiment, of the manner in which birds are able to soar without appreciable motion of their wings. (H. Cw.; X.)

LANGLOIS, HIPPOLYTE (1839–1912), French general, noted for his classic treatise on artillery, was born at Besançon in 1839. After passing through the École Polytechnique, he was appointed to the artillery as sublieutenant in 1858, attaining the rank of captain in 1866. He served in the army of Metz in the war of 1870. In 1888 Langlois became professor of artillery at the École de Guerre, and worked out the tactical principles of the employment of field artillery under the new conditions of armament. His great treatise *L'Artillerie de campagne* (1891–92) is an artillery classic. In 1907 Langlois began the publication of a monthly journal of military art and history, the *Revue militaire générale*. The most important of his other works are *Enseignements de deux guerres récentes* and *Conséquences tactiques du progrès de l'armement*. He died in Feb. 1912 in Paris.

LANGMUIR, IRVING (1881–1957), U.S. physical chemist who won the Nobel prize in chemistry in 1932 for his discoveries in surface chemistry, was born in Brooklyn, N.Y., on Jan. 31, 1881. He studied at the Columbia school of mines and at the University of Göttingen, Ger. (Ph.D., 1906), and then taught at Stevens institute, Hoboken, N.J. (1906–09). In 1909 he joined the General Electric research laboratory, Schenectady, N.Y., where he worked until his retirement in 1950. There he made many noteworthy scientific contributions. In physics he pioneered in electrical discharges in gases, in electron emission and in the development of the mercury condensation vacuum pump. In chemistry he investigated the high-temperature surface chemistry of tungsten, formulated theories of atomic structure and adsorption, and opened new fields in colloid and biochemistry through his work on molecular films. In 1946 Langmuir's work and that of his associates led to the discovery of techniques for transforming supercooled clouds into ice crystals by cloud seeding with silver iodide.

His scientific achievements resulted in many technological advances that included the vacuum tubes later used in television sets, the gas-filled tungsten lamp and atomic hydrogen welding. He died in Falmouth, Mass., on Aug. 16, 1957. (B. Vt.)

LANGO, a Nilotic people of Uganda who numbered about 300,000 in the 1960s and inhabited the marshy lowlands northeast of Lakes Kwania and Kyoga; not to be confused with unrelated Sudanic people of the same name. They cultivated millet for food and for making beer, their staple drink, and also grew numerous vegetables. Men and women shared the agricultural work, but men had the sole custody of cattle.

The population was divided into a number of exogamous, totemic patrilineal clans, each having its own territory. Hereditary chiefs had authority over all inhabitants of their clan areas, regardless of kinship. Above these were senior chiefs (*rwot*) who won their positions by personal merit, each controlling from three to six hereditary chiefs. Men also were divided into a series of age-grades with such religious and magical functions as rain making.

Lango traditionally believed that every human had a guardian spirit (*winyo* or bird) that attended him during life and must be ritually liberated from the corpse. There was also a belief in a shadow-self or immaterial soul (*tipo*) that after death might be renamed *chyen* and eventually was merged into a vague entity called *jok*. Ancestors, of whom *jok* was held the universal sublimation, were worshipped along with *jok* at shrines and sacred trees by prayer and sacrifice. *Jok* was believed to manifest himself in a diversity of forms, some of them being anthropomorphic in conception. *See* also NILOTES; UGANDA.

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LANGPORT, a small market town in Somerset, Eng., lies 14 mi. E. of Taunton by road. Pop. (1951) 772. The town is an ancient borough situated at the head of the Somerset marshes, protecting the first and, for centuries, the principal bridge over the Parrett river. Founded in Saxon times as a royal borough, by 1086 Langport had 34 burgesses and, until the establishment of Bridgwater in 1200, was in direct communication with the Bristol channel. River trade made it an important market and centre of distribution, but with the coming of the railways a decline set in from which it never recovered. Langport was represented in parliament in 1304 and 1306, and the first charter of 1563 recognized the great antiquity of the town and made a formal grant of a market and fairs. Incorporated in 1616, it continued under its ancient government of reeve and commonalty with two bailiffs. All rights as a borough were lost in 1886 and Langport gives its name to the rural district of which it forms the chief parish. The church of All Saints is Perpendicular with some remarkable medieval glass in the east window. Set upon an arch over the road is the hanging chapel built originally to serve a guild, used for a time as the grammar school and now, restored, as a Masonic lodge. Langport was the scene of a battle in 1645 during the Civil War, and the birthplace of Walter Bagehot (1826–77), the economist and author. (T. J. Ht.)

LANGREO, a municipality of northern Spain in the region of Asturias and province of Oviedo. It comprises a number of settlements whose capital is Sama, on the Nalón river, 20 km. (12 mi.) E.S.E. of Oviedo by road. Pop. of municipality (1960) 65,860. Langreo receives an increasing number of immigrants from the south, from Extremadura and from Galicia. They are attracted by the mining and industrial wealth of the region, which has good road and rail (Oviedo-Pola de Laviana) links. The municipality is situated in the Nalón valley, where the principal crops are maize (corn) and apples (from which cider, a popular drink in Asturias, is made). There is also cattle raising. The main mineral wealth is coal, with large deposits in the area. (M. B. F.)

LANGRES, a town of eastern France, capital of an *arrondissement* in the *département* of Haute-Marne and seat of a bishopric, is 35 km. (22 mi.) S.S.E. of Chaumont. Pop. (1962) 7,648. The town is situated on a promontory at the northern end of the Langres plateau overlooking the Marne. It is a fortified town and its ramparts, which have often been destroyed, still form a circle of 2½ mi. A 2nd-century Roman gate is embedded in the walls, and other gates date from the 16th, 17th and 18th centuries. Seven 15th- and 16th-century towers command extensive views of the surrounding countryside. Among buildings of interest are the cathedral of St. Mammès (11th and 12th centuries with an 18th-century façade), a 13th-century cloister, the church of St. Martin (13th, 14th and 18th centuries), several Renaissance houses, portals of 17th- and 18th-century chapels and the 18th-century *hôtel de ville*. In the Place Diderot is a statue by F. A. Bartholdi of the Encyclopaedist Denis Diderot, who was born in the town. There are two museums of Gallo-Roman antiquities and a large library.

Langres is a meeting place for the principal tourist roads of eastern France. The Paris-Basel, Dijon-Nancy and Dijon-Lille railways pass through it. Industries include manufacture of cutlery, tiles, large electrical equipment, cheese processing and printing. The town is a subprefecture and has courts of the first instance and of commerce.

Langres, the ancient Andematunum, was the chief city of the Lingones, an important Gallic tribe, from whom it was captured by the Romans. It became an episcopal see in the 3rd century, and in medieval times the bishop was a duke and a peer of the realm. The town was destroyed on several occasions by barbarian invaders. It suffered during the Hundred Years' War and the wars of religion. (Gs. M.)

LANGTOFT, PETER (d. *c.* 1307), author of an Anglo-Norman chronicle in alexandrines, took his name from the village of Langtoft in East Yorkshire, and was a canon of the Augustinian priory at Bridlington. He acted as procurator for the prior or chapter, 1271–86, but seems later to have been in disgrace. His *Chronicle* deals with the history of England from the earliest times to the death of Edward I, and seems to have as its aim the glorification of that king. The early part relies ultimately upon Geoffrey of Monmouth and other writers, but for the reign of Edward I it is an original and valuable authority, with a strong anti-Scottish bias. The latter part of the *Chronicle* was translated into English verse by Robert Mannyng of Brunne (completed, 1328). This translation was edited by T. Hearne in 1725.

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LANGTON, JOHN (d. 1337), chancellor of England (1292–1302 and 1307–10), and bishop of Chichester (1305–37), had been a chancery clerk. He failed to secure the bishopric of Ely in 1298. Although reappointed chancellor after the accession of Edward II (1307), he was one of the lords ordainers of 1310. In the same year he was ordered to come to the king at Windsor with the great seal and all the chancery. When he proved unwilling to do this, he was superseded as chancellor. He later joined the middle party, led by the earl of Pembroke, and attempted to

mediate between the king and Thomas, earl of Lancaster. He was a member of the standing council which was set up by the treaty of Leake (1318). Langton built the chapter house at Chichester, and was a benefactor of Oxford university. He died in June or July, 1337. (J. Ta.)

LANGTON, STEPHEN (d. 1228), English cardinal whose appointment as archbishop of Canterbury precipitated King John's quarrel with Pope Innocent III, played an important part in the Magna Carta crisis and during the minority of Henry III. He was the son of Henry, lord of the manor of Langton-by-Wragby, Lincolnshire, but the date of his birth is uncertain. He became early in his career a prebendary of York, as was his brother Simon (d. 1248), whose election to that see in 1215 was quashed by the pope at King John's request. Stephen, however, went to Paris (*c.* 1181) and having graduated in that university became one of its most celebrated theologians. He spent 25 years there, during which time he probably composed his voluminous commentaries, many of which still exist in manuscript. He divided the Old Testament books of the Vulgate into chapters, and was probably responsible for the grouping of the historical apocryphal books. To this period belong most of his *Questiones,* dealing with subjects of current theological debate. At Paris he became friendly with Lotario de' Conti di Segni, who as Pope Innocent III summoned Langton to Rome, and in 1206 created him cardinal-priest of St. Chrysogonus. Immediately afterward Langton was drawn into the vortex of English politics.

The Canterbury Election.—After the death of Hubert Walter (1205), a dispute immediately arose as to who should be the new archbishop. Some of the monks hurriedly elected their subprior Reginald, and sent him to Rome to obtain his pallium. But the suffragans of Canterbury had for some time been claiming a share in the choice of a primate; King John supported them since they were willing to elect his nominee, John de Gray, bishop of Norwich. Others among the monks were also induced to support De Gray, who followed Reginald to Rome. Innocent III quashed both elections, and with John's consent a representative party of monks traveled to Rome, there to conduct the election afresh. At the pope's suggestion they now chose Stephen Langton, who was duly consecrated by Innocent at Viterbo on June 17, 1207.

John refused to allow the new archbishop access to his province, seized the revenues of Canterbury and banished the monks; Innocent replied by laying England under an interdict (March 1208). Langton crossed to Dover (Oct. 1209) in an attempt to achieve negotiation with the king, but John would go no nearer than Chilham, Kent, and after a week the archbishop left the country, and John's excommunication was published (Nov. 1209).

By 1212 John was seriously planning the recovery of the French territories lost to Philip II in 1204. The need to embark on this enterprise unhampered by ecclesiastical censure, Innocent's threat of deposing him, and the news that Philip was planning (April 1213) an invasion of England finally caused John to submit. He at once agreed to receive the archbishop, and Langton, who had been residing mainly at the Cistercian abbey of Pontigny, crossed to England (July 1213) and absolved the king.

Langton's Work as Archbishop.—Langton was not only associated with the baronial opposition against King John; he advised and supported it, encouraging the barons to formulate their demands and suggesting that they take their stand upon the coronation oath and the charter of Henry I. He withdrew, however, late in 1214, when the opposition began to resolve on violent means, and it is uncertain what share he took in drafting Magna Carta (*q.v.*). At Runnymede (June 1215) he appeared as a commissioner on the king's side. It is possible, therefore, to see his influence in those clauses of the charter which differ from the original petition of the barons; of these the most striking is that (clause i) which confirms the "liberties" of the church.

When the archbishop was on the point of leaving England (Sept. 1215) to attend the fourth Lateran council, he was suspended by the representatives of Innocent for not enforcing the papal censures against the barons. He proceeded to Rome, where the pope confirmed the sentence (Nov. 4). Early in 1216 Langton was absolved, but was required to remain out of England until peace was restored in the realm. He did not in fact return until May 1218, when both Innocent and John had died and peace had been restored in England following the treaty of Kingston (1217). From his return until his death Langton was a tower of strength to the royal party and worked in concert with Hubert de Burgh, the justiciar. He was responsible for the 1225 reissue of Magna Carta and in the same year convened a council of clergy to determine upon a grant to the king. Through his influence the legate Pandulph was recalled to Rome (1221), and Honorius III promised that no legate should be sent to reside in England during Langton's lifetime, thus strengthening the claim of the archbishop of Canterbury to be in England *legatus natus.* Langton held a provincial council at Oxford (April 1222) where he promulgated the decrees of the Lateran council, issuing also a set of important constitutions. He died at Slindon, Sussex, on July 9, 1228.

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LANGTON, WALTER (d. 1321), a leading counselor of King Edward I of England, bishop of Lichfield from 1296 to 1321 and treasurer of the exchequer from 1295 to 1307, was probably born at Langton West, near Market Harborough in Leicestershire. From June 1296 to Nov. 1297 he was in France and Flanders on diplomatic missions for Edward I. After Edward's death (July 1307), Langton, a greedy and unpopular official whose enemies included Robert Winchelsey, archbishop of Canterbury, was at once dismissed by Edward II, with whom he had previously quarreled. His temporalities and revenue were seized and he was kept in prison until Jan. 1312, when Edward decided to use him to undermine the power of the lords ordainers. But the barons would not countenance his reappointment as treasurer and Edward was forced to dismiss him from the privy council in 1315. Langton died in London on Nov. 9 or 16, 1321, and was buried in Lichfield cathedral.

LANGTRY, LILLIE (sometimes Lily; originally Emilie Charlotte Le Breton) (1853–1929), British actress, celebrated for her beauty and known as the "Jersey Lily," was the daughter of the Very Rev. W. C. Le Breton, dean of Jersey, where she was born on Oct. 13, 1853. In 1874 she married Edward Langtry, who died in 1897, and in 1899 she married Hugo de Bathe, who became baronet in 1907. In 1881 Mrs. Langtry caused a sensation by being the first society woman to go on the stage, making her first important appearance at the Haymarket theatre, London, as Kate Hardcastle in *She Stoops to Conquer.* For some time the critics did not take her seriously, but she became a competent actress, her most successful part being Rosalind. She also toured the provinces and the U.S. She turned the old Aquarium theatre in London into the Imperial theatre, modeled on a Greek temple, and opened it under her own management in 1901. Lillie Langtry also maintained a successful racing stable at Newmarket. One of the most beautiful women of her time, she had many distinguished admirers, including the prince of Wales (subsequently King Edward VII). Mrs. Langtry died at Monte Carlo on Feb. 12, 1929.

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LANGUAGE is a system of conventional spoken or written symbols by means of which human beings, as members of a social group and participants in its culture, communicate.

Each term in this definition should be examined. By "conventional" is meant that there is no necessary relation between any linguistic item and what it symbolizes. In English a certain animal is called "horse," in French *cheval,* in Russian *loshad',* and no one of these words is more adequate or appropriate than any other to the reality of the animal. Even onomatopoetic words

turn out to be in part conventional, since they are always made up of ordinary sounds of the language. The English verb "purr" and the French *ronronner* can both be said to imitate the sound a cat makes, but note how different they are. It is apparent that language is a "system." A baby babbles unsystematically, but when it learns to talk only certain of the possible noises are used, and they are arranged in orderly ways. "Spoken" means that it is specifically speech which is being defined. Other communication systems exist, and will be mentioned below. Writing is a systematic, conventional system dependent on speech. "Symbols" are tokens of things, rather than the things themselves. The word "book" is not a book, and the word "democracy" refers to a system of behaviour that requires many pages to describe. Human beings live in social groups and learn and participate in the behaviour patterns of their societies and cultures. The behaviour consists of interaction of human beings with their environment, which includes language. The interaction is largely involved with the communication of information from one individual to another.

The science of linguistics (*q.v.*) is the systematic study of language, as distinct from the study of languages for the purpose of being able to speak, read and write them.

LANGUAGE IN CULTURE

Language as defined is the peculiar possession of human beings. Other animals interact by means of sounds and body movements, and many also learn to understand human speech to some extent. But no other species of being has conventionalized its cries and utterances so that they constitute a systematic symbolism in the way that language does. In these terms, then, man may be described as the talking animal. In the fossil records of various primitive creatures there is obviously no indication of the noises they made, but the remains are accompanied by various kinds of artifacts—chipped stone flakes and the like. The existence of these suggests that the creatures who made them could talk, for the co-operation involved in the production of such artifacts probably required systematic symbolic communication.

Man's power to learn the language of his group and to pass it on to others, to transmit experience vicariously, is the basis for the development of all that array of behaviour patterns known as culture. It is the distinguishing mark of humanity. Among the lower animals, *e.g.,* the social insects, there are instances of remarkably complex behaviour. This is transmitted genetically; succeeding generations do not learn it from their elders and the patterns remain unchanged through geological ages. As one goes higher in the evolutionary scale, the role of instinctual behaviour is reduced and learning begins to enter. The vertebrates show many instances of learned behaviour, and the mammals especially owe their biological success to their ability to learn complex patterns. All the higher mammals can do this, and the young learn from and are taught by their elders. These animals, in teaching and learning, exhibit symbolic behaviour. But the symbols—noises and body movements—never become entirely abstracted. That is, they demonstrate and can be imitated but they do not become detached from the immediate environment. Among human beings, however, the noises and body movements have become abstracted from time and place. Thus the young of the human species can be told all that their predecessors knew, and any normal human being can learn about the experiences of any other.

Cultural Systems.—Those activities of the human organism that are universal and necessary to the existence of all human beings constitute the biological basis of culture. Once this basis has been established, man has an unlimited power of developing cultural behaviour through language. Because man talks—if not aloud, then to himself (*i.e.,* thinks)—about everything he observes, language becomes related to all other cultural activities.

All living beings are dependent on their environment. They act on it and it acts on them. Interaction with environment necessitates association of human beings in various ways. Work is often divided according to sex. Among the higher animals there is the basic activity of learning, which is especially developed among human beings. Learning is often started by means of play, something that only the higher animals exhibit and that man has developed extensively. Lower creatures find protection in coloration, armoured hides or some other natural feature, but higher animals defend themselves by the skilful use of their strength. For man, defense is the basis for elaborate activities including the exploitation of his environment.

Cultural systems have been developed on the basis of such activities and various combinations of them. For human beings, interaction with environment becomes systematized as symbolic behaviour at several levels. There is, first, cerebration. How this takes place is not fully known, but man seems predisposed to interpret everything about him symbolically. The interpreting takes place by classifying or coding. Everything is differentiated from everything else by a process of isolating details: "this is A; everything else is not A," and so on. Cerebration and coding are accompanied by emotions and valuation. Emotions affect the set and quality of the voice; valuation (the appreciation and definition of situations, often by "hunch") is evidenced by action or by utterances substituted for action ("meaning"). Communicative activity arises directly from coding and is manifested by variety of voice and bodily action.

By means of language a human being can learn about the experiences of others without being present when the experiences happen. He learns to talk about all kinds of complex cultural behaviour long before he has any direct experience of it.

Language reflects the basic relationships between human beings that constitute the subdivisions of society; *e.g.,* government, kinship, status and role. Kinship systems are often studied in and of themselves. In English the kinship system requires a relatively small number of basic terms: "father," "mother," "parent," "husband," "wife," "spouse," "child," "son," "daughter," "brother," "sister," "nephew," "niece," "uncle," "aunt," "cousin," the prefixed terms "grand-" and "great-" and "step-," the suffixed "-in-law" and the rare and specialized phrases "once removed," "twice removed." Other societies with different systems require additional specialized terms; *e.g.,* terms for older brother, younger brother, older sister, younger sister. Or there may be no distinction where one is made in English; *e.g.,* there may be a term for sibling but not for brother or sister, for a parent's sibling, but none for uncle or aunt (*cf.* the English word "cousin"). Class and caste relationships are connected with status and role in many ways. All four areas require large vocabularies, but more is involved than vocabulary. Persons of different classes often speak in different ways as regards pronunciation, grammatical forms, style. There are in many languages special terms of address indicating varying class status of speakers and of those spoken to. Members of castes sometimes have to speak indirectly to members of other castes. Persons of one status may not talk at all about some things that others talk of constantly. Different roles also may involve quite different language behaviour. The activities necessary to perform one's function in society, such as that of a school child at a certain age, a wage earner or housewife at another, or a retired person late in life, require enormous vocabularies. Occupations, exchange units, commercial activities all must be named, and occupational groups develop special technical jargons.

The existence of two sexes is one of the superficial conditioners of language. Descent is in the female line in one place and in the male line in another, implying different connotations for terms like "ancestor." In many languages differences of usage between men and women are slight. In English there are some expressions such as "dear me!" that are predominantly used by women, while others, such as profanity or "tough" language, may be chiefly used by men. In some languages, however, the differences are extensive and carry over even into grammatical forms. Such a language was that of the Yana Indians of California.

The concepts of space and time are productive of many kinds of linguistic activity. Space involves orientation and distance, the measurement of lengths (and of weights and measures) and the matter of territoriality (the boundaries or limits of the space in which a person is active). Such references as "my," "your," "his"; "this," "that"; "near," "far"; "north," "east," "south,"

"west"; the systems of terms for weights and measures are based on territoriality and the use of space. Time similarly involves location and change, notions of hours and seasons. Time is talked about in different ways in different languages. In the languages of western culture, time and space are often spoken of in similar ways and are used to measure each other (a day's journey, travel time). In Navaho, time is treated as if it actually were extension in space. Time and space may also be talked about in quite different terms.

The process of becoming a member of a group is for the most part a matter of explicitly being told by one's elders and contemporaries what is approved and disapproved. Formal education is carried on with a teacher who tells the students, by word of mouth or in written form, what they should learn. The process is almost wholly verbalized.

Many aspects of recreation derive largely from specialized uses of language. In games the rules must be agreed upon. Spectators approve, cheer and boo. In drama, the material of the occasion is specialized, literary language. The reader or hearer judges such material by its accuracy of portrayal. All literature is based on special uses of language.

Systems of protection against enemies, natural or supernatural, are made possible only by the constant use of language. They have their special vocabularies and usages. The power of the word is tremendous, people everywhere being very responsive to formulaic remarks (greetings, proverbs), to commands ("Stop!," "Attention," "Danger") and to ritual. It is believed that man learned to talk at the same time he learned to produce artifacts. Manufacture has grown in importance until the ways of talking about artifacts and about how to make them constitute the bulk of the vocabulary of almost all languages and the subject of the largest proportion of speech. In all kinds of metaphor the vocabulary of technology and allied fields is used (*e.g.,* "Strike while the iron is hot," "As ye sow so shall ye reap," "A homespun fellow," "The mills of the gods grind slowly").

Language expresses the attitude of a speech community toward its culture, which is the sum total of conditions in which it lives, both natural and as transformed by man. It is the expression of the interaction of external phenomena and of human responses to them; *i.e.,* of the human and nonhuman.

Communication.—Communication is a specialization of symbolic behaviour that exists conterminously with culture and society. Three systems may be used. One is vocalization, the making of various noises other than those of language proper. Another is the system of gestures and body movements, kinesics. The third and principal one is language.

1. Vocalizations include the noises that differentiate, on the basis of vocal quality, various emotional situations. Noises like laughing and crying are made by the newborn infant, but after about six weeks communication in terms of them begins. Crying is employed to signal distress, hunger and the like, and ceases when these are relieved; laughing is used in pleasurable situations. Other forms of vocalization include whispering, shouting, over-all nasalization and moaning. There are also vocal qualifiers: overloudness, oversoftness, overhigh pitch, overlow pitch, drawl, clipping (shortened enunciation), singing (spreading of all pitch extremes), monotone (reduction of pitch differences), rasp, openness (opposite of rasp) and others. A third kind of vocalization is the use of vocal identifiers; in *uhuh* or *ahah* meaning affirmation, "yes," there is a smooth transition between the syllables, whereas in *uh-uh* or *ah-ah* meaning "no," there is a glottal closure.

2. A system of kinesics involves units of body motion or gesture, such as an extended finger, a wink, a raising of an eyebrow, and patterns of units such as a shaking of the head accompanied by an admonitory finger and perhaps movement of the arms. Kinesic communication systems are more nearly alike in different parts of the world than are linguistic systems, but even within one area there may be clear differences.

3. In language, the principal and most complex communication system, there are systematically differentiated sounds, which are arranged into grammatically significant sequences, accompanied by elements of meaning from kinesics and vocalizations.

Origin of Language.—Human culture depends on the ability to speak. But presumably there was a time when the ancestors of modern man had not yet developed language. There has been much speculation on this matter in the past, and the origin of language has been sought in such things as imitation of the noises of animals, or in reflex exclamations of pain or pleasure, or in unintentional grunts under the stress of physical work, or in play-activity consisting of the babbling of meaningless sounds, or even in the imitation of bodily gestures by the vocal organs. But there is no evidence for any of these speculations, and linguists have therefore for the most part not concerned themselves with the problem. Historical knowledge about existing languages goes back only a few thousand years. All languages of today are highly complex and are adequate to express all the facets of the speakers' culture, and all languages can be expanded and modified to meet changing circumstances. There are no languages which could justifiably be called primitive. There are also no normal human beings without language; nor are there any other animals that can talk.

The existence of language can be dated back perhaps a million years or more, in terms of the age of the artifacts found with fossil man. The only way of deducing the formative stages of language is from the features all language systems have in common, namely that system which, though subject to constant historical variation, remains statistically stable through selection (*see* J. Whatmough, *Language,* pp. 168–173 [1956]). It is probable that the human brain evolved, as a consequence of upright posture and binocular vision, in such a way as to enable hominid creatures to associate definite meanings with remembered utterances. A rudimentary language came into being and demonstrated its own usefulness to its possessors, who thus successfully established themselves as the human (that is, talking) species—*Homo sapiens.* Linguistic symbolism became dominant over all other symbolic behaviour and finally its accepted basis.

Children's Language.—Children's language shows how language is learned by contemporary children from their elders but nothing about the origin or development of language. Children are exposed to language from birth; talking constantly goes on around them and they are talked to as if they understood. At the age of about six weeks an infant begins to respond to the vocal qualities used by adults. By six months a child begins to understand some of the intonation patterns of language. By the age of one year the child is babbling with varying intonation patterns, accompanied by extensive kinesic and vocalizational activity. During the second year of life the babbling becomes systematic, and the child begins to imitate some of the utterances he hears. It is at this stage that he is usually reported to have said "mama" or "daddy" or the like. When the age of two is reached the child suddenly begins to make sense; he begins to utter sound sequences that sound like words or even phrases of the language. From this point the child's language develops rapidly. He attempts to repeat what he hears. He is corrected. He begins to analyze his world and talk about it. By the age of three most children have enough of the sounds of the language to give a very presentable version of it, though they usually still do not know many of the grammatical forms. Between three and six these deficiencies are corrected and, everywhere in the world and for all languages, the normal child of six has acquired all the sounds and grammatical forms of his native language, though of course he does not command an adult vocabulary. The acquisition of the latter continues all through life. By puberty, however, most persons have acquired, through the language, an adequate understanding of the entire cultural system of their social group. There is reason to believe that aphasiacs lose first the sounds acquired last.

The ability to acquire linguistic material rapidly continues for several years, as is evidenced by the acquisition of foreign languages. Women seem to retain this ability somewhat longer than men. People learn more about their own language and learn new languages all their lives, though normally much more slowly after the age of 40.

THE STRUCTURE OF LANGUAGE

In defining language the phrase "spoken or written symbols" was used. Mention was made of systematic arrangement of sounds in grammatically significant sequences and recurrent references to words, special vocabularies, turns of phrase and the like.

The use of such terms and phrases is testimony that language has a structure or a series of structures and that this structuring can be analyzed and systematically presented. When language is spoken, as in the case of any human behaviour, what is going on is a complex series of events. These events are on many planes of experience: physical (the sound waves); chemical (the body chemistry); physiological (the movements of nerve impulses and of muscles); psychological (the reaction to stimuli); general cultural (the situation of the speaker in respect to the cultural system of his society); linguistic (the language being spoken) and semantic (its meaning).

Words and Grammatical Forms.—These elements of a language are the first to arouse interest and are also the first things that are learned by the child. The infant who is observed to say something that sounds like "mama" does not, at that time, have a system of sounds for a language, nor does he have any words or grammar. But if he is in an English-speaking environment, and his utterance is apprehended as the English word "mama" (or "mommy," or some similar form), and the reaction to it is such that he makes the association between the utterance and his mother, then he starts to acquire a vocabulary.

If he then, on a subsequent occasion, says "dada" (for "daddy"), and learns a reference for it, and then makes utterances like "mama-dada" or "dada-mama," he has begun to have arrangements of words. When he devises some such arrangement as "more dada" to refer to several adult males, he is formulating a grammar. The adult learner of a foreign language, like the constant learner of his native language, proceeds always by adding new words and new arrangements to his stock and putting them into utterances.

All languages have items that recur throughout utterances, and a limited (though often rather large) number of patterns for arranging these items. A linguist calls the recurring items morphs, and he groups them by various processes of classification into morphemes (a morph is a recurrent partial not composed of smaller morphs, *e.g., -er* in "father," "butter"; a morpheme is a minimum recurrent meaningful form, *e.g., err*). These are then found to be grouped into words by certain statable patterns, and the words are grouped into phrases and other constructions (clauses, sentences). As an example, the item *boy* recurs in English by itself and in *boy-s, boy-ish, boy-hood;* similarly *-s* recurs in *boy-s, girl-s,* etc., and *-ish* and *-hood* likewise recur. These are orthographic representations of morphs. The arrangement is always in a fixed order to form words—*boy-s* and not *s-boy, boy-ish* and not *ish-boy* and so on. In English sentences, one says "The man goes home," or conceivably "Home goes the man," but not "man-the home-goes." The study of the arrangement of morphemes is subdivided into morphology, the study of word formation, and syntax, the study of the use and order of words in constructions. Along with the arrangement of morphemes, linguists also study their shape, that is, the kinds of sounds that enter into them and their combinations. This is called morphemics. (*See* also GRAMMAR.)

Sounds.—The sounds of a language are learned as the different forms and arrangements are acquired. The linguist analyzes sounds into various kinds. There are vowels and consonants, degrees of loudness (stress), various pitch heights (tone), transitional phenomena between sounds (junctures). The classification of sounds is within the realm of the study of phonology. Phonetics (*q.v.*) is concerned with the description of the actual sounds or phones that are heard; phonemics is concerned with the grouping of the sounds into phonemes. In the English words "pit," "lip" and "spin" the sounds represented by the letter *p* are all different: the first is followed by a puff of breath (is aspirated), the second is closed off suddenly (is unreleased), the third has no puff of breath and is also said with relatively weak muscular tension (is unaspirated and lenis). Yet to a speaker of English all three are the same because the differences result automatically from their situation in the word (initial, final, after *s*). They are said to constitute one phoneme. Experience would indicate that all languages can be analyzed in terms of phonemes; but both the nature and number of these phonemes vary in different languages.

Vowels are sounds having maximal sonority and made with the least amount of obstruction of the vocal passages. Languages may have only a few vowels (there are languages with only 2 or 3 vowel phonemes) or they may have many (9, 10, even 12 vowel phonemes are found).

Consonants are sounds with less sonority than vowels, and made with various kinds of obstruction in the passage, such as the lips or the tongue. All languages also have consonants, the number varying from a dozen or so to as many as 60 to 70.

Stresses are differences in loudness. All languages have such differences, but in some they are significant while in others they are not. Thus in French the loudest stress is regularly at the end of a word or phrase and can be varied only for sentence emphasis, so French has no significant word stress. English, on the other hand, according to one analysis, has four significant degrees of stress: primary on the loudest syllable; secondary; tertiary; and weak on the so-called unstressed syllables (*see* ACCENT). Pitch differences also may be significant or automatic. In English the fall of pitch in "Now!" is significant as compared with the steady pitch with final rise in "Now?" In other languages pitch differences may be significant within a word, but not for whole phrases. Transitional phenomena are significant in all languages. They indicate ends of clauses and phrases (as the falling off into silence in English "Now!" contrasted with the rise of pitch in "Now?") and various other kinds of structure (English "nitrate" compared with "night rate").

Text.—The text of an utterance is made up of sentences consisting of clauses and phrases arranged according to the structural rules of the language. Each clause and phrase consists of words, again in patterned arrangements. Each word consists of morphemes (grammatically significant forms) in fixed order and arrangement. Each morpheme consists of a pattern of phonemes. Each phoneme occurs as a phone whose particular form is dictated by the pattern of sequence in which it is found. In normal speech, every utterance is accompanied by kinesic patterns and vocalizations. Together, all these form the communication context, which is located in a symbolic situation. All languages show this same over-all structure, regardless of differences in the details of pattern.

Meaning.—The meaning of linguistic forms, as this term is generally understood, proceeds from the total context. That is, the meaning of an utterance is the result of the interrelated references of all the items in it to the rest of the cultural behaviour of the speaker and hearer; hence meaning may be described as goal-directed activity. The usual way of giving the meaning of a term is to describe the object or situation referred to by other or equivalent terms. As between two languages, this is called translation. Where the nonlinguistic cultures are similar, translation can often be exact: "horse" = *cheval,* "mother-in-law" = *bellemère.* But where cultures differ, translation is often difficult. English "brother" must be translated by one of two words in Taos (a Pueblo Indian language), depending on whether "younger brother" or "older brother" is meant, the difference in cultural behaviour between older and younger brothers being significant to the Taos.

Within a language, the statement of the meanings of linguistic forms is easy for those that have reference to a limited number of easily described extralinguistic phenomena ("boy," "house," "go," "ride"), but difficult for those whose references are extensive and culturally widely differentiated ("do," "get," "democracy," "freedom," "privacy"). The meanings of morphemes and of rules of arrangement, moreover, can for the most part only be given in general terms. English plural means "more than one" generally but not in "scissors" or "trousers." English primary stress by itself indicates a word of one syllable. English 2–3–1 pitch sequence indicates a declarative sentence or certain kinds of questions. English open transition (as in "night rate") with

primary stress before it and tertiary after it indicates a unitary term of two parts.

It is sometimes supposed that the languages of civilization are much more precise in their meanings than are the languages of primitive peoples. It is true that modern technical and scientific vocabularies have great precision of reference. But a thorough examination of any number of other languages shows that where a culture demands it, in ritual, for instance, there is a comparable exactness and precision. On the other hand, large parts of all languages have only generalized or vague extralinguistic reference. The differences of precision in different parts of the structures make it impossible to evaluate languages as better or worse for the conduct of communication.

Language Typology.—The ways in which languages convey meanings and the efficiency with which they do it are often analyzed according to differences in structure or language type. The traditional classification evolved in the 19th century divides languages into four types: isolating, agglutinative, fusional (synthetic) and polysynthetic. Chinese is given as the typical isolating language. By this is meant that its words are uninflected (*i.e.,* without changes in form according to function in different constructions). Turkish is cited as a typical agglutinative language. Here the various morphemes follow each other, often in sequences of a half-dozen or more, but with each clearly retaining its own form, so that segmentation is easy. Fusional languages (the term "inflected" is also used) are the languages of the classical European tradition, such as Latin or Greek. Here grammatical endings are numerous, but it is not easy to isolate the separate functions fused in each (Latin *-us* in *dominus* is said to be at once nominative and singular and masculine). Polysynthetic (or "incorporating") is a term applied chiefly to certain American Indian languages which include the morphemes for what in English would be a whole sentence in one word. (Taos *tinąthə̀mŭ́ą,* "I saw the house": *ti-,* "I-it"; *-ną-,* "in a place" [reference to the classification of "house"]; *thə́-na,* "house"; *mîą, "saw"*). This classification does point out some predominant structural patterns, but most languages show mixtures of all these types of structure, as well as others. Thus, much of English is of the isolating type, as in "All the deer cut through the brush to the river in search of water," where there is not a single inflectional ending. But English also occasionally incorporates, as in "I house hunted yesterday," or "the man I saw yesterday's daughter" (where *'s* refers to the whole preceding part of the sentence).

An examination of the kinds of structures found in a language system might be hèlpful in showing how languages analyze their cultural universe. As regards phonology, there are languages with many phonemes and others with few; some languages use vowels to a very large extent, with few consonants (*e.g.,* Hawaiian has five vowels and only seven consonants, and all syllables consist of a consonant followed by a vowel), while others have very heavy combinations of consonants (*e.g.,* English "strengths," "glimpsed"); some use stress, and also pitch, phonemically, others use neither; and so on through all the possible variations. As regards morphemics, there are languages with very little inflection and others with a great deal. When these are analyzed by modern methods the traditional classification loses much of its significance. Thus Chinese does indeed have no inflection, but Chinese uses stress and juncture patterns to form complex lexical items in much the same way as English. Turkish appears really to have many instances of inflectional endings being fused with others. Latin *-us* can be analyzed as *-u-* (developed from earlier *-o-*), second-declension stem vowel, and *-s,* nominative (singular), without reference to masculine at all. Taos can say "house I-it-saw" as well as "I-it-house-saw."

It seems, according to the opinion of many linguists, that only as regards vocabulary and certain kinds of over-all syntactic patterns can there be found some correlation between linguistic structures and the nonlinguistic universe.

Linguistic Analysis.—The linguistic analysis of the physical universe has received some consideration from linguists and much more from philosophers. The task requires thorough analyses of language structure and of other aspects of culture.

In the languages of the western world there is a great deal of dichotomizing. Terms are paired, with meaning references to opposite extremes ("good"-"bad," "black"-"white," "clean"-"dirty," "strong"-"weak"). It has been observed that in the western cultures generally dichotomies are constantly made in behaviour as well as words. A question arises whether dichotomizing is a general cultural habit accurately reflected in language or whether the linguistic habit is stimulus for the rest of the behaviour. Or do the two interact?

Another such question is suggested by the prevailing sentence structure of the languages of the western world. Most sentences have an actor, an action and a goal. This implies an anthropomorphism in everything. In English it may be said: "The man runs around the lake for exercise," and "The road runs around the lake for convenience." In some languages the two sentences might be rendered: "As for the man there is running around the lake," and "In regard to the road equidistance exists relative to the lake." The two are quite different. Does this mean that the ways of thinking of the peoples are different, that they really see things differently? There is contradictory evidence on such matters. As was shown above, every cultural system is intimately connected with some part of its language. If more were known about these connections, it might be possible to see patterns of meaning relationships that would indicate the extent to which language depicts or colours the universe.

The question is particularly important for science. In science specific languages or cultures are overcome and set aside; scientific terminology is internationally equivalent. But if some languages do not lend themselves to discussion about, for example, the passage of time, certain scientific findings might not be accurately translated into that language and its speakers would be at a disadvantage. This has been alleged about some oriental languages, but there is no real evidence. The problem of the influence of language on one's picture of the universe has thus become important. *See* SEMANTICS IN LINGUISTICS.

HISTORICAL DEVELOPMENT OF LANGUAGES

The evolution of the languages that are now spoken can be only reconstructed in theory. For existing languages can be compared, and if systematic similarities are found they can be used to reconstruct some of the older stages of languages. More specifically, the languages concerned often make related groups. The branch of linguistics that concerns itself with these matters is called historical (or comparative) linguistics.

Languages, like all activities of living beings, are subject to various kinds of pressures arising from changing circumstances. Changes in the cultural system of a people necessarily change part of the language. Old words and expressions go out of use or change their meaning; new words are introduced. In addition, the speakers of a language are always changing. They grow up, grow old and die, and new speakers come along. Each individual changes his ways of speaking during his lifetime; others may imitate him, or he may imitate someone else, and the changes spread. Every new learner of a language is likely to learn it slightly differently; transmission from one generation of speakers to the next is never perfect. As time goes on, a language becomes different from what it has been. The process is slow, but it can be observed by noting the differences in speech between very old people and young persons in the same community. Specific changes in vocabulary or usage often take place rather suddenly, moreover, and everybody is aware of such changes in his own speech or that of his associates. But system and order always remain, being indispensable to communication.

In vocabulary (*i.e.,* not only words but also meanings, sequences of words, idioms and the like), changes take place constantly. Where writing has existed for any length of time, it is easy to trace these changes. They are of several kinds. A word "changes its meaning," that is, it is used in different contexts and with different references: English "deer" now refers to a particular kind of animal, but the Old English form (*déor*) meant "animal" in general (as does its cognate in German, *Tier*). A word goes out of use: Old English *here* meant "army," but has been entirely

replaced by the latter word. New words or expressions are created out of existing material: when ice began to be used in homes for cooling and preserving food, the receptacle into which it was put was called an "icebox"; when mechanical or electrical ice-making machines were adapted to home use, the term "refrigerator" was applied to them and largely replaced "icebox." Finally, words are taken over from other languages: after the Norman Conquest of England in 1066, the speakers of English began to learn many French words. Some of these were for new things such as "chair," a device for sitting having a back, whereas Old English *stōl*, modern "stool," referred to a backless chair (note that "chair" is now the general word for all such things), but many simply replaced existing words, as in the case of "army" replacing "here."

The process of taking over words from another language is known as borrowing, and words so taken over are called loanwords. Every language has many loanwords, for no group of people has ever existed in isolation. Evidence of loanwords depends upon the history of the contacts of the speakers with other peoples. Where there are no written records it is often quite difficult to identify loanwords, unless the source language is still spoken and direct comparison can be made. Once a word is borrowed it is adapted and becomes, for the ordinary speaker, an ordinary part of the language. It may nevertheless be possible on some occasions to diagnose certain words as loanwords, if, as sometimes happens, they show phonological patterns or features which are not normal in the native language. (*See*, for example, Aasta Stene, *English Loan-Words in Modern Norwegian* (1947), or E. J. A. Henderson, "The Phonology of Loanwords in Some South-East Asian Languages," *Transactions of the Philological Society* [1951].) The speakers of English in the period from 1066 to the middle of the 15th century took over a great many words from French, but these have all been incorporated into the language in such a way that only the student of historical linguistics is able to identify them. In the preceding sentence there are 49 words (items separated from each other by a white space, "1066" being counted as one for this purpose); eight are of French or Latin origin, and not one of these could be now replaced by any other single word ("period," "century," "incorporated," "language," "student," "historical," "linguistics," "identify").

Loanwords are of several types. Popular loans are words that come into a language by means of bilingual or partly bilingual speakers. The monolingual speaker adapts the words to his own patterns of sound and grammar, often producing considerable change. Popular loans can often be used to date the contacts between peoples. The Latin word *vinum*, "wine," was adopted by the speakers of Continental Germanic (ancestral to modern German, Dutch and English) not later than the 2nd century. It took a form that came out in Old English as *win*, Modern English "wine." French *vin* is also from the Latin *vinum*, and is the first part of the word "vinegar" (originally, in Old French, made up of the words for "sour," "sharp" and "wine"). The fact that "wine" has an initial *w* indicates that it is old, since Latin *v* had a sound like English *w* up to the early empire. The word "vinegar," by its initial sound and by the second part of it, has to be dated as post-Norman Conquest. Learned loans are introduced by writers or educated speakers and usually show much less distortion. Since the middle ages many Latin words have come into English this way. "Insulate" is direct from Latin *insulatus*, past participle of a verb *insulare* from the noun *insula*, "island." But English also has the popular loan "isle" from Old French *isle* (Modern French *île*), which is directly from Latin *insula*.

Loan blends are words or expressions that consist partly of borrowed and partly of native material. "Speedometer" is made up of English "speed," a combining vowel *-o-* as in "thermometer" and "meter," a Greek-through-Latin loan.

Loan translations are items that seem to be made up of native material but are based on existing phrases or words in some other language. English "calling" in the sense of profession, especially in connection with religion, is a loan translation from Latin *vocatio* which took this meaning in early Christian times. Once a loanword has come into the language it follows all the changes undergone by other words. Germanic (Latinized) *caupo*, "itinerant peddler," came into English at the same time as did *vinum*. In Old English it had already changed to *céap* (at one time pronounced approximately like "chap," but with a diphthongal vowel ending in an off-glide). This is Modern English "cheap."

The fact that the changes in a language take place regularly and automatically is also used to identify loanwords as against the native vocabulary. Historical linguists have found by comparing languages that English "break" and Latin *fragilis* both go back to an original that was something like *bhreg*. Latin *fragilis* became, by regular change, Old French *fraile* (Modern French *frêle*). This was taken into English and has become modern "frail." The latter must be a loan, because it does not fit the form that the original *bhreg* would have taken in English. So even if "break" did not exist, and "frail" were the only English word for fragile, it could still be identified as foreign. Note that "fragile" is a learned loan, direct from Latin *fragilis*.

Such changes are called "phonological change" in historical linguistics. The phonemes of a language change, and the system may become quite different with the passage of time. These changes are regular, and exceptions from them take place only under regularly determined circumstances. Latin *c* for the most part remained in French (ultimately developing to an *s*-sound before *e* and *i*, though still written *c*). Before *a*, on the other hand, it became Old French *ch* (like English *ch* in "chap," Modern French like *sh* in "shoe"), so that *cor* became *coeur*, but *campus* became *champ*. Latin *capitalem* became an Old French word that gives English "chattel"; therefore French *capital* (and English "capital") is a learned loan from Latin.

As phonemes change, new ones arise and old ones disappear. This often leads to changes in words that result in grammatical change. Latin *homo* became French *on*, "one," "someone"; *hominem* became *homme*. Originally the nominative and accusative of the word for "man," they have become two different words, one an indefinite pronoun, the other the noun continuing the original meaning.

Language changes may vary in the territory where the language is spoken. In fact, the changes may differ slightly from one individual to another. As the differences develop, dialects arise. These are local, but similar, varieties of a single language. The term "dialect" carries no stigma to the linguist; he applies it to the standard literary language of a world capital ("the dialect of Paris") as well as to the language of an isolated mountain village. Dialects are sometimes so similar that speakers of contiguous ones can easily be understood by their neighbours. Over a large area, dialect A may be much like B next to it, B like C, C like D and so on, but A and, say, M may be quite different and mutually unintelligible.

Besides geographical dialects, there are also social dialects. Persons of different social groups (*e.g.*, classes, castes, occupations) may develop special ways of speaking. These dialects are referred to as technical jargons where they are limited to members of some special occupation.

If the contacts between speakers of dialects cease or become rare, the dialects will change separately and will eventually constitute separate languages. Such languages are known as related languages. It must be emphasized that the term "related languages" only means that the languages so designated evolved from a single language. In terms of the regularity of change mentioned above, linguists are able to compare languages, and, if the similarities are systematic, the languages can be said to be related. Thus when English "father," "thin," "horn," are compared with Latin *pater, tenuis, cornu*, English is seen to have spirant sounds where Latin has stop sounds. This is true of a great many words with similar meanings. Further comparison shows that where English has voiceless stops as in "ten," "kin," Latin has voiced stops (*decem, genus*). A large series of correspondences indicate that English and Latin are related languages, going back to a single original language (called by linguists "Indo-European"). These systematic comparisons also indicate that Latin *dies* and English "day," though meaning the same, are not products of a single original. To *dies* should correspond some-

thing beginning with *t*, which is found in the first part of "Tuesday." English *d*, however, sometimes corresponds to Latin *f*, and "do," "did" can be systematically connected with Latin *facio*.

When comparisons of related languages are made, it is possible to surmise what the original form is likely to have been. Thus, the English "kin" and Latin *genus* go back to an Indo-European original of the form *gen-; dies* and *Tues-* (and Greek *Zeus* and Latin *Iu-* in *Iupiter*) go back to a form *dyew-;* "day" and *foveo* go back to something beginning with a sound usually written *dh-*.

The reconstructions are theoretically made by comparing two languages, then two reconstructions and so on, giving a kind of branching-tree diagram. Such a diagram represents a family of related languages and can be constructed so as to show a relative chronology of development as well as closeness of relationship. On the basis of such reconstructions and comparisons, it is possible to group many of the languages of the world into a number of related families and subfamilies.

Principal Language Families.—The first families to be reconstructed were the Indo-European, Semitic and Finno-Ugric. Many ancient records of the first two languages exist; the third contains a few languages in the orbit of European culture. Language families in the far east and in Africa and the Americas were then reconstructed. For a long time there was doubt that the unrecorded languages of the latter two regions could be subjected to reconstruction techniques, but as soon as a few good descriptions of the languages appeared, it was clear that they could be treated like any other language. Here only the principal families and the most widespread languages in them can be named.

The Indo-European (*q.v.*) family includes: Hittite (*q.v.;* extinct since ancient times), Armenian, Phrygian, Indo-Iranian, Hellenic, and the properly European languages, Italic, Celtic, Germanic and Balto-Slavonic. Also included are Tocharish in Turkestan, and Illyrian. The Iranian languages (*q.v.*) include Sanskrit, Avestan, Old Persian and the modern languages of India, Pakistan, Afghanistan, Persia and parts of the Soviet Union. Hellenic has only one principal language, Ancient Greek surviving in Modern Greek. Albanian is perhaps the modern form of Thracian. The Italic dialects (*q.v.*) are Oscan, Umbrian (both extinct) and Latin, surviving in the Romance languages (*q.v.*), Rumanian, Italian, Raetic, French, Spanish, Portuguese. The Celtic languages (*q.v.*) include Gaulish (extinct) and Irish and Scottish Gaelic, Welsh and Breton. The Germanic languages (*q.v.*) include the extinct Gothic, Scandinavian (Swedish, Danish, Norwegian, Faroese, Icelandic) and West Germanic (German, Dutch, English). Old Prussian is extinct; Lithuanian and Lettish survive. The Slavonic languages include the South Slavonic Bulgarian, Macedonian, Serbo-Croatian and Slovene (and the extinct Old Church Slavonic); the West Slavonic Czech, Slovak and Polish; and the East Slavonic Ukrainian and Russian. (*See* SLAVIC LANGUAGES.)

The Semitic languages (*q.v.*) are Akkadian (Babylonian, Assyrian), Aramaic, Hebrew (all extinct, though Hebrew has now been revived), Arabic and Ethiopic (Geez, Amharic).

The Hamitic languages, Ancient Egyptian, Coptic, Cushite, are allied to Semitic. In Negro Africa there are the Bantu languages (*q.v.*), many languages in West Africa related to them, and Hottentot and Bushman. (*See* also AFRICAN LANGUAGES.)

The Finno-Ugric languages (*q.v.*) include Hungarian, Finnish, Estonian. With the related Samoyedic they form Uralic. (*See* URAL-ALTAIC LANGUAGES.)

The Turkic languages (*q.v.*) include Turkish; Turki, Kirghiz, Kazakh, Uzbek; Chuvash, Yakut. It is believed, though the material has not yet been sufficiently worked out, that Turkic is related to Mongolian and Tungusic, forming Altaic. Mongolian includes Mongol and Kalmyk. Tungusic includes Manchu and numerous languages in northeastern Asia.

Also in northeastern Asia are the Chukchean languages (Chukchi, Kamchadal, Koryak), Yukaghir, Gilyak, Ainu. Whether these are related to each other is not known.

Japanese and Korean may be related, and it has been suggested that they are further related to Altaic.

The Caucasian languages (*q.v.*) include Georgian and numerous so-called North Caucasian languages.

In India, principally in the south, are the Dravidian languages: Tamil, Telugu, Malayalam, Kanarese and a number of others (*see* DRAVIDIAN). In central India, and extending toward the east, are the Munda languages (*q.v.*). To these are probably related the Mon-Khmer languages of Southeast Asia—Mon in Burma and Khmer (or Cambodian) in Cambodia. (*See* AUSTROASIATIC LANGUAGES.)

Andamanese, on the Andaman Islands, is not known to be related to any other language. Because of the remoteness, isolation and general cultural primitiveness of these people, it has been conjectured that the language might be structurally different and more primitive than others. Examination of the available material disproves this idea.

The Sino-Tibetan family includes Tibeto-Burman (*q.v.*), Tibetan and Burmese, and the Chinese languages. Thai is also usually included in the group (Siamese, Laotian and others). Annamese (Vietnamese) seems to have the same kind of structure, but relationship has not been proved.

The Malayo-Polynesian languages (*q.v.*) include Malayan, Polynesian, Micronesian, Melanesian. Malayan languages are Malay, Indonesian, the other languages of Indonesia (as Bali, Javanese), Malagasy in Madagascar, the languages of the Philippines and Samoan. Melanesian languages are those of the Solomon Islands and various other islands in that region. Micronesian includes Yap, Ponape, Gilbert Island. Polynesian languages are numerous: Fijian, Tahitian, Hawaiian, the language of Easter Island and many others. In New Guinea there are many languages whose relationships are almost wholly unknown.

The many languages of the original natives of Australia, except Tasmanian, are now believed to be related (*see* AUSTRALIAN LANGUAGES).

In North America there are about 55 language families, but these can be grouped into five or six large superfamilies (*see* CENTRAL AND NORTH AMERICAN LANGUAGES; AMERICAN ABORIGINAL LANGUAGES; INDIAN, NORTH AMERICAN). The Eskimo-Aleut languages (*q.v.*) include Eskimo (several varieties) and Aleut. Algonkian includes the languages of many Indians of northeastern and midwestern North America, Passamaquoddy, Massachuset, Mohican, Natick, Delaware, Ojibwa, Ottawa, Illinois, Miami, Shawnee and also Arapaho, Cheyenne and Blackfoot farther west, and possibly Wiyot and Yurok in California. The Nootkan languages (Nootka, Kwakiutl) and the Salish languages may be related to Algonkian.

The Penutian languages (Maidu, Chinook, Wintun, Tsimshian, Sahaptin, and many others) may be somehow related to the next group. Aztec-Tanoan has two main branches: Uto-Aztecan includes Ute, Paiute, Shoshone, Comanche, Pima, Papago, Hopi, some languages in California and in northern Mexico and Aztec (or Nahuatl); Tanoan (all in New Mexico) includes the Tiwa languages Taos and Picuris, several Tewa languages and Jemez (Towa). Kiowa (in Oklahoma) is related to Tanoan as a whole and Zuni may be related to Kiowa-Tanoan.

The Mayan languages of Yucatan and Guatemala, together with Totonacan and Zoquean of Mexico, may also be related to Aztec-Tanoan and Penutian (Macro-Penutian).

In California and Arizona there are the Yuman languages. These, together with certain languages farther north (Washo, Yana, Pomo) and Tonkawa and some other extinct languages in Texas and northern Mexico (the Coahuiltecan languages) are often assigned to an over-all Hokan group.

The Keresan pueblos in New Mexico and the Caddoan languages (Caddo, Wichita, Pawnee) are sometimes thought to be related both to Hokan and to Iroquoian (Iroquois, Huron, Erie, Mohawk, Oneida, Onandaga, Cayuga, Seneca, Tuscarora, Cherokee). All of these are then possibly further connected with Siouan (Omaha, Osage, Dakota, Hidatsa, Crow, Catawba). Siouan is almost certainly related to Muskogean (Choctaw, Chickasaw, Creek, Seminole).

In Mexico there are the Mixtec and Zapotec language groups, but their relationship and that of other Mexican Indian languages is not known.

The Chibchan family extends from Guatemala to Colombia, interspersed with other languages.

Quichuan was the language of the Inca empire, and is still widely spoken. It may be related to Aymaran.

In South America there were, and still are in Brazil, Venezuela and Colombia, many Indian languages (*see* SOUTH AMERICAN LANGUAGES). The Arawakan family in the north and in the West Indies, the Cariban family in the same region and the Tupi-Guarani languages of Brazil and Paraguay are the best known. On the whole, however, very little comparative work has been done in South America and most of the languages of the Amazon can merely be listed.

The Araucanian language in Chile, and the Ona and Yahgan in Tierra del Fuego may be mentioned. Their relationships are unknown.

PRACTICAL APPLICATIONS OF LANGUAGE KNOWLEDGE

There are about 3,000 known languages in the world (the number varies according to what is counted as a language; dialects that are clearly just that are not included in this number), and each is the vehicle of a culture that is different in at least some ways from any other culture. The learning and teaching of languages, the recording of languages by writing and by other methods and the use of languages in intercultural communication are matters of primary importance.

Languages have had to be taught and learned for centuries. Everywhere, when speakers of different languages have come in contact, somebody had to learn a foreign language. There have always been individuals who found it interesting or profitable to do this. The earliest written records give evidences of such activity and of the attempt to systematize the process. Word lists with translations were compiled and grammatical analyses were attempted. Sanskrit grammarians toward the middle of the 1st millennium B.C. developed a systematic grammar equal in many ways to modern analyses. The ancient Greeks developed a grammar that influenced their philosophy; it was passed on to the Romans and thus to the modern western world. Greek slaves were used as language teachers by the Romans. Latin itself was learned by conquered peoples, sometimes in school but more frequently in informal contact with Roman soldiers and officials. After the middle ages much new interest in languages arose, and they were taught in schools and church, following traditional Latin grammar.

Experience in the first half of the 20th century has shown that languages can best be learned through constant direct contact with native speakers. It also became apparent that the effective teaching of languages had to include analysis of language and of the other aspects of culture, including the learner's culture.

Writing and Recording of Languages.—The first known writing systems (Egypt, Mesopotamia, the Indus Valley) go back no further than 6000 B.C., their actual beginnings being unknown. Writing in China is somewhat later. In Middle America, writing developed among the Maya perhaps as early as the beginning of the Christian era.

Writing (*q.v.*) began as pictorial representation of events. Then specific linguistic items (words usually) came to be represented by pictures or by arbitrary symbols for items not easily pictured (*see* PICTOGRAPHY). Later the arbitrary symbols were used to represent their sound value and were extended to represent other words that had the same or similar sounds. This step permitted the development of an alphabet (*q.v.*) in which a number of symbols represent enough of the phonemes of the language to identify linguistic items with a minimum of ambiguity.

Until modern times writing, even where it existed, was known and used by very few persons. Where chronicles or poetry or other kinds of literature were created, writing began to assume special value. It came to be considered as fixed and immutable and more valuable than ephemeral speech. Thus arose the tendency to confuse language with writing.

According to many modern linguists, language is either what is spoken (most of the people in the world are still illiterate) or written, the systems being different in detail. The recording of speech mechanically and electrically makes possible the preservation of language as it is uttered. This enables one to study spoken language more thoroughly. Recorded spoken language can be disseminated over wide areas even more effectively than printing. Communication between peoples thus comes into existence on a previously unrealizable scale.

Mass communication, which includes propaganda but is not restricted to it, is a combination of written, printed and recorded language. The multiplicity of languages still retards the processes of cultural change. But a few standard and official languages are being learned by more and more people to whom they are not native and many languages may become disused in the next few centuries. With fewer languages, there will necessarily be fewer cultural differences. Moreover, the dominant languages, whatever their linguistic family, become easier to translate as their speakers adopt cultural systems in common.

See also references under "Language" in the Index.

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LANGUEDOC, a French province of the *ancien régime*, named after the *langue d'oc* or "*oc* language" of its inhabitants—*oc* being their word for "yes" instead of the French *oïl* (modern *oui*). The language, however, was not confined to the province, and the name Languedoc in a territorial sense dates only from the end of the 13th century. The province in its final determination was bounded on the east by the Rhône, separating it from Dauphiné and Provence; on the southeast by the Gulf of the Lion; on the south by Roussillon; on the southwest by Foix; along its deeply indented western frontier by Gascony and Guienne; on the northwest by Auvergne; and in the extreme north by Lyonnais (Forez). In terms of the modern *départements* it thus comprised Ardèche, Gard, Hérault, most of Aude, part of Ariège, about half of Haute-Garonne, part of Tarn-et-Garonne, Tarn, Lozère and most of Haute-Loire.

The Roman province of Gallia Narbonensis (*see* GAUL), stretching from the Pyrenees to the Alps, was organized by the end of the 2nd century B.C. along the Via Domitia, the highway linking Italy and Spain. When the areas east of the Rhône were detached at the end of the 4th century A.D., the remainder was constituted as the province of Gallia Narbonensis I. Traversed by the Vandals and the Suebi on their way to Spain early in the 5th century, the whole area was occupied by the Visigoths from 412 to 507, when the Franks under Clovis drove them from all their lands north of the Pyrenees except Septimania; *i.e.*, the coastal strip from the Pyrenees to the Rhône, with Carcassonne, Narbonne, Béziers, Agde and Nîmes as its principal cities.

The Arabs from northern Africa, who overthrew the Visigothic kingdom in Spain, conquered Septimania in 716–720, and it was not until 759 that the Franks recovered the whole country. Under the early Carolingian kings Septimania seems to have been held, officially at least, by the counts of Toulouse (*q.v.*) from 778 to 852 as a march or marquisate for the defense of Aquitaine against Gascons and Arabs. After a period in which the Toulousain (that is, the immediate vicinity of Toulouse) was separated from the march, the areas were reunited by 924, and on the extinction of a junior line of their dynasty in the 1050s the counts of Toulouse became suzerains over a territory including not only the Toulousain and Septimania but also Quercy, Rouergue and the country round Albi.

From the end of the 9th to the middle of the 11th century the kings of France were unable to exert much influence over Languedoc, which in this period began to build up its individual culture. Orientated toward Provence, Italy and Muslim Spain, the country was to enjoy a prosperous civilization of its own, characterized by the literature of the troubadours (*q.v.*), by splendid Romanesque architecture and by a remarkable development of commerce

and urbanization, with a flourishing textile industry. The first crusade, in which Raymond IV of Toulouse played a leading part from 1096, led to closer contact between Languedoc and the east. Also, while Raymond's successors were preoccupied with dynastic struggles, their vassals—viscounts of Carcassonne and Béziers and lords of Montpellier—rose to greater independence, and at the same time many of the towns enfranchised themselves with the "consular" system of government (*see* COMMUNE [MEDIEVAL]).

By the middle of the 12th century the Cathari (*q.v.*) were spreading their heresy in Languedoc, where their strength in the region of Albi won them the name Albigensians. The artisans and the merchants favoured them, and they were protected by the great feudatories. Pope Innocent III having proclaimed a crusade against the heretics, an army from northern France overran the country in 1209 and conquered Béziers and Carcassonne, and after years of vicissitudes Raymond VII of Toulouse in 1229 had to cede to Louis IX of France all the country from Carcassonne eastward and to betroth his daughter and heiress Jeanne to the king's brother Alphonse. Military operations against the heretics continued till 1244.

Raymond VII worked energetically to restore what was left of his territory and was a great builder of the new towns of the type known as bastide (*q.v.*); but his daughter Jeanne died childless a few days after Alphonse in 1271, and thereupon the countship of Toulouse and the remnant of its dependencies were annexed to the French crown by Philip III of France. Louis IX had already divided his acquisitions of 1229 between the *sénéchaussées* of Carcassonne and Beaucaire. The reports of the *enquêteurs* sent in 1248 to correct abuses by royal agents led to ordinances of 1254 and 1259 reorganizing the administration. Sessions of the royal *parlements* were held in Toulouse under Philip IV, and the estates of Languedoc were convened under Philip V in 1317.

For the transfer of Agenais, Quercy and Rouergue from French to English rule *see* GUIENNE (this transfer accounts for the irregularity of the province's western frontier). The Hundred Years' War moreover exposed Languedoc not only to invasion from the west but also to the rapacity of the French king's own representatives, whose extortions provoked riots in the towns and finally the peasant rebellion of the Tuchins (1382–83). Charles VII of France, however, who as dauphin had instituted a *parlement* at Toulouse in 1420, further conciliated opinion by definitively recognizing the estates of Languedoc in 1428 and by refounding the Toulouse *parlement* in 1443. The governorship of Languedoc was held by the ducs de Bourbon from Louis XI's reign till 1523 and thereafter by the ducs de Montmorency with little interruption till 1632.

With the Reformation, Calvinism spread over Languedoc, so that by 1560 most of the people may have been Huguenots. The Wars of Religion (1561–98) ended with the concession of ten places of safety to the Huguenots in Languedoc under the Edict of Nantes, but a local outbreak at Privas in 1620 grew into a series of wars in which the Huguenots of Languedoc fought the king's armies till 1629. The political revolt of the governor, Henry II de Montmorency, against the cardinal de Richelieu's government (1632) was supported by the estates, and they were punished by the Edict of Béziers, which withdrew their right to discuss taxation. This edict was revoked in 1649, during the Fronde.

In the last centuries of the *ancien régime* the administration of Languedoc was divided between the *généralités* of Montpellier (the seat of the intendant) and of Toulouse. Agriculture and viticulture suffered from the fall in prices from the late 1650s onward, but the textile industry and commerce flourished under official encouragement, while the great Canal du Midi was constructed (1666–81) to link the Atlantic seaboard to the Mediterranean. On the revocation of the Edict of Nantes (1685) the intendant Nicolas Lamoignon de Basville launched a thorough persecution against the Huguenots. They reacted in the insurrection of the Camisards (*q.v.*) and remained very numerous in the province despite the continuance of persecution by the royal government till 1758 and by the *parlement* of Toulouse for some years longer. The second half of the 18th century brought a revival of the rural economy, an expansion of industry and further improvement of roads and waterways. With the other old provinces of France, Languedoc was dissolved into *départements* in 1790.

See Dom Claude Devic and Dom J. J. Vaissete, *Histoire générale de Languedoc,* 5 vol. (1730–45; revised and augmented ed., 16 vol., 1872–92); D. Faucher, J. Godechot *et al., Visages du Languedoc* (1949).

LANGUET, HUBERT (1518–1581), French writer and diplomat. A convinced Protestant, he was primarily concerned with the relationship of the ruled to the rulers and the right of peoples to insurrection. Born at Vitteaux in Burgundy, he studied law at Poitiers, Bologna and Padua and became doctor of law in 1548. He was won over to the Reformation by reading the *Loci communes rerum theologicarum* (1521) by Melanchthon, for whom, after a stay at Wittenberg, he developed a great devotion. In 1561 he became representative of Augustus I, elector of Saxony, at the French court, and narrowly escaped the massacre of St. Bartholomew (1572). He was ambassador at the imperial court (1573–77) and, later, ambassador to England from John Casimir of Bavaria and counselor to William the Silent. He traveled widely, going as far as Pomerania (Pomorze), Livonia, Sweden and Lapland. He died in Antwerp on Sept. 30, 1581.

His affability, his sense of European culture and his devotion to Protestant causes gained him many friends, as can be seen from his vast correspondence in Latin, a mine of information on the history of the period. Some has been published, notably his letters to the elector of Saxony (1669); to Joachim Camerarius, Melanchthon's friend, and to his son (1646); and to Sir Philip Sidney (1633; Eng. trans. 1845; ed. by A. C. Bradley, 1912).

Languet was the author of *Historica descriptio susceptae a Caesarea Majestate executionis contra S. Romani Imperii rebelles* (1568); *Harangue faite au roi Charles IX de la part des princes protestants d'Allemagne* (Dec. 30, 1570); *Défence de Guillaume, prince d'Orange* (1581). His authorship of a pseudonymous work, *Vindiciae contra tyrannos sive de principis in populum, populique in principem legitima potestate, Stephano Bruto Celta auctore* (1579; French trans. 1581; Eng. trans. 1689) has been disputed and it has been attributed to Languet's friend, Philippe de Mornay (*q.v.*). This claim, asserted by de Mornay's wife and constantly repeated, notably by H. J. Laski (*A Defence of Liberty against Tyrants. A translation of the "Vindiciae contra tyrannos,"* 1924), has been abandoned for the hypothesis that Mornay only adapted and edited Languet's work.

To quote A. Vignié, "The *Vindiciae contra tyrannos* . . . is, with Hotman's *Franco-Gallia* (1573) and La Boétie's *Contr'un* (1576), the vindication of a people's rights against tyrants and a call to religious and political liberty. Languet's work reveals a balanced and vigorous mind, as well as a profound practical experience of men and affairs. Hotman's *Franco-Gallia* is the erudite and logical treatment of popular sovereignty, La Boétie's *Contr'un* a work of republican fervour; the *Vindiciae* is a treatise on constitutional law." (*Encyclopédie des Sciences Religieuses,* vol. 7, pp. 732–733, 1880). Languet does not go as far as the *"monarchomaques"* (antimonarchists); with a more balanced judgment he accepts monarchy but protects it from becoming tyranny by recognizing the rights of resistance. To do this, he makes use of many arguments from medieval French law, of which he had great knowledge, both as a lawyer himself and as a friend of one of the outstanding Huguenot jurists, Charles du Moulin. The wisdom and balance of his theory of the monarchy, as well as the admirable lucidity and directness of his style are seen in the following extracts from his treatise: "It is to the people that Kings owe their establishment . . . God has willed it so. If it be objected that the king was chosen by the people five or six hundred years ago . . . I would answer that the people never die . . . for as the constant passage of water gives perpetual existence to the river, so the cycle of birth and death renders the people immortal." (But) "law is the instrument given by God for good government . . . law is the guiding spirit of a good king . . . what he wills must be just before he will it. . . . Nothing is just simply because the king commands it, but a king is just who rules that to be just which is already just in itself" (*i.e.,* as being ordained by God).

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(É. G. LÉ.)

LANGUR (HANUMAN), the name for several different common oriental monkeys of the subfamily Colobinae, which are generally arboreal and characterized by a lank body, long slender limbs and tail, well-developed thumbs and a complex stomach. The sacred langur or sacred monkey of India is typical: it has an extremely long tail, black ears, face, feet and hands, and grayish-white fur on the body. These monkeys roam at will in the bazaars of Hindu cities, where they help themselves to the stores of the dealers. They are also kept at various temples. *See* PRIMATES: *Old World Monkeys (Catarrhines): Langurs and Allies.*

LANIER, NICOLAS (1588–1666), English composer, singer and painter of French descent, born in London and baptized on Sept. 10, 1588. He painted the scenery and composed the music for, as well as singing in, Ben Jonson's masque *Lovers Made Men;* he also wrote music for masques by Thomas Campion and others. In 1625 he was sent to Italy by Charles I and the duke of Buckingham to buy pictures for the court; he was appointed master of the king's music after 1626. During the Civil War and Commonwealth there are reports of him in Holland, but at the Restoration he assumed his former court appointments. He died in London in Feb. 1666.

Lanier's use of the *stylo recitativo* is an important landmark in the influence of Italian music upon English composers. His experimentation with speech rhythms, in imitation of the Italian style, sowed the seeds of a tradition later to be reaped by John Blow and Henry Purcell. (B. P.)

LANIER, SIDNEY (1842–1881), U.S. poet and musician, was born at Macon, Ga., Feb. 3, 1842. He was reared by devoutly religious parents, Robert and Mary Anderson Lanier, in all the traditions of the old south. As a child he wrote verses and was passionately fond of music. After graduation from Oglethorpe university, near Milledgeville, Ga. (1856–60), he served in the Civil War until his capture and subsequent imprisonment at Point Lookout, where he contracted tuberculosis. In 1867 he married Mary Day, also of Macon, and in the same year he published his first book, the novel *Tiger-Lilies*, a strange mixture of German philosophy, southern traditional romance and his own war experiences. After working in his father's law office at Macon, teaching school at Prattville, Ala., and traveling for his health in Texas, he overcame his prejudice against professional music sufficiently to accept a position as first flutist in the Peabody orchestra, Baltimore, Md. (Dec. 1873). He had already published numerous poems in magazines, and now, in spite of the inroads of tuberculosis, he made desperate efforts to support his family in the environment of cultural activity that he loved. He wrote several potboilers, such as *Florida* and *The Boy's Froissart*, and he played private concerts and delivered lectures to small groups.

"Corn" (1874), a poem treating agricultural conditions in the south, and "The Symphony" (1875), treating industrial conditions in the north, brought national recognition. Adverse criticism of his "Centennial Meditation" launched him on an investigation of verse technique which he continued until his death. In 1877 Lippincott and Co. published a volume of his poems, and two years later he was appointed lecturer in English literature at Johns Hopkins university. He delivered series of lectures on verse technique, the early English poets and the English novel, later published as *The Science of English Verse* (1880), *Shakspere and His Forerunners* (1902) and *The English Novel: a Study in the Development of Personality* (1883 and 1887). When, in the spring of 1881, advanced tuberculosis made further work impossible, he established camp quarters at Lynn, N.C., where he died Sept. 7. His wife three years later published an enlarged edition of his poems, and his sons brought out several posthumous volumes of his essays, lectures and outlines for poems. The complete edition of his works (10 vol.) appeared in 1945. His best prose work, *The Science of English Verse*, treats the relation of poetry to music and explains a system of superimposed rhythms in verse. His best poems, such as the "Marshes of Glynn," treat, through elaborate imagery and complex verse music, man's approach to a state of love.

As poet and man, Lanier derives his chief significance from his transitional position. Schooled in the ideals of the old south, he was confronted after the Civil War by the new science, industrialism, and by a rapidly widening horizon of social and artistic values. His best works reflect his struggle to readjust himself. Because he was only partially successful, some consider him largely traditional, while others consider him one of the most forward-looking poets of his time.

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(PH. G.)

LANIIDAE, the shrike family of small, rapacious songbirds, often called butcherbirds for their habit of impaling their victims on thorns or other sharp objects. *See* SHRIKE.

LANKESTER, SIR EDWIN RAY (1847–1929), British zoologist renowned for his researches in embryology and morphology, was born in London on May 15, 1847, and was educated at St. Paul's school, at Downing college, Cambridge, and at Christ Church, Oxford. In 1872 he was elected to a fellowship at Exeter college, Oxford. He was professor of zoology and comparative anatomy at University college, London (1874–90), and Linacre professor of comparative anatomy at Oxford (1890–98). In 1884 Lankester played the major role in founding the Marine Biological association, and became its president in 1892. He held the Fullerian professorship of physiology and comparative anatomy at the Royal institution, London (1898–1900), and was director of the British museum (natural history) (1898–1907). He did valuable research work on the comparative anatomy and embryology of living animals, and on paleontology. His first paper (on the fossil *Pteraspis*) was published when he was 16 years old.

There is scarcely a group of organisms which Lankester did not study, or to which he did not make a substantive contribution by his researches. He showed the affinity between king crabs, scorpions and spiders. To him are due the embryological terms "blastopore," "invagination," "stomodaeum" and "homoplasy." A firm supporter of Darwin and natural selection, he exposed the illogicality of Lamarck's speculations. Lankester became known to the general public as a result of his vigorous personality and successful presentation of scientific subjects in a popular form. He was elected a fellow of the Royal society in 1875. He died in London on Aug. 15, 1929.

Lankester's numerous publications include *Comparative Longevity* (1871); *Degeneration* (1880); *Science From an Easy Chair* (1908; 15th ed., 1922); *Diversions of a Naturalist* (1915; 3rd ed., 1923); and *Great and Small Things* (1923).

See *Nature* (Aug. 24, 1929).
(G. DE B.)

LANMAN, CHARLES ROCKWELL (1850–1941), U.S. Sanskrit scholar and distinguished editor of the Harvard Oriental Series, was born at Norwich, Conn., July 8, 1850. He received his doctorate from Yale, where he studied Sanskrit under William Dwight Whitney. After further study in Germany, Lanman was appointed to Johns Hopkins university (1876) and later to Harvard (1880), where he became Wales Professor of Sanskrit (1903–26). In 1891 Lanman became editor of the Harvard Oriental Series, founded and financed by his friend and pupil Henry Clark Warren. During Lanman's editorship 31 volumes were issued, many of them, such as Whitney's *Atharva Veda* and Arthur B. Keith's *Yajur Veda* and *Rig Veda Brahmanas*, furnishing for the first time scholarly translations into English of the most ancient Sanskrit texts. In 1884 Lanman published the first edition of his *Sanskrit Reader*, which has formed a standard introduction to that language for English speaking students. He died in Boston, Mass., on Feb. 20, 1941. (D. H. H. I.)

LANNES, JEAN, DUC DE MONTEBELLO (1769–1809), French marshal of whom Napoleon said "I found him a pygmy and left

him a giant," was born at Lectoure in Gascony on April 10, 1769. He was a colonel in Dec. 1793, one of the volunteers from Gers fighting in the army of the Pyrenees against the Spaniards near Perpignan. He entered the army of Italy in 1795 and led his regiment triumphantly in the battle of Dego (April 15, 1796); Napoleon saw his marvelous courage, but also noted his ignorance and lack of education. To courage, Lannes added devotion: at Arcola (Nov. 1796) though crippled with wounds, he rode into the battle to shield his general from danger. In the Egyptian and Syrian campaigns of 1798 and 1799 he showed the same courage, especially at Acre. He was made general of division on May 10, 1799.

In 1800 Lannes was entrusted with the vanguard of the new army which crossed the Alps into Italy in May. He justified the command by the forward thrust to his own battle of Montebello on June 9 and then by steadiness at the battle of Marengo on June 14. He was made a marshal in 1804, though not yet fully educated in responsibility and swayed by violent temper, even with the emperor. In the battles before Ulm (Oct. 1805) he showed a more perceptive instinct for war than did Murat, and his corps was the pivot of the army at Austerlitz (Dec. 2). In the Prussian campaign he led the emperor's moves to victory at Jena (Oct. 13, 1806). Then, after crossing the Oder at Stettin into the worst mud of Poland, he faced a Russian army of twice his strength in the stubborn battle of Pultusk (Dec. 26). This completed his reputation. When he returned after three months' illness he covered the siege of Danzig (Gdansk) most successfully, then rejoined Napoleon and, by his skill in holding the masses of Russians in the centre, decided the battle of Friedland (June 14, 1807).

In 1808 Lannes was created duc de Montebello. He was now a lieutenant whom Napoleon could abruptly and confidently detach with some improvised army group to any objective. Thus in the Peninsular War he routed the Spaniards at Tudela on the Ebro and then conducted the terrible siege of Saragossa. Two months after the fall of Saragossa (Feb. 21, 1809) he was with Napoleon on the Danube and with a new grouping of troops ended the battle of Eckmühl (April 22) and took Regensburg. At the battle of Aspern-Essling (May 21–22) he was the centre of the defensive fighting, but the artillery fire was too heavy. During the withdrawal he was resting when a three-pounder hit his crossed legs. After nine days of great pain, he died in Vienna on May 31, 1809. (I. D. E.)

LANOLIN is the purified form of wool grease or wool wax (sometimes erroneously called wool fat). It is a soft, unctuous, tenacious substance that is buff- or chamois-coloured and translucent. The best starting material for its preparation is the wool grease recovered by centrifuging the soap solutions used to scour raw wool as the first step in preparing the fibre for spinning. The recovered grease is refined, bleached, deodorized and dried.

Lanolin may be modified chemically to enhance its affinity for water or for mineral oil. It may be fractionated to give more easily handled fluid products with all the desirable properties of lanolin. Hydrolysis or reduction yields a mixture of long-chain alcohols and sterols. Lanolin and its derivatives and modifications are highly valued for their emollient, unguent and emulsification properties and are used in a great variety of cosmetic and pharmaceutical preparations. (J. T. Sn.)

LA NOUE, FRANÇOIS DE (1531–1591), Huguenot captain in the French Wars of Religion, the author of several works of military or historical interest, was born near Nantes of an old Breton family. He was a page to Henry II of France in his youth and had his first experience of war in Picardy and Italy. After the visit to Brittany of the admiral de Coligny's brother François, seigneur d'Andelot, in 1558, however, La Noue became a Protestant. His first notable exploit was the capture of Orléans at the head of only 15 horsemen in 1567. At Jarnac (March 1569) he commanded the rear guard. Taken prisoner at Moncontour (Oct. 1569), but exchanged shortly afterward, he drove the royalist troops out of lower Poitou, but was wounded at Fontenay (1570) and had to have one arm replaced by an iron one; hence his nickname, Bras-de-Fer. After the peace of St. Germain (1570) he fought against the Spaniards in the Netherlands but was forced to surrender Mons (1572). He was commissioned by Charles IX, after the massacre of St. Bartholomew's Day, to reconcile the inhabitants of La Rochelle to the king, but gave up his royal commission and, from 1574 to 1578, acted as Huguenot general of La Rochelle. After the peace of Fleix, he went again to aid the Protestants of the Netherlands, but fell in 1580 into the hands of the Spaniards. In close imprisonment at Limburg, he wrote his *Discours politiques et militaires,* a series of moral and military reflections together with a commentary on the state of France and an account of the Wars of Religion from their start to the peace of St. Germain (first published 1587; the last part constitutes the so-called *Mémoires* of La Noue, often published separately). Exchanged in 1585, he lived in Geneva till 1588. Subsequently he returned to France to serve Henry IV and fought in the battles of Senlis, Arques and Ivry. He died at Moncontour on Aug. 4, 1591, of a wound received at the siege of Lamballe. La Noue's other writings are *La Défense de Sedan* (1588), *Observations sur Guicciardini,* two volumes (1592), and notes on Plutarch's *Lives.* There is an edition of his correspondence by P. Kervyn de Volkaersbeke (1854).

See M. Amirault, *La Vie de François de La Noue* (1661); H. Hauser, *François de la Noue* (1892).

LANREZAC, CHARLES LOUIS MARIE (1852–1925), French army officer and field commander in the early part of World War I, was born at Pointe-à-Pitre, Guadeloupe, on July 31, 1852. While he was at the École de Guerre, the new French doctrine of strategy and tactics was being established, and to this doctrine Lanrezac himself contributed in his study *La manoeuvre de Lützen.* He became colonel in 1902, general of brigade in 1906 and general of division in 1911. In 1912 he commanded the 11th corps, and on April 10, 1914, succeeded Galliéni as a member of the *conseil supérieur de la guerre* and commander designate of the 5th army.

At the outbreak of World War I, neither Lanrezac nor his superior Joffre anticipated the magnitude of the scythelike sweep of the German right wing through Belgium. Lanrezac's 1st and 3rd corps were attacked by Bülow's army in the battle of Charleroi on Aug. 22, 1914. The following day Lanrezac was obliged to order a retreat, which continued until Sept. 5. Meanwhile, on Aug. 27, he was directed to support the British by renewing the offensive at St. Quentin. Although this order provoked a violent disagreement with Joffre, Lanrezac obeyed and won a brilliant tactical success on the 29th in the battle of Guise. Nevertheless, the retreat continued and on Sept. 3 he was relieved of his command by Joffre. In 1917 he was offered the post of major general of the armies by Painlevé, but refused it. He died on Jan. 18, 1925. (H. Bi.; Ln. Ms.)

LANSBURY, GEORGE (1859–1940), British statesman, leader of the Labour party, 1931–35, was born on Feb. 21, 1859, near Halesworth, Suffolk. In 1868 the family moved to east London. Leaving school at 14, Lansbury worked on the Great Eastern railway, married when he was 21 and in 1884 emigrated to Queensland, Austr. Returning after a year he joined his father-in-law in a timber merchant's business. He began political life as a Liberal, but in 1892 joined the Social Democratic federation started by Henry M. Hyndman and became well known as a propagandist. Later, disagreeing with the narrow Marxism of the Social Democrats, he joined the Independent Labour party. He was for a time a militant atheist but soon rejoined the church and remained for the rest of his life an ardent Christian Socialist. He settled in Poplar and became prominent there. Elected in 1892 to the board of guardians, he, with Will Crooks, initiated a humane policy contrary to the official doctrine. In 1900 he was appointed to the Central (Unemployed) Body for London and in 1905 to the royal commission on the poor laws (*q.v.*) whose famous minority report he signed in 1909. Elected member of parliament for Bow and Bromley in 1910, he resigned in 1912 to fight a by-election as a woman's suffrage candidate and was defeated. He continued his activities as a propagandist and in local government. In 1912 he joined others in launching the *Daily Herald* and for some time was editor, keeping it alive as a weekly

through great difficulties during World War I. During 1919–20 he was mayor of Poplar. He and his fellow councilors refused to raise the county rate (tax) as protest against the burden on poor boroughs of relieving the unemployed. Lansbury and others were imprisoned for a term, but the injustice was remedied. Elected again for Bow and Bromley in 1922 he held the seat till his death. He refused office in 1924, but as minister of works in the 1929 Labour government he made many reforms in London's amenities. In 1931 he led the small Labour opposition with great ability. Owing to his pacifism he disagreed with the Labour party and in 1935 resigned the leadership. A man of simple faith with a warm devotion to peace and social justice, he spent his last years in unavailing attempts by personal influence to stop the drift to war. He died in London on May 7, 1940. (A.)

LANSDOWNE, MARQUESSES OF. The first marquess of Lansdowne, WILLIAM PETTY FITZMAURICE (1737–1805), better known as the earl of Shelburne, was prime minister under George III. He was born in Dublin on May 13, 1737, the son of John Fitzmaurice, who took the additional name of Petty on succeeding to the Irish estates of his uncle, and was created Viscount Fitzmaurice (1751) and earl of Shelburne (1753)—both in the peerage of Ireland—and Baron Wycombe in that of Great Britain (1760). William was educated privately and at Christ Church, Oxford (1755–57), and, entering the army, served in the Seven Years' War. While abroad he was elected to parliament for the family borough of Chipping Wycombe (1760). In 1761 he was re-elected and was also returned to the Irish parliament for County Kerry, but his father's death in May of that year made him ineligible to sit in either house of commons and removed him to the English house of lords. He declined office under Lord Bute but became first lord of trade in the Grenville ministry (1763). He resigned, however, a few months later and attached himself to William Pitt under whom, in 1766, he served as secretary of state for the southern department. Differences with his colleagues on colonial questions caused him to resign in 1768. In 1782 he took office under Lord Rockingham as home secretary and was appointed prime minister on Rockingham's death in July, but the Foxite Whigs refused to serve under him and combined with Lord North to defeat him in Feb. 1783. When the younger Pitt formed his ministry in Dec. 1783 following the dismissal of the coalition, Shelburne was left out. His arrogance and aloofness, and his popularity with the king, had alienated those with whom he had acted, and he was accused of being the king's tool as much as North had been. Pitt never even consulted him, but Shelburne, realizing his own unpopularity, made no effort to embarrass Pitt and the breach was not permanent, for in Dec. 1784 he was created marquess of Lansdowne. He no longer took an active part in politics, and died in London on May 7, 1805. JOHN HENRY PETTY (1765–1809), his son by his first marriage with Lady Sophia Carteret, succeeded as 2nd marquess. He had been a member of parliament for Chipping Wycombe, 1786–1802. He married Mary Arabella, the widow of Sir Duke Gifford, but the marriage was childless.

HENRY PETTY (Petty-Fitzmaurice from 1818), 3rd marquess of Lansdowne (1780–1863), son of the 1st marquess by his second marriage, served in several ministries. He was born in London on July 2, 1780, and educated at Westminster school and at Edinburgh university. He sat in the house of commons for Calne (1802–06), Cambridge university (1806–07) and Camelford (1807–09). He refused a minor post in Pitt's ministry (1804), and, attaching himself to the Whigs, became chancellor of the exchequer in the "Talents" ministry (1806–07). The death of his half brother in 1809 removed him to the house of lords as 3rd marquess of Lansdowne, and he succeeded Lord Grey as leader of the opposition in 1824. In 1827 he joined with the liberal Tories to enable George Canning to form a government, entering the cabinet without portfolio in May, and becoming home secretary in July. He resigned in Jan. 1828 when the Goderich ministry collapsed. In Grey's reform ministry (1830–34) and also under Lord Melbourne (1834 and 1835–41) he was president of the council; and he again took that office under Lord John Russell (1846–52). In 1852 he refused Queen Victoria's invitation to form a government, but was in the cabinet without office under Lord Aberdeen (1852–55) and Viscount Palmerston (1855–58). He died at Calne, Wiltshire, on Jan. 31, 1863. Lansdowne had married Louisa (1785–1851), daughter of the 2nd earl of Ilchester, and was succeeded by his son HENRY, the 4th marquess (1816–66). The latter, who was member of parliament for Calne (1847–56) and for many years chairman of the Great Western railway, married in 1843 for his second wife Emily (1819–95), eldest daughter of the Comte de Flahault, who became Baroness Nairne in her own right in 1867. By her he had two sons, the 5th marquess and Lord Edmond Fitzmaurice (Baron Fitzmaurice of Leigh).

HENRY CHARLES KEITH PETTY-FITZMAURICE, 5th marquess of Lansdowne (1845–1927), was a leader of the Liberal Unionist party. He was born Jan. 14, 1845, at Lansdowne house, Berkeley square, and was educated at Eton and Balliol college, Oxford. In 1869 he married the daughter of the 1st duke of Abercorn. In Gladstone's ministries he was a lord of the treasury (1868–72), undersecretary for war (1872–74) and undersecretary for India (1880). He resigned from the India office within a few months, disapproving of the Irish Compensation for Disturbance bill. From 1883 to 1888 he was governor-general of Canada, and viceroy of India (1888–93). He joined the Liberal Unionist party in 1886 and became one of its most influential leaders. He was secretary of state for war (1895–1900), and foreign secretary (1900–05). He revolutionized British foreign policy after the Fashoda incident and the South African War had demonstrated the disadvantages of diplomatic isolation, made an alliance with Japan in 1902 and, by the *entente cordiale* of 1904, ended the long-standing hostility to France. (*See* EUROPE: *History: The 19th Century, 1815–1914.*) He succeeded the duke of Devonshire as leader of the Unionist party in the house of lords (1903). In 1915 he joined the first coalition ministry, under H. H. Asquith, as minister without portfolio, but resigned with him in Dec. 1916. In Nov. 1917 he published a famous letter in the *Daily Telegraph,* asking for a precise statement of the Allied peace terms with a view to the early termination of World War I, but his belief in the possibility of a negotiated peace was not shared by the country as a whole. He died on June 3, 1927, and was succeeded by his son, HENRY WILLIAM EDMUND PETTY-FITZMAURICE (1872–1936). The 7th marquess, son of the 6th marquess, who was born in 1917 and died in 1944, was succeeded by a cousin whose father was the second son of the 5th marquess.

See Lord Newton, *Lord Lansdowne* (1929). (A. AL.)

LANSEL, PEIDER (1863–1943), Romansh leader of the revival of Raeto-Romance language and culture, and one of its most accomplished lyric poets. Born at Pisa, Italy, Aug. 15, 1863, of a Romansh family from the Grisons, he studied in Switzerland and entered his father's business in Tuscany (1879). After 1906 he lived in Geneva, where he died on Dec. 9, 1943. He spent every summer at his family's native village of Sent in the Engadine, devoting himself to the collection and critical examination of Raeto-Romance texts of the previous four centuries, a work crowned by publication of the lyric anthology *La musa ladina* (1910, 2nd ed. 1918), amplified in *Musa rumantscha* (1950), and by his study, *Ils retoromans* (1935), translated into English, German, Italian, French and Esperanto. In his nostalgic and exquisitely controlled verse (definitive ed. *Il vegl chalamer,* 1929) he was able to sublimate a tragic love affair of his youth in the celebration of the beauty of his alpine valley, with its age-old culture rooted in the soil. His poems and stories (*Grusaidas albas,* 1931) signaled the rebirth of Raeto-Romance literature, purging it of impurities and turning it back to its beginnings in the 16th century.

See M. E. Maxfield, *Studies in Modern Romansh Poetry in the Engadine* (1938). (R. R. B.)

LANSING, ROBERT (1864–1928), international lawyer and U.S. secretary of state under President Wilson, was born in Watertown, N.Y., Oct. 17, 1864. He graduated from Amherst college, Amherst, Mass., in 1886, was admitted to the bar in 1889 and practised law in Watertown, 1889–92. Appointed associate counsel in the Bering Sea arbitration of 1892–93, he served frequently thereafter as United States counsel or agent before inter-

national tribunals, including the Alaskan Boundary tribunal (1903) and the North Atlantic Coast Fisheries tribunal (1910). President Wilson appointed him counselor for the department of state on March 27, 1914, and secretary of state June 23, 1915, succeeding William Jennings Bryan.

As secretary of state, Lansing drafted notes upholding American rights, among them the protest of Oct. 21, 1915, against British blockade and contraband practices. He foresaw the possibility of United States entry into the war and influenced Wilson to view the Allied cause as the cause of world democracy. As preparatory measures, he sought peace with Mexico, worked toward Pan-American solidarity and negotiated the purchase of the Danish West Indies. As a war measure, he signed in Nov. 1917 the Lansing-Ishii agreement with Japan, which, while recognizing Japan's "special interests in China," declared a continuance of the "open door" policy.

Following the armistice, a rift developed when Wilson ignored Lansing's advice that the president should not attend the peace conference. At the conference their views diverged fundamentally. To Wilson the League of Nations was essential and needed to be created immediately. To Lansing the conclusion of the peace treaty was more urgent and he considered the League had better be postponed. He also disagreed on details of the League covenant, particularly the positive guaranty of territorial integrity and political independence in article 10, and proposed a negative guaranty instead. In Washington he exerted himself to gain senate approval of the treaty; and during nearly five months following Wilson's illness he directed foreign policy and conducted cabinet meetings. Because of their differences and because of Lansing's action with respect to the cabinet, Wilson requested his resignation, which became effective Feb. 13, 1920.

Lansing later wrote *The Peace Negotiations* (1921) and *The Big Four and Others of the Peace Conference* (1921) and practised international law in Washington. He was a son-in-law of John W. Foster, secretary of state, 1892–93, and an uncle of John Foster Dulles, secretary of state, 1953–59. Lansing died in Washington, Oct. 30, 1928. (E. L. Du.)

LANSING, capital city of Michigan, is located in Ingham county on the Grand river at the mouth of the Red Cedar, 85 mi. W.N.W. of Detroit. Pop. (1960) city, 107,807; standard metropolitan statistical area (Clinton, Eaton and Ingham counties) 298,949. (For comparative population figures *see* table in MICHIGAN: *Population.*)

The state capitol, erected in 1873–78, stands in a ten-acre park in the centre of a small plateau which, surrounded on three sides by the Grand river, marks the heart of the city. Nearby are the Stevens T. Mason state office building, completed in 1954; the Civic centre, completed in 1955; the new city hall and police building, completed in 1958; and the Lewis Cass state office building, completed in 1922. The state vocational school for boys and the state school for the blind occupy spacious grounds in the city. In Potter park is a fine, small zoo.

An important suburban community is East Lansing (*q.v.*), with 30,000 residents, the home of Michigan State university, oldest land-grant institution in the U.S., which was provided for by the state constitution in 1850, established in 1855 and opened in 1857. Other suburbs in the Lansing metropolitan area include Okemos (pop. 3,000); Holt, (5,000); Grand Ledge, (5,000); and DeWitt, (2,500). Many residents of these communities work in Lansing or East Lansing. The suburban areas have changed radically from former agricultural communities.

Some of these suburban communities antedate Lansing. Near Holt, which was settled in 1837, was North Settlement. Its pioneers in 1844 built a dam and mill in what is now North Lansing. They were employed by James Seymour, New York state land speculator who had become influential in Michigan affairs. Seymour took advantage of a legislative deadlock over a new site for the state capitol, then located in Detroit, offering his tiny water-power site in the wilderness. The legislature chose the site in 1847, and a two-story frame capitol was built in a clearing near Seymour's settlement.

For a time the community was named "Michigan, Michigan," but in 1848 was changed to Lansing, being derived from Lansing, N.Y., former home of North Settlement pioneers. A plank road to Detroit was finished in 1852; the city was chartered in 1859; and in 1860 it had a population of 3,074.

Industry did not gain a foothold until the American Civil War era, when railroads connected the capital with the rest of the state.

Wood from nearby forests went into agricultural implements. During the last quarter of the 19th century the city had become a centre of manufacture of small steam engines used primarily in farm operations. Ransom Eli Olds of Oldsmobile and Reo fame, whose father, Pliny F. Olds, operated a small engine plant, experimented with steam-powered "horseless carriages" in the late 1880s, switching to gasoline power in 1895. He founded the Olds Motor Works, temporarily (1897–1901) located in Detroit, which was the first firm to develop the assembly-line technique. Differing with his directors, Olds severed connections with the Olds Motor Works and established the Reo Motor Car Co. in 1903. Evolution of Lansing as an automotive centre continued with establishment of a Fisher Body plant, a unit of Durant Motor Car Co., and Motor Wheel Corp. With these came several forging plants, and Lansing became a leader in this field. The rapid industrial growth after 1900 was accompanied by the growth of the city, the population increasing from about 16,000 to nearly 60,000 in 20 years.

Trucks, diesel engines, hoists, pumps, oil burners, air compressors, tools, screw-machine products, awnings and tents, and aviation instruments are also manufactured and the city is a banking and a shopping centre for central Michigan. It is served by state and federal highways, by three railways and by air, bus and motor truck lines.

City government is mayor-council in form, with finances administered by a city comptroller. Education, high on the list of the New York settlers, has been stressed. There are three public and two parochial high schools and a technical-training college. Arts, crafts, little theatre and musical groups are well established. City parks date almost from the city's founding and nearly all sports are represented by city leagues. (Ls. B.)

LANTANA, a large genus of shrubs or herbs, sometimes half-climbing, mostly of tropical America but also in the old world, belonging to the verbena family (Verbenaceae). One species, *L. camara,* is a very popular florist's plant that is used as an ornamental shrub out of doors in the south and in California. Its flower clusters are one to two inches wide, flat-topped, with the flowers yellow at first, then orange or red, sometimes all three colours present in the same cluster. Propagation is easily accomplished by cuttings of softwood. Low, compact varieties are used as bedding plants and house plants. Other species, especially the trailing *L. sellowiana,* are grown to a more limited extent, usually as a ground cover.

ALINARI

MODEL OF THE RENAISSANCE LANTERN ATOP THE DOME OF THE FLORENCE CATHEDRAL, *c.* 1445, BY FILIPPO BRUNELLESCHI. IN THE MUSEO DELL'OPERA, FLORENCE

LANTERN, in its original sense, is a container to hold or protect a lamp. It may be hung from a post or wall, or carried in the hand. By extension, it came to mean an architectural form set on top of a roof, originally for the purpose of admitting light to a building.

The lantern as a lamp container is of great antiquity; elaborate examples have been found at Pompeii and Herculaneum and other classical sites. In their essentials, all lanterns consist of some kind of cage, usually metal, with transparent or translucent sides. Historically, however, the variety of their materials has been immense—lantern cages have been made of such diverse metals as iron, silver, gold and tin, and

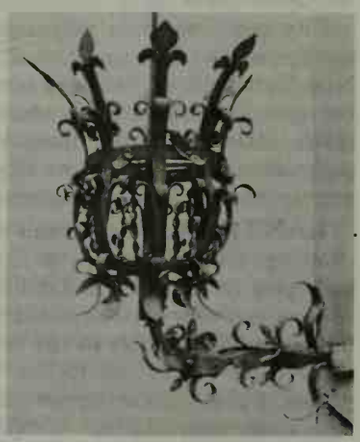
BY COURTESY OF JAPAN TRADE CENTER, SAN FRANCISCO

RANKEI STYLE STONE LANTERN USED AS A LANDSCAPE FEATURE IN JAPANESE GARDENS

their sides of horn, talc, bladder, oiled paper and glass. In consequence, their artistry has been equally various, ranging all the way from oriental openwork bronze and exquisitely delicate examples of Renaissance and baroque craftsmanship in gold and silver to the crude iron boxes perforated with nail holes still used in rural parts of the U.S. during the 19th century, and simple "globes" or "chimneys" with round blown-glass sides. So-called Chinese lanterns are made of pleated oiled paper, and may be folded flat when not in use.

In the 20th century, lanterns have become generally obsolete. Once used universally to light ships, houses and streets, they are now restricted largely to places and occasions where electricity is unavailable. A number of specialized lanterns have been developed, such as that of Sir Humphry Davy (*q.v.*) for use in mines, or those used for temporary warning flares on highways and railroads. The protected cage which contains the light used in a lighthouse is also known as a lantern. (*See* also LAMP; LIGHTHOUSES AND OTHER AIDS TO NAVIGATION; LIGHTING.)

In architecture, a "lantern" was originally a timber construction, open on all sides, placed on top of a building to admit light. Something of this idea persists in medieval examples like the lantern above the central octagon of Ely cathedral (14th century). The term "lantern," however, soon came to be applied to the open top story of towers, partly because such a construction resembled a lamp container, and partly because beacons were occasionally placed there.



ALINARI

ITALIAN WROUGHT-IRON LANTERN, 17TH CENTURY

Primarily by visual association with this form, "lantern" in Renaissance architecture means a small cupolalike structure set on top of a dome. It sometimes serves to admit light to the interior, but its more usual function is as a proportional element in the visual design. Typical are the lanterns capping the domes of St. Peter's in Rome and St. Paul's in London; the most famous U.S. example is the one on the Capitol at Washington, D. C.

(AN. G.)

LANTERN FLY (*Fulgora laternaria*), the name originally applied to a large South American planthopper and by extension given to all members of the superfamily Fulgoroidea (*see* HEMIPTERA: *Homoptera: Planthoppers*). The most remarkable feature of the original lantern fly is the inflated peanutlike anterior prolongation of the head, which accommodates a pouchlike extension from the digestive tract. This structure was accepted as being luminous at night (hence the common name) on the basis of statements published by N. Grew (1681) and Maria Merian (1719). Doubt was long cast on these early reports because they were not verified by later observations. In the 1950s, however, one observer reported seeing luminosity when males and females were present together, and suggested that the display is restricted to mating behaviour. Although the insect is harmless, a belief that its bite causes death is said to be widely held among Amazonian Indians.

The original lantern fly and its nearest allies (family Fulgoridae) are large and often brightly coloured; they live on trees, usually in forests, and are relatively uncommon. Most other members of the superfamily are smaller and a few attack agricultural crops. Members of the family Delphacidae include the sugar-cane leafhopper of Hawaii (*Perkinsiella saccharicida*), which threatened the local sugar industry until it was controlled by natural enemies introduced from Queensland, Austr., its native home. Sugar cane is attacked in the West Indies by another delphacid, *Saccharosydne saccharivora,* and in India by *Pyrilla perpusilla* (Lophopidae). Other injurious delphacids include *Tarophagus proserpina,* which attacks taro in some Pacific islands; *Peregrinus maidis,* a widespread pest of maize (corn) and also a vector of virus disease of maize and sorghum; and *Javesella pellucida,* a vector of striate mosaic virus of wheat.

(R. G. F.)

HARALD SCHULTZ

LANTERN FLY (ABOUT LIFE SIZE)

LANTERNS OF THE DEAD, small stone structures, with windows in the upper part, in which were placed lanterns to mark, at night, the position of a cemetery. Their use, which seems limited to western and central France, is probably due to a traditional survival of primitive Celtic, rather than Christian, ideas. The lantern of the dead usually takes the form of a column or a clustered column, or a small turret, often with a conical cap and a cross at the top. The lamp was hoisted into position by means of a pulley, and at the bottom was an opening to allow access. Twelfth-century examples exist at Cellefrouin, Charente; and at Ciron, Indre. One from the 13th century is at Antigny, Vienne. At a later date lanterns of the dead were usually superseded by small chapels.

LANTHANUM, a chemical element, the prototype of the rare-earth group, is a ductile metal that tarnishes in dry air and reacts vigorously with hot water. It is a component of misch metal (*see* CERIUM), which is used as cigarette-lighter flints, as a deoxidizer in electron tubes and in metallurgy. The oxide is a component of special glasses used in photographic lenses.

The element was discovered by C. G. Mosander in 1839; the name is derived from the Greek *lanthanein,* meaning "to be concealed," indicating that the element is difficult to isolate. It is purified commercially by crystallization of the double ammonium nitrate. Ion-exchange methods or liquid-liquid extraction with tributyl phosphate and similar extractants are used when high purity is desired.

The metal is prepared by electrolysis of fused anhydrous halides or by thermoreduction of the halides by alkali or alkaline earth metals. The melting point is 920° C.; the density is 6.174 g. per cubic centimetre for the hexagonal, closely packed structure; two other forms are known. At 5° C. above absolute zero, lanthanum metal becomes a superconductor. The symbol for lanthanum is La, atomic number 57, atomic weight 138.91. Two species occur in nature: a stable isotope, La^{139} (99.911%), and a long-lived radioactive isotope, La^{138} (0.089%).

Lanthanum is trivalent and, like the rare earths, forms a series of salts such as $La(NO_3)_3$ and $La_2(SO_4)_3$. The ionic radius is larger than that of any of the rare earths and as a consequence the white oxide, La_2O_3, is more basic than any of the rare-earth

oxides. The colourless solutions of the La^{3+} ion have no discrete absorption bands in the ultraviolet, visible or near-red spectral regions. The salts are diamagnetic since no unpaired electrons are present. *See* RARE EARTHS. (LD. B. A.)

LANUVIUM (modern LANUVIO), ancient city of Latium in Italy, about 19 mi. S.E. of Rome, on an isolated southern projection of the Alban hills, commanding an extensive view over the low country between it and the sea. It remained independent until conquered by Rome in 338 B.C. when it received Roman citizenship, and even in imperial times its chief magistrate and municipal council kept the titles of *dictator* and *senatus* respectively. It was famous for its rich temple of Juno Sospes or Sospita, the possessions of which extended as far as the seacoast. Remains of theatre and city walls exist in the modern village, and above it is an area surrounded by a portico, upon the north side of which is a rectangular building, possibly connected with the temple of Juno.

LANZA, GIOVANNI (1810–1882), Italian statesman who was prime minister at the time of the occupation of Rome and its proclamation as the capital of united Italy, was born at Casale Monferrato, in Piedmont, on Feb. 15, 1810. He graduated from the University of Turin as a medical doctor in 1833, but preferred to devote himself to improving agriculture in his native land. In 1848 he enlisted as volunteer in the Piedmontese army sent to help the Lombard rebels (*see* ITALIAN INDEPENDENCE, WARS OF). Later in the same year he was elected to the Piedmontese chamber of deputies, where he opposed the Milan peace treaty of 1849. Vice-president of the chamber of deputies in 1853, he was appointed minister of education in 1855 and minister of finances in 1858, under Cavour. From 1860 he was president of the chamber of deputies, which in Feb. 1861 proclaimed Victor Emmanuel II to be king of Italy. He was Italian minister of the interior in 1864–65 and served as president of the Italian chamber of deputies in 1867–68.

Lanza was prime minister of Italy from Dec. 14, 1869, to June 25, 1873. In this capacity he threatened the hesitant Victor Emmanuel with a major constitutional crisis if he refused to give orders to the army to occupy Rome in 1870. Lanza was a man of stern character and an unwavering supporter of the Risorgimento. He died in Rome on March 9, 1882.

See E. Tavallini, *La vita e i tempi di Giovanni Lanza,* 2 vol. (1887).

LANZAROTE, the most easterly island of the Spanish archipelago of the Canary Islands (*q.v.*). Area 323 sq.mi. Pop. (1960) 34,125. It has a length of 35 mi. and a breadth varying from 5 to 15 mi. Although rising to only 2,447 ft., it is mountainous, with numerous small craters and extensive lava flows. About 1730 the appearance of half the island was altered by volcanic eruptions. The last violent activity was in 1825 but crevices in the Montañas del Fuego still retain sufficient heat to fry eggs. The climate is hot and dry, and large tracts are sand covered. Dromedaries are the chief beasts of burden. The people, by remarkable dry-farming methods, produce cereals, wine, vegetables and other crops. Arrecife (pop. [1960] 12,886 [mun.]), the capital and chief port, has a fishing and fish-preserving industry. Regular sea and air services connect Lanzarote with Las Palmas. Graciosa, a volcanic islet (9½ sq.mi.) lying 1 mi. off northern Lanzarote, has a few hundred inhabitants, mainly fishermen. (R. P. BE.)

LANZI, LUIGI (1732–1810), Italian philologist, archaeologist and art historian, was born in Treia on June 14, 1732, and died in Florence on March 31, 1810. A critic and translator of classical authors, a gifted writer in prose and verse, and antiquarian of the galleries of Florence, he was noted for his distinguished studies of Italian antiquities and language, and of Italian painting. Lanzi proposed the theory relating the Etruscan and Greco-Latin tongues of Italy (*Saggio di lingua etrusca e di altre antiche d'Italia,* 1789); he recognized the Greek origin of what had been called Etruscan vases (*De' vasi antichi dipinti volgarmente chiamati etruschi,* 1806). His *Storia pittorica dell'Italia* (1792–96) was the first full and methodical history of Italian painting, long respected for its precision and perception. (L. T. SE.)

LAO: *see* SHAN.

LAOCOON, in Greek legend a brother of Anchises, who had been a priest of Apollo. Having profaned the temple of the god he and his two sons, or one of them, were destroyed by serpents while preparing to sacrifice a bull at the altar of Poseidon, in whose service Laocoon was then a priest. An additional motive for his punishment consisted in his having warned the Trojans against the wooden horse left by the Greeks. The most famous expressions in literature and art respectively of this legend are in Virgil (*Aeneid,* ii, 109 *et seq.*) and in the Laocoon group of the Vatican, which is of interest not only for its great merits but from the circumstance that Lessing's *Laokoon,* a landmark in art criticism, is written around it (*see* LESSING, GOTTHOLD EPHRAIM). It was the work of three Rhodian sculptors, Agesander (*q.v.*), Polydorus and Athenodorus, and is dated *c.* 42–21 B.C.

LAODICEA, the ancient name of several cities of western Asia, mostly founded or rebuilt in the 3rd century B.C. by monarchs of the Seleucid dynasty, and named after Laodice, the mother of Seleucus I Nicator, or after Laodice, daughter (or possibly niece) of Antiochus I Soter, wife of Antiochus II Theos and mother of Seleucus II Callinicus. Established as commercial centres on newly opened or reconditioned trade routes, or as strongholds for the pacification of the empire, they aided in the Hellenization of the near east and subsequently in the spread of Christianity in the region.

1. LAODICEA AD LYCUM, a city of Phrygia, now Eskihisar, a ruined site in the vicinity of Denizli, in the Denizli *il* of Turkey. Originally known as Diospolis and Rhoas, it was inferior in importance to its neighbours Hierapolis and Colossae until rebuilt by Antiochus II Theos (*c.* 261–*c.* 246 B.C.). It was situated on some low alluvial hills between two streams, about 2 mi. S. of the Lycus river, the modern Curuksu. Lying on the great eastern trade route, the Greco-Roman highway from Ephesus to Syria, it soon attained great wealth and importance, and though it suffered severely in the Mithradatic wars it soon recovered. From the Seleucid kings of Syria it passed to those of Pergamum, and when that state was bequeathed to the Romans in 133 B.C., Laodicea was included in the province of Asia. The city was famous for its money transactions and for the high quality of the fine, soft, black wool of the local sheep, which was marketed there. It became a centre of early Christianity, and its church was one of the seven to which St. John addressed the Revelations. A church council held at Laodicea in the 4th century issued a series of canons. The city continued to flourish into the middle ages but fell into decay in the Byzantine-Turkish frontier wars of the 11th century A.D. Its surviving ruins include a stadium, theatres, gymnasia, an extensive necropolis and an aqueduct.

2. LAODICEA COMBUSTA, the modern Ladik, about 20 mi. N.W. of Konya in the Konya *il* of Turkey. It was probably so called from the volcanic nature of the local terrain. Many remains of altars, columns and cornices are found there.

3. LAODICEA AD MARE, the modern Latakia, the main seaport of the republic of Syria. Built on a small peninsula by Seleucus I Nicator, it became famous not only for its fine harbour but for the high quality of the vines and fruits grown in its neighbourhood. Herod the Great built an aqueduct there. It suffered severely in the civil wars of Rome and was almost destroyed by Pescennius Niger in A.D. 194. But Septimius Severus restored it, and in Byzantine times it served as the port of Antioch. The place has suffered severely from earthquakes, and no extensive remains of the old city are left standing.

4. LAODICEA AD LIBANUM, also known as Scabiosa, probably from some local leprosy or skin affliction. There are only fragmentary remains around a mound which has been identified as the great Hittite provincial capital, Kadesh (*q.v.*), on the Orontes river.

5. LAODICEA PONTICA, the modern small town of Ladik, about 30 mi. S.W. of Samsun, in the Tokat *il* of Turkey. It lies in a fertile plain with a small lake, set amid wooded mountains.

6. A city in Media, destroyed by an earthquake in the age of Nero. The site has not been identified.

7. Another city of the same name, which Pliny places in Mesopotamia. (WM. C. B.)

LAOMEDON, legendary king of Troy and father of Podarces,

who was later famous as King Priam of Troy. Laomedon defrauded the gods Apollo and Poseidon of their wages after they had had to build the walls of Troy for him as a punishment for conspiring against Zeus. They therefore sent a pestilence and a sea monster to ravage the land, which could be delivered only by the sacrifice of the king's daughter, Hesione. But Heracles just then called at Troy; he killed the monster and rescued the maiden on the understanding that Laomedon should give him his divine horses. This Laomedon failed to do—so, when subsequent opportunity offered, Heracles returned with a band of warriors, captured Troy and slew Laomedon with all his sons except Priam. Laomedon was buried near the Scaean gate; and it was said that so long as his grave remained undisturbed, so long would the walls of Troy remain impregnable.

LAON, a town of northern France, and prefecture of the *département* of Aisne, is situated on a scarped hill about 330 ft. above the surrounding plain and a small stream, the Ardon, 87 mi. N.E. of Paris by rail. Pop. (1962) 23,528.

The hilly district of Laon (Laudunum) has always had some strategic importance. The town was fortified by the Romans, and successively checked the invasions of the Franks, Burgundians, Vandals, Alani and Huns. St. Remi, the archbishop of Reims who baptized Clovis, was born in the Laonnois, and at the end of the 5th century, he instituted the bishopric of the town. Thenceforward Laon was one of the principal centres of the Frankish kingdom, and its possession was often disputed. Charles the Bald enriched its cathedral with the gift of numerous domains. After the fall of the Carolingians, Laon supported Charles of Lorraine, their heir; and Hugh Capet only succeeded in making himself master of the town by the connivance of the bishop, who, in return for this service, was made second ecclesiastical peer of the kingdom. In the early 12th century the citizens profited by a temporary absence of Bishop Gaudry to secure from his representatives a communal charter, but he, on his return, purchased from the king of France the revocation of this document; the consequence was a revolt in which the episcopal palace was burned and the bishop and several of his partisans were put to death. After 1239 the liberties of Laon were no more contested until 1331, when the commune was abolished. During the Hundred Years' War it was occupied by the Burgundians, who gave it to the English, and it was retaken by the French after the consecration of Charles VII. Laon took the part of the Leaguers and was captured by Henry IV in 1594. As a result of the Revolution, Laon permanently lost its rank as a bishopric (1789). During the campaign of 1814 Gen. G. L. von Blücher successfully defended it against Napoleon. In 1870 an engineer blew up the powder magazine of the citadel at the moment when the German troops were entering the town. Many lives were lost, and the cathedral and the old episcopal palace were damaged. Laon succumbed to Alexander von Kluck's attack in Aug. 1914 and was held by the Germans until Gen. Charles Mangin recaptured it in Oct. 1918, when he succeeded in breaking the German salient south of the Aisne. The town was badly damaged during World War II.

From the railway station, situated in the plain to the north, several hundred steps lead to the "Montagne couronnée" (crowned hill) and the gate of the town. All the roads connecting Laon with the surrounding district are cut in zigzags on the steep slopes, crowned by promenades on the site of the old ramparts. The 13th-century gates of Ardon, Chenizelles and Soissons, the latter in a state of ruin have been preserved. A monument (1937) to Jacques Marquette, the Jesuit explorer and missionary to North America (who was born at Laon), is located near the Soissons gate. At the eastern extremity of the hill rises the citadel; at its apex is the parade ground of St. Martin and at the southern end stands the ancient abbey of St. Vincent. The cathedral of Laon, which was begun in 1160, is important artistically. It took the place of the old cathedral, burned in 1111 at the beginning of the communal struggles. The building is cruciform and the choir terminates in a straight wall instead of in an apse. Of the six towers flanking the façades, only four are complete to the height of the base of the spires, two at the west front with huge figures of oxen beneath the arcades of their upper portion, and one at each end of the transept. A square central tower forms a lantern within the church. The west front, with three porches, the centre one surmounted by a fine rose window, ranks next to that of Notre Dame at Paris in purity. The cathedral has stained glass of the 13th century and a choir grille of the 18th century. The chapter house and the cloister are of the 13th century. The old episcopal palace is now used as a courthouse. The front, flanked by turrets, is pierced by great pointed windows. There is also a Gothic cloister and an old chapel of two stories, of a date anterior to the cathedral. The church of St. Martin dates from the middle of the 12th century. The old abbey buildings of the same foundation are now used as the hospital. The museum of Laon has collections of Gallo- and Greco-Roman antiquities, coins, and paintings of the Lenain brothers. In its garden there is a chapel of the Templars belonging to the 12th century. The old town library houses valuable collections of incunabula and manuscripts, including the illuminated Gospel book of the 9th century, in Carolingian uncials, a particular treasure of the library. The church of the suburb of Vaux near the railway station dates from the 11th and 12th centuries. Notre Dame de Liesse, 9 mi. N.E., is a noted pilgrimage church dating from the 14th century.

Laon is the seat of a prefect and a court of assizes and possesses a tribunal of high instance. Sugar refining, metal founding and the making of plastics are carried on, but neither industry nor trade, which is mainly in grain and wine, is of much importance. The newly built village called Fr. Marquette, where reside many personnel of the nearby U.S.-NATO air base, is on the road to La Fère.

LAOS, a landlocked kingdom situated in the Indochinese Peninsula and formerly part of French Indochina, is bounded north by China, northeast by North Vietnam and east by South Vietnam, south by Cambodia, and west by Thailand and Burma. Stretching more than 600 mi. (965 km.) from northwest to southeast, but in places barely 50 mi. (80 km.) wide, its area is 85,900 sq.mi. (222,481 sq.km.).

Physical Features.—Laos is a generally mountainous country covered by tropical rain forest or by deciduous monsoon forest with patches of savanna interspersed with thickets and cultivated clearings. It forms the shape of a hatchet: the "head" consists of complex sandstone and limestone plateaus deeply etched by rivers in forbidding gorges, with the major valleys focusing on Luang Prabang; the "handle" is part of the hill country west of the Annamese Cordillera (Chaîne Annamitique) watershed, from which short streams drain westward into the Mekong (*q.v.*). Flowing south from Yünnan (China) this great, fast-moving river, with major rapids caused by distorted strata from the Annamese chain formations, forms the border between Laos and Burma and further downstream much of that between Laos and Thailand. The climate is the most extreme in Southeast Asia and the driest in Indochina. Luang Prabang receives only 53 in. (1,350 mm.) of rain annually, and there is a drought from December to February, when the Mekong is at its lowest ebb because of frozen headwaters.

The elephant (which is trained for forest work), leopard, tiger, gaur, and panther roam the virgin forests (shared with Cambodia), and also the Annamese Cordillera. Lizards and crocodiles abound, and there are many varieties of birds, fish, and insects.

History.—Among the principalities formed by groups of the Thai peoples (*q.v.*) moving southwestward from China in the 10th and 11th centuries was a Buddhist settlement at Luang Prabang, which by 1353 united Laotian plains-dwellers and Austro-Asiatic hill peoples in the kingdom of Lan Xang ("million elephants"). Conflict with its Burmese and Siamese (Thai) neighbours forced the kingdom's rulers to transfer the capital to Vientiane (1563), but the kingdom maintained its power and was at the height of its glory when the Dutch merchant Gerrit van Wusthof visited Vientiane in 1641. On the death of King Souligna Vongsa (1694) the kingdom disintegrated, separate states being established at Luang Prabang, Vientiane, and Champassak (Bassac) in the south. Their inability to unite against Siamese and Vietnamese expansionism left them at the mercy of Siamese armies, which captured Champassak and Vientiane in 1778 and forced Luang Prabang into a dependent relationship. When Vientiane under Chao Anou

tried to assert its independence in 1827 the city was completely destroyed and all Laos came under the Siamese king.

In the mid-19th century disorders in South China set loose groups of marauding bandits, who began to threaten Siam's Laotian dependencies. The king of Luang Prabang then encouraged the French, in control of all Vietnam by 1885, to press on Vietnam's behalf traditional claims to suzerainty over Laos. When Siam resisted these claims, Franco-Siamese clashes on the borders of Laos ensued. By the treaty of 1893 Siam relinquished in France's favour its claims over all of Laos east of the Mekong. The French Protectorate of Laos was established in 1899, with its administrative capital at Vientiane.

After the Japanese occupied Tongking in 1940 the Thais revived claims to territories west of the Mekong, and there was fighting between French and Thai forces. The Japanese then arbitrated in favour of Thailand, which, however, returned the territories to Laos in 1947. The departure of the Japanese in 1945 left the Laotian ruling elite divided over the issue of the restoration of French control. King Sisavang Vong welcomed the French return; but Prince Phetsarath, the viceroy, and his brothers, Souvanna Phouma and Souphanouvong, were prominent in the non-Communist Lao Issara (Free Laotian Party), which demanded independence. The granting of limited independence within the French Union to a royalist union government in 1949 split the Lao Issara. With Vietminh aid, Prince Souphanouvong formed a pro-Communist party, the Pathet Lao (Lao Nation), to continue guerrilla warfare against the French, joining similar revolutionary movements in Cambodia and Vietnam to provide a screen behind which the Vietminh could move through all of Indochina. To win support the French devolved increased powers upon the government of Prince Souvanna Phouma, successful in the elections of 1951 and bolstered by substantial United States aid.

UNITED NATIONS PHOTO

SHRINE OF THAT LUANG, VIENTIANE, LAOS

At the Geneva Conference of 1954 the Vietminh agreed to withdraw its military forces from Laos, while the Pathet Lao Army (as with Chinese and Vietminh help it had by then become) was to withdraw to the northern provinces of Phong Saly and Sam Neua until party differences could be tested in a nationwide general election. The execution of these agreements was to be supervised by an international commission with members from India, Canada, and Poland. The Pathet Lao claimed autonomy for its two provinces and at times claimed to be the only lawful government in Laos. A *de facto* partition of the country was occurring because the government and the Pathet Lao failed to agree on means of implementing the election agreement; and while the impasse continued the Pathet Lao strengthened its control over the two provinces and increased its guerrilla activity.

Laos left the French Union in 1956, and in that year, after prolonged haggling, Prince Souphanouvong agreed to transfer Phong Saly and Sam Neua to the kingdom of Laos and integrate his army with the Laotian Army, in return for which he and another member of the Pathet Lao became cabinet ministers. At the 1958 election the Pathet Lao campaigned as the Neo Lao Hak Sat (Patriotic Front of Laos), 9 of its 13 candidates winning seats; but in 1959 the Pathet Lao resumed its attempts to control the northern border provinces. In the fraudulent election of April–May 1960 all the 59 seats were won by right-wing candidates. This was followed by the arrest and subsequent escape into North Vietnam of Souphanouvong and his supporters and then by the seizure of Vientiane by Kong Le, a parachute battalion commander, whose forces subsequently joined with those of the Pathet Lao.

The confused situation led to tension between the United States and the U.S.S.R., because the central government of Prince Souvanna Phouma, under King Savang Vatthana, despite U.S. aid, could not control Prince Souphanouvong during peaceful phases or defeat his Pathet Lao forces (aided by Soviet equipment) in the outbursts of guerrilla fighting. In 1960 Prince Boun Oum formed his own (right-wing) government in Savannakhet. In 1961 the re-formed International Control Commission found it difficult to ensure an effective disengagement, and the revival of the Geneva Conference in 1961 failed to establish a Swiss-type neutrality for Laos. Despite efforts to persuade the three princes to form a provisional government of national union, the Pathet Lao forces in northwest Laos renewed attacks against Royal Laotian troops in May 1962. Their advance toward the Thai border led Thailand to request U.S. troops (withdrawn in October).

In June 1962 the three factions (neutralist, right-wing, and Pathet Lao) signed a pact to end the civil war and to form a coalition government. Souvanna Phouma, the neutralist leader, became prime minister. The 14-nation Geneva Conference was reconvened on July 2, and a neutrality agreement for Laos was drawn up and signed on July 23. On Nov. 27 the three factions also reached agreement to integrate their military and police forces.

Despite this progress, however, the year 1963 saw the failure of the tripartite government to function. The integration of the military and police forces was not carried out, and there was a further outbreak of guerrilla warfare. This continued into 1964 when the Pathet Lao forces gained the upper hand in fighting on the Plaine des Jarres. On April 17 the leaders of the three factions met on the plain in an attempt to reach a compromise, but the attempt failed and the prime minister, Souvanna Phouma, resigned. He was reinstated later in the year. A meeting between the Laotian leaders in Paris (August–September) also failed to bring about national unity, and fighting continued sporadically and at a low level. In early 1965 Souvanna Phouma's government survived an attempted coup by the rightist leader Phoumi Nosavan, supported by some army officers, and Phoumi fled to Thailand. Other minor military revolts were similarly put down.

During 1964 U.S. aircraft carried out air reconnaissance to

ascertain whether troops and war material were reaching Laos from North Vietnam. Bombing raids on Vietcong supply routes in Laos followed in 1965–66 (*see* VIETNAM). (D. K. WY.)

Population.—The population was estimated at 2,453,000 in 1962 (about 28.6 persons per square mile or 11.0 per square kilometre); no census had been taken since 1921. The poor farming population is divided into isolated valley communities which preserve different traditions and several forms of monosyllabic tonal speech resembling southern Chinese dialects. The Lao, Neua, Dam, Dang, and Lu clans, closely resembling the Thai, are culturally Buddhist but have strong animist traditions (*see* also SHAN). Other mountain tribes like the Lao Theung anthropologically resemble Indonesians, and the Ho, Yao (*q.v.*), and Miao (*q.v.*) clans are directly related to those of Yünnan. Inside the northern border about 12,000 persons claim to be Chinese, and 15,000 persons of Vietnamese origin live along the eastern border. The chief towns, both on the Mekong, are Vientiane (*q.v.;* 1962 est. 162,000) and Luang Prabang (*q.v.;* 1959 est. about 25,000). During the 1950s movements along the Mekong from the delta to Vientiane increased Savannakhet's population to more than 60,000.

The official language is Lao, which is related to the Thai language. French, however, is still widely used in government and commerce. Theravada (Hinayana) Buddhism is the state religion but, despite the importance of temples and priests, the upland Lao (and to a less extent the lowland Lao) regulate a large part of their daily activities in accordance with animistic concepts.

Administration and Economy.—According to the 1947 constitution (amended in 1952 and 1956) Laos is a parliamentary democracy with the king as head of state, supreme religious authority, and commander in chief of the armed forces. The king appoints the prime minister, who is assisted by a Council of Ministers. The legislative body consists of the National Assembly, elected every five years, and an advisory King's Council. The administrative capital is Vientiane and the royal capital Luang Prabang. The state is divided into 16 provinces (*khoueng*): Houa Khong, Phong Saly, Savannakhet, Houa Phan (Sam Neua), Luang Prabang, Xieng Khouang, Sayaboury, Vientiane, Khammouane, Saravane, Champassak (Bassac), Attopeu, Borikhane, Sithandone, Sedone, and Wapikham Thong. There are courts of first and second instance and a supreme court of appeal. Laos has about 1,350 primary schools and 10 secondary schools and colleges.

Laos is a very poor country and manufactures are few (silk fabrics, leather goods, pottery, silverwork). Development plans include foreign-aided schemes for damming the Mekong near Pakse for hydroelectric power, irrigation, and improved river transport. Although more than two-thirds of the country is covered with teak and other forest trees, lumbering is little developed and there are only about 30 sawmills. Most cultivation is on a subsistence basis on self-contained paddy farms, 1,000,000 ac. (404,700 ha.) being under rice, but the average yield is the lowest in Southeast Asia. Commercial plantations of coffee and tea on the Plateau des Bolovens have been largely paralyzed since World War II. Opium poppies are grown by the mountain peoples. Tin ore (more than 700 tons annually in the early 1960s) is mined at Phon Tiou, and constitutes the chief export. There is also some stock raising and river fishing. During the 1960s Laos was a net food importer and the total value of imports (mainly from Thailand, the United States, Japan, and France) was many times larger than that of exports, which went mainly to neighbouring countries of Southeast Asia. The adverse balance was offset by large foreign grants-in-aid, mostly from the United States. The unit of currency is the kip, which was devalued in January 1964 to one-third the former U.S. dollar rate (U.S. $1 = 240 kips); few banks will negotiate it.

Pack-horse caravan routes are still used between Yünnan and northern Laos. Roads are rarely macadamized and often impassable during rains; one links Vientiane with Luang Prabang, a branch running to Vinh in North Vietnam; Savannakhet is linked with Quangtri in South Vietnam, as well as Vinh; and a third road runs parallel with the Mekong to Saigon. There are only a few thousand motor vehicles in the country and no railways. The Mekong provides the chief means of transport, particularly for timber, but the rapids prevent large vessels being used. Savannakhet and Vientiane have airfields with connections to Bangkok and Saigon. Radiodiffusion Nationale Lao in Vientiane is government-owned and broadcasts in Lao and French. *See* also INDOCHINA.

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LAO-TZU. Probably no one except Confucius has exerted greater influence over Chinese minds throughout history than a shadowy philosopher called Lao-tzu (Lao-tze or Lao-tse), who is traditionally considered to have founded the naturalistic, quietistic philosophy called Taoism. Lao-tzu is quoted in several early Taoist and other works, and the most revered Taoist canon was originally known as the *Lao-tzu,* only later acquiring the now current title *Tao-te ching.*

The appellation Lao-tzu, "Master Lao," refers to a person named Lao Tan. Because of its literal meaning, western writers have often rendered Lao-tzu as "the old master." Chinese tradition holds that Lao-tzu was born about 600 B.C. in the modern Honan province, that though a recluse he became librarian (treasurer?) at the royal court of the Chou dynasty, that his younger contemporary Confucius (*q.v.*) humbly sought advice from him in 517 B.C., and that he finally abandoned the royal court and departed westward, depositing with a frontier warden his treatise on the *Tao* (the "way"). This tradition is based primarily on an account given in the *Historical Records,* a work completed in the 1st century B.C. Later Taoist propagandists, competing for prestige with Buddhism, claimed that Lao-tzu traveled to India and converted the Buddha himself to Taoism.

Confusion about the historical identity of Lao-tzu has existed from early times. The *Historical Records,* though reporting Lao-tzu's supposed conversation with Confucius in the 6th century B.C., confusedly identifies him as Li Erh, the father of a general of the feudal state of Wei known to have been active in 273 B.C. In addition, it inconclusively takes note of conflicting legends identifying Lao-tzu with (1) Lao Lai-tzu, a reputed contemporary of Confucius; and (2) a 4th-century Chou librarian named Tan. And 20th-century scholarship has failed to resolve the problem of Lao-tzu's historicity. Most scholars, relying upon comparisons of the *Lao-tzu's* style and ideas with those of other ancient Chinese works, contend that the book was probably compiled not earlier than the 4th century B.C. and not by one hand, but admit knowing nothing with any certainty about its author or authors. (C. O. HR.)

BY COURTESY OF THE TRUSTEES OF THE BRITISH MUSEUM

SOAPSTONE FIGURE OF LAO-TZU, TRADITIONAL FOUNDER OF TAOISM, IS SAID TO SHOW THE PHILOSOPHER ON HIS RETURN FROM VISITING HSI-WANG-MU, THE WESTERN QUEEN MOTHER

The *Tao-te ching,* or *Lao-tzu,* has exerted tremendous influence on Far Eastern philosophy, art, and literature for 2,000 years. The title means the "classic of the Way and virtue" (or "and its power"). By the "Way" is meant the natural way of things, the order of Nature. *Tao* is eternal, unchangeable, all pervasive, One, indescribable, and nameless. It is "non-being," that is, the source from which all being has come. By "virtue" is meant naturalness, simplicity, and *wu-wei,* or "taking no (unnatural) action." The book, consisting of from 5,227 to 5,722 words, depending on the edition, is often called the 5,000-character classic. Its 81 chapters are unrelated,

repetitious, nearly all rhymed but irregular in literary style, and contain no dialogue, historical event, or proper noun. Its language is obscure, hence it is subject to widely varying interpretations. There have been more commentaries on the *Tao-te ching* than on any other Chinese classic—about 700 in all, half of which are extant. It is also the most frequently translated; there are more than 40 versions in English alone. No Chinese or Japanese can be considered educated without some knowledge of this little classic. *See* further TAOISM. (W. C.)

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LA PAMPA, Argentine province immediately west of the province of Buenos Aires. Geographically it belongs to the dry southwestern area of the Argentine pampa, although its western and southern parts are broken by hills, swamps and sandy wastes with occasional wooded areas. A number of lakes are found, particularly in the southeast. Rainfall is light and irregular, but the eastern half of the province is fertile and suited for grazing. Occasional severe droughts make agriculture uncertain. Strong variable winds characterize the region and the temperature range is from 110° F (43° C) in summer to severe frosts in winter. Area 55,382 sq.mi.; pop. (1960) 158,436.

The area remained in the hands of nomadic Indian tribes until the closing years of the 19th century. Renewed efforts to extend the frontier and eliminate the Indian menace combined with the pressure of European immigration to extend some settlement into this region. Cattle, sheep, wheat, corn (maize), linseed, barley and alfalfa have become the principal products of the territory. Railways and several highways connect the eastern portion of the province with Buenos Aires and with Bahía Blanca, which serves as the principal port of the area. The western half, largely a broad depression filled with swamps, is sparsely inhabited and has no important towns. The capital, Santa Rosa (pop. [1956 est.] 16,331), is approximately 450 mi. from Buenos Aires. General Pico in the northwest corner of the province was the only other town with a population over 10,000 in 1957.

From 1952, when La Pampa was advanced from territorial to provincial status, until the overthrow of Juan D. Perón (1955), the area was known by his wife's name, Eva Perón. (Js. R. S.)

LAPAROTOMY, or celiotomy, is the opening of the abdominal (or peritoneal) cavity. After laparotomy became reasonably safe, the whole field of abdominal surgery unfolded. (*See* also ABDOMEN, SURGERY OF.)

Laparotomy requires (1) a safe cutting into the abdominal cavity through the skin, fat, muscles, muscular aponeuroses and peritoneum in that order from the exterior inward; (2) the repair or removal of intra-abdominal organs while the surgeon is working inside the cavity; and (3) a safe and meticulous closure. If the abdominal wall is not closed properly, wound disruption, or possibly wound evisceration, may result. Because of an inherent resistance to infection on the part of the peritoneum, infection of the laparotomy wound may occur without accompanying peritonitis. Such wound infection, faulty technique and the high pressure produced within the peritoneal cavity by coughing or straining are the main causes of laparotomy wound disruption.

See H. N. Harkins *et al., Surgery, Principles and Practice* (1961); R. Maingot, *Abdominal Operations* (1961). (H. N. Hs.)

LA PAZ, a department of Bolivia, bounded north by Pando, south by Oruro, east by Beni and Cochabamba and west by the republics of Chile and Peru. Area 51,732 sq.mi. Pop. (1962 est.) 1,157,400. The department was established in 1826 during the administration of Antonio José de Sucre. The city of La Paz is capital of the department and seat of the national government.

The department, in the northwest of the country, comprises 16 provinces. Indians make up a large proportion of the population, with lesser numbers of mestizos and whites. The landscape and general character of the department display great variation as a result of the physical diversity and wide range of elevations. Within its scope is the plateau of the Altiplano, the eastern Cordillera with its enormous peaks rising more than 21,000 ft. above sea level, the lower tropical valleys of the Yungas, and the rain forests on the periphery of the Amazon basin. The department borders upon Lake Titicaca and contains a number of streams and rivers. Among them are the Desaguadero, which drains Titicaca to the south, and the Choqueyapu, or Río de La Paz.

Economic activities of the department include those of La Paz, the nation's chief industrial and commercial city, mining, livestock grazing and agriculture, the nature of the crops depending upon the elevation. Tin, gold, antimony, lead, petroleum, copper and tungsten are important mineral resources of the department. These ores are found largely in the provinces of Inquisivi, Murillo, Sur Yungas, Loayza, Los Andes, Pacajes, Aroma and Sicasica.

Lying between the city of La Paz and Lake Titicaca are the ruins of the city of Tiahuanaco, the centre of a pre-Inca state which was absorbed into the Inca empire. The ruins contain the Gateway of the Sun, the Palace of Kalasaya and numerous statues dramatizing the human figure. On the islands of Titicaca and Coati in Lake Titicaca are found many artifacts of this ancient civilization.

The department affords some of the best motor roads in the country, and it has railway connections with the Chilean ports of Arica and Antofagasta and, via steamer across Lake Titicaca, the Peruvian ports of Mollendo and Matarani. Other railway lines connect with Argentina and Brazil, and the city of La Paz is on main international air routes. (J. L. TR.)

LA PAZ, a department of El Salvador, bordering on the Pacific ocean. Area 464 sq.mi.; pop. (1961) 130,659. The southern coastal plain is sparsely settled; population is concentrated in the northern hilly to mountainous two-thirds of the department and in the second half of the 20th century was about 65% rural. La Paz ranks high in the country in cotton production, in fruits (bananas, plantains and pineapples) and in rice; it is also fairly important in the production of coffee, raised on volcanic mountain slopes, corn, beans, vegetables, sesame, livestock, lumber and salt. Zacatecoluca, the capital (pop. [1961] 12,232), is connected by modern highway with San Salvador, 35 mi. distant. (C. F. J.)

LA PAZ, a small department in southern Honduras, bordering El Salvador. Area 900 sq.mi. Pop. (1961) 60,600, of which 75% was rural. The department consists mostly of rough to rugged mountains and the rural population and many small villages are isolated in mountain valleys. Only La Paz, departmental capital and largest town, pop. (1961) 4,705, near the northeastern corner of the department, has an all-weather highway, connecting it with the national capital, Tegucigalpa, 57 mi. distant; the remainder of the department depends on pack and cart transportation. Coffee is the principal commercial crop. The department is also noted for several handcraft industries. (C. F. J.)

LA PAZ, the first city of Bolivia, capital of the department of the same name and seat of the national government. Pop. (1962 est.) 352,912. The city, which is 42 mi. S.E. of Lake Titicaca, lies at an elevation of 12,001 ft. above sea level in a deep, broad canyon formed by erosive action of the Río de La Paz, or Choqueyapu, a tributary of the Río Beni and the Amazon. Rainfall is about 22 in. annually. The annual average temperature is about 49° F. with a range of 8.3° F. The location, 1,400 ft. below the surface of the Altiplano, affords some protection from the cold highland winds. Viewed against the background of Illimani (22,578 ft.) and other great snow-capped peaks of the Cordillera Real, the scenery from La Paz has a spectacularly rugged beauty.

Founded in 1548 by Capt. Alonso de Mendoza on the site of the Incan village of Chuquiapu, La Paz soon became an important station on the colonial trade routes. When railroads were constructed they also converged upon La Paz. The city, originally called the Ciudad de Nuestra Señora de la Paz (City of Our Lady of Peace), was renamed La Paz de Ayacucho in 1825 in commemoration of the last decisive battle of the wars of independence. The national government was established there in 1898, but Sucre remains the legal capital of the country.

La Paz, usually regarded as the world's highest big city, contains a number of fine buildings, both public and private. These

FENNO JACOBS FROM THREE LIONS

LA PAZ AS SEEN FROM THE WESTERN SECTOR OF THE CITY. SNOW-COVERED ILLIMANI MOUNTAIN IS IN THE BACKGROUND

include the government palace, the capitol, the Roman Catholic cathedral and bishop's palace, a museum, a military club, hotels and theatres. The streets, particularly the older ones, are generally narrow and steep because of the unevenness of the canyon floor. The Plaza Murillo, named for the patriot who led the revolt against Spanish rule in 1809, is the focus of the city's activities. Industries include food processing and the manufacture of textiles, chemicals, glassware, metalware, furniture and other consumer goods.

La Paz is connected by railways and highways with the Peruvian ports of Mollendo and Matarani, the Chilean ports of Arica and Antofagasta and with Argentina and Brazil. The airport is situated upon the plateau above the city and may be reached by road or by electric railway. (*See* also LA PAZ [Department].)

La Paz is the site of the University of San Andres (1830). The American institute, begun there in 1912 and conducted by a faculty from the United States, is supported in part by the Bolivian government. (J. L. TR.)

LA PÉROUSE, JEAN FRANÇOIS DE GALAUP, COMTE DE (1741–*c.* 1788), French navigator who explored the Pacific ocean, was born near Albi on Aug. 22, 1741. During the war with England (1778–83) he served on the eastern coasts of Canada and in Hudson bay. On Aug. 1, 1785, he sailed from Brest in command of a French government expedition of two ships, "La Boussole" under La Pérouse himself, and "L'Astrolabe" under Paul Fleuriot de Langle, designed to complete the work of Capt. James Cook in exploring the Pacific. In addition to investigations in the southern ocean and the tropical South Pacific he was to explore the coasts of North America and Asia with a view to discovering the Northwest passage from the Pacific end. The ships sailed round Cape Horn, visited the Sandwich Islands and reached Mt. St. Elias, Alaska, June 23, 1786. La Pérouse then explored southward to Monterey in California, crossed the Pacific north of the Sandwich Islands, and reached Macao on Jan. 3, 1787.

From Manila, on April 9, 1787, he began the exploration of the coast of Asia, sailing through the Sea of Japan to the Gulf of Tatary, which separates Sakhalin from the mainland of Manchuria. He explored the strait almost to its end, and on Aug. 2 discovered the strait between Hokkaido and Sakhalin. At Petropavlovsk in Kamchatka he sent Jean, baron de Lesseps, home overland with the dispatches. The ships sailed south to L. A. de Bougainville's Navigators' Islands (the Samoan group) where, at Manua, De Langle and ten men from the "Astrolabe" were murdered.

From Samoa La Pérouse proceeded by way of Tonga and Norfolk Island to Port Jackson (Jan. 26, 1788). A letter written from Australia on Feb. 7 was the last heard of him until in 1826–27 Capt. Peter Dillon found evidence of the shipwreck of the "Boussole" and "Astrolabe" on the reefs of Vanikoro in the Santa Cruz group.

See L. M. A. D. Milet-Mureau, *Voyage de la Pérouse autour du monde*, 4 vol. (1797); Peter Dillon, *Narrative . . . of a Voyage in the South Seas . . . to Ascertain the Actual Fate of La Pérouse's Expedition* (1829). (H. M. Ws.)

LAPIDARY, a cutter, polisher or engraver of gem stones. For the history of the lapidary's art from its beginnings in antiquity to modern times *see* GEM; for diamond cutting, which because of the extreme hardness of the stone constitutes a special category, *see* DIAMOND.

LAPIS LAZULI, a mineral substance valued for decorative purposes because of its deep blue colour. It is opaque and takes a good polish, and since ancient times it has been much used for small ornaments and for inlaying. Its beautiful colour led to its employment, when ground and levigated, as ultramarine (*q.v.*), a valuable pigment now displaced by a chemical product (artificial ultramarine). Lapis lazuli occurs as compact masses, with finely granular structure, its specific gravity is 2.38 to 2.45, and its hardness about 5.5, so that being comparatively soft it tends, when polished, to lose its lustre rather readily. Chemical analyses show considerable variation in composition, and thin sections under the microscope show blue particles and various minerals embedded in a white matrix. The main constituents are minerals of the sodalite group, principally lazurite (*see* SODALITE), which is occasionally found as deep-blue crystals of rhombic-dodecahedron form. In addition to the sodalite minerals in lapis lazuli the following have also been found: diopside, amphibole, feldspars, mica, apatite, sphene, zircon, calcite and pyrite.

Lapis lazuli usually occurs in crystalline limestone, and is a product of contact metamorphism near granite masses. The best-known and probably the most important locality is in Badakhshan, northeastern Afghanistan, where it occurs in limestone, in the valley of the Kokcha, a tributary to the Amu-Darya (Oxus) south of Firgamu. The mines were visited by Marco Polo about 1271. Another important locality is in the U.S.S.R. near the western end of Lake Baikal. Fine masses of paler blue lapis lazuli occur in the Andes, near Ovalle, Chile. In Europe it is found as a rarity in the peperino of Latium, near Rome, and in the ejected blocks of metamorphosed limestone on Monte Somma, Vesuvius. Much of the material sold as "lapis" is an artificially coloured hornstone or jasper from Germany. This shows colourless specks of clear crystallized quartz; and never the goldlike specks of pyrite, so characteristic of true lapis lazuli, and fancifully compared with stars in the deep blue firmament.

See W. H. J. Eitel, *The Physical Chemistry of the Silicates* (1954). (L. J. S.; C. E. T.)

LAPITHAE, a people, first mentioned in Homer, best explained as semilegendary, semihistorical. Their home was said to be in Thessaly in the valley of the Peneus river (mod. Pinios). They are related to the Centaurs through their king, Pirithous, he and the Centaurs having the same father, Ixion (*q.v.*). *See* also CENTAUR.

LAPLACE, PIERRE SIMON, MARQUIS DE (1749–1827), the great French mathematician and astronomer, celebrated for his work on gravitation, was born at Beaumont-en-Auge in Normandy on March 28, 1749. His father owned a small estate. At the age of 16 he went to the University of Caen, where his mathematical genius was soon recognized. In 1767 he went to

Paris and was appointed professor at the École Militaire.

Shortly afterward Laplace discovered that any determinant is equal to the sum of all the minors that can be formed from any selected set of its rows, each minor being multiplied by its algebraic complement. This theorem has been described as the most important in the subject and has been named after him. Laplace next turned his attention to celestial mechanics. In 1773 he took up one of the outstanding problems which until then had resisted all attempts at solution in terms of Newtonian gravitation: the problem of why Jupiter's orbit appeared to be continually shrinking while Saturn's was continually expanding. In a brilliant memoir (published in three parts, Academy of Sciences, 1784–86) Laplace showed that this phenomenon was not a secular inequality, as previously supposed, but has a period of 929 years. The phenomenon arises because the mean motions of the two planets are very nearly commensurable. The main object of this memoir, however, was to establish the permanence of the solar system for all time. The mutual gravitational interactions of the component bodies of the solar system were so many and varied that Newton had come to the conclusion that divine intervention was required from time to time if the system were to be preserved in anything like its present state. Despite increasing knowledge of planetary perturbations, no advance beyond this position was made until Laplace finally succeeded in showing (partly as the result of equally brilliant work by J. L. Lagrange) that, because all the planets revolve around the sun in the same direction, the eccentricities and inclinations of their orbits to each other will always remain small, provided they are small at a particular epoch, as in fact they are at present. Laplace's investigation presupposed that the solar system is isolated in space and is entirely free from diffuse matter. Moreover, it was tacitly assumed that the sun can exist indefinitely in its present physical state.

In 1787 Laplace presented to the Academy of Sciences an important memoir on the secular acceleration of the mean motion (or average angular velocity) of the moon about the earth. L. Euler and Lagrange had failed to solve this problem. After various attempts, Laplace found that, although the mean motion of the moon round the earth depends mainly on the gravitational attraction between them, it is slightly diminished by the pull of the sun on the moon. This solar action depends, however, on the changes in the eccentricity of the earth's orbit due to the perturbations by the other planets. As a result, the moon's mean motion will be accelerated so long as the earth's orbit tends to become more circular, but when the reverse occurs then this motion will be retarded. The inequality is therefore not truly secular but is of a period running into millions of years.

Summarizing the work of three generations of illustrious mathematicians on gravitation, Laplace's monumental *Mécanique céleste* appeared in five volumes between 1799 and 1825. In 1796 he published *Exposition du système du monde,* a semipopular book which is a model of French prose. His nebular hypothesis appeared in a note in this work. In a celebrated memoir on the gravitational fields of spheroids, published in 1785, he introduced the potential function and the equation named after him, and he completed the technique of spherical harmonic analysis. Laplace is also famous for his *Théorie analytique des probabilités* published in 1812 and his *Essai philosophique* on the same subject published in 1814. The former introduced important new ideas in pure mathematics, in particular the theory of Laplace-transforms.

In 1799 when Napoleon I became first consul he appointed Laplace minister of the interior, but dismissed him after six weeks for bringing "the spirit of infinitesimals into administration" and elevated him to the senate. Later he was made a count of the empire, and after the restoration of the Bourbons he was created a marquis. He died in Paris on March 5, 1827.

See also references under "Laplace, Pierre Simon" in the Index.

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(G. J. Ww.)

LAPLACE'S EQUATION AND INTEGRAL: *see* Spherical Harmonics.

LAPLAND, a region of northern Europe stretching across the north of Norway, Sweden, Finland and the U.S.S.R. from the Norwegian coast to the White sea. The name is not applied to any unified administrative district.

Lapland shows a great topographical variety. To the west, it embraces the northern part of the Scandinavian mountains. On the Norwegian side these are deeply eroded into fjord and headland and fractured into archipelagoes, though they broaden into undulating uplands or *viddar* in Finnmark and Troms. Swedish Lapland includes the highest peaks in the country. These look eastward across a broad piedmont rich in great lakes that feed the rivers of the Bothnian slope. The eastern half of Lapland consists of the relatively low-lying Fennoscandian or Baltic shield. There are vegetational contrasts between the eastern and western parts of Lapland. Norwegian Lapland is largely open and windswept, with timber growth developing only in sheltered tracts and the more protected interior. The boundaries of spruce and pine penetrate deeply into Lapland. Latitudinally and, more important, altitudinally, they are succeeded by the dwarf birch, willow and lichens of the tundra. *Cladonia rangiferina* is one of the most distinctive lichens, growing freely on sandier land and offering reindeer pasture. Swamps cover much of Lapland; their associated peat may vary from several inches to tens of feet in depth. Such saturated land is a summer breeding ground for mosquitoes. The swampland margins and river valleys support natural meadowland. Game birds are abundant and waterways are well stocked with fish.

Climate is dominated by winter. The growing season may fall below a hundred days and leaves may not break upon the trees until June. Depending on the locality, the sun does not rise above the horizon for six or seven weeks in winter; but it remains continually in the sky for a corresponding period in summer. Waterways freeze in November and thaw in May. Snow depths vary greatly, for eastern Lapland contains some of the driest parts of northern Europe.

Lapps are a minority people in many parts of Lapland. Many have adopted a sedentary life and intermarried with Finns and Scandinavians. Reindeer censuses are notoriously unreliable, but even with a minimum 500,000, some experts would say that grazing grounds are overpopulated. Traditional reindeer country has been intruded upon by permanent farmers, forestry, mining, hydroelectric and even industrial enterprises. *Odlingsgränsen,* the official boundary of cultivated land which is defined in Sweden, is a theoretical frontier between Lapp husbandry and settled farming, while in Finland debate continues about casting a formal protective boundary around a *saamelaisalue* or Lapp territory. Those who practise reindeer husbandry have liberty of movement across the open boundaries of Finland, Norway and Sweden. For Scandinavia and Finland, Lapland is a "colonial" country, the scene of many conflicting economic and social interests.

(W. R. Me.)

The Lapps.—The Lapps (*sabmi,* pl. *samit*) have sparsely inhabited northern Fennoscandia and the Kola peninsula in Russia for at least 2,000 years; in many areas resident non-Lapp neighbours are comparatively recent. When the Finns entered Finland, Lapp settlements were probably dispersed over the whole of that country; today they are confined to its northern extremity. In Sweden the Lapps have been pushed away from the Baltic coast; in Norway 96% of the Lapp population is north of 67° N. But in both countries Lapps still inhabit the greater part of their original area so that, although their fecundity remains high and their infant mortality rate is greatly reduced, their over-all population density remains low and they are now a numerical minority in most districts.

Certain scholars include the forefathers of the Lapps among the paleoarctic peoples; others maintain that they were alpine and came from central Europe. However, the Lapps as a single physical group do not possess uniform features and do not belong to a single blood group.

Lappish belongs to the group of Finno-Ugric languages (*q.v.*) in which it is nearest to Finnish, although these two languages are not mutually intelligible. Lappish also has a great number of

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LAPP FAMILY OUTSIDE THEIR CANVAS HERDING TENT IN SUMMER

loans from early and contemporary Scandinavian languages and also from Russian. There are three main Lappish dialect areas: eastern, northern and southern; these are not mutually intelligible. Possession of Lappish, or sometimes more strictly its daily use, is the usual criterion in national censuses of Lapps: about 22,000 Lapps in Norway, about 10,000 in Sweden, about 2,500 in Finland and perhaps 2,000 in Russia making a rough aggregate of 36,500. But practically all Lappish speakers are now bilingual. There are also communities where Lappish reindeer breeding is the main livelihood but where Lappish is no longer spoken. Furthermore, many of the Lappish spouses in Lapp–non-Lapp marriages are overlooked in the censuses.

Skolt Lapps of Finland (and perhaps also the Russian Lapps) belong to the Russian Orthodox faith; all others are Lutheran. Missionaries visited Lapps, and gained proselytes, as early as the 13th century, but in most areas Christianity had no secure roots before the 18th or 19th century. The shaman was important in non-Christian Lappish society. There is, at least in most of the Northern Lappish communities, a strong evangelical congregationalism (Laestadianism) with insistences upon personal asceticism and open confession of sins. Confessions are sometimes accompanied by ecstasy. Local congregations are virtually autonomous.

Probably two-thirds of Norwegian Lapps, *i.e.*, roughly half of the world population of Lapps, are coastal fishermen with small holdings. Other communities depend for their livelihoods on farming, forestry, fresh-water fishing, various municipal and industrial employments, and reindeer breeding. Although Lapps have hunted reindeer since earliest times, and kept them in small numbers as pack and decoy animals, full-scale nomadism with large herds is comparatively recent. In Norway and Sweden nomads account for no more than 10% and 33%, respectively, of the Lapp populations. Nevertheless there is an evident tendency to associate Lapp culture and society with reindeer nomadism. This is partly because it has been exceptional for non-Lapps, except the Finns in recent times, to depend on reindeer for their livelihood; and as the one livelihood in which Lapps do not compete with Norwegians and Swedes (and probably Russians), reindeer breeding usually offers the most propitious circumstances for the retention of Lappish social and cultural forms.

Maternal relatives are as important as paternal relatives; but it is more important to be able to demonstrate wide filiation within one's own generation than descent from common ancestors so that kinsfolk through marriage are not considered as a separate and inferior category of relatives to kinsfolk through blood. The most important kinship bond is usually between brothers and sisters and their spouses, and these relatives are the typical personnel of a reindeer-herding unit. Cousins may be included in this fraternal unity—they are called "half-brothers and half-sisters"—and cousinhood is a common link between separate units. While the reindeer of a unit are herded communally, each animal is individually owned. Married women retain their maiden names and their reindeer ownership marks. This bilateral system of relations stresses individual rights within any group as well as an ideal of group unity; it also stresses egality as well as sanctioning competition which, both within a group and between groups, is conceptualized as being between equals. The Lapps, however, have not developed higher political institutions whose sanctions would affect, say, all the persons of a dialect area.

The nomad has a monetary economy today and is often richer than the fisherman or farmer, whether Lapp or non-Lapp. But the nomad's wealth is usually dependent on his accepting rough living conditions. Lapps have entered the professions, the arts and the academic world. Attention is being drawn to the problems of the Lapp minority; dispensations are being urged to help the continuance of Lappish society and culture; *e.g.*, the use of Lappish in schools (besides the language of the nation) and the protection of reindeer pastures. In each country there is a national Lapp society; there are a few Lappish newspapers and radio programs.

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LA PLATA, Argentine city and capital of the important province of Buenos Aires, located 3 mi. inland from the southern shore of the Río de la Plata estuary, and 33 mi. S.E. of the city of Buenos Aires. Pop. (1960) 330,310. Major rail lines and excellent highways link it to the national capital of Buenos Aires.

The site of the city was selected in 1882, two years after the city of Buenos Aires, till then the provincial capital, had been federalized as the national capital, forcing the provincial authorities to look for a new residence. The city plan was modeled on that of Washington, D.C. A municipal library, astronomical observatory and museum were included with government buildings in the original construction of the city. The museum houses one of the most important paleontological and anthropological collections in South America. The National University of La Plata was founded in 1897 to further the cultural life of the city. Parks, including an imposing plantation of eucalyptus trees, dot the urban area. Systematic location of public buildings and principal avenues combine with adjacent port facilities to make the city one of the most attractive for growth and commerce in Argentina.

Though its proximity to the urban metropolis of Buenos Aires has obstructed independent development, La Plata has achieved a recognized cultural and economic importance within a province dominated by the national capital. The man-made port is capable of receiving the largest vessels navigating the Río de la Plata estuary. In addition to the old port of Ensenada, a large artificial basin 1,450 yd. long by 150 yd. wide has been built. Railroads and highways connect the port facilities with the grain- and cattle-producing areas of the province, and an important meat packing industry has developed. Electrical and chemical as well as industrial assembly plants have been built. The refinery centre of the Argentine oil industry also is located at La Plata, 1,050 mi. by sea from the main fields at Comodoro Rivadavia.

In 1952 the city was officially renamed Eva Perón in memory of the wife of Pres. Juan Perón. After his regime was overthrown in 1955 the city resumed its original name. (Js. R. S.)

LA PORTE, a city of northwestern Indiana, U.S., about 30 mi. S.W. of South Bend, 60 mi. E. of Chicago and 12 mi. S. of Lake Michigan; the seat of La Porte county. Its manufactures include harvesters, corn pickers, hay balers, bread and meat slicers,

artificial flowers, moldings, car and truck radiators, sponge rubber products and fine steel castings. The region abounds in rich farm lands and lakes, including two within the city limits. An outstanding park system gives further opportunity for recreation.

La Porte was settled in 1832 and was chartered as a city in 1852. The world's first automatic commercial telephone exchange was installed there in 1892. A collection of firearms is housed in the La Porte County museum. For comparative population figures *see* table in INDIANA: *Population.* (L. G. Sc.)

LAPP: *see* LAPLAND.

LAPPA ISLAND: *see* PATERA ISLAND.

LAPPENBERG, JOHANN MARTIN (1794–1865), German archivist and historian, did important work on the Hamburg archives and wrote a history of England up to 1154 which, according to Leopold von Ranke, first turned the attention of German scholars to English history. Lappenberg was born, July 30, 1794, at Hamburg. Intended for his father's profession, medicine, he studied in Edinburgh and London, where he became ambitious to enter English political or diplomatic service. He therefore studied law in Berlin and Göttingen, but was convinced after visiting England again that his ambition must remain unfulfilled. Returning to Hamburg, he was appointed keeper of the archives in 1823. He published copiously, contributing editions to the *Monumenta Germaniae historica* ("Adam of Bremen," "Thietmar of Merseburg," etc.) and the archives of the *Gesellschaft für ältere deutsche Geschichtskunde;* he also worked with enthusiasm, industry and critical appreciation on the Hamburg archives and Hanseatic history. His *Geschichte von England,* two volumes (1834–37; Eng. trans., 2 vol., 1845–57) proved a useful work of research to historians as late as William Stubbs (1825–1901).

Lappenberg was government secretary to the senate, and in 1850 represented Hamburg in the Frankfurt parliament. He died in Hamburg, Nov. 28, 1865.

See E. H. Meyer, *J. M. Lappenberg* (1867).

LAPPI (LAPLAND), the northernmost *lääni* (county) of Finland. Area 38,274 sq.mi.; pop. (1960) 206,311. The Kemi river divides the *lääni.* Inari is the principal lake and drains to the Arctic ocean. Tornio (Torneå) is the historic market centre, Kemi (*q.v.*) is the chief port and manufacturing town, Rovaniemi (pop. 20,200) is commonly called "the capital of Finnish Lapland" and is the administrative centre. Lappi is an underdeveloped area in rapid transition, with forestry and water power as the principal exploited sources of wealth. (W. R. Me.)

LAPRADELLE, ALBERT GEOUFFRE DE (1871–1955), French international lawyer distinguished for academic as well as for practical achievements, was born at Tulle, Corrèze, on March 30, 1871. He studied at the University of Paris and taught there from 1901 until his retirement in 1939. During this period he also served as legal adviser on Moroccan affairs (1913–19) and later as a general legal adviser (1919–27) to the French ministry of foreign affairs. In this capacity he participated in the work of the peace conference in 1919 and was *rapporteur* of the committee of jurists which drafted the statute of the Permanent Court of International Justice. Neither these official activities nor his work as a consultant in such cases as that of the delimitation of the frontier between Iraq and Iran (1937) prevented Lapradelle from making a substantial academic contribution to international law. His writing, principally in the form of articles, ranged over such questions as recognition, the Hague conferences of 1899 and 1907, the enforcement of arbitral awards and nationalization. One of his best-known works is the *Recueil des arbitrages internationaux,* of which he edited the first two volumes together with N. Politis (1922). He also founded and edited the *Revue de droit international* (1927), the *Nouvelle Revue de droit international privé* (1934) and the *Recueil général de décisions et conventions intéressant le droit international.* Lapradelle died in Paris on Feb. 2, 1955.

See C. Rousseau, *Annuaire de l'Institut de Droit International,* vol. 46, p. 474 (1958).

LAPSE RATE OF TEMPERATURE refers to the vertical temperature distribution in the atmosphere, or the rate of change of temperature observed in passing upward through the atmosphere. The lapse rate is considered as positive when the temperature decreases upward, zero when the temperature is constant with elevation and negative when the temperature increases with elevation (inversion of temperature). Two particular lapse rates are defined in terms of the dry and of the saturation adiabatic rates of cooling (*see* ADIABATIC PROCESSES IN ATMOSPHERE). The comparison between the prevailing lapse rate in the atmosphere and the dry and saturation adiabatic lapse rates determines the vertical stability of the atmosphere, that is, the tendency of an air particle to return to its original position or to accelerate away from its original position, after being given a slight vertical displacement. For this reason the lapse rate is of prime importance to meteorologists in forecasting certain types of cloud formations, incidence of thunderstorms and intensity of turbulence in the atmosphere. *See* also INVERSION OF TEMPERATURE. (H. Wr.)

LAPTEV SEA (MORE LAPTEVYKH), a part of the Arctic ocean lying off the north coast of Siberia in the Russian Soviet Federated Socialist Republic between Severnaya Zemlya and the New Siberian Islands (Novosibirskie Ostrova), largely on the continental shelf and therefore shallow. The name commemorates the cousins Dmitri Yakovlevich Laptev and Khariton P. Laptev who explored the sea in 1736–41. It receives the waters of the great Siberian rivers Lena, Khatanga and Yana, and salinity is therefore low in the southern part. The climate is arctic, with a mean annual temperature of about 8° F., and ice covers the whole sea for eight or nine months of the year. In summer, navigation is possible, and the northern sea route runs through the sea, with a major port and transshipment point at Tiksi, near the mouth of the Lena. The sea was formerly called the Nordenskiöld after the Swedish explorer, (Nils) Adolf Erik Nordenskiöld. (T. E. A.)

LA PUENTE, a residential city of southern California, U.S., 18 mi. E. of Los Angeles (*q.v.*) on the slopes of the San Jose hills. Its name goes back to the Portolá expedition of 1769 when soldiers put a "bridge over an arroyo." Members of the John Rowland-William Workman party that brought immigrants overland to southern California settled the area in the 1840s. La Puente remained a community of citrus and walnut growers and wheat farmers until 1945. Agriculture gave way to urbanization and La Puente expanded rapidly. It was incorporated in 1956. Adjacent to La Puente and the place of employment of many of its residents is the city of Industry, incorporated in 1957, a manufacturing centre for furniture, oil products, electrical gadgets and household items. For comparative population figures *see* table in CALIFORNIA: *Population.* (J. A. Sz.)

LAPWING (*Vanellus vanellus*), a large plover (*q.v.*) with plumage mostly black, bronzy green and white; a conspicuous crest; and broad, rounded wings about a foot long. Its normal range is the northern part of the old world from Europe to Siberia, with a partial withdrawal in winter as far south as northern Africa, India and Japan; but stragglers have reached North America in some numbers certain years, being noted from eastern Canada to North Carolina. The lapwing's conspicuous appearance and its call of "pee-wit," whence one of its vernacular names, make it a well-known bird.

It frequents open country, fields and farmland, but winter weather may force it to mud flats on the coast. Its nest is a hollow on the ground, usually with a lining of grass stems. The eggs, slightly pear shaped and buff coloured to brownish with black spots, are usually four in number. The lapwing's food is mostly insects, worms and other invertebrates but also includes vegetable matter such as seeds and algae. Lapwing eggs, the plover eggs of commerce, were eaten in Europe before the bird was protected by law. (A. L. Rd.)

ERIC HOSKING

LAPWING (VANELLUS VANELLUS)

LAPWORTH, CHARLES (1842–1920), English geologist, was born at Faringdon, Berkshire, on Sept. 30, 1842. He was educated at Culham college near Oxford and became a schoolmaster at Galashiels, Scot.

In 1864 Lapworth began to study Silurian rocks of the Southern Uplands, where he proved that graptolites could be used as index fossils to determine the succession of strata. In 1873 he published his first paper on graptolites, for which he established the classification used and elaborated by later workers. In 1879 he proposed the name Ordovician for a complex series of strata previously called Lower Silurian and Upper Cambrian by followers of Sir Roderick Murchison and Adam Sedgwick (*see* ORDOVICIAN SYSTEM). In 1881 he was appointed to the chair of geology and physiography at the Mason college, Birmingham university (which he held until 1913), and in the following year began detailed mapping in the Durness-Eireboll region of the northwest Highlands. There he grasped the true solution of the geological structure with the recognition of great overthrusting of the Lewisian rocks on Cambrian strata. Lapworth died in Birmingham on March 13, 1920. (C. E. T.)

LARA, a state in northwestern Venezuela, the greater part of which is mountainous. Area 7,645 sq.mi. Pop. (1961) 489,140. The Tocuyo river rises in the western part of the state and flows northeast to the Caribbean sea. The state is well served by roads, including a paved section of the Pan-American highway. The capital, Barquisimeto (*q.v.*), has always been a road centre where routes from the mountains, plains and sea converge.

Before the discovery of the area by the Spaniards, it was inhabited by advanced Indian tribes who cultivated cassava, maize and other crops. In modern times sugar cane, tobacco, cacao, maize and vegetables are raised in the warm, irrigated lowlands; potatoes, coffee and wheat, at higher elevations. Livestock is important; domestic animals include cattle, sheep and goats, all introduced by the Spaniards. There is a small amount of mining but the copper mines at Aroa, which were once owned by Simón Bolívar, have been abandoned. Lara was long a centre of handicrafts—cotton and leather goods, multicoloured blankets, footwear and furniture. Important modern industries include the manufacture of sisal into bags, sacks and cordage. (L. We.)

LARACHE (Arabic EL ARAISH), a seaport on the Atlantic coast of northern Morocco, lies on the left bank of the estuary of the Loukkos (Lucus) river, 56½ mi. S.S.W. of Tangier by road. Pop. (1960) 30,763. Its Arabic name relates to the vine arbours of the Beni Arous tribe. The old walled town rises in terraces to forts that dominate it on the north and south. The former Spanish quarter grew both toward the port and on the coastal plateau to the south and west. Gardens and orchards border the left bank of the Loukkos, which describes wide meanders in its valley. The most interesting buildings are the ancient Kebibat ("little domes") fortress (now used as a hospital) that rises out of the sea, and the fort of La Cigogne (*c.* 1700) built by the Spaniards. The port has a jetty prolonging the right bank of the estuary, with rail-served quays on the left bank; its accessibility depends on the depth of water over the bar. Cork, beans, fruit, timber and wool are exported and European goods imported. Larache is an important agricultural and fishing centre; it is linked by road with Alcazarquivir, 22 mi. S.E.; and through it passes the highway between Tangier and Rabat.

Larache corresponds to the ancient Lixus, whose ruins lie about 3 mi. N. on the right bank of the Loukkos. Some ancient writers located there the garden of the Hesperides (*q.v.*), whose golden apples may have been oranges. Lixus was an important Phoenician and later Carthaginian settlement; under the Romans it was an imperial colony and reached its zenith in the reign of Claudius. Larache belonged to Spain from 1610 to 1689, when it was recaptured by the Moors. It was bombarded by the French in reprisal against piracy in 1765 and by the Spaniards in 1860. Spain regained possession in 1911 and built the port and modern town. With other places in Spanish Morocco, Larache passed to the kingdom of Morocco in 1956. (G. L. M.)

LARAMIE, a city of southeastern Wyoming, U.S., on the Laramie river, 50 mi. W. of Cheyenne, the seat of Albany county. Laramie came into existence in May 1868, when the Union Pacific track layers arrived. For a few months that summer several thousand persons made the new city their headquarters, their community a jumble of tents and shanties upon the treeless plain. Then most of the people moved on, leaving only a few to lay solid foundations for a permanent city. Thereafter Laramie's growth was slow but steady (for comparative population figures *see* table in WYOMING: *Population*). Small industries, such as an iron-rolling mill, a glass factory, a flour mill, a cigar factory, an oil refinery and a railway refrigerator-car icing plant, have come and gone. For many years the search for precious metals in the Medicine Bow mountains 30 mi. to the west provided employment. This wooded range became the centre of Laramie's recreation, offering trout fishing, boating, camping and skiing. Throughout the life of the city the railroad, cattle and sheep ranches and lumbering have furnished employment. In later years tourism, forest products, aggregates plants and cement became important industries.

Laramie attracted international attention in 1870 with the first woman jury in the U.S. In the years 1876–83, the humorist Bill Nye (*q.v.*) lived in Laramie; his *Boomerang* newspaper columns and books brought fame to the city.

The University of Wyoming, opened in 1887, is important in the city's economic and cultural life.

Laramie city, river, plains and mountains take their name from Jacques La Ramie, a fur trader of the region (d. *c.* 1820). The city of Laramie was chartered by Wyoming in 1873; it has a council-manager form of government, in effect since 1942. (T. A. Ln.)

LARAMIE MOUNTAINS, a range in southeastern Wyoming, U.S., a narrow and relatively low northern extension of the Front range of the Rocky mountains in Colorado. The two are divided by the Cache la Poudre river near the Wyoming boundary. From this point the Laramie range extends north by northwest for 125 mi. into Wyoming. The range rises about 3,000 ft. from the Great Plains on the east, and 1,500 ft. from the floor of the Laramie basin on the west. Laramie peak (10,272 ft.) is the highest point on the range. Iron ore is mined at Sunrise on the eastern slope of the mountains. The name is from Jacques La Ramie (*see* LARAMIE). (H. B. Ha.)

LARBAUD, VALERY NICOLAS (1881–1957), French man-of-letters, particularly outstanding as a translator and interpreter of English literature. Born on Aug. 29, 1881, at Vichy, Larbaud inherited sufficient wealth to be able to devote his life to reading, writing and travel. He acquired a sound knowledge of the culture of England, Italy, Spain and Portugal, all of which he visited regularly till 1936 when he was permanently and almost completely incapacitated by a cerebral hemorrhage. He died in Vichy on Feb. 2, 1957.

Larbaud's novels and stories, all largely based on personal experiences, demonstrate his particular gift for delineating elusive shades of feeling: *Fermina Marquez* (1911) describes the emotional upheaval caused in a boys' boarding school when it is visited by a beautiful Colombian girl; *A. O. Barnabooth* (1913; English translation, 1924) comprises the collected verse and journal of a young South American millionaire who travels through Europe seeking self-knowledge; *Enfantines* (1918) is a collection of evocations of the more poignant feelings of childhood; *Amants, heureux amants* (1923), is a trio of analyses of men and women in love, two of which are in the "stream-of-consciousness" form of James Joyce's *Ulysses* which Larbaud helped to translate.

Larbaud's other works reveal his cosmopolitan culture and his eclectic taste: they include essays and reflections, largely inspired by his travels, *Jaune, Bleu, Blanc* (1927) and *Aux Couleurs de Rome* (1938); translations including Sir Thomas Browne, S. T. Coleridge, Samuel Butler and Walt Whitman; and two volumes of criticism of English and French literature, *Ce Vice impuni, La Lecture* (1925 and 1941).

That his love of travel and foreign literature in no way diminished his affection for France is revealed in many of his essays, in his *Journal* (1955) and most effectively in the imaginary conversations of *Allen* (1927) which sings the praises of his native Bourbonnais.

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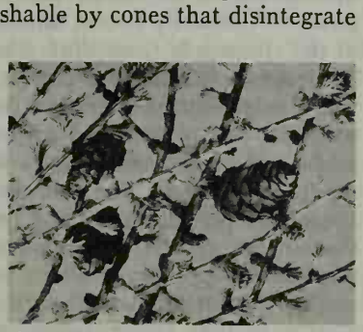
LARBERT, a town and civil parish of Stirlingshire, Scot., lies 9 mi. S.E. of Stirling by road, on the Carron river, which divides it from Falkirk. Pop. (1961) 17,087 (civil parish). The community includes the villages of Larbert (5,281), Stenhousemuir (8,794), Carron (2,732) and part of Carronshore. There are light casting (metal), iron founding, sawmilling, confectionery making (Stenhousemuir), and a caravan (house trailer) factory (Carron). Larbert is a railway junction. The principal buildings are Larbert Old church, Bellsdyke Mental Hospital and the Royal Scottish National institution for mental defectives. James Bruce, the African traveler, who was born and died at Kinnaird house, 2½ mi. N.E., is buried in Larbert churchyard.

LARCENY is the basic theft offense in the Anglo-American law of crimes. The offense is of ancient origin and may be defined as the trespassory taking and carrying away of personal goods from the possession of another with intent to steal. The property subject to larceny at common law consisted of tangible personal goods. Modern legislation has expanded the scope of the offense by making larcenable such objects as crops and fixtures attached to the land and documents evidencing legal claims. Larceny requires a trespassory taking; *i.e.,* the goods must be taken from the possession of another without his consent. The expansion of the larceny offense at common law occurred principally by extending the notion of property in the possession of another. Thus, possession of property entrusted by a master to his servant was regarded as remaining in the master; hence a conversion of such property by the servant was larceny. So also, when a defendant gains control or possession of goods, as distinct from the property in them, by trick or false representations, possession is deemed not to pass to the offender, and a misappropriation by the latter is larceny; where the owner is induced to consent to parting with the property in goods by a false representation, the offense is obtaining goods by false pretenses (*see* FRAUD). The goods must not only be taken but "carried away." The latter requirement is highly formalistic and is satisfied by any movement of the entire object, however slight. There must, finally, be an intent to steal, which is ordinarily defined as an intent to deprive the owner permanently of his property. Thus, an unauthorized borrowing of another's property is not larceny if there was an intent to return the property. Moreover, one who takes goods erroneously believing them to be his own does not commit the offense. *See* CRIMINAL LAW: *Substantive Criminal Law: Particular Offenses.* (F. A. A.)

LARCH, an ancient Latin name for trees of the genus *Larix* in the pine family (Pinaceae). The genus contains 10 or 12 species native to the cool-temperate and subarctic parts of the northern hemisphere, with one species (*L. griffithii*) confined to the Himalayas. Larches have the pyramidal growth habit typical of conifers, but the leaves are shed in autumn, like deciduous trees. The short, needlelike leaves are arranged spirally on new growth, in whorls at the tips of dwarf spurs on older twigs, with 10 to 30 soft, light green needles on each spur. The related golden larch (*Pseudolarix amabilis*) is distinguishable by cones that disintegrate at maturity, whereas those of *Larix* often remain on the trees several years, then fall intact.



JOHN MARKHAM

LARCH BRANCH IN SPRING SHOWING MALE AND FEMALE FLOWERS, TUFTS OF YOUNG LEAVES AND LAST YEAR'S CONES

The wood of larch is coarse-grained, strong, hard and heavy (second densest coniferous wood), with yellowish sapwood, orange to reddish-brown heartwood and numerous small, scattered resin ducts. It is valued in the building of ships and barges, and because it is resistant to the deleterious effects of soil it is used for telephone poles, mine timbers, railroad ties and general building purposes. The trees grow on a variety of soils, from sandy loam to boggy muskeg, and from flat plains to mountainsides.

JOHN TOPHAM LTD. FROM L. HUGH NEWMAN

GRACEFUL CANOPY OF THE EUROPEAN LARCH (LARIX DECIDUA) IN WINTER

Four species of larch occur in North America, the most widely ranging one, tamarack, hackmatack or eastern larch (*L. laricina*), extending from Labrador to northern Pennsylvania and from thence northwesterly to Yukon territory and Alaska, where it reaches 67° N. Eastern larch has cones under one inch long, with the bracts hidden by the scales. The seeds average 318,000 per pound; the bark is gray to reddish-brown. The trunks are 12 to 36 in. in diameter and the trees are 40 to 100 ft. tall. At the southern edge of its range it is restricted to swamps and sphagnum bogs, farther north it grows better on well-drained uplands and along lakes. It grows in pure stands or mixed with paper birch, jack pine, aspen and black spruce. Its growth is rapid for 25 to 50 years, then slows, the trees maturing in 100 to 200 years.

The western larch (*L. occidentalis*) is confined to the valleys and mountain slopes between 2,000 and 7,000 ft. in the "inland empire" of the Pacific northwest. Its bracts protrude beyond the cone scales, the seeds run 143,000 per pound and the trees attain diameters of 3 to 4 ft., heights of 140 to 180 ft., or, rarely, to 8 ft. in diameter and 210 ft. tall. Seedlings may grow a foot a year for the first 4 to 10 years; thereafter the growth is slower, maturity being reached in 300 to 400 years, and trees 700 years old are known. It is an important timber tree, the lumber being used much in the same manner as Douglas fir, as well as for poles, posts and piling.

Both the subalpine larch (*L. lyallii*), native in the Cascade, Bitterroot and northern Rocky mountains, and the Alaska larch (*L. alaskensis*), extending along the coast from Cook inlet to the Yukon, are smaller trees of little economic importance.

The European larch (*L. decidua,* syn. *L. europaea*), native from the mountains of north and central Europe to Siberia, approaches the western larch in size, trees often being 3 to 5 ft. in diameter and 80 to 140 ft. tall. Mature trees have gradually tapering trunks with horizontal branches spaced irregularly and becoming somewhat drooping but ascending again at the tips. The bark is reddish-gray, smooth in young trees, rough and scarred in age. The European larch occurs in most of the hilly areas in central Europe, reaching an elevation of about 5,000 ft. in the Alps. It grows rapidly and may be cut for poles and small timber at 40 to 60 years of age. The wood of large trees is fine textured, reddish to yellow-brown, tough and resistant to splitting and highly prized for making boats. It is excellent for post and piling, and much of the city of Venice is reputed to be standing on piling of larch. Log houses constructed of larch gradually turn rich brown as a result of the exudation and hardening of resin under the heat of the sun.

European larch produces a fine, clear, abundant oleoresin. This pitch is collected and sold as "Venice" or "Venetian" turpentine. It is a thick, viscous fluid, deep yellow, nearly transparent, and contains about 15% essential oil of turpentine and some resin. It hardens slowly unless subjected to heat. Similar but slightly inferior pitch occurs in the wood and bark of other larches.

European larch is used in reforestation work in England and in the United States where it reproduces spontaneously in at least one locality. Several species are utilized as ornamentals, *L. decidua* var. *pendula* and the Japanese larch, *L. leptolepis,* being favourites in Britain and the United States.

Several fungus and insect pests attack and severely damage

larch, the larch sawfly (*Lygaeonematus erichsonii*) being particularly destructive. Larch canker fungus (*Dasycypha calycina*) and honey fungus (*Armillaria mellea*) both take heavy toll, especially if the trees are too crowded. Control is difficult.

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LARCIUS, TITUS (or LARGIUS; probably surnamed FLAVUS), a member of an originally Etruscan family which settled in Rome. His brother Spurius was, with Horatius Cocles, one of the defenders of the Sublician bridge against the attack of Lars Porsena (*q.v.*). Titus was said to have been the first dictator appointed at Rome. There was doubt as to whether this occurred during his first consulship (501 B.C.), to command against the 30 Latin cities which had sworn to reinstate Tarquinius at Rome, or during his second (498 B.C.), when the plebeians refused to serve against the Latins until their debts had been canceled. There was in antiquity, however, much doubt as to both name and date of the first dictator. The fact that Larcius was consul in the year of his appointment as dictator is curious.

See Livy, ii, 18; Dionysius of Halicarnassus, v, 59 ff. (R. B. LD.)

LARD, the rendered, or melted, fats of the hog. Types are differentiated according to the rendering method. Prime steam lard is made by injecting steam under pressure into a closed vessel containing hog fats. Kettle-rendered (open system) and dry-rendered (enclosed system) lards are made by melting hog fats in steam-jacketed vessels. The resulting residue is called cracklings. Neutral lard is prepared by melting leaf fat, that which comes from around the kidneys, and back fat at about 120° F. Continuous rendering involves grinding, rapid heating, and separation of fat from the cells by centrifugation. Lard is creamy white with a wide plastic range (butterlike consistency); its specific gravity is about 0.93, its solidifying point about 27–30° C. and its melting point 33–46° C. The predominant fatty acids are oleic, palmitic and stearic, with substantial amounts of the essential fatty acids, linoleic and arachidonic. The composition varies with the diet of the hogs from which it is obtained. Lard has the highest shortening value of any plastic fat and digestibility equivalent to that of other cooking fats. It is a highly valued cooking and baking fat and is blended, frequently after modification by molecular rearrangement or hydrogenation, with other fats and oils to make large quantities of shortening. Lard and shortenings made from lard are usually protected from rancidity by antioxidants.

Lard oil is the clear colourless oil pressed from pure lard after it has been grained (crystallized) at 45° F. It is used in cutting oils, and as a nutrient for cultures in antibiotic production. The solid residue, lard stearin, is used in shortenings and as a source of saturated fatty acids. (L. R. DN.)

LARDNER, RING (RINGGOLD WILMER LARDNER) (1885–1933), U.S. journalist and fiction writer, well known for his short stories, was born in Niles, Mich., March 6, 1885. After graduating from the Niles high school, he attended the Armour Institute of Technology in Chicago for one term. Beginning his writing career in 1905 as a reporter for the *South Bend* (Ind.) *Times*, he later went on to more important assignments on papers in Chicago, where he established a reputation as a sports writer specializing in baseball stories. From 1913 to 1919 he wrote a daily variety column, "In the Wake of the News," for the *Chicago Tribune* and from 1919 to 1927 a humorous weekly column for the Bell syndicate. Meanwhile, in 1914, he began publishing fiction and won notable success with his stories about a comic baseball player, Jack Keefe, some of which were collected in *You Know Me, Al* (1916). In other collections which followed—*Gullible's Travels* (1917), *Own Your Own Home* (1919), and *The Big Town* (1921)—he not only demonstrated his knowledge of other American character types besides athletes but also his mastery of the American vernacular. These volumes, together with his columns and comic sketches, brought him a national reputation as a humorist. But with the publication of three later collections of stories, *How to Write Short Stories* (1924), *The Love Nest* (1926) and *Round Up* (1929), he earned a second reputation as a satirist and master of the short story. Lardner died in East Hampton, Long Island, N.Y., on Sept. 25, 1933.

See Donald Elder, *Ring Lardner* (1956); Walton R. Patrick, *Ring Lardner* (1963). (W. R. PA.)

LAREDO, a city of southern Texas, U.S., on the Rio Grande opposite the Mexican city of Nuevo Laredo; a port of entry and the seat of Webb county. Pop. (1960), city 60,678, of which about 85% was of Mexican or Spanish descent; standard metropolitan statistical area (Webb county) 64,791. (For comparative population figures for the city *see* table in TEXAS: *Population.*) Laredo was established in 1755 and was named for the town of Laredo in Santander, Spain. For more than 200 years it witnessed much of the violence of the southwest: Indian wars, border bandits and the influx of immigrants on their way to the California gold fields. The official, municipal, church and social affairs of Laredo from 1755 to 1846 are recorded in the Laredo archives, which were discovered in 1934 and made available largely through the efforts of Seb S. Wilcox, a local historian.

Laredo, with its adobe houses, church buildings, mission bells and plazas, has retained much of the feeling and colour of the frontier, and the influence and language of old Spain and Mexico are everywhere apparent.

It also has modern hospitals, hotels and schools, including a junior college established in 1947. The city has a considerable export-import trade and is the commercial centre of an area of rich, irrigated farming lands and ranches; gas and oil discoveries have also given it industries. Since 1898 a popular international event, the Washington's Birthday celebration, has attracted thousands of visitors from both sides of the Rio Grande; during the first week in March Laredo sponsors the Border Olympics. (O. Mo.)

LARES, older form *Lases,* Roman tutelary deities (etymology unknown, possibly connected with *lascivus*). They were originally gods of the cultivated fields, worshiped by each household at the *compitum* or crossroads where its allotment joined those of others. Later, they were worshiped in the houses, and the household Lar (*familiaris*) was conceived of as the centre point of the family and of the family cult. The word itself (in the singular) came to be used in the general sense of "home." It is certain that originally each household had only one Lar; the plural was at first used only to include other classes of Lares, and only gradually, after the time of Cicero, ousted the singular. The image of the Lar stood in its special shrine (*lararium*) or niche, originally in the atrium. It was usually a youthful figure, dressed in a short, high-girt tunic, holding in one hand a drinking horn, in the other a cup. Under the empire usually two of these were to be found, one on each side of the central figure of the Genius, Vesta, or some other deity. The whole group was called indifferently Lares or Penates. A prayer was said to the Lar every morning, and offerings were made at family festivals. On these occasions the Lares were crowned with garlands, and offerings of wine and incense, cakes and honey and swine were laid before them. Their worship persisted throughout the pagan period. The public Lares belonged to the state religion. Among these must be included, especially after the time of Augustus, the *Lares compitales.* Generally two in number, they were the presiding deities of the crossroads (*compita*), where they had their special chapels. Their sphere of influence included not only the crossroads, but the whole neighbouring district of the town and country in which they were situated. They had a special annual festival, called Compitalia, to which public games were added some time during the republican period. The colleges of freedmen and slaves, who assisted the presidents of the festival, were abolished by Julius Caesar, but revived by Augustus, who added to these Lares his own Genius (*q.v.*).

The state itself had its own Lares, called *praestites,* the protecting patrons and guardians of the city. They had a temple and altar on the Via Sacra, near the Palatine, and were represented on coins as men wearing the chlamys, carrying lances, seated, with a dog, the emblem of watchfulness, at their feet. Mention may also be made of the *Lares grundules,* whose func-

tions are unknown; the *viales,* who protected travelers; and the *permarini,* connected with the sea. *See* also PENATES.

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LA REVELLIÈRE-LÉPEAUX, LOUIS MARIE DE (1753–1824), an honest but not very brilliant member of the French Directory from 1795 to 1799, was born at Montaigu in Poitou on Aug. 25, 1753. Elected to represent the third estate of Anjou when the estates-general met at Versailles in 1789, he sat in the National Constituent Assembly until 1791. From Sept. 1792, he was deputy for Maine-et-Loire in the Convention. On Nov. 19, 1792, he proposed the decree offering French protection to all peoples who wanted to set themselves free; and at the trial of Louis XVI he voted for the death sentence. On the fall of the Girondins (May 31, 1793) he had to go into hiding until the Thermidorian reaction (July 1794). He returned to the Convention in March 1795 and was in April appointed to the commission that drew up the constitution of 1795. A member of the reconstituted committee of public safety, he helped to suppress the royalist rising of 13 Vendémiaire (Oct. 3). When the Directory was set up (Oct. 1795), he was elected to it.

La Revellière belonged to the left majority, which dominated the Directory. His dislike of Christianity was attributed to his having been deformed in youth by beatings from a clerical tutor. He blamed the priests for the revolt of the Vendée and encouraged the deistic system known as theophilanthropy.

Forced by threats of prosecution to resign, with two other directors, on 30 Prairial (June 18, 1799), La Revellière thenceforward kept himself out of politics. He was expelled from the Institut for refusing to swear allegiance to Napoleon in 1804. During the Hundred Days he took neither side; and in 1816 he was not banished, even though he had voted for Louis XVI's death. He died in Paris on March 27, 1824. His memoirs, which contain many errors, were published by his son Ossian in 1873.

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LARGILLIÈRE (LARGILIERRE), **NICOLAS DE** (1656–1746), French portrait and historical painter, was born in Paris, Oct. 10, 1656. At the age of three, his father took him to Antwerp, where he received his training, a fact which was to prove extremely significant. Largillière lived during the artistic quarrel between those who took as their standard of excellence the adherence to classical models and emphasis on drawing as exemplified by Nicolas Poussin, and those who broke away in favour of the style of Rubens and an emphasis on colour. By his admiration for the Flemish masters, Largillière revealed himself as a modern and came to be looked upon as a pioneer by 18th-century artists who followed the same course.

In 1674 he went to London, where he was an assistant to Sir Peter Lely, whose influence is clearly seen in Largillière's portrait of Jane Myddelton. Anti-Catholic feeling forced him to return to Paris, where he rapidly became established as a portrait painter. In this field Largillière is usually considered a traditional artist: his approach to portraiture retains the formality and the allegorical conceits of the 17th century, yet his colour, which as a true admirer of the Flemish school he considered to be of the first importance, appears exceptionally vivid and sumptuous.

He painted a few still lifes and religious pictures, but excelled in official likenesses, a notable example being the ex-voto offered to Ste. Geneviève (St. Étienne-du-Mont, Paris), which contains portraits of all the leading officers of the municipality of Paris. Among his many other portraits are those of James II and his queen, the duc de La Rochefoucauld and Jean Jacques Rousseau. Largillière was highly honoured and became chancellor of the Academy in 1743. He died in Paris on March 20, 1746.

(AA. B.; X.)

LARGO CABALLERO, FRANCISCO (1869–1946), Spanish Socialist leader, prominent during the second republic of which he became prime minister soon after the outbreak of the civil war of 1936–39, was born in Madrid on Oct. 15, 1869. He joined the Socialist party in 1894 and distinguished himself as organizer of the Unión General de Trabajadores (U.G.T.). He was sentenced to life imprisonment for his part in the general strike of Aug. 1917 but was released on election to the *Cortes* in 1918. Minister of labour in the republican government of 1931, he introduced legislation concerning industrial relations. However, in common with other Socialists, he became disillusioned with the republican parties because of their failure to deal with agrarian reform and was personally affronted by their failure to carry out much of his labour legislation. As president of the U.G.T. and secretary of the Socialist party, he was one of the most important supporters of the rising in Oct. 1934. An unsuccessful attempt in 1935 to convict him of complicity in the revolt increased his popularity and he was hailed by the Soviet newspaper *Pravda* as "the Lenin of Spain." After Feb. 1936 his intransigent attitude was a major factor in precipitating the military insurrection, while his refusal to allow Socialist collaboration simultaneously weakened the republican government's authority. He became prime minister on Sept. 4, 1936; his government, which included Communists and Anarcho-Syndicalists, fell in May 1937 as a result of internal differences which culminated in the Anarcho-Syndicalist rising in Barcelona (May 3–10, 1937). Largo Caballero went into exile in France in 1939; during World War II he was interned by the Germans in Dachau concentration camp. He died in Paris on March 23, 1946.

LARGS, a small burgh and seaside town on the Firth of Clyde, Ayrshire, Scot., lies 30 mi. W.S.W. of Glasgow by road. Pop. (1961) 9,100. The island of Great Cumbrae lies opposite (*see* CUMBRAES, THE). Largs has a long pebble beach and from the quay a broad esplanade, 2 mi. long, runs northward round the bay. The harbour is used mainly by Clyde passenger steamers and yachtsmen. Skelmorlie Aisle, part of the old church transformed into a mausoleum in 1636 by Sir Robert Montgomery of Skelmorlie castle, has an elaborately painted roof and contains the tombs of Sir Robert and his wife. At Bowen Craig, south of Largs, a round tower stands where it is thought the Norwegians were driven ashore in the battle of Largs in 1263. As a result of the battle the Hebrides and the Isle of Man were ceded by Norway to Scotland. Brisbane house, birthplace of Sir Thomas Makdougall Brisbane, governor of New South Wales (1821–25) and astronomer, stood $1\frac{1}{2}$ mi. N.E. of Largs in the valley of the Noddsdale water. There too is Netherhall where the physicist William Thomson, Baron Kelvin, died in 1907.

LARIDAE, the family of long-winged scavenging birds that includes the gulls and terns. *See* GULL; TERN.

LA RIOJA, northwestern Argentine province located immediately north of the province of San Juan and bordering Chile. Area, 35,649 sq.mi. Pop. (1960) 128,270. The eastern half of the province is an arid plain while the western part is traversed north to south by part of the Andean range. The headwaters of the Bermejo river drain this western part and flow south into the province of Mendoza, while several small streams flow north into the province of Catamarca. The climate is extremely hot and dry.

Like the rest of northwest Argentina, the province was settled at the end of the 16th century by Spaniards. The capital, La Rioja, pop. (1956 est.) 26,878, located at the foot of the Sierra de Velasco, was founded in 1591 by the governor of Tucumán. Its destruction by earthquake in 1894 led to its reconstruction along modern lines. The area was of little importance during the colonial period. The province separated itself from the control of Córdoba in 1816 but there followed 50 years of civil war and unrest, furthered by the poverty and nomadic life of its inhabitants. The establishment of an effective national government in Buenos Aires in the 1860s contributed to stability in the province.

Water supply and irrigation are the major problems of La Rioja.

The small streams do not provide adequate volume, and both agriculture and mining have been seriously restricted by the lack of water. Dams erected on the Anzulón and Rioja rivers, the latter near the capital, provide irrigation and electric power for the immediate area. Only in the valleys of the Andean range is small scale irrigated cultivation possible: some wheat, grapes, oranges, olives, tobacco and alfalfa are grown. Mining is the major industry, the deposits including gold, silver, copper, nickel, tin, cobalt, coal, alum and salt. The copper mines of Famatina at 16,400 ft. elevation are the best known. Cable cars and aerial wire transport the ore to the province's second largest town, Chilecito, pop. (1956 est.) 6,911, in the valley. Highways and railroads link the two major towns of the province with Tucumán and Córdoba. (Js. R. S.)

LARISSA (Gr. Larisa), the chief town of the *nomos* (department) of Larissa in Thessaly, Greece, on the Pinios (Peneus) river, 56 km. (35 mi.) N.W. of the port of Volos; it is connected with Volos, Athens and Salonika by rail. Pop. (1961) 55,391. Located in the midst of a fertile plain, Larissa is an agricultural trading centre.

When Thessaly was dominated by a few powerful clans, Larissa was the seat of the Aleuadae, who until 369 B.C. furnished the military commander (*tagos*) of the Thessalian confederacy. Their rivals, the Scopadae, held Crannon (named by the Turks "Old Larissa") about 10 mi. S.W. Having "medized" during the Greco-Persian Wars, Larissa supported Athens during the Peloponnesian War (*q.v.*), but was weakened by political faction thereafter; and in 357 B.C. the last of the Aleuadae called in the help of Philip II of Macedonia against the sons of Alexander, tyrant of Pherae. Larissa was under Macedonian rule from 344 to 196 B.C., when the Romans made it the capital of the reorganized Thessalian confederacy. Justinian fortified it, and since at least the 9th century it has been the seat of a bishop of the Orthodox Church. In the 13th century, when it had a large Vlach population, it belonged to the separatist Greek despotate of Epirus and Thessaly. In 1348 it was conquered by the Serbs and in 1393 by the Turks, under whom it remained—though at first it was of secondary importance to the pashalik of Trikkala—until 1881, when Thessaly was annexed to the kingdom of Greece. Until 1920 some of the inhabitants were still Turks, though many left in 1881 and after the Greco-Turkish War of 1897. Larissa was the site of severe fighting between the Germans and the Greek-British army in World War II. It was ruined by earthquake in Feb. 1941, and suffered considerably under German occupation until 1944.

Larissa, meaning "citadel," was a common place name in the ancient Greek world. Another Thessalian Larissa (*kremaste*, "suspended," or Pelasgia) lay high on the slope of Mt. Othris. (D. M. N.)

LARISTAN (Larestan), an extensive region in the southeastern part of the *ostan* (province) of Fars in Iran, lies between the Persian gulf coast and the main water divide. It consists largely of limestone ridges, dissected uplands and depressions which are increasingly arid toward the east. A feature of the region is the *kafeh* or salt swamp which occurs in isolated depressions. The coastal fringe is particularly inhospitable, with a series of rough ridges and marshlands. All of Laristan, except the highest ridges, is true *garmsir* ("warm country") where date palms and citrus fruits can be cultivated. In four or five years out of ten the rainfall is sufficient to produce a grain crop without irrigation. The area is sparsely settled, with a strong nomadic element of the Khamseh tribes, of Turkish, Arab and Iranian origin. Laristan was formerly a quasi-independent dominion; the last khan was deposed and put to death by Shah Abbas I. Lar, the chief town, lies at an elevation of 3,000 ft. on the motor road from Shiraz to Bandar Abbas. Once a flourishing place, its inhabitants numbered 14,188 in 1956. (H. Bo.)

LA RIVE, AUGUSTE ARTHUR DE (1801–1873), Swiss physicist, one of the founders of the electrochemical theory of galvanism, was born in Geneva, Switz., on Oct. 9, 1801, and died in Marseilles, France, on Nov. 27, 1873. He was the son of Charles Gaspard de la Rive (1770–1834), professor of pharmaceutical chemistry (1802) in the Academy of Geneva and later rector (1823). De la Rive was elected to the chair of natural philosophy in the academy in 1823 and with François Marcet he investigated the specific heats of gases and the temperature of the earth's crust, but electricity was his chief interest. His experiments on the voltaic cell, published in 1836, furthered the development of electrical theory. He shared Michael Faraday's view that voltaic electricity was due to chemical action. He invented in 1840 the electroplating process for gold on silver and brass, for which in 1841 he received a prize of 3,000 fr. from the French Academy of Sciences. His *Traité de l'électricité théorique et appliquée*, three volumes (1854–58), was translated into several languages. Later (1867) he carried out a series of researches on the discharge of electricity through gases, with observations on the critical pressure and the conductivity of the cathode dark space. His birth and fortune gave him considerable social and political influence and he was distinguished for his hospitality to literary and scientific men and for his interest in the welfare and independence of his native country. (D. McK.)

LARIVEY, PIERRE (*c.* 1540–1619), the chief French comic dramatist of the 16th century, who, by his free translations from Italian comedy, provided the basis on which Molière and others were to build. He belonged to a family of Italian origin, established at Troyes, which had gallicized its name from Giunto to L'Arrivey. Born in Champagne, about 1540, he lived at Paris and later became a canon at Troyes, where he died on Feb. 12, 1619. He translated books from the Italian and compiled almanacs and books of predictions but his most successful works were his *Comédies facétieuses*, six of which he published in 1579 and three in 1611; he spoke of publishing three more, but they have not survived. Like most of his French emulators, he turned to the Italian for his plots, but instead of borrowing from a variety of Italian plays as they did, he made free translations. The nine comedies printed were: *Le Lacquais*, from Ludovico Dolce's *Il Ragazzo; La Veuve*, from Nicolo Buonaparte's *La Vedova; Les Esprits*, from Lorenzino de Medicis' *L'Aridosio; Le Morfondu*, from Anton Grazzini's *La Gelosia; Les Jaloux*, from Vincente Gabbiani's *I Gelosi;* and *Les Escolliers*, from Girolamo Razzi's *La Cecca*, in the 1579 volume; and in the 1611 volume, *Constance*, from Razzi's *La Costanza; Le Fidèle*, from Luigi Pasqualigo's *Il Fidele;* and *Les Tromperies*, from N. Secchi's *Gli Inganni*.

Larivey's originality consisted in giving the plays French settings, cutting out many of the female parts so that they could be more easily produced, and replacing Italian with French idioms. These translations helped to spread the comedy of intrigue (featuring swift reversals of fortune and the traditional characters—captain, pedant, courtesan, etc.) in France. The comedy lies in the sudden twists in the plot and the alternation of scenes, and in the realistic, racy language. Molière made use of situations from *Les Esprits* and *Le Fidèle* in *L'Avare* and *Les Femmes savantes*. (Ra. L.)

LA RIVIÈRE, BUREAU DE (d. 1400), one of the "Marmousets" or trusted counselors of the French king Charles V who were restored to power after an interval in the early years of Charles VI's reign, came of an old family of the Nivernais. He married Marguerite, heiress to the lordship of Auneau in Beauce, and owed some of his advancement to his uncle Jean d'Angerant, bishop of Chartres. In Sept. 1358 he was made squire to the dauphin, the future Charles V (*q.v.*), then governing for his father John II. From 1360 until Charles V's death in 1380 Bureau acted as premier chamberlain of France, receiving many tokens of friendship from the king.

Charles V had so much confidence in Bureau that in Oct. 1374, when he was providing for the succession, he appointed him custodian of the treasure that he left to his son and receiver of the revenues destined for the upkeep of the royal children. At the same time he designated him to be a member of the projected council of guardians for his son. When Charles V died, his brother Louis of Anjou seized the treasure, but when Charles VI dismissed his uncles (1388), Bureau emerged as one of the king's most reliable advisers, entrusted with numerous affairs. When Charles VI went mad, his uncles had Bureau arrested at Auneau (Sept. 1392) and confiscated his estates, but in Jan. 1394 the

property was restored, though Bureau had to withdraw for a time to La Tour-du-Pin in Dauphiné. He died in Paris on Aug. 16, 1400, and was buried, according to Charles V's wishes, at St. Denis. (R. Cs.)

ERIC HOSKING

SKYLARK (ALAUDA ARVENSIS)

LARK, generally, any bird of the family Alaudidae, perching birds known for their liquid, flute-like song, which is often sounded on the wing or while soaring. Popularly and traditionally the name, unmodified, refers to the most well-known member, the skylark (*Alauda arvensis*), one of the most abundant songsters of Europe. The family, of about 75 species, is cosmopolitan (except in polar regions), but the greatest concentration of species occurs in Africa, with only a few extending to the Australian region. The new world has only one species, which is shared with the old world, the horned lark or shore lark (*Eremophila alpestris*). Larks inhabit open, grassy country and cultivated fields. Generally brownish, often with darker streaks, larks are inconspicuous birds that forage on the ground, running instead of hopping, for insects, small berries and seeds.

The skylark is typical of the family. It ranges across northern Europe to Siberia, wintering southward to northern Africa and northeastern China, but has been introduced widely to Long Island, N.Y. (where it is now apparently extinct), Australia, New Zealand, Vancouver Island and Hawaii. It is seven inches long, mottled above, paler below and has white outer feathers on the tail. It nests on the ground, three to five usually buff eggs, heavily mottled with purplish-brown, being laid in a grassy cup. The female incubates the eggs for about 12 days, the male all the while defending the nest and supplying the female with food.

Other European larks include the crested lark (*Galerida cristata*), with an erectile crest; the wood lark (*Lullula arborea*), similar to the skylark but smaller and favouring edges of woods; and *Melanocorypha,* which comprises the calandra lark (*M. calandra*), the white-winged lark (*M. leucoptera*) and the black lark (*M. yeltoniensis*), only the male of which is black. The hoopoe lark (*Alaemon alaudipes*) is a desert bird of northeastern Africa; the bush larks (*Mirafa* species), centred in Africa, have a few species in the Australian region.

The horned lark, ranging over North America from the edge of the Arctic circle southward, is fragmented into many geographic races, all of them having black feather tufts or "horns" directed backward over the eyes and a distinctive head pattern of a black eye patch and black bib on a yellowish face and throat.

Among other birds popularly called larks are the mud lark, rock lark and titlark, which are pipits (*q.v.*), and the American meadow lark (*q.v.*), which belongs to the Icteridae.

LARKANA, a town and district in the Khairpur division of West Pakistan. The town lies on the southern bank of the Ghar canal, 8 mi. W. of the Indus, and on the Pakistan Western railway 281 mi. N.E. of Karachi. Pop. (1961) 48,008. Its name derives from the Larak tribe which inhabited the neighbouring area, and it stands at the site where the Kalhoras first established their power. The town is divided into two parts by the railway line: the old town to the east, and Lahori village and the civil lines (a section containing mostly official residences) to the west. The roads are wide and the canals are lined with gardens. Old buildings include the Tajar in the Jinnah municipal garden, the tomb of Shah Behar, the vice-regent of Nur Mohammed Kalhora in whose days Larkana was the capital of Sind, and the ruined fort.

There are two colleges affiliated to Sind university. The town is a trade centre and noted for its manufacture of brass and other metal wares.

LARKANA DISTRICT, lying along the right bank of the Indus, was formed in 1901. Area 2,866 sq.mi. Pop. (1961) 604,460. Its western part is mountainous (Kirthar range) but the rest is an alluvial plain, watered by canals, well cultivated and the most fertile part of the Sind region—it is known as the "Garden of Sind." The staple crops are rice, wheat, gram, rape and mustard. There are numerous rice-husking and flour mills. The remains of the ancient city of Mohenjo-Daro (Moenjodaro), key site for the establishment of the history of the Indus civilization (*c.* 2,500 B.C.), were found 15 mi. S. of Larkana. *See* INDUS CIVILIZATION.

(K. S. AD.)

LARKSPUR, the popular name for herbaceous plants of the genus *Delphinium,* comprising about 200 species belonging to the buttercup family (Ranunculaceae), some of which are grown as ornamentals. The flowers are borne in long and narrow terminal clusters and are usually strikingly showy; some shade of blue is the predominating colour but purple, pink, rose, orange, scarlet, yellow and white also occur.

The "spur" is a backward-projecting organ formed from the uppermost one of the five large colourful sepals. The true petals are two to four in number and are relatively small. The stems vary from less than one foot to over six feet tall. The leaves are variously lobed in digitate fashion. Both annual and perennial species occur in the genus with the latter more common. All species are poisonous because they contain several alkaloids including delphinin.

The larkspurs are of easy cultivation but seem to thrive best on a deep well-drained and well-manured soil. The annual forms are generally shorter, are grown from seed and are often used as border plants; they include several horticultural varieties of the rocket larkspur (*D. ajacis*). The taller perennial types are increased by division of older plants or by cuttings and seeds started in the greenhouse during the winter in colder climates, or in outside beds in the fall in warmer areas; they include chiefly varieties of the garland larkspur (*D. cheilanthum*), especially *D. c. formosum.* The varieties cannot usually be perpetuated with certainty by seed. Rather than offer named varieties to the trade, commercial companies often select out colour "series."

The belladonna and bellamosa hybrids, belonging to *D. c. formosum,* are hardy, prolific and reasonably true as to colour. The English hybrids are large-flowered and reasonably permanent. The so-called Pacific hybrids are very popular but seem to be relatively short-lived. Double-flowered types are not uncommon and many colour forms are available.

ROCHE

LARKSPUR (DELPHINIUM)

Many species are poisonous to livestock, such as the deep-blue-flowered Geyers larkspur (*D. geyeri*), which is at the same time one of the loveliest and also one of the worst cattle-poisoning plants of the Rocky mountains.

(H. D. H.; X.)

LARNACA, a seaport of Cyprus, is on the southeast coast in the bay between Cape Kiti and Cape Pyla, 26 mi. S.E. of Nicosia. Pop. (1960) 19,520. A long pier stretching into the bay accommodates small craft. Larger ships anchor in the roadstead and are served by lighters. Behind the sea front, with municipal offices, customhouses and hotels, are smaller streets with shops and banks; several consular representatives are in the town. Larnaca is the seat of a Greek Orthodox bishopric and contains interesting churches, that of St. Lazarus being the chief. An an-

nual feast and fair attended by great crowds is held at Whitsuntide. The town is known for its good schools which include the American academy (1908). The fort, now a museum, was built by the Turks in 1625. Three miles southwest is the widely revered Muslim shrine of Umm Haram. Dhekelia, a British military base, is about 7 mi. N.E. across the bay. Larnaca is linked to the rest of the island by road, telephone and telegraph; it has submarine telegraphic cables to Haifa and Alexandria and radiotelephone connections with other parts of the world. Cargo and passenger ships serve the port. Industry is developing; there is a tannery and a co-operative cheese factory and manufactures include underwear, brooms, processed food and chemicals. Commercial salt is produced from a lake southwest of the town and there are umber mines in the district. A government housing project was completed in 1956 and improvement of the port in 1957. Though much of the shipping has moved to Famagusta, Larnaca remains the third port of Cyprus.

Known anciently as Kition, Kittium or Chittim, Larnaca was the chief Phoenician town of Cyprus but was reduced in importance by the Greco-Persian wars. In 450 B.C. the Athenian general Cimon was killed there while besieging the Persian garrison. The Greek philosopher Zeno the Stoic was born there *c.* 336 B.C. According to tradition St. Lazarus settled there after his resurrection in Bethany and became the first bishop of Larnaca. Between the Turkish occupation (1571) and the early 20th century the town revived greatly in importance. (M. Ro.)

LARNE, a municipal borough and seaport in County Antrim, N.Ire., lies 21 mi. N.N.E. of Belfast by road. Pop. (1961) 16,341. A steamship mail, passenger and car ferry service operates twice daily each way between Larne and Stranraer, Scot., throughout the year. This is the shortest Irish sea crossing. A daily passenger, vehicle and container service operates between Larne and Preston. There are cargo services from Larne to Stranraer, Ardrossan (Scot.) and Liverpool covering all classes of goods. The port is equipped with modern cranes and loading facilities capable of dealing with all types of container and vehicular traffic.

A popular holiday resort from about 1900, Larne is the gateway to the Antrim coast road and the renowned Glens of Antrim. Turbines, radios, linen, paper and cement are assembled or manufactured locally. At Curran point may be seen the ruins of Olderfleet castle, built around 1250. It was there that Edward Bruce, the last monarch of Ireland, landed with a band of Scots in 1315 in an attempt to free Ireland from English rule. The harbour was the scene of great activity during the Unionist gunrunning in 1914. (W. McF.)

LA ROCHE, SOPHIE VON (née GUTERMANN) (1731–1807), German writer belonging to the period of sensibility. She was born on Dec. 6, 1731, in Kaufbeuren, Bavarian Swabia, the daughter of a doctor. Her engagement to her intimate friend and cousin C. M. Wieland (*q.v.*) was dissolved and in 1754 she married G. M. Franck von La Roche. From 1771 she maintained a literary salon in Ehrenbreitstein to which the young Goethe belonged (*see* his *Dichtung und Wahrheit,* book 13). Her first work, the *Geschichte des Fräuleins von Sternheim* (1771), was the first original German novel written by a woman. Indebted to Samuel Richardson, and not only for its epistolary form, the action takes place partly in England. Its heroine's melancholy moods and its "confessional" aspect as well as its social ideas won it fame. Among her other books are *Rosaliens Briefe* (1779–81), *Geschichte von Miss Lony* (1789) and *Erscheinungen am See Oneida* (1797–98), a novel set in America. All Sophie La Roche's works are imbued with the spirit of the Enlightenment and with interest in economic and social problems, including women's education; but her sensibility too often became sentimentality. She died in Offenbach on Feb. 18, 1807. She was the grandmother of Bettina von Arnim and Clemens Brentano (*qq.v.*).

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(K. Sc.)

LA ROCHE-AUX-MOINES, BATTLE OF (1214), a victory won by a French army under the Capetian prince Louis (the future king Louis VIII) for his father Philip II Augustus of France against the English under King John, at La Roche-aux-Moines, a stronghold near Savenières (in the modern *département* of Maine-et-Loire), about 9 mi. S.W. of Angers.

John had resolved to attack the Capetian domain from Poitou, while his allies, the German king Otto IV, the count of Flanders (Ferrand or Ferdinand of Portugal) and Renaud, count of Boulogne, would assail it from the north. Having disembarked at La Rochelle in Feb. 1214, John took the offensive in June, made his way over the Loire at Ancenis, laid hands on Angers and, on June 19, undertook the siege of the castle at La Roche-aux-Moines, which commanded the routes westward to Nantes and southwestward to the Poitevin coast. It was there that Louis, until then entrenched at Chinon, attacked him on July 2. At the sight of the Capetian army, John and his barons fled toward the Loire, which they crossed in disorder. The French, falling upon them as they fled, took many prisoners and a great deal of plunder. Shortly afterward, on July 27, Philip Augustus crushed the remainder of the coalition in the battle of Bouvines (*q.v.*). Consequently John had to sign the treaty of Chinon (Sept. 18).
(M. Pac.)

LA ROCHEFOUCAULD, a noble family of France, taking its name from the castle of La Rochefoucauld in Angoumois (13 mi. N.E. of Angoulême, in the modern *département* of Charente), which in turn is named after Foucauld I, seigneur de La Roche in 1019, the earliest traceable ancestor of the family. A tradition that the family was originally connected with the later royal house of Lusignan (*q.v.*) cannot be substantiated by genealogists. A barony from 1299, La Rochefoucauld was raised to a countship for FRANÇOIS I DE LA ROCHEFOUCAULD (d. 1517), who in 1494 had stood godfather to the future king Francis I of France. FRANÇOIS III (d. 1572) became a Huguenot and was killed in the massacre of St. Bartholomew's Day, but his grandson FRANÇOIS V (1588–1650) was brought up as a Catholic and was in 1622 created duc de La Rochefoucauld for his services against the Huguenots and other rebels in Poitou. However, the new duchy's letters of erection were not registered in the Paris *parlement* till 1637. The letters moreover referred to the family's alliances with royalty and thus lent support to those pretensions to special rank and princely privileges at the French court for which the illustrious FRANÇOIS VI DE LA ROCHEFOUCAULD (*q.v.*) contended so disastrously in his early manhood. The style of prince de Marcillac, long used by the eldest son in the duc's lifetime, signified merely one of the petty seigniories paradoxically styled "principalities" in France, not princely rank in the desired sense.

As well as numerous countships, the family accumulated further duchies. FRANÇOIS VIII (1663–1728) became duc de La Roche-Guyon in 1679, before succeeding his father. His son ALEXANDRE (1690–1762) left only two daughters, who both married distant cousins of the branch of La Rochefoucauld-Roye or Roye-Roucy, descended from François III's third son CHARLES (d. 1605), comte de Roye-Roucy. LOUIS FRANÇOIS ARMAND DE LA ROCHEFOUCAULD-ROYE (1695–1783) was created duc d'Estissac in 1737, just before marrying Alexandre's daughter Marie: their son, created duc de Liancourt in 1747, succeeded to his maternal grandfather's titles in 1762 (*see* LA ROCHEFOUCAULD-LIANCOURT, FRANÇOIS ALEXANDRE FRÉDÉRIC, DUC DE). From him the 20th-century ducs de La Rochefoucauld, etc., descend. Louis François Armand's uncle LOUIS (d. 1746) was created duc d'Anville in 1732, before marrying Alexandre's daughter Marie Louise Nicole.

The ducs de Doudeauville (from 1780), who have also the Neapolitan duchy of Bisaccia (from 1851), descend from FRANÇOIS, marquis de Surgères, a great-grandson of François I's younger son LOUIS, seigneur de Montendre.

LA ROCHEFOUCAULD, FRANÇOIS, DUC DE (1613–1680), French classical author who had been one of the most active rebels of the Fronde before he became the leading exponent of the *maxime* as a literary form, was born in Paris on Sept. 15, 1613, the son of François, comte de la Rochefoucauld, and his wife Gabrielle du Plessis-Liancourt. The family of La Rochefoucauld, which had been reconciled to Catholicism after being Protestant, belonged to the ancient nobility of Angoumois, possessing estates

at La Rochefoucauld, at Verteuil and at Marcillac in that province. The public life of both father and son was conditioned by the political situation in France in which the royal government was by turns threatening and flattering the nobility. Thus in 1622 the comte de la Rochefoucauld was made governor of Poitou and created duke; but later he was deprived of his governorship. His dukedom, moreover, was not registered by the *parlement* of Paris until 1637, and this delay complicated the lawsuits about precedence in which the family was to be for years engaged (apart from its claim to be accorded the same princely privileges at court as were enjoyed by the houses of Rohan and La Trémoïlle). The prince de Marcillac, as the son was called until his father's death in 1650, was married in 1628 to Andrée de Vivonne, who bore him four sons and three daughters. He served in the army against the Spaniards in Italy in 1629 and later in the Netherlands (1635) and in Picardy (1636). In 1635, however, he came under the influence of Marie de Rohan-Montbazon, duchesse de Chevreuse, who involved him in her conspiracies on behalf of the unhappy queen of France, Anne of Austria. His comings and goings in these intrigues only succeeded in procuring for him a humiliating interview with the cardinal de Richelieu and eight days' imprisonment in the Bastille (1637), followed by two years' exile at Verteuil. In 1639 he was again campaigning in Flanders. On the death of Louis XIII, he was disappointed that Anne of Austria did not reward him according to his ambitions. In 1646, however, he was wounded at Mardyck, and Cardinal Mazarin at last allowed him to acquire the governorship of Poitou.

Meanwhile Marcillac had found a mistress more tyrannical, because more clearheaded, than Mme de Chevreuse, namely Anne Geneviève de Bourbon-Condé, duchesse de Longueville, the sister of the great Condé. Throughout the phases of the Fronde (*q.v.*) he remained her closest adherent, whether or not his political or personal interests were served by the attachment. His own account of his role in the plotting and campaigning, too complex to be described here, can be read in his *Mémoires,* where he clearly shows himself to the best advantage. Though his rank, his intelligence and his daring made him one of the most prominent Frondeurs, his loyalty to the Condé faction made his real importance far less than that of his gifted rival the cardinal de Retz (whose death he tried to accomplish at one moment in 1651 by trapping the cardinal in swinging doors during a meeting of the *parlement*). Wounded at Lagny in 1649, he was horribly wounded in the battle of the Faubourg Saint-Antoine in 1652 and retired from the struggle in the following year, his health ruined and his peace of mind lost.

After convalescence in Angoumois (where his house at Verteuil had been razed in 1650), La Rochefoucauld began to live increasingly in Paris from 1656 onward. His last years were consoled by lasting and intellectually stimulating friendships with Madeleine de Souvré, marquise de Sablé (1598–1678), one of the most remarkable women of the age; and the comtesse de La Fayette (*q.v.*). He died in Paris the night of March 16–17, 1680.

Publications.—As a young man La Rochefoucauld seems to have known J. L. Guez de Balzac, his neighbour in Angoumois, but at that time he probably considered literary interests beneath the dignity of a grand seigneur. Though his self-portrait was published in a collection of such pieces sponsored by the duchesse de Montpensier in 1659, he never authorized any edition of his *Mémoires,* of which mutilated and conflated versions were published surreptitiously from 1662 onward. The first edition of his *Maximes,* published in Holland as *Sentences et maximes de morale* (1664), was disavowed by him, but he authorized five editions of them, under the title *Réflexions ou sentences et maximes morales,* in 1665, 1666, 1671, 1675 and 1678.

The Maximes.—To Mme de Sablé more than anyone else would appear to be due La Rochefoucauld's cultivation of the peculiarly French type of epigram known as the *maxime.* It all seems to have started with a sort of society game, in which moral and intellectual subjects were debated by a circle of cultivated friends and their final resolutions noted by a secretary. Brevity and pungency seem to have been the aim of the exercise. If a point of view or observation was thought unusual, its author would endeavour to make it into an epigram. In Mme de Sablé's circle, which comprised not only members of the nobility but also men of letters from the lesser clergy and the *bourgeoisie,* the great point is that all competed on equal terms; no one was the expert. La Rochefoucauld professed the greatest respect for Mme de Sablé's opinion and protested that he required her approval for all his *maximes.* Interchange of epigrams went on for several years, and the reason why several *maximes* that appeared in the Dutch edition were omitted in later editions was probably that they were considered the property of Mme de Sablé or of Jacques Esprit, who also later published their own collections.

Despite his modesty there is no doubt of La Rochefoucauld's mastery in handling the new invention. The manuscripts (and even more the Dutch edition, apparently based on a manuscript earlier than any now extant) show how carefully he would write up the essence of his thought in one or more paragraphs and then file it down to the point of ultimate brevity. Thus *maxime* 65 in the edition of 1678 has only one-sixth of the length of its counterpart in the Dutch edition (no. 14), from which he removed both the name of God and a quotation from Juvenal as the quality of the *maxime* came to be recognized as impersonal, impenetrable, unattached to any particular origin. Research has attempted the process in reverse, discovering beneath the impersonal *maxime* a personal reminiscence, often of the Fronde or of politics. The vigour and even violence of the original version is surprising, for example *Les crimes deviennent innocents, même glorieux par leur nombre et par leurs qualités; de là vient que les voleries publiques sont des habiletés, et que prendre des provinces injustement s'appelle faire des conquêtes. Le crime a ses heros ainsi que la vertu* ("Crimes are made innocent and even virtuous by their number and quality; hence public robbery is political talent and the wrongful seizure of a province is called a conquest. There are heroes in crime as well as in virtue"; no. 4 in Dutch edition). It may have been hostile reception in the first instance or the fear of revealing a political attitude that made him abandon all this, save the unrecognizable no. 185 of 1678: *Il y a des heros en mal comme en bien* ("Evil as well as good has its heroes"). Modern readers may forget that La Rochefoucauld's contemporaries would read past history into sentences that are now cryptic.

The Fronde indeed is one of those moments of history which seems to reveal men's motives at their worst. La Rochefoucauld's exposure of the self-seeking that lay beneath a customary homage to morality has earned him the reputation of a cynic, but his keenest contemporaries are no less severe. The pungency and absence of explanation which the epigram entailed make his work seem more scornful than it really was. Beneath professions of idealism he discovers and brilliantly pinpoints a restless and unquenchable thirst for self-preservation. Virtue is but one ingredient among many that are unavowed: *Les vertus se perdent dans l'interêt comme les fleuves se perdent dans la mer* ("Virtues are lost in self-interest as rivers are lost in the sea"). This image of the human mind as a sea of conflicting impulses tending toward biological survival forms the climax of his most eloquent piece of writing, a long reflection that opened the first edition of 1665 and was thereafter suppressed: . . . *Voilà la peinture de l'amour-propre, dont toute la vie n'est qu'une grande et longue agitation; la mer en est une image sensible; et l'amour-propre trouve dans la flux et reflux de ses vagues continuelles une fidèle expression de la succession turbulente de ses pensées et de ses éternels mouvements* ("Such is the picture of self-love, whose whole life is one continuous ferment; the sea is the visible image of it, and the flux and reflux of the ceaseless waves give a true likeness of the chaotic sequence of its thoughts and of its everlasting motion"). Many of the *maximes* treat other themes with remarkable acumen. For instance there is La Rochefoucauld's distinction between what we are and what we do: *La nature fait le mérite, et la fortune le met en oeuvre* ("Nature gives us our good qualities, and chance sets them to work"). More than one epigram shows a respect for the power of indolence (no. 169, 266, 293), and some express an almost Nietzschean respect for strength (no. 237, 387).

La Rochefoucauld has been called an Epicurean, but his imaginative insights attach him to no doctrine. Like Montaigne and

Pascal, he is aware of the mystery around us that dwarfs our efforts and mocks our knowledge, of the many things about ourselves of which we are unconscious, of the gap between thinking and being. All these insights seem common to the French classical school, of which, though disdaining the name of author, he is so brilliant a representative. They account for his fame and for his influence on a peculiar kind of writer, on Chesterfield and Hardy, on Nietzsche and Lichtenberg, on Stendhal and Sainte-Beuve and Gide.

Yet his chief glory is not as thinker but as artist. In the variety and subtlety of his arrangement of words he made the *maxime* into a jewel. He used its brevity not only to display the most intense concision but to express, with the effect of shock and surprise, a truth or an attitude from which palliation and explanation were absent. In his hands it is always clear, sometimes not as the truth but as that exaggeration that can surprise us into a new aspect of the truth. He describes and defines—there is no time for more—but of the single metallic image he makes amazing use. He handles paradox to such effect that the final word can reverse the rest: *On ne donne rien plus libéralement que ses conseils* ("We give nothing more generously than advice"); *Un homme d'esprit serait souvent embarrassé sans la compagnie des sots* ("An intelligent man would often find himself in difficulties without the society of fools"); *C'est une grande folie de vouloir être sage tout seul* ("It is madness to want to be wise all by oneself").

There is a complete edition of the works of La Rochefoucauld ed. by L. Martin-Chauffier and Jean Marchand in the Pléiade series (1957).

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LA ROCHEFOUCAULD-LIANCOURT, FRANÇOIS ALEXANDRE FRÉDÉRIC, DUC DE (1747–1827), French social reformer, was born at La Roche-Guyon on Jan. 11, 1747, the son of François Armand de La Rochefoucauld, duc d'Estissac. The duc de Liancourt became an officer of carbineers, and married at 17. He established a model farm at Liancourt (between Beauvais and Senlis), where he reared cattle imported from England and Switzerland. He also founded a school of arts and crafts for the sons of soldiers, which became in 1788 the École des Enfants de la Patrie. Elected to the estates-general of 1789, he became president of the assembly on July 18. Established in command of a military division in Normandy, he offered Louis XVI a refuge in Rouen and, failing in this effort, assisted him with a large sum of money. After the capture of the royal palace on Aug. 10, 1792, he fled to England and thence to the United States. After the assassination of his cousin Louis Alexandre, duc de La Rochefoucauld d'Anville, in Sept. 1792, he assumed the title of duc de La Rochefoucauld. He returned to Paris in 1799, and at the Restoration in 1814 he entered the house of peers. Successive governments recognized the value of his institutions at Liancourt, and he was for 23 years government inspector of his school of arts and crafts, which had been removed to Châlons. He was one of the first promoters of vaccination in France and an active member of the central boards of administration for hospitals, prisons and agriculture. His opposition to the government led to his removal in 1823 from his honorary positions. His works, chiefly on economic questions, include books on the English system of taxation, poor relief and education, as well as *Prisons de Philadelphie* (1796) and *Voyages dans les États-Unis* (1800). He died on March 24, 1827.

La Rochefoucauld-Liancourt's eldest son, FRANÇOIS, duc de La Rochefoucauld (1765–1848), succeeded his father in the house of peers. The second son, ALEXANDRE, comte de La Rochefoucauld (1767–1841), became ambassador successively to Vienna (1805) and to The Hague (1808–10), where he negotiated the union of Holland with France. During the Hundred Days he was made a peer of France. He devoted himself to philanthropic work and in 1822 became deputy to the chamber and sat with the constitutional royalists. He was again raised to the peerage in 1831.

The third son, FRÉDÉRIC GAÉTAN, marquis de La Rochefoucauld-Liancourt (1779–1863), wrote on social questions, notably on prison administration; he edited the works of François VI de La Rochefoucauld (1825) and the memoirs of the marquis de Condorcet, two volumes (1824), and was the author of some poems and theatrical pieces.

See F. G. de La Rochefoucauld, *Vie du duc de La Rochefoucauld-Liancourt* (1827); M. E. P. de Castellane-Novejan, *Gentilshommes démocrates: Les deux La Rochefoucauld* (1891).

LA ROCHEJACQUELEIN, the territorial name of a branch of the Poitevin family of Du Vergier, who from the 16th century were seigneurs of La Rochejacquelein and who distinguished themselves as royalists in the Wars of the Vendée (*q.v.*) and in the Hundred Days.

At the outbreak of the Revolution of 1789 the chief of the family was HENRI LOUIS AUGUSTE, marquis de La Rochejacquelein, *maréchal de camp* in the royal army, who had three sons, Henri, Louis and Auguste. The marquis emigrated with Louis and Auguste in 1791, entered the service of Great Britain and died in San Domingo in 1802.

HENRI, comte de La Rochejacquelein, born at Dubertien, near Châtillon-sur-Sèvre on Aug. 30, 1772, did not emigrate with his father. He served in Louis XVI's Constitutional guard and remained in Paris till the fall of the monarchy on Aug. 10, 1792. He then took refuge with Louis Marie, marquis de Lescure, on his own estates near Parthenay in Poitou. When the anticlerical policy of the Revolution provoked the rising of the peasants of the Vendée in March 1793, he became one of their leaders. After the defeat of the Vendéans by the republicans at Cholet in October, he became their nominal commander in chief, but he had in fact to obey his army and could only display his personal valour in action. He could not avert the mistaken policy that led to the rout at Le Mans and was shot near Nouaillé on Feb. 9, 1794.

LOUIS, marquis de La Rochejacquelein, the younger brother of Henri, born at St. Aubin de Beaubigné in 1777, accompanied his father in the emigration, served in the "army of Condé" and entered the service of England in America. He returned to France in 1801, when there was an amnesty for *émigrés*, and, also in 1801, married the marquise de Lescure (Marie Louise Victoire de Donnissan), widow of his brother's friend (who had been mortally wounded at Cholet). Her *Mémoires* (1815) give a remarkable picture of the war and the fortunes of the royalists. On the first Restoration (1814), the marquis was made *maréchal de camp* by Louis XVIII, whom he accompanied to Ghent in March 1815, when Napoleon I returned to France. After passing to England, Louis in May went back to the Vendée to try to bring about another rising for the king. He was shot in a skirmish at the Pont des Mathes, St. Gilles, on June 4, 1815.

LA ROCHELLE: *see* ROCHELLE, LA.

LA ROCHE-SUR-YON: *see* ROCHE-SUR-YON, LA.

LA ROMANA, the largest province in the Dominican Republic, 1,445 sq.mi. in area, occupies the rolling plains of the extreme eastern part of the nation and includes Catalina and Saona islands off the Caribbean coast. It is a leading sugar-producing and cattle-raising centre. Pop. (1960) 104,987. The capital, La Romana (pop. [1960] 24,058), was founded near the end of the 19th century and grew rapidly after the establishment of a large sugar mill in 1911. The old town of Higüey, founded in 1502, has an elaborate shrine. Until 1961 the name of the province was La Altagracia. (D. R. D.)

LAROMIGUIÈRE, PIERRE (1756–1837), French philosopher, one of the liberal and free-thinking Idéologues, was born at Livignac in Rouergue, on Nov. 3, 1756. As professor of philosophy at Toulouse, he incurred the censure of the *parlement* by a thesis on the rights of property in connection with taxation, which he considered arbitrary and therefore illegal. After the French Revolution he was appointed professor of logic at the École Normale and later librarian of the Prytanée (the Collège Louis-le-Grand) in Paris. He became associate member of the Institut (1796), a member of the tribunate (1799), professor at the Faculté des Lettres (1811) and a member of the Académie des Sciences Morales et Politiques (1833).

Laromiguière's *Projet d'éléments de métaphysique* (1793) was well received by the followers of Condillac's philosophy, and he edited Condillac's works in 1795. He departed from Condillac's doctrine however in his view of the faculty of judgment, which he regarded as an independent property of the mind, and he published a work entitled *Les Paradoxes de Condillac* (1805). His famous *Leçons de philosophie* (1815–18) reproduced a course of lectures at the Faculté des Lettres. Against the natural scientists who were attributing all functions of the mind and all mental experiences to physiological causes, Laromiguière maintained that some functions of the mind originate from within itself. He sought on the other hand to account for ideas in terms of established and familiar faculties and their interplay, thus depriving certain ideas—such as those of virtue, God and beauty—of their mystery. In this he stood for the protest of the philosophical Idéologues against the growing romanticism of his age. Laromiguière died in Paris on Aug. 12, 1837.

See H. Taine, *Les Philosophes français classiques du XIXe siècle* (1857); F. Picavet, *Les Idéologues* (1891); P. Alfaric, *Laromiguière et son école* (1929).

LAROUSSE, PIERRE ATHENASE (1817–1875), French grammarian, lexicographer and encyclopedist, whose monument is the *Grand Dictionnaire universel du XIXe siècle* and the publications which have stemmed from it, was born at Toucy (Yonne) on Oct. 23, 1817, the son of a blacksmith. His thirst for knowledge could not be satisfied with the little books sold by the peddlers. A bursary enabled him to study at Versailles and this was followed by a period as schoolmaster at Toucy. In 1840 he decided to go to Paris where for eight years he gave himself to intense study, following all the courses at the Observatoire, the Sorbonne and the Collège de France; it was a spartan existence on his inadequate savings. In 1852 he founded a publishing house and bookshop for the dissemination of the grammars and educational works he had begun to write. The success was immediate and provided a financial basis for the *Grand Dictionnaire*. This was issued in fortnightly parts, the first in 1865, the last, completing the 15 volumes, in 1876. Larousse, exhausted by his immense labour, died on Jan. 3, 1875. "My first ambition was to teach children; I wanted to continue by trying to teach everyone about everything"—such was the ideal that animated him. He was utterly single-minded in a time when belief in progress, science and universal education was unclouded by doubt.

See *Grand Dictionnaire universel du XIXe siècle,* vol. 10, p. 211, and vol. 16 (supplementary vol.), p. 1038; *Bibliographie de la France,* pp. 163–166 (1961). (H. G. Wh.)

LARRA, MARIANO JOSÉ DE (1809–1837), satirist and the most famous Spanish journalist. His brief life is uniformly depressing. Five childhood years (1813–18) in exile in Bordeaux, estranged parents, an unhappy early marriage (1829), the proud consciousness of superior talents denied honourable rank in society and politics induced in him a morbid conviction of failure as man and patriot which a rejected passion (for Dolores Armijo de Cambronero) exacerbated to suicide in Madrid on Feb. 13, 1837. Not surprisingly his work, including neoclassic verse and translated plays, is autobiographical. The figure of the lonely wanderer haunted him, and a play, *Macías,* and a novel, *El doncel de don Enrique el doliente* (both 1834), recreate the tragedy of the Galician troubadour.

In privately published journals, *El duende satírico del día* (1828), *El pobrecito hablador* (1832) and at unprecedented salaries in the public press—*Revista española, El español, El redactor general*—he wrote the articles which made him a classic of the language and stamped the image of a disillusioned personality on the pseudonym "Fígaro" which he first adopted in 1833. With mordant wit, magnificent dramatic feeling for dialogue and characterization and a rich display of the finest craft of journalism, he scarified contemporary society in its social habits, literary tastes and political ineptitudes.

See I. Sánchez Esteban, *M. J. de Larra* (1834); Carmen de Burgos, *Fígaro* (1919). (R. F. B.)

LARSA, one of the ancient capital cities of Babylonia, has been identified with the site of Senkarah about 20 mi. S.E. of Uruk (Erech; Arabic Tall al Warka) in southern Iraq. The ruins occupy an extensive area estimated by A. Parrot (who excavated for two months on behalf of the Musée du Louvre in 1933) at 1 x 1.8 km. It is probable that the city was founded in prehistoric times and the mound certainly contains extensive remains of the 3rd millennium B.C. Its most prosperous period however coincided with an independent dynasty inaugurated by a king named Naplanum (*c.* 2023–03 B.C.), a contemporary of Ishbi-Irra who founded a dynasty at the rival city of Isin (*q.v.*). Naplanum was succeeded by 13 kings, many of whom exercised great authority in Babylonia and represented the new hegemony of Semitic Akkadian elements which superseded the Sumerians.

Isin and Larsa seem to have existed in a state of armed neutrality for rather more than a century during the time when each city was consolidating its rule; the former city was then recognized as dominant at Ur. But business records found at Ur and dated by reference to the fifth and sixth kings of Larsa, Gungunum and Abisare (*c.* 1900 B.C.), show that Larsa was already on the road to dominance. The 12th king of the dynasty, Silli-adad, reigned for a single year, *c.* 1834 B.C., and was then deposed by a powerful Elamite, Kudur-Mabug, who installed his son Warad-Sin (1833–22 B.C.) in his stead; this apparently was accomplished with little disturbance to economic continuity, for a local tradesman charged both outgoing and incoming rulers for their consumption of beer on the same bill. This was in fact a most prosperous period as many thousands of business documents attest. Agriculture and stock breeding flourished; much attention was given to irrigation; and long-distance trade connected the Euphrates with the Indus valley through a commerce in hides, wool, vegetable oil and ivory. Indian-type seals and etched carnelian beads, variants of those found on Indus valley sites, form a part of this evidence. Under Warad-Sin's son Rim-Sin (1821–1761 B.C.) the arts received every encouragement. In particular the old scribal schools were responsible for the composition of hymns and poems of high quality, still written in the old Sumerian language. The days of Larsa were however now numbered, for Hammurabi of Babylon, who had long been determined to destroy his most dangerous enemy, defeated Rim-Sin in the 30th year of his reign and substituted his own authority for that of Larsa over southern Mesopotamia.

The brief excavations conducted by Parrot in Larsa were rich in promise and revealed a ziggurat, a temple to the sun-god, a palace of Nur-Adad (1863–48 B.C.), as well as many tombs, small objects and remains of the Neo-Babylonian and Seleucid periods. Many important discoveries remain to be made on this site. *See* also Babylonia and Assyria.

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LARTET, ÉDOUARD ARMAND ISIDORE HIPPOLYTE (1801–1871), French geologist and archaeologist, was born in 1801 at Saint Guiraud near Castelnau-Barbarens, *département* of Gers, France. The then recent work of Baron Cuvier on fossil mammalia encouraged Lartet in excavations which led in 1834 to his first discovery of fossil remains in the neighbourhood of Auch. Thenceforward he devoted considerable time to a systematic examination of French caves, his first publication on the subject being *The Antiquity of Man in Western Europe* (1860), followed in 1861 by *New Researches on the Coexistence of Man and of the Great Fossil Mammifers Characteristic of the Last Geological Period.* In this paper he made public the results of his discoveries in the cave of Aurignac, where evidence existed of the contemporaneous existence of man and extinct mammals. In his work in the Périgord district Lartet had the aid of the English ethnologist Henry Christy. They published their researches as *Reliquiae Aquitanicae,* the first part appearing in 1865. The most modest and one of the most illustrious of the founders of modern paleontology, Lartet was made professor of paleontology at the museum of the Jardin des Plantes in 1869. He died at Seissan, in Jan. 1871. (H. Ke.)

LA RUE, PIERRE (Pierchon) **DE** (*c.* 1460–1518), celebrated Franco-Flemish composer, was born at Tournai about 1460. He was apparently a pupil of Jean d'Okeghem. From 1492 he worked in Brussels, where he served Philip the Handsome and (from about 1508) Margaret of Austria, regent of the Netherlands; with them he visited France and Spain. He spent the end of his life as canon at Courtrai, where he died on Nov. 20, 1518.

La Rue left more than 30 Masses and about 45 motets, distinguished by their densely compressed style and structural unity. His 32 surviving secular pieces include instrumentally accompanied solos as well as exclusively vocal polyphony.

See *Pierre de La Rue: Liber Missarum,* ed. by A. Tirabassi (1941). (B. L. Tr.)

LARYNGITIS, an inflammation of the mucous membrane of the larynx, may be either acute or chronic. It is the result of infection, chemical irritation, vocal abuse or some internal systemic disorder.

Acute Laryngitis may occur independently or as an extension of an inflammation of nasal or bronchial mucous membrane. The chief causes are "catching cold," excessive use of the voice in speaking or singing, inhalation of irritating smoke or dust, or swallowing very hot fluids or corrosive poisons. It occurs in acute fevers such as accompany influenza, measles, diphtheria and scarlet fever. As a result of the inflammation there is a general swelling of the larynx and epiglottis, with a narrowing of the air passages, and to this the chief dangers of laryngitis are due. Symptoms vary with the intensity of the attack; there is first a sense of tickling, then of heat, dryness and pain in the throat, with difficulty in swallowing and a dry cough with expectoration later; phonation becomes painful; the voice is husky or completely lost. As the swelling of the parts increases, difficulty in breathing (dyspnea) develops. This occurs more rapidly in children than adults because of the small size of the child's laryngeal air passages. In favourable cases, which form the majority, the attack abates in a few days, but if the inflammation increases, edema may develop and death occurs suddenly from an asphyxial paroxysm. Many cases of acute laryngitis are so slight that they cause only hoarseness and cough. In children, the question of diphtheria must always be considered. The treatment is rest; talking must not be allowed. The patient should be kept in bed in a room in which the temperature is even and the air is saturated with moisture. An ice bag around the throat gives much relief, while diaphoretics may be given internally with Dover's powder if there is much pain or cough. Chemotherapy with sulfa drugs and antibiotics is used in all but mild cases. (*See* also Croup.)

Chronic Laryngitis follows repeated attacks of the acute form and is nearly always accompanied by granular pharyngitis. It may progress to cause chronic polypoid, hypertrophic changes or hyperkeratosis and leukoplakia. (*See* also Cancer.) It is common in people who habitually overuse the voice. The constant inhalation of irritating vapours, such as tobacco smoke, may also cause it. The most prominent symptom is the voice change or hoarseness, which varies according to voice use. There is usually little or no pain, only the unpleasant sensation of tickling in the larynx, with a constant desire to cough. Treatment consists of removing the cause when it is known—for example, smoking or shouting—and local application of mild astringents. Of particular importance is the clearing of any nasal or sinus infection; such infections cause continued reinfection of the larynx and ultimately lead to an atrophic (chronic) laryngitis, or laryngitis sicca. In atrophic laryngitis, the mucosa of the larynx atrophies and crusts of dried secretions form on it.

Tuberculous Laryngitis is secondary to pulmonary tuberculosis. The mucous membrane is invaded by tubercles that first form small masses and later caseate and break down. The first indication is hoarseness or, in certain forms, pain on swallowing. The irritating laryngeal cough, which varies from the patient's chronic, productive pulmonary cough, is a late symptom. Of greatest importance in treatment is the adequate management of the pulmonary disease. Voice rest is essential. Streptomycin and its adjuvants have made a vast change in the course of this condition, although laryngeal tuberculosis still adds to the gravity of the prognosis of the patient with pulmonary tuberculosis.

Syphilitic Laryngitis may occur in all three stages of syphilis and in the inherited form. In the secondary stage the damage is superficial and symptoms are those of a slight acute laryngitis. The injury in the tertiary stage is much more serious; deep ulcers, which in healing form strong cicatrices or scars, produce stenosis (narrowing) of the air passage, requiring surgical intervention. Occasionally a fatal edema arises. The treatment is that of the primary condition.

Paroxysmal Laryngitis, or laryngismus stridulus, is a nervous affection of the larynx that occurs in infants. It appears to be associated with adenoids and rickets. The disease consists of a reflex spasm of the glottis with complete occlusion of the air passages. The attacks, which are recurrent, cause acute asphyxia. They may cease for no obvious reason, or one may prove fatal. The whole attack is of such short duration that the infant has either recovered or possibly succumbed before assistance can be called. After an attack, careful examination should be made and the adenoids, if present, should be removed by operation.

Other Forms of laryngitis such as those due to fungus diseases are less common. All inflammations may cause varying degrees of edema, ulceration, granulation tissue formation or perichondritis with ultimate destruction of parts and final healing by scar tissue formation and stenosis. Acute laryngeal edema, or edematous laryngitis, occurs in acute laryngitis as a complication of cellulitis of the neck and in angioneurotic edema. A more chronic form is seen in tuberculous and syphilitic laryngitis as well as in kidney disease and certain fevers. The mucous membrane of the epiglottis, false cords (ventricular folds) and subglottic region becomes swollen; hoarseness, marked stridor and increasing dyspnea develop rapidly, becoming dangerous within an hour in severe cases. Treatment is the same as that indicated for acute laryngitis; if treatment does not relieve the symptoms, tracheotomy must be performed immediately.

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LA SABLIÈRE, MARGUERITE HESSEIN, Dame de (*c.* 1640–1693), patroness of the French poet Jean de La Fontaine, was the wife of Antoine Rambouillet, sieur de La Sablière (1624–79), a Protestant financier entrusted with the administration of the royal estates. She received an excellent education in Latin, mathematics, physics and anatomy from the best scholars and made her house a meeting place for poets, scientists, men of letters and members of Louis XIV's court. About 1673 she received into her house La Fontaine, whom for 20 years she relieved of all material anxiety. La Fontaine dedicated one of his poems to her. Another inmate of her house was the traveler and physician François Bernier. The abbé de Chaulieu (Guillaume Amfrye) and his fellow-poet, Charles Auguste, marquis de La Fare, were among her most intimate friends. La Fare sold his commission in the army to be able to spend his time with her. This liaison, which lasted two years and seems to have been the only serious passion of her life, was broken in 1679, when La Fare abandoned her for the actress Mlle de Champmeslé (Marie Desmares). She then retired to the Hospital of the Incurables in Paris to nurse the sick. She died there on Jan. 8, 1693.

See V. Menjot d'Elbenne, *Madame de La Sablière* (1923).

LA SALE, ANTOINE DE (*c.* 1386–*c.* 1460), French writer chiefly remembered for his *Jehan de Saintré,* in which a great gift for the observation of court manners and a keen sense of comic situation and dialogue enlivens a biographical romance dedicated to the ideals of chivalry. He was born in Provence, near Arles. From 1400 to 1448 he served the dukes of Anjou, Louis II, Louis III and René I (*qq.v.*), as squire, soldier, administrator and, ultimately, as governor of René's son and heir, John of Calabria. The Angevin claims to the kingdom of Sicily brought him repeatedly into Italy, and his didactic works contain several alertly related accounts of his unusual and picturesque experiences there. In 1407 he was at Messina and the Lipari islands, and about this

time he attended a tournament at Brussels. He was in Italy again for Louis II's 1409–11 campaign against Ladislas of Durazzo, and soon after its collapse again visited the Burgundian domains, to attend a tournament at Ghent. In 1415 he took part in a Portuguese expedition against the Moors of Ceuta. From 1420 to 1426 he was in Italy while Louis III, based on Rome, again tried to make good his claim to Naples and Sicily against the Aragonese allies of Queen Joanna II of Durazzo, queen of Naples. During this time La Sale made the excursion to the Sibyl's mountain near Norcia, seat of the legend later transported to Germany and attached to the name of Tannhäuser, which he relates in great detail in his *Paradis de la reine Sibylle*. In 1429 he served as *viguier* of Arles.

Shortly after the accession to the dukedom of René, brother of Louis III, La Sale was appointed governor of the duke's eldest son, Jean (John of Calabria). In 1438–40 he was again in Italy with René. In 1445 he accompanied René's daughter, Margaret, who had married Henry VI, to London to see her crowned queen of England, and in 1446 he was judge of an *emprise d'armes* at Saumur. In 1448 he left the Angevin service to become governor of the three sons of Louis of Luxemburg, count of St. Pol. The remainder of his life was spent in the domains of his new patron on the river Oise. Here he wrote *La Salle* (1451), a collection of moral anecdotes, relying heavily on Simon de Hesdin's translation of Valerius Maximus, *Le Petit Jehan de Saintré* (1456), *Du Réconfort à Madame de Fresne* (1457) and a *Lettre sur les tournois* (1459). He is last mentioned in a document of 1460.

La Sale's reputation as a writer rests on *Jehan de Saintré*, a pseudo-biographical romance relating the youth and rise to fame of a knight at the court of Anjou who, in real life, achieved great fame in the mid-14th century. The scene is laid at the court of France under John II (Jean le Bon; 1319–64), where the youthful page attracts the interest of a young widow "qui des Belles-Cousines estoit," and under her tutelage and, in time, with the incentive of her love, grows up into a "perfect gentleman" and celebrated knight. While Saintré is absent on a chivalric enterprise the lady yields to the advances of a jovial young abbot of bourgeois extraction, and the two endeavour to render Saintré ridiculous on his return, before falling victims to the humiliating revenge he exacts. Modern criticism ascribes an important place to the *Saintré* in the development of French prose fiction, and extols the writer's grace, wit, sensibility and realism.

BIBLIOGRAPHY.—The *Réconfort* and selections from the didactic works were ed. by J. Nève (1903); *Le Paradis de la reine Sibylle* (1930), *La Salade* (1935), and *La Salle* (1941) by F. Desonay. The best mod. ed. of the *Saintré* is by P. Champion and F. Desonay (1927). For biography, *see* J. Nève, *Antoine de la Salle* (1903); F. Desonay, *Antoine de La Sale, aventureux et pedagogue* (1940); and articles by C. A. Knudson in *Romania,* LIII (July 1927), pp. 365–373, and in *Romance Philology,* II (Aug. 1948), pp. 90–98; XI (May 1958), pp. 362–368. E. Auerbach, *Mimesis* (1946; Eng. trans. 1953) has an illuminating chapter on an episode in the *Réconfort*. (C. A. K.)

LA SALLE, SAINT JEAN BAPTISTE DE (1651–1719), French reformer of education and founder of the Brothers of the Christian Schools, was born of an aristocratic family at Reims on April 30, 1651. After becoming a priest (1678) he devoted himself to the education of the poor, at that time much neglected. He helped to establish charity schools in his own town and subsequently formed his teachers into a religious order (1684). His schools multiplied until at the time of his death they were to be found in 22 towns of France and in Rome. La Salle also set up training colleges for secular teachers, the first of their kind; boarding schools of nonclassical type for middle-class boys; and reformatories. He was a man of refined manners, cultured mind and great practical ability, in whom personal austerity was allied with kindliness and affability. He died at Rouen on April 7, 1719, and was canonized in 1900; his feast day is May 15.

Among La Salle's spiritual writings are *Les Devoirs d'un chrétien,* 3 vol. (1703); *Recueil de différents petits traites* (1711); and two series of *Méditations* (1730–31). His pedagogical works include *Les Règles de la bienséance et de la civilité chrétiennes* (1703); *La Conduite des écoles chrétiennes* (1720); and various school manuals. W. J. Battersby edited the *Letters and Documents,* in French and English (1952), and the *Meditations,* in English (1953). *See* also CHRISTIAN SCHOOLS, BROTHERS OF THE.

BIBLIOGRAPHY.—W. J. Battersby, *St. John Baptist de La Salle* (1957), *De La Salle: Pioneer of Modern Education* (1949), *De La Salle: Saint and Spiritual Writer* (1950). (W. J. BY.)

LA SALLE, RENÉ ROBERT CAVELIER, SIEUR DE (1643–1687), French explorer in North America, was baptized at Rouen, France, on Nov. 22, 1643. He received the best education of the period, that of the Jesuits, but acquired an enmity for the organization which influenced many of his later acts. In 1666 he emigrated to Montreal where he received a grant of land on the St. Lawrence river. An impetus to explore, however, led him constantly into the wilderness and in 1669 and 1670 he undertook explorations south of Lakes Ontario and Erie. The claim often made that he discovered the Ohio river in 1671 is not accepted by modern historians. His services and ability made him a favourite with Frontenac, the governor of Canada, and in 1674 he was sent to France as the governor's representative to defend the building of Fort Frontenac (on the site of Kingston, Ont.), which Frontenac had undertaken upon his own initiative, and also to petition for the command of the fort. His petitions were successful. In 1677 he again visited France to seek further privileges and financial assistance in extending his explorations and the fur trade westward, together with the permission to build forts. He was rewarded with a monopoly of the trade in the Mississippi valley.

In 1679, after thorough preparation, members of his expedition boarded the "Griffin," the first commercial vessel on Lake Erie, and proceeded to Green Bay, Wisconsin, where the ship was loaded with a cargo of furs and started on its return voyage. La Salle hoped the cargo would pay his creditors at Montreal but the ship was never heard from again. Unaware of the loss of the ship, La Salle continued down the west shore of Lake Michigan to the mouth of the St. Joseph river where Fort Miami was built. From there, joined by a party under his lieutenant, Henri de Tonti, his expedition of 34 men ascended the river and portaged to the Illinois, where they erected Fort Crèvecoeur near Lake Peoria. Preparations were here made for the voyage down the Mississippi, while Michael Accault, Father Hennepin and another *voyageur* were sent on a successful trip up that river beyond the Falls of St. Anthony in Minnesota. La Salle and four companions started on a hurried trip back to Fort Frontenac to straighten out finances and bring supplies, while Tonti led a small party in search of a better site for a fort. Messengers met La Salle upon his return with the news that Fort Crèvecoeur had been abandoned and the men deserted. La Salle, fearing for Tonti's safety, rapidly canoed westward and descended the Illinois to the Mississippi without finding him. He and his men then returned on foot to Fort Miami, from where La Salle returned to Fort Frontenac for a third time. Tonti and his men, after being captured by the Indians, had meantime made their way to Green Bay.

La Salle, having been able to raise funds, returned in the spring full of courage for another attempt. Tonti rejoined him and the party of more than 50 proceeded via the Chicago-Illinois portage to the Mississippi river, down which they descended without difficulty to its long-sought mouth. There on April 9, 1682, La Salle took possession of the region watered by the Mississippi and all its tributaries for Louis XIV of France and named it "Louisiana."

La Salle was on the verge of success. He intended to build forts and plant colonies both in the Illinois region and at the mouth of the Mississippi, through which he could control the resources of his vast empire. He hoped soon to free himself of the entanglements of Canada and become governor of an independent realm. In Dec. 1682, he began the construction of Fort St. Louis on the Illinois river, the first post of a permanent character in the Illinois country. To facilitate the transportation of supplies he sent two men to build a post on the present site of Chicago to guard the Chicago portage. Unfortunately, however, Frontenac, his loyal supporter, was recalled to France. La Salle's merchant rivals, who resented his monopoly, carried on a campaign against him, succeeding first with Frontenac's successor, and finally with the French government at home. La Salle, convinced of the hostility

of the new governor, started east to treat with him, but on the way met officials sent by the governor to take over the Illinois forts. La Salle was forced to carry his troubles directly to France.

There he met with favour, and the ministry, convinced that a colony at the mouth of the Mississippi was a strategic move of first importance against Spain, with whom France was then at war, authorized and aided La Salle to attempt it. La Salle was made governor of all Louisiana and the forts in the Illinois country were restored to him and repossessed by Tonti. In 1684 La Salle left France with four ships and about 400 men to make the settlement. The naval commander, Beaujeu, however, refused to obey La Salle from the first, and before long was responsible for the loss of the main supply ship to the Spanish. In the West Indies, La Salle was seized with the fever and during his long illness the expedition became completely disorganized. When he finally continued with but 180 men it was only to miss the mouth of the Mississippi by proceeding too far to the westward. He retraced his steps and, conditions on shipboard becoming desperate, disembarked his colonists on the present Matagorda bay, Texas, the inlet of which he supposed to be the western outlet of the Mississippi. A short land journey soon convinced him of his mistake, and a longer land expedition to find the Mississippi was unsuccessful. Two of his remaining three ships were wrecked and the third had returned to France. The plight of the colony—reduced to 45 men—had become so desperate that La Salle and a small party made a fruitless attempt to reach Canada where their situation might be made known. Finally, in Jan. 1687 he determined to make a second attempt and took about half the remaining survivors with him. On the way a mutiny occurred and La Salle was assassinated by one of his own men. A few reached Fort St. Louis on the Illinois river.

See also references under "La Salle, René Robert Cavelier" in the Index.

For sources *see* P. Margry, *Découvertes et Établissements* (1876–86); I. J. Cox, *Journeys of La Salle* (1922); L. P. Kellogg, *Early Narratives of the Northwest* (1917). For secondary works: F. Parkman, *La Salle and the Discovery of the Great West* (1879); H. Lorin, *Le Comte de Frontenac* (1895); G. Gravier, *Cavelier de La Salle* (1871); L. S. Hasbrouck, *La Salle* (1916); Maurice Constantin-Weyer, *The French Adventurer: The Life and Exploits of La Salle* (1931).

LAS BELA, a district of Karachi division, West Pakistan, in the southeast coastal area of the Baluchistan region, and formerly a princely state. Area 7,048 sq.mi. Pop. (1961) 90,826. The Porali and Kud rivers from the north unite to water the fertile alluvial plain of Las Bela, the Porali flowing into the Arabian sea near Sonmiani. The eastern part of the district is mountainous and includes the western slopes of the Kirthar range and the main ridge of the Pab range. Between these two ranges lies the long, narrow Hab valley. The hills strike nearly north and south, diminishing in height as they approach the sea and allowing of a route skirting the coast between Karachi and Bela. The climate of the northern parts is extremely hot for about eight months of the year, while the coastal area has a moderate and moist climate. The rainfall is low and uncertain. The soil is a fertile sandy loam, mostly dependent upon flood irrigation. The staple food grain of the country is jowar. Sheep, goats and camels are bred in large numbers.

Bela (pop. [1961] 3,139), formerly the state capital and now the district headquarters, is scenically situated on the Porali, near the apex of the Las Bela plain, 115 mi. N.W. of Karachi and 195 mi. S. of Kalat. A fair-weather road links it with Karachi and another with Quetta through the Mengal country via Kalat and Mastung. The town is not walled. The jam's (chief's) residence, a *tahsili* (treasury) and a jail are the principal buildings. Sir Robert Sandeman died at Bela in 1892.

Las Bela has been important in history for its situation on the Makran coastal trade route between Sind and Persia (Iran). Alexander the Great passed through the southern part in 325 B.C.; the Arab general Mohammed bin Kasim followed the same path in A.D. 711. There are traces of ancient Arab (possibly Himyaritic) occupation in stone ruins at Gondakeha on the Kud, 10 mi. N.W. of Bela, while the Greek name Arabis for the Porali is itself indicative of a prehistoric connection with races of Asian Ethiopians referred to by Herodotus. With the influx of Arabs into Makran, Bela, under its ancient name of Armel (Armabel), rose to importance as a link between Persia and Sind.

The later history of Las Bela is bound up with that of Kalat and of Baluchistan (*qq.v.*) as a whole. It acceded to the new dominion of Pakistan on March 17, 1948, and with Kalat, Kharan and Makran formed the Baluchistan states union on Nov. 3, 1952. In Oct. 1955, when West Pakistan was made into a single governor's province, Las Bela became one of the five districts of the Kalat division, and from July 1, 1961, one of the two districts of the Karachi (*q.v.*) division. The former ruling family belongs to the Aliani family of the Jamot tribe of Qureish (Koreish) Arabs.

The population of Las Bela is Muslim. The Lumris or Lasis, from whom comes the prefix Las, are the dominant people in the district. The term Lasi strictly includes the Panj Raj or five tribal confederacies, under each of which is a large number of small groups. Outside elements later joined this nucleus making the Lasis a somewhat heterogeneous mixture. The other chief tribes are the Brahuis and Balochis. (K. S. Ad.)

LASCARIS, the name of a Byzantine family that came into prominence at the time of the fourth crusade. Theodore I, a son-in-law of Alexius III Angelus, became founder of the Lascarid dynasty in Nicaea after the Latin conquest of Constantinople (1204) and was crowned emperor there in 1208. He was succeeded by his son-in-law John III Vatatzes (1222–54) and by his grandson Theodore II (1254–58), whose son John IV was disinherited and blinded by Michael VIII, founder of the dynasty of Palaeologus. Other Lascarids held office under the later Palaeologi; the scholars John (Janus) and Constantine, who helped to promote the revival of Greek learning in Italy after 1453, were of the same family. *See* also Byzantine Empire.

See A. Gardner, *The Lascarids of Nicaea* (1912). (D. M. N.)

LASCARIS, CONSTANTINE (1434–1501), a Byzantine exile, primarily a grammarian and copyist, who taught Greek in Italy. He was born in Constantinople and after the fall of the city (1453) visited Rhodes. By 1460 he was in Milan where he became tutor to the duke's daughter Ippolita Sforza and wrote for her his *Erotemata*. Published in Milan (1476), this was the first book printed entirely in Greek and enjoyed long popularity as an elementary grammar. He held chairs at Naples in 1465 and at Messina, where he taught Pietro Bembo, from 1467 to his death. A scholarly copyist, he produced many valuable manuscripts, including collections of the Greek rhetoricians and epistolographers.

See minor works in J. P. Migne, *Patrologia Graeca,* vol. 161 (1866); V. Labate, "Per la biografia di Costantino Lascaris," *Archivio storico siciliano,* vol. 26, pp. 222–228 (1901). (R. R. Bo.)

LASCARIS, JOHN (Janus) (*c.* 1445–*c.* 1535), Greek scholar and diplomat, whose career shows the close connections which linked political interests and humanist effort before the Reformation, was born in Constantinople. When the Turks captured the city (1453) he was taken to the Peloponnese, and *c.* 1465 went to study at Padua, a beneficiary of Cardinal Bessarion's scheme to educate young Greeks in Italy for the eventual liberation of Constantinople. Ten years later he was teaching Greek in Florence. Appointed librarian to Lorenzo de' Medici, he toured the Levant (1489–92), and his records of the manuscripts he sought, examined or purchased are of great value for the history of learning. Simultaneously, he collected information about the Turkish empire. He produced some useful *editiones principes* including the *Greek Anthology*, Callimachus, Musaeus and Lucian. His knowledge, connections and devotion to Greek freedom rendered his services much in demand among rulers contemplating an active eastern policy. After the fall of the Medici he served the French court in various diplomatic posts, helped Pope Leo X to establish in Rome the short-lived Quirinal college for training young Greeks and was chosen in 1525 to present Pope Clement VII's appeal for a crusade to the emperor Charles V. Appointed French ambassador in Venice in 1503, he helped Aldus Manutius with his edition of the *Rhetores Graeci* and through his friendships with Jacques Lefèvre d'Étaples and Guillaume Budé he presided over the beginnings of the French Renaissance.

Lascaris died in Rome *c.* 1535.

See B. Knös, *Un Ambassadeur de l'héllenisme—Janus Lascaris* (1945). (R. R. Bo.)

LAS CASAS, BARTOLOMÉ DE (1474–1566), bishop of Chiapas, known as the "Apostle of the Indies," was born in Seville of a merchant father. His youth was spent in Triana, a suburb of Seville, where he studied Latin and the humanities. Ordained to minor orders, he went to Hispaniola with the Spanish governor Nicolás de Ovando in 1502 to help indoctrinate the Indians in the Christian religion. In 1512 he was ordained priest. About 1514 Las Casas became convinced that the forced labour of Indians was an unmitigated evil. He renounced his own Indian allotment and in 1515 returned to Spain to appeal for a change in government policy toward the natives. He found a patron in Francisco Cardinal Jiménez de Cisneros, coregent of Spain for Charles V, who sent a commission to investigate the problem. Las Casas, who accompanied the commission, was dissatisfied with its half measures and returned to Spain, where he was given a grant of land in Cumaná (Venezuela) to be colonized without conquest. The attempt proved a failure, and a revolt of the Indians in 1521 forced Las Casas to take refuge in the Dominican monastery of Santo Domingo. In 1523 he joined the Dominican order. He spent the next 12 years in Santo Domingo, beginning work on his *History of the Indies* and his *Apologetic History.*

En route to Peru in 1535 Las Casas was forced ashore in Nicaragua by unfavourable winds. From there, because of his censure of Spanish colonial methods, he had to flee to Guatemala, where he tried, unsuccessfully, to preach the faith by peaceful means, as described in *The Only Method of Attracting All People to the True Faith* (1537). In Oct. 1540 he returned to Spain, where he wrote his *Very Brief Account of the Destruction of the Indies,* attributing the evils in the colonies to the cruelty of the Spanish colonists and contributing to the promulgation of the new laws in 1542, which revoked or limited the right of Spaniards to service or tribute from the Indians. In the midst of the turmoil evoked by this legislation Las Casas was named bishop of Chiapas, Guatemala (consecrated 1544). His uncompromising attitude soon alienated every responsible sector of his diocese, and in 1547 he returned to Spain, never again visiting the new world. Las Casas spent his last years close to the court, opposing royal colonial policy and correcting his historical writings. He died at the Dominican monastery of Atocha in Madrid in 1566.

Las Casas is still a figure of controversy. His colonization attempt was a humiliating failure; his experiments to test the capacity of the natives found only a few capable of living alone as free subjects of the king; the attempt to preach the faith by peaceful means led to bloodshed in Guatemala and Florida; the radical decrees of the new laws led to near revolt in Mexico, open rebellion in Peru and grave unrest throughout the empire. None of his plans succeeded. Yet by his monolithic stubbornness, Las Casas dramatized the plight of the Indian and made progress for their betterment possible for more reasonable men.

See L. Hanke, *The Spanish Struggle for Justice in the Conquest of America* (1949). (A. S. Tr.)

LAS CASES, EMMANUEL AUGUSTIN DIEUDONNÉ JOSEPH, Comte de (1766–1842), French author whose account of Napoleon's conversations at St. Helena was an outstanding contribution to Bonapartist propaganda, was born near Revel in Languedoc on June 21, 1766. Educated at the military schools of Vendôme and Paris, he entered the navy and took part in various engagements of the years 1781–82.

Emigrating during the French revolutionary period, he spent some years in Germany and England and took part in the disastrous Quiberon expedition (1795). After some years in London he returned to France during the consulate with other royalists who rallied to Napoleon. In 1802 he published an *Atlas historique.* In 1810 Napoleon made him a chamberlain and created him a count of the empire (he was marquis by hereditary right). After Napoleon's first abdication (1814), Las Cases retired to England, but returned to France during the Hundred Days (1815).

Las Cases, who after Napoleon's second abdication had proposed that he should appeal to the British nation, accompanied him voluntarily into exile at St. Helena, where he was for 18 months his constant companion. He there recorded, day by day, all that Napoleon said—his reminiscences, his reflections, his aspirations. Some letters, however, which Las Cases wrote to friends in Europe complaining about the unfair treatment of Napoleon by the governor of the island, Sir Hudson Lowe, were intercepted, and Las Cases was then deported from St. Helena (Nov. 1816) to the Cape of Good Hope, after all his papers had been seized.

Taken to England in Aug. 1817 and later detained in various towns in Germany or in Belgium, Las Cases was finally allowed to return to France in 1822, after Napoleon's death. He then recovered his manuscripts from the British government and, in 1823, published the *Mémorial de Sainte-Hélène,* which had a great success and earned him an enormous sum of money. The book served to revive the Napoleonic legend and did much to win the sympathies of liberals for Napoleon's personality and program, despite its obvious prejudice in his favour as the work of an ardent admirer.

Elected deputy for Saint Denis in 1831, Las Cases sat on the extreme left of the chamber. Elected again in 1834, he declined to take his seat, but was returned yet again in 1839 and collaborated with the opposition until his death at Passy on May 15, 1842. There is a critical edition of the *Mémorial* by M. Dunan (1951).

See Emmanuel de Las Cases, *Las Cases, le mémorialiste de Napoléon* (1959).

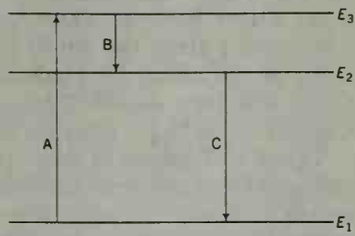
LASER, a device used for the amplification or generation of coherent light waves, the term laser being an acronym for light amplification by stimulated emission of radiation. The principle of the laser is so similar to that of the microwave maser (*see* Maser) that the former is often referred to as an optical maser. Unlike the waves emitted by an ordinary light source, such as an electric lamp, the laser produces a light beam that does not diffuse. Moreover, a laser organizes the energy waves emitted by a stimulated atom so that they travel in the same direction, at the same frequency, and perfectly in step with the stimulating radiation. This property is known as coherence. A laser thus produces a very narrow band of frequencies similar to those of a radio frequency oscillator, but in the infrared and visible-light portions of the spectrum.

The highly parallel, intense beam of coherent radiation emitted by the laser has important applications in communications systems and in experiments requiring an intense source of radiation that can be focused to a fine point. For instance, the visible-light band of frequencies could theoretically accommodate 80,000,000 television channels of the present bandwidth, or 800,000,000 simultaneous telephone conversations (more than four times the population of the United States in the 1960s). Other applications include devices for range finding, radar tracking, welding, and even surgery.

The laser, proposed in 1958 by A. L. Schawlow and C. H. Townes, is the first coherent light source. It consists of an active material, between two parallel plates of an interferometer (*q.v.*), which is excited by an external source to invert the population of a pair of energy levels of energy difference ΔE. This "population inversion" is simply a matter of altering the normal distribution of atoms on an energy basis. Where normally more atoms are found in lower energy levels, laser activation by a power source produces greater occupancy, or population, in the higher levels. An electromagnetic wave of frequency $f = \Delta E/h$ (h is Planck's constant) will then produce stimulated emission of radiation at the frequency f. The interferometer is tuned to the frequency f so that it acts as a resonant cavity, and this allows energy to build up. When the rate at which energy is emitted into the cavity exceeds the rate at which energy is lost by absorption of transmission through the interferometer plates, the laser will oscillate.

The first report of a working laser was made by T. H. Maiman in 1960. In this device the active material is a crystal of synthetic ruby (aluminum oxide containing a small concentration of chromium ions), and the interferometer is plated on the plane-parallel faces of the crystal. Radiation in the green absorption band of ruby brings the chromium ions up to an excited level (E_3 in the figure). From this level there is a very rapid nonradiative decay

to a pair of intermediate levels. The laser operates between one of these levels (E_2) and the ground state (E_1), which must be partially emptied in order to obtain population inversion. The ions emit red light during this transition; when they are irradiated with red light of the same frequency they are stimulated to make the transition more rapidly and to produce an intense beam of red light. This operation requires a light source so powerful that it can operate for only a very short time, and therefore the ruby system acts as a pulsed laser.



ENERGY LEVELS OF CHROMIUM IONS IN RUBY LASER. E_1, GROUND STATE; E_2, INTERMEDIATE LEVEL; E_3, EXCITED LEVEL. GREEN LIGHT IS ABSORBED IN TRANSITION A; ENERGY BUT NO LIGHT IS EMITTED IN B; RED LIGHT IS EMITTED IN C

Coherent sources, utilizing the laser principle, now exist at many frequencies in both the visible and infrared regions. These devices use gases, semiconductors, and ions in solids, the activation of the material being caused by intense light sources or passing electron currents through the medium. Both pulsed and continuously operating lasers exist, the former able to give extremely high peak powers and the latter able to give very-high-frequency stability and purity.

Because of the immense electric fields produced when the beam of coherent light is focused to a fine point, solids respond in a nonlinear way to the light waves, producing frequency doubling and related phenomena. These fields also cause a strong interaction of the light with the molecular vibrations in materials, producing shifts of the light frequency. By these techniques, coherent light can be produced at a large number of frequencies.

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LA SERENA, capital of the Chilean province of Coquimbo (*q.v.*), is located on terrace land overlooking Coquimbo bay and just south of the Elqui (Coquimbo) river. Pop. (1960) 40,854. The city is an episcopal see, a garrison and civil centre. Founded in 1543 on the north side of the river, it was named after Pedro de Valdivia's birthplace in Estremadura, Spain. Razed by the Indians in 1549 and rebuilt on the present site the same year, La Serena received city status in 1552. Pirates raided it in the 1680s; serious earthquakes struck several times, one in 1922 caused heavy damage. From 1946 to 1952, during the presidency of native son Gabriel González Videla, the city's impressive colonial-style public buildings were erected.

There is a plaza, parkway, an archaeological museum and schools of mines and agriculture. The city's population swells with summer vacationers. Peñuelas, 4 mi. S.W., is an exclusive beach community. Direct rail, bus and air connections exist to Santiago; interurban buses serve La Serena-Peñuelas-Coquimbo. (J. T.)

LASHLEY, KARL SPENCER (1890–1958), U.S. psychologist, notable for his pioneer quantitative investigations of the relationship between brain mass and learning ability, was born at Davis, W.Va., on June 7, 1890. He studied at West Virginia university, the University of Pittsburgh (M.S. in bacteriology) and Johns Hopkins university (Ph.D. in genetics), where he was a collaborator of the biologist H. S. Jennings and the behaviourist psychologist J. B. Watson. Lashley taught at a number of universities, including Minnesota (1917–26), Chicago (1929–35) and Harvard (1935–55). From 1942 to 1955, while still research professor of neuropsychology at Harvard, he was also director of the Yerkes Laboratories of Primate Biology at Orange Park, Fla. He died at Poitiers, France, on Aug. 7, 1958.

In addition to his work on the relationship between brain mass and learning, Lashley demonstrated the equipotentiality of much brain tissue in the process of learning and the incorrectness of the view that every psychological function necessarily has a specific cortical localization. He also performed research on brain mechanisms related to sense receptors and on the cortical basis of motor activities. He studied many animals, including primates, but his major work was done on the measurement of behaviour before and after specific and carefully quantified induced brain damage in the white rat.

Lashley was the author of *Brain Mechanisms and Intelligence* (1929); he also wrote more than 100 monographs and major papers in psychology, neurology and the biology of behaviour. (L. CAR.)

LASKER, EDUARD (1829–1884), German political leader, a Liberal conspicuous for his opposition to Bismarck, was born of Jewish parents at Jarotschin in the Prussian province of Posen (Jarocin in Poznan) on Oct. 14, 1829. In Vienna during the revolution of Oct. 1848, he fought in the "Academic legion" for socialism. After completing his legal studies at Breslau and Berlin, he lived five years in England. He then became a judge in Prussia, but left the public service in 1870 to practise as a solicitor. In 1873, however, he became a legal official of the Berlin municipal administration; and in 1876 he was appointed a judge of the Prussian administrative court.

Lasker was a deputy in the Prussian diet from 1865 to 1879 and in the *Reichstag* of the North German confederation and then of the German empire from 1867 to 1883 (*see* GERMANY: *History*). His incisive, liberal thought, sharpness of intellect, application and knowledge made him soon one of the most important parliamentarians of the empire. He took the lead in the formation of the National Liberal party in the autumn of 1866 and was instrumental in the constitutional, legal and economic legislation for Germany (especially in 1867). In this he collaborated with Bismarck without giving up the independence of his convictions.

Bismarck rebuffed, as premature, Lasker's famous suggestion of Feb. 24, 1870, that Baden should be admitted to the North German confederation in order to hasten the pace of German unification. When the empire was established (1871), Lasker agreed only with reluctance to the special rights given to the South German monarchies. He was most active in working out the unification of the legal administration and procedure of the empire (1877) and of its economic structure; and he defeated Bismarck's attempt to limit the financial competence of the *Reichstag* by permanently fixing the military budget. At the time of the *Kulturkampf* he protested against the law expelling the Jesuit order (1872). His sharp and early criticism of the scandals associated with the reckless financial speculation of the early 1870s forced Bismarck's close collaborator Hermann Wagener to resign from the public service in 1873. In 1878 Lasker, for reasons of party discipline, reluctantly voted to outlaw the German Socialists.

An opponent of the Bismarckian exploitation of parliamentarism and a convinced adherent of the tenets of free trade, Lasker broke with the National Liberal party after quarrels over constitutional reform and the introduction of a protective tariff in 1878. This "secession" was followed in 1884 by the fusion of Lasker's followers with the German Progressive party to form the German Radical party, of which, however, not Lasker but Eugen Richter became the most influential leader. When Lasker died, on a visit to New York, Jan. 5, 1884, Bismarck refused to forward an address of condolence from the U.S. house of representatives to the *Reichstag*. Lasker's memoirs for the years 1866–80 were edited by W. Cahn (1902). His letters were printed in *Deutscher Liberalismus im Zeitalter Bismarcks*, edited by P. Wentzcke and J. Heyderhoff, volumes i and ii (1925–26). (HA. H.)

LASKI, a noble and powerful Polish family, so named from the town of Lask, their oldest residence.

JAN LASKI the Elder (1455–1531), statesman and ecclesiastic, was born near Lask. He took orders at an early age, and in 1495 was secretary to the Polish chancellor, Bishop Krzeslaw Kurozwecki, in which position he acquired both influence and experience. He was sent on important diplomatic missions to Rome in 1494 and in 1500; and in 1496 he went on a special embassy to Flanders, of which he left an account. On the accession to the Polish throne of the indolent King Alexander (1501), Laski, as

the king's secretary, successfully opposed both the growing separatist tendencies of the grand duchy of Lithuania and also the tendencies of the magnates to subordinate the king to their ambitions. In 1503 he was appointed chancellor. Representing the political movement of the middle group of the gentry, he was not supported by King Sigismund I; and in 1510 he resigned from his chancellor's office. In the same year Laski became archbishop of Gniezno and thus primate of Poland. He showed conspicuous ability in difficult negotiations on Sigismund's behalf with the Teutonic Order and at the Lateran council of 1513, where he attended to plead the cause of Poland against the order. This mission was equally profitable to his country and to himself, and in 1515 he obtained from Pope Leo X the title of *legatus natus* for the archbishops of Gniezno. In his old age Laski's partiality for his nephew Jaroslaw (*see* below) led him to support the Turkish-sponsored candidature of John Zápolya for the Hungarian crown so vehemently that Clement VII excommunicated him on Feb. 6, 1530. Laski died at Kalisz on May 19, 1531.

Of his numerous writings the most noteworthy are his collection of Polish statutes *Commune incliti Regni Poloniae privilegium* (1506) and *Statuta provinciae Gnesnensis antiqua* (1525–28).

JAROSLAW, otherwise HIERONIM or HIERONYMUS, LASKI (1496–1542), a diplomat, was a nephew of the archbishop Jan Laski. He was successively palatine (*wojewoda*) of Inowroclaw and of Sieradz; but on the death of Louis II of Hungary (1526), though his own sovereign Sigismund I was favouring the Habsburgs' claim to the Hungarian succession, Laski entered the service of John (*q.v.*) Zápolya, the rival claimant, thus seriously compromising Poland both with the Holy Roman emperor Charles V and with Pope Clement VII. He acted as Zápolya's envoy to Paris, Copenhagen, London and Munich (1527) and finally to Istanbul, as Zápolya had put himself under the protection of the Turkish sultan Suleiman the Magnificent. On his way to Istanbul he was robbed of his credentials and of the presents that he was bearing to the sultan; yet he persuaded the sultan to recognize Zápolya and even, on his own authority, concluded a ten years' truce between Poland and Turkey. He then returned to Hungary at the head of 10,000 men, with whose help he enabled Zápolya to reestablish his position. He was rewarded with the countship of Zips (Szepes or Spisz) and the governorship of Transylvania (1530); but his influence excited the jealousy of the Magyars, and Zápolya was persuaded to imprison him in 1534. Released in 1535 by the interposition of the Polish grand hetman Jan Tarnowski, he became Zápolya's violent opponent. Shortly after his return to Poland, Laski died suddenly in Cracow, probably of poisoning.

JAN LASKI the Younger (1499–1560), also known as JOHANNES A LASCO, a supporter of Reformation, was born at Lask, another nephew of Archbishop Jan Laski. He studied in Bologna (1513), in Rome (1514) and later in Basel, where he met Erasmus, whose teachings impressed him much. From 1517 he received various ecclesiastical benefices, and in 1521 he took orders and became the king's secretary. He was a candidate for various bishoprics but never obtained them, because as political adviser to his brother Jaroslaw in his Hungarian ventures he was in conflict with the Polish court. In 1537 he visited Philipp Melanchthon in Leipzig, turning toward the Reformation. He left his country in 1539 and married the daughter of a weaver at Louvain in 1540. Consequently his adversaries could have him deprived of his benefices. Eventually in 1542–43, he adopted the Augsburg confession. Religious persecution compelled him to move from place to place. Meanwhile he worked as a theological writer and as a clergyman. From 1542 to 1548 he was at Emden, where he organized the East Frisian Church; after a stay in Denmark (1553) he was at Emden again (1553–55). He visited England in 1548–49 and in 1550–53: on Archbishop Thomas Cranmer's invitation he became superintendent of the foreign congregation in London. In 1556 he returned to Poland, where the Reformation took hold at that time. He took part in the translation of the Bible into Polish and worked at uniting the quarreling Protestant denominations. He died at Pinczow on Jan. 8, 1560.

OLBRACHT LASKI (1536–1605), army officer, administrator and diplomat, was the son of Jaroslaw. It was he who in 1560–62 conquered Moldavia, establishing Vasile Heraclidis as hospodar there. He became commander of the Moldavian forces; but after Vasile's fall then he returned to Poland and was appointed palatine of Sieradz (1566). He published his *Exhortatio ad milites in expeditione Moldauica* in 1567. In 1583 he was sent by the Polish chancellor Jan Zamoyski on an unofficial diplomatic mission to London to combat Russian influence at the court of Elizabeth I.

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Olbracht Laski: W. Zakrzewski, *Rodzina Łaskich* (1882); S. Kot, *Anglo-Polonica* (1935). (ST. HE.)

LASKI, HAROLD JOSEPH (1893–1950), British political philosopher and author who is remembered chiefly for his forceful attempt to apply Marxist theory to interpret "the crisis in democracy," particularly in Great Britain in the 1930s. He was born in Manchester, Eng., on June 30, 1893. His parents, Nathan and Sarah Laski, were Jewish immigrants from Poland. After a brilliant career at New college, Oxford, where he was much influenced by the historian F. W. Maitland, he taught at McGill university, Montreal, Can. (1914–16), Harvard university (1916–20) and then at the London School of Economics, where he was appointed professor of political science in 1926, a post he held for the rest of his life. Immensely erudite, he wrote more than 20 books, *e.g., A Grammar of Politics* (1925), *Liberty in the Modern State* (1930), *The Rise of European Liberalism* (1936), *The American Presidency* (1940), *Communism* (1927) and *Reflections on the Revolution of Our Time* (1943). As an academic philosopher, he was at his best in early works such as his introduction to *A Defence of Liberty Against Tyrants* (1924), a translation of *Vindiciae contra Tyrannos,* written in 1579. His persistent efforts as a prominent member of the Labour party (and as its chairman in 1945) to work out a philosophy for the British socialist movement did not bear much fruit. Perhaps his most enduring legacy is to be found in the hundreds of devoted students from all parts of the world who came under his influence. Revealing sidelights on his personality are provided by the numerous letters he wrote to the distinguished American jurist Oliver Wendell Holmes between 1916 and 1935. Laski died in London on March 24, 1950.

See B. Kingsley Martin, *Harold Laski (1893–1950): a Biographical Memoir* (1953); *Holmes-Laski Letters: The Correspondence of Mr. Justice Holmes and Harold J. Laski, 1916–35,* ed. by Mark DeWolfe Howe, with a foreword by Felix Frankfurter, 2 vol. (1953). (B. TH.)

LAS PALMAS (LAS PALMAS DE GRAN CANARIA), capital of the island of Grand Canary in the Canary Islands, is the largest city and chief port of the archipelago and is also the capital of Las Palmas province, one of the two Spanish provinces into which the islands are divided. Pop. (1960) 193,862 (mun.). Las Palmas lies on the northeast coast. It was founded on the banks of the mouth of a ravine, its name deriving from the abundant palms there. The oldest houses date from the late 15th century, but in 1857 the population was only about 16,000 and growth was slow until 1883, when the port was begun. Most of the city lies below 100 ft. altitude and within ½ mi. of the sea, which it fronts for 5 mi. Las Palmas is well built and well drained and is supplied with pure water by an aqueduct from the interior highland.

The handsome cathedral of Santa Ana, which dominates the city, was begun in 1497 and much reconstructed three centuries later. The bishop is suffragan to the archbishop of Seville. Near the cathedral the Canario museum contains important relics of the extinct Guanches (*q.v.*). There is a beautiful theatre and the Pueblo Canario, a group of buildings in the old Canary style of architecture, includes an art gallery. Numerous hotels and clubs, excellent bathing beaches and facilities for golf, tennis and yachting have combined with the warm, dry and sunny climate to attract a considerable foreign colony.

The development of the modern city is largely attributable to

foreign (especially British) merchants. La Luz, the port, 6 km. (4 mi.) N. of the old quarter, has a safe and well-equipped harbour. It is sheltered westward by a rocky promontory, La Isleta, which is joined to the island by a narrow sandy isthmus (now built over), and eastward by long breakwaters. Its total berthing space, which includes accommodation for the largest ships, is about 3 mi. The port is on the main shipping routes between Europe and South America, and is entered annually by about 5,500 ships. It is a major oil-bunkering port. Its chief imports are petroleum, machinery, hardware, textiles, coal and foodstuffs; the chief exports are bananas, tomatoes and other agricultural produce. International and local air services call at Gando airport, 26 km. (16 mi.) S.

See also CANARY ISLANDS; GRAND CANARY. (R. P. BE.)

LASSALLE, FERDINAND (1825–1864), the architect of the German labour movement after the unsuccessful revolution of 1848 and the creator of the German Social Democratic party as the political movement of organized labour. He was born in Breslau in Silesia on April 11, 1825, the son of a prosperous Jewish wholesale textile merchant. He studied law and philosophy at Breslau and at Berlin and visited Paris. Then, in 1846, he became involved, as legal adviser to the Gräfin Sophie Hatzfeldt, in her long-drawn-out divorce suit, which damaged his social and political reputation. In the revolution of 1848 (*see* GERMANY: *History*) he stood on the extreme left wing with Karl Marx and Friedrich Engels, but these two kept him at a distance because of the scandal. When the Prussian national assembly decided to refuse paying unauthorized taxes, Lassalle organized armed resistance against tax collection and was finally sentenced, in 1849, to six months' imprisonment. This kept him from political activities during the last phase of the revolution, so that, unlike Marx and Engels, he could remain in Germany after its collapse.

Lassalle continued his philosophical and legal studies and may be considered a representative of the left wing of the Hegelian school but did not follow Marx's turn to historical materialism. He stood by Hegel's basic principles and method but demanded the "total reform" of his system. The direction of this reform is shown in Lassalle's criticism of Hegel's philosophy of law in his most important legal work, *System der erworbenen Rechte* ("System of Acquired Rights") (1861). He denied the existence of permanent logical categories such as property, hereditary rights, middle-class society, or family. He regarded their real content as being determined by the spirit of a people at a given time and so varying in the course of time. Law, even natural law, no less than the state or society, is only a historical product and will disappear in the last stage of historical development—the stateless and classless society of all mankind. Lassalle, however, expressed this last conclusion only in his correspondence: in public, he avoided every appearance of radicalism. His true political aims are more apparent in hints contained in his scholarly works and private letters than in his numerous political and economic speeches and pamphlets.

Lassalle's political aim was to bring about a national, democratic and social revolution in which all individual rights would be abolished without compensation. From 1858, when the future William I became regent for King Frederick William IV, he used every means to this purpose. At first he tried to shake monarchist thinking and feeling by presenting the establishment of German unity as a possible task for the Prussian crown and simultaneously doubting its capacity to achieve that goal. He abandoned these tactics when bitter hostility separated the monarchy and the Prussian diet over the "army conflict" of 1861–64. He sought to aggravate the crisis of the constitutional system by demanding a parliamentary strike in his addresses *Über Verfassungswesen* (1862–63), but at the same time he cut himself off from the middle classes by attacking the liberal conception of state and society in his *Arbeiterprogramm* (1863). The more his revolutionary hopes were disappointed, the more sharply Lassalle turned against the middle classes, whose capacity to solve the social question he denied. Thus he contended that the proposal of the liberal Hermann Schulze-Delitzsch to found co-operative associations of producers would not help the workers. Only co-operative associations formed with state subsidies could, in Lassalle's opinion, break the "iron law of wages," by which "the average wage always remains on the lowest level to secure the minimum livelihood in accordance with national habits, sufficient for the bare existence and propagation of the species." Therefore Lassalle demanded state intervention in the field of economics and tied this up with the demand for universal suffrage. In this matter too he was concerned to avoid the appearance of radicalism and to introduce, in very cautious form, the new theoretical principles of socialism and democracy. Their rejection, he reckoned, would prove to the "have-nots" that neither the government nor the property owners wanted to improve the situation of the have-nots even when a reform did not curtail their own rights.

The Allgemeine Deutsche Arbeiterverein (General German Workers' association) founded by Lassalle in 1863, over which, as its first president, he had almost dictatorial powers, did not develop into a party of the masses despite his efforts: it had 6,400 members in 1864. In his struggle against the Liberals, meanwhile, Lassalle came closer to Bismarck, from whom he expected the implementation of universal suffrage. Lassalle also supported Bismarck's national policy in the hope that it would give rise to warfare. The overthrow of Prussia—which did not seem improbable in view of the internal cleavages produced by the constitutional conflict—would have made possible revolutionary action, in which Lassalle saw himself as the future dictator.

A love affair with Helene von Dönniges led to Lassalle's being mortally wounded in a duel with her fiancé, Yanko von Racowitza. He died in Geneva on Aug. 31, 1864.

After vehement controversies, Lassalle's Arbeiterverein and the Marxist "Eisenach group" agreed at Gotha in 1875 to combine to form the Sozialistische Arbeiterpartei Deutschlands, forerunner of the modern German Social Democratic party.

The influence of Lassalle's fascinating personality on the German labour movement continued to be felt until Marx's sharp criticism of the Gotha program was published (1890). His influence as a theoretician, on the other hand, had been much less and cannot be compared with Marx's. Paradoxically his posthumous reputation does not correspond to his actual political intentions, as his emphasis on tactics led to his being represented not as a revolutionary, but as a reformer and an advocate of a democratic transition to socialism. There are collected editions of Lassalle's speeches and writings by E. Bernstein, 3 volumes (1891–93) and 12 volumes (1919–20), and of his letters by G. Mayer, 6 volumes (1921–25).

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LASSELL, WILLIAM (1799–1880), English amateur astronomer whose name is linked with those of Sir William Herschel and Lord Rosse in connection with the development of the reflecting telescope, was born at Bolton, Lancashire, on June 18, 1799. Educated at the Rochdale academy, he served a seven-year apprenticeship before starting his brewery business about 1825. Lassell became interested in astronomy through his aptitude for invention. In 1844 he constructed a two-foot reflector, with which he discovered the satellite of Neptune in 1846. In 1848 he found (simultaneously with G. P. Bond) the eighth satellite of Saturn and, in 1851, two satellites, Umbriel and Ariel, of Uranus. In 1861 he erected a four-foot reflector at Malta, with which he catalogued hundreds of new nebulae. He was elected a fellow of the Royal society in 1849 and was president of the Royal Astronomical society in 1870–72. He died at Maidenhead on Oct. 5, 1880. (O. J. E.)

LASSEN VOLCANIC NATIONAL PARK, in northeastern California, approximately 135 mi. N.W. of Reno, Nev., has as its principal attraction Mt. Lassen (10,457 ft.), the only volcano active within the conterminous United States after 1851. (Both Alaska and Hawaii, however, had active volcanoes in the 20th century.)

Lassen's first eruptions of the 20th century began without warn-

ing on the morning of May 30, 1914. Volcanic ash, steam, and small amounts of lava were produced intermittently for a year. On May 19, 1915, larger explosions occurred and hot lava spilled a thousand feet down the mountain, melting snow and causing mudflows. Three days later a blast of hot gases blew down many trees. The last eruptions occurred in 1921. Evidence suggested the possibility of a 65-year cycle for volcanic activity in the area.

Geologically, Mt. Lassen is the most southerly major peak in the youthful volcanic Cascade range. Lassen is composed primarily of lavas, the oldest being perhaps 2,000,000 years old. The mountain is a rare dome type of volcano, whose top was formed from relatively viscous lavas. Cinder Cone, nearby, was active in 1851, and Chaos Crags is believed to be the result of volcanic activity in 1720.

An area of 106,934 ac. around Mt. Lassen was set aside as a national park by congress on Aug. 9, 1916. The park is a wildlife refuge. Mule and blacktail deer, bear, and smaller mammals may be seen. Fishing is permitted with a state licence.

The distance to the park from Redding, Red Bluff or Susanville, Calif., is less than 50 mi. Campsites and a variety of accommodations are available in and near the park. (J. E. Cl.)

LASSO (Lassus), **ORLANDO DI** (*c.* 1532–1594), the most important Flemish composer of the second half of the 16th century, celebrated both for his secular and for his sacred music. He was born *c.* 1532 at Mons in the province of Hainaut, now Belgium.

For more than a century before Lasso's time, the Netherlands had been supplying various countries of Europe with their leading musicians, and Lasso also visited many parts of Europe during the course of his career. Because of his beautiful voice, the boy was taken into the service of Ferdinand of Gonzaga, general to the Emperor Charles V. Thus he traveled with the imperial army during its French campaign in 1544 and accompanied Gonzaga in 1545 to Italy, where he remained for ten years. After some years in Milan and Naples he was appointed *maestro di capella* of the papal church of St. John Lateran at Rome (1553–54), an honoured position in which he was later succeeded by Palestrina. This post was followed by a sojourn in Antwerp (1555–56). In 1556, one of the Wittelsbachs, Duke Albrecht V, appointed him to the court chapel in Munich, where he remained for the rest of his life, except for some incidental journeys. In 1558 Lasso married a daughter of one of the clerks at the Bavarian court. The four sons of this marriage were all musicians.

Of Lasso's more than 2,000 compositions many appeared in print between 1555, when his first book of Italian madrigals was published in Venice, and 1604, when a posthumous collection of 516 Latin motets, *Magnum Opus Musicum,* was published in Munich by his sons. From this wealth of music certain volumes may be singled out as significant landmarks in Lasso's career: the first collection of motets (Antwerp, 1556) established his mastery in a field to which he contributed all of his life; a comprehensive anthology of his French chansons appeared in Paris in 1570 and helped to consolidate his position as the leading composer in this genre, in succession to J. Arcadelt (d. *c.* 1575). At the invitation of his publisher, Adrian Le Roy, Lasso visited Paris, where he received flattering offers from the king of France. These he declined, however, in favour of retaining his post at the court of Munich (which attracted many distinguished composers from Lasso to Wagner). The German emperor raised him to the nobility in 1570; and when Lasso dedicated a collection of his Masses (Munich, 1574) to the pope, he received the knighthood of the Golden Spur. (In later centuries, Alessandro Scarlatti, Gluck, Mozart and Paganini were so honoured.) Lasso's best-known work today is probably his collection *Psalmi Davidis Poenitentiales,* printed in Munich, 1584. This sombre and impressive work was rediscovered and edited in 1838 by the German scholar S. W. Dehn, an event that initiated a revival of interest in Lasso's works. This followed closely upon the reawakening of interest in Palestrina.

When Duke Albrecht of Bavaria was succeeded by his son Wilhelm in 1579, Lasso's new patron introduced several reforms that were sympathetic to the Counter-Reformation. In spite of his genuine appreciation of Lasso's art, Duke Wilhelm reduced the personnel of the world-famous court chapel from 44 to 22 members. This must have been a grave experience for the composer, who, in middle life, had become increasingly subject to illness and fits of despondency. In the course of a temporary break in his health in 1590, his wife reported that he did not recognize her and that he refused to speak to her or to anyone else. Such attacks of melancholia were not uncommon toward the close of the 16th century and were experienced by, among others, Tasso and Michelangelo. But whether the more sober tone of Lasso's last works should be ascribed to a fashion of the period or to his personal development, the change of emphasis is unmistakable. In contrast to the love songs and drinking songs of his youth, his secular works—though still in the vernacular—now comprised an increasing number of spiritual and sacred madrigals, as shown in the later anthology of secular works (Paris, 1584) and the book of madrigals published in Nürnberg (1587). He died on June 14, 1594, at Munich, where his collection of spiritual madrigals, *Lagrime di San Pietro,* was printed posthumously in 1595.

Lasso lived and died a pious Catholic, but the tunefulness and expressive quality of his music was such that his compositions found almost as much favour among the Protestants of Germany, France and England as they did among the Catholics. At La Rochelle (the centre of the Huguenot party), at London and Heidelberg, editions of Lasso's music were printed with new texts suitable for the adherents of the Reformation. Lasso's popularity in England was considerable; his music is to be found in many printed and manuscript collections and an adaptation of one of his chansons is quoted in Shakespeare's *Henry IV,* part 2.

Lasso was a master in the field of sacred music and was equally at home in secular composition. In the latter field his internationalism is striking since he wrote French chansons as well as Italian madrigals and German part songs. In sacred as in secular works Lasso was an unchallenged master of vocal composition. His style was less conservative and at times more chromatic than that of Palestrina, but he always exhibited an unmatched ability to express the meaning of the words in music.

Lasso's works are published in the following editions: *Orlando di Lasso, Sämtliche Werke,* 21 volumes edited by F. X. Haberl and A. Sandberger (1894–1927), which contains a reprint of the *Magnum Opus Musicum* of 1604 as well as of most of the secular works, including 200 madrigals and 150 chansons; *Sämtliche Werke,* new series, edited by W. Boetticher, motets, chansons and madrigals (1956), passions (1961) and masses 1–9 (1962).

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(Fr. W. S.)

LASSO (Span. *lazo,* snare, ultimately from Lat. *laqueus, cf.* "lace"), a rope 60 to 100 ft. in length with a slip noose at one end, used in the Spanish and Portuguese parts of America and in the western United States for catching wild horses and cattle. It is now less employed in South America than in the vast grazing country west of the Mississippi river, where the herders, called locally cowboys or cowpunchers, are provided with it. When not in use, the lasso, called rope or lariat in the west, is coiled at the right of the saddle in front of the rider. When an animal is to be caught, the herder, galloping after it, swings the coiled lasso around his head and casts it straight forward in such a manner that the noose settles over the head or around the legs of the quarry, when it is speedily brought into submission.

LAST JUDGMENT, in Christian doctrine, the general judgment of mankind, both living and dead (as distinct from the particular judgment of the individual soul at the moment of death), which precedes the ending of this present age and the final consummation of Christ's victory over evil won on Calvary and manifested in his resurrection. The Last Judgment, which is an article of faith for all Christians, is confessed ("will come to judge the living and the dead") by the three creeds generally received: the Nicene, the Apostles' and the Athanasian.

The background to this conception is found in the Hebrew idea of the day of Yahweh, which will inaugurate God's kingly rule

upon earth. The phrase first appears in the book of Amos where, significantly, the prophet declares that the day of Yahweh, although a day of God's triumph over his enemies and a source of joy for the righteous (*cf.* Zeph. iii, 8–11), will also be a day of darkness and not light, a day of judgment for Israel as well as for the gentiles (Amos v, 18; *cf.* Zeph. i, 15). Preternatural phenomena will precede that day—blood, fire, and columns of smoke (Joel ii, 30–31), accompanied by plagues of locusts (Joel ii, 1–11) and invasion by hostile armies (Isa. xiii, 17). The day of Yahweh is not, however, dependent upon the operation of such created agencies; it is God himself who acts (Isa. lix, 16; lxiii, 4–5). The nations will be gathered for judgment in the valley of Jehoshaphat (Joel iii, 2), elsewhere called the valley of decision (Joel iii, 14) and identified in Jewish, Christian and Muslim tradition with the valley of the Kidron (east of Jerusalem), though the name may indicate an ideal and not an actual spot.

The notion of judgment at the end of the world developed during the intertestamentary period and is strongly emphasized in the First Book of Enoch, one of the most important of the Old Testament pseudepigrapha (*see* ENOCH, BOOKS OF: *I Enoch*), and at Qumran in the Manual of Discipline:

> God, in the mysteries of His understanding and in His glorious wisdom, has ordained an end for the existence of wickedness, and at the season of Visitation He will destroy it for ever. Then truth, which has wallowed in the ways of wickedness during the dominion of falsehood until the season of decreed judgment, shall arise in the world for ever (iv, 18, 19).

In the New Testament, the phrases "day of the Lord" (I Thess. v, 2), "day of Christ" (Phil. i, 10; ii, 16), "the day of the Son of man" (Luke xvii, 30), "the last day" (John vi, 39, 40) and "day of judgment" (I John iv, 17) are used to describe the *parousia,* the second coming of Christ in glory (Matt. xxiv, 3, 27, etc.), when God will judge the secrets of men by Christ Jesus (Rom. ii, 16), at whose judgment seat all must appear (II Cor. v, 10). The date of the *parousia* is not revealed to men or angels (Matt. xxiv, 36; Mark xiii, 32; *cf.* Acts i, 6–7). It will come as a thief in the night (I Thess. v, 2) and be a searching visitation (I Pet. ii, 12). Signs and portents will precede it (Matt. xxiv, 29); then the sign of the Son of man will appear in heaven and Christ will come with power and great glory. A trumpet call will awaken the dead (Matt. xxiv, 31, etc.) and living and dead will alike be caught up into the clouds to meet the Lord (I Thess. iv, 17). In the Apocalypse, the seer beholds the dead and the living standing before the throne of God, when the books of their deeds are opened and they are judged by their works (Rev. xx, 11–15). In the Matthaean description of the judgment, all humanity is brought before the Son of man by angels (Matt. xxiv, 31) and is separated by his sentence, the sheep on his right hand being welcomed into the Kingdom of God while the goats on his left go to eternal punishment prepared for the devil and his angels (Matt. xxv, 31–46). St. Paul asserts that the elect will join Christ in judging the world (I Cor. vi, 2).

The vision of the day of judgment, so universal in its majesty and yet so poignantly personal for every individual soul, has long exercised the imagination of Christendom. In literature it has inspired a series of hymns and poems, culminating in the majestic *Dies irae* (*q.v.*), attributed to Thomas of Celano, still sung at Masses for the dead.

In visual art the subject has been even more emphasized. In the catacombs are representations of Christ the Judge, with the sheep on his right hand and the goats on his left. During the middle ages two interpretations of the theme were developed. One is inspired by the Apocalypse and finds expression principally in manuscript illumination, partly in a series of illustrated commentaries on the Apocalypse produced in Spain from the 8th to the 12th century and partly in a number of Anglo-Norman Apocalypses of the 13th and 14th centuries. The manuscript illumination based on the Apocalypse is, however, a restricted form. More influential was the account of the Last Judgment in Matt. xxiv and xxv, interpreted by the third book of the *Elucidarium* of Honorius of Autun, written *c.* 1100.

Inspired by these texts, French cathedral sculptors and English mural painters produced in the 13th century great pageants of judgment which were to find their most sublime expression in Michelangelo's "Last Judgment" in the Sistine chapel in Rome. Christ is shown, the central figure, with upraised arms revealing his wounds. On his right is the Virgin, interceding for humanity, while on his left is St. John the Baptist (or St. John the Evangelist). Around this group, angels sound the last trump or display the emblems of Christ's passion. Below, the dead rise from their graves. St. Michael weighs the souls and separates the elect from the reprobate. The latter go to his left into the mouth of hell, while the redeemed enter into the eternal joys of heaven. Such was the picture in Thomas of Celano's mind when he wrote:

> Righteous Judge, from sin's pollution
> Grant Thy gift of absolution,
> Ere that Day of retribution.

See also KINGDOM OF GOD; SON OF MAN; and references under "Last Judgment" in the Index. (GD. B.)

LAS VEGAS, a city of Nevada, U.S., 288 mi. N.E. of Los Angeles, Calif.; the seat of Clark county. A unique desert community, it is famous for "the strip," an array of luxurious resort-hotels lining both sides of the highway to Los Angeles; several blocks of "downtown" casinos flourish under state-legalized gambling. Nearby Lake Mead National recreational area, Death Valley National monument, and skiing near Mt. Charleston (11,910 ft.) provide additional tourist attractions.

Las Vegas is in a section of southern Nevada detached from Arizona territory and accepted by Nevada in 1867. Mormons from Utah were the first settlers, drawn there by the presence of artesian waters in the arid valley along the Old Spanish trail—hence the name Las Vegas, "the meadows." With the coming of the San Pedro, Los Angeles & Salt Lake railroad (later part of the Union Pacific), Las Vegas became a railroad town in 1905 and was incorporated in 1911. A stimulant to the economy of the area was the construction, 29 mi. E., of Hoover dam in Black canyon on the Colorado river, authorized by the Boulder Canyon Project act of 1928, which, together with nearby Boulder City, became an established and popular tourist attraction.

During World War II a magnesium reduction plant was constructed by the federal government at Henderson, midway between Hoover dam and Las Vegas. There hydroelectric power was employed in processing magnesium ore from interior Nevada. Subsequently Nevada purchased the facilities and leased them to chemical, titanium sponge and mineral-treating industries. The Las Vegas bombing and gunnery range, established at the same time, lies 40 mi. N.W.; a portion of it (Nevada test site) has been used by the Atomic Energy commission for atomic detonations.

Educational facilities at Las Vegas include Nevada Southern, a regional division of the University of Nevada. The city has a council-manager form of government, in effect from 1943.

The population, less than 10,000 before World War II, was 64,405 in 1960. North Las Vegas, between Las Vegas and Nellis air force base, also experienced a population boom. The Las Vegas standard metropolitan statistical area (Clark county) had a 1960 population of 127,016. For comparative population figures *see* table in NEVADA: *Population.* (A. J. PR.)

LAS VILLAS, a province in central Cuba between Matanzas and Camagüey provinces. It consists of the Trinidad mountains (which rise to 3,800 ft.) in the south, hilly sections northeast of the mountains, and plains in the north and west, including the Zapata peninsula. The northern coast contains a chain of numerous cays on a wide platform bordered by coral reefs; main ports in the north are Caibarién and Isabela. The excellent Bay of Cienfuegos is on the southern coast.

The province has the most diversified agriculture in Cuba, consisting of production of sugar cane, tobacco, coffee, rice and corn (maize). Varied industries, such as alcohol distilleries, tanneries, tobacco factories and chemical plants, developed in the principal cities of Santa Clara, the capital, Cienfuegos, Sancti Spíritus, Sagua la Grande and Placetas. Pop., province (1961 est.) 1,121,800; area 8,267 sq.mi. The name was changed from Santa Clara province in 1940. (D. R. D.)

LÁSZLÓ I (Saint Ladislas) (1040–1095), king of Hungary from 1077, was a son of Béla I of Hungary and the Polish princess Rycheza (Ryksa). He was born in Poland on June 27, 1040, whither his father had sought refuge. Returning to Hungary, László and his brother Géza refused to contest the throne against their cousin Salomon, whom they served in his campaigns against the Kumans (1070) and against the Pechenegs (1072). In 1073, however, the brothers quarreled with Salomon. They expelled him from Hungary, and Géza then took the throne (1074). On Géza's death László succeeded him (1077).

László's reign was peculiarly eventful. He extended Hungary's frontier in Transylvania, supported the pope against the Holy Roman emperor Henry IV, married the daughter of Welf, duke of Bavaria, and is said to have refused the German crown for himself. By supporting the widow of Prince Stephen II of Croatia against his enemies, he established a claim to the crown of that country (1091); and he introduced Catholicism there, founding the bishopric of Zagreb. He extirpated heathendom in his dominions with great severity and also introduced an elaborate legal code. László died suddenly on July 29, 1095, at Nitra, when about to take part in the first crusade. No other Hungarian king was so generally beloved. The whole nation mourned for him for three years and regarded him as a saint long before his canonization, which took place in 1192; his feast day is June 27. A whole cycle of legends is associated with his name. His daughter Piroska married the Byzantine emperor John II Comnenus. (Ge. Gr.)

LÁSZLÓ IV the Kumanian (1262–1290), king of Hungary from 1272, was the son and successor of Stephen V. His minority, which lasted till 1277, was an alternation of palace revolutions and civil wars, in the course of which his Kuman mother, Elizabeth, was engaged in a continuous struggle with rebellious vassals supported by Premysl Otakar II of Bohemia, who had designs on Slovakia. Finally, however, the German king Rudolf I, of the house of Habsburg, appealed to László for help in his own struggle against Otakar; and at the battle of Dürnkrut (Aug. 26, 1278) the young Hungarian king contributed much to the defeat of the Bohemians and thus helped establish the future power of the Habsburg dynasty. The Bohemian danger being removed, László, a talented man but wild and reckless, was at once involved in a further struggle with his own magnates. He had married Isabella of Anjou, a daughter of Charles I of Naples and Sicily, but neglected her for Kuman mistresses and was accused by his enemies of undermining Christianity by preferring the Kumans to the Magyars. After an inquiry by a papal legate into his conduct, he was forced to take up arms against the Kumans, whom he defeated at Hódmezö (May 1282). He soon relapsed, adopted Kuman dress, passed his time exclusively with Kumans and ill-treated his legitimate wife. At last Pope Nicholas IV decided that the crown of Hungary should pass to the Angevin Charles Martel, son of László's sister Maria by her marriage to Isabella's brother Charles II of Naples and Sicily; and on Aug. 8, 1288, he proclaimed a crusade against László. For the next two years Hungary was convulsed by civil war; László, who fought with desperate valour, was driven from one end of the kingdom to the other. On Dec. 25, 1289, he issued a manifesto to the lesser gentry, many of whom sided with him, urging them to fight on against the magnates and their foreign supporters; but on July 10, 1290, he was murdered in his camp at Körösszeg by the Kumans, who never forgave him for deserting them in 1282. (Ge. Gr.)

LÁSZLÓ V (1440–1457), also known as Ladislas Posthumus, titular king of Hungary from 1440 and, under the name Ladislav, king of Bohemia from 1453, was the only son of the Habsburg German king Albert II (*q.v.*), who was also king of Hungary and of Bohemia, and his consort Elizabeth, daughter of the Holy Roman emperor Sigismund. He was born at Komárom on Feb. 22, 1440, four months after his father's death. The estates of Hungary had already elected Wladyslaw III of Poland to be their king as Ulászló I, but László's mother caused the holy crown to be taken from its guardians at Visegrád and compelled the primate to crown the infant king at Székesfehérvár on May 15, 1440; whereupon she placed the child under the guardianship of his cousin, the future emperor Frederick III (*q.v.*). On the death of Wladyslaw at the battle of Varna (Nov. 10, 1444), the Hungarian estates elected László king; but Frederick, despite many representations, retained the guardianship of both László and the crown until 1452. Meanwhile János Hunyadi (*q.v.*) was elected governor of Hungary, to exercise full regal and administrative powers for the young king. The child was later transferred to the guardianship of Ulrich, count of Cilli (*q.v.*), who inspired him with a jealous hatred of the Hunyadis. On Oct. 28, 1453, he was crowned king of Bohemia; and thenceforth he spent most of his time in Prague and Vienna, actually trying to hinder János Hunyadi's attempts to defend Hungary against the Turks. After the death of János his son László Hunyadi had Ulrich assassinated (1456); but the king's judicial murder of László Hunyadi in March 1457, after he had solemnly sworn not to harm him, finally raised such a storm in Hungary that the king fled to Prague, where he died suddenly on Nov. 23, 1457. He is supposed to have been poisoned by his political opponents in Bohemia. (Ge. Gr.)

LASZLO DE LOMBOS, PHILIP ALEXIUS (1869–1937), naturalized British painter who gained international fame for his portraits of eminent men, was born in Budapest, Hung., on Jan. 6, 1869. He studied there in the Industrial Art school and at the Budapest academy under B. Székely and K. Lotz. He went in 1890 to Munich, where he was a pupil of A. Liezenmayer, and in 1891 to Paris, where he studied under J. Lefebvre and B. Constant. He was awarded gold medals at the Paris Salon in 1899 and 1900. His work afterward brought him many other awards and honours.

Among his best known subjects were King Edward VII, Kaiser William II, Theodore Roosevelt, Woodrow Wilson, George V, Pope Leo XIII and Benito Mussolini. He died in Hampstead, Eng., on Nov. 22, 1937.

See P. A. Laszlo De Lombos, *Painting a Portrait* (1934).

LA TAILLE, JEAN DE (*c.* 1533–*c.* 1607), French poet and dramatist, who, by his treatise on the art of tragedy and his plays, helped to effect the transition from native French drama to classical tragedy, was born at Bondaroy in or after 1533 and died there in or after 1607. During studies at Paris he came under the influence, shown in his minor poems, of Ronsard and Du Bellay. He fought on each side in turn in the Wars of Religion, and his personal views are uncertain; he seems to have been a practising Roman Catholic with Protestant sympathies but a strong belief in royal authority. His chief poems, prosaic but forceful, are a satire, *Le Courtisan retiré,* and *Le Prince nécessaire,* a portrait of his ideal, if rather Machiavellian, monarch. He was wounded at the battle of Arnay-le-Duc in 1570, and returned to his estate at Bondaroy.

In 1572 appeared a collection of his works including his tragedy of *Saül le Furieux* (completed ten years earlier) with a preface *De l'art de la tragédie,* the most important piece of French dramatic criticism of his time. Like Étienne Jodelle, Jacques Grévin and Jean Bastier de La Péruse, La Taille wrote for the limited audience of a lettered aristocracy, depreciated the native drama and insisted on the Senecan model. In his preface he enunciates the unities of place, time and action; he maintains that each act should have a unity of its own and that the scenes composing it should be continuous; he objects to deaths on the stage as unconvincing and he requires as tragic subject an incident really moving, developed by skilful intrigue. He criticizes as unsuitable the subjects of the sacrifice of Abraham and the death of Goliath, chosen respectively by Beza (Théodore de Bèze) in *Abraham sacrifiant* (1550) and Louis des Masures in his trilogy on David (1562–63), because "pity and terror" are evoked from the spectators without real cause. If in *Saül* he did not completely carry out his program, yet the action is exciting and the principal character ably developed.

A second collection (1573) included a lesser tragedy, *La Famine ou les Gabéonites,* neatly plagiarizing Seneca's *Troades,* and two comedies, *Le Négromant,* translated freely from Ariosto, and *Les Corrivaux,* remarkable for its colloquial prose dialogue. La Taille continued to a great age to write minor prose works in retirement at Bondaroy; but the attribution to him of the political pamphlet entitled *Histoire abrégée des singeries de la ligue,* often published

with the *Satire Ménippée,* is questionable.

His brother, JACQUES DE LA TAILLE (1542–1562), composed one comedy and six tragedies, the chief of which, *Alexandre* and *Daïre,* were published with Jean's *Famine,* together with his *Manière de faire des vers en français* (an attempt to regulate French verse by quantity) and those of his poems not already published with Jean's *Saül.* He died young of plague.

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(K. M. H.)

LATAKIA, a seaport on the coast in Latakia *muhafaza* (governorate), Syria, stands on the low promontory of Ras Ziyaret, about 2 mi. N.W. of the Nahr el Kebir (river). Pop. (1960) 67,799. The people are a mixture of Arabs and Alawis. The town is divided into two parts, an upper and a lower. The upper or old quarter is farther from the sea and has narrow straggling streets and poor houses; the lower, modern quarter has well-built houses, wide straight streets lined with trees and modern buildings. It has developed largely because of its position as the only Syrian port after 1946. The port formerly consisted of an open roadstead and a small enclosed basin, but in 1950 a port development project was begun, entailing the replanning of the entire water front. Latakia is the centre of a rich agricultural area and vineyards surround the town. The main exports are bitumen and asphalt, cereals, raw cotton, fruit, eggs, vegetable oil, pottery and the well-known Latakia tobacco. Sponge fishing is also an important local industry. The town is connected by road with Aleppo to the northeast and with Tripoli and Beirut, Lebanon, to the south and there is an airfield. A railway was proposed, to link Latakia with Homs.

Latakia was known to the Phoenicians as Ramitha and to the Greeks as Leuke Akte; its present name is a corruption of Laodicea, after the mother of Seleucus I (4th century B.C.). Ramitha replaced the earlier settlement of Ugarit (Ras Shamra) situated 4½ mi. N. and destroyed in the 12th century B.C. Because of frequent earthquakes few buildings remain from the classical period, but there are some Corinthian columns known as the colonnade of Bacchus and a Roman tetrapylon possibly dating from the reign of Lucius Septimius Severus. North of the town is a large ancient rock-cut cemetery. Latakia became the seat of a bishopric and during the Byzantine period was destroyed twice by earthquakes. In 638 it was taken by the Arabs, in 1103 by the crusaders under Tancred and in 1188 by Saladin, and it changed hands frequently in subsequent years, being administered alternately by the Christians at Tripoli and the Muslims at Hamah. After it passed to the Ottoman empire the French established a trading factory there in the 16th century. During the 19th century there were constant disturbances between the Alawis and the Ottoman government, and after the defeat of Turkey in World War I the French made it into a separate state, which lasted from 1922 to 1926. It was then incorporated into the mandated territories of Syria and Lebanon and remained the administrative centre of that region. In 1946 it became part of the Republic of Syria. (M. V. S.-W.)

LA TÈNE (THE SHALLOWS), the eponymous site for the archaeological name of the Celtic culture of the Late Iron Age at the east end of the Lake of Neuchâtel (Switzerland). The finds collected there belong to an advanced stage of Celtic culture, the origin of which is a much-discussed problem. But there can be no doubt of the connection of Celtic culture with a late western species of the middle European Early Iron Age. The rise of Celtic typology is a result of the reaction of this species on Greco-Etruscan influences crossing the Alps from northern Italy and modifying the latest phase of northeast France's and southwest Germany's Early Iron Age. The accumulation of early Celtic pottery and metalwork in this area gives well-established archaeological evidence of the cultural revival during the second half of the 5th century B.C.

As P. Jacobsthal demonstrated, Greco-Etruscan oenochoae, stamnoi, dishes and red-figured pottery did not find their way to the north Alpine zone before 450 B.C. As the spreading out of Celtic peoples with a fully developed cultural pattern is chronologically fixed by Roman writers (notably Livy) in the first years of the 4th century B.C. (Rome, 390 B.C.), so the origin and formation of Celtic culture have to be traced back to the short period between 450 and 400 B.C.

This is the first period of La Tène culture, or P. Reinecke's La Tène A. It is possible to divide La Tène A into two substages: A_1, or the time of the contamination of Greco-Etruscan imports and ideas with north Alpine tradition; and A_2, or the time of stabilization of the new pattern.

The 4th century B.C. (Reinecke's La Tène B) is the period of the extended migrations of the Celtic peoples on both sides of the Alps. La Tène culture therefore may be said to extend well into France, into the northeastern parts of the Iberian peninsula, into north and central Italy and also into Switzerland, south Germany, Czechoslovakia, Austria and Hungary.

In England, the first real Celtic infiltrations appeared during this time. The migrations connected the Celtic peoples with many others, notably the west European stock of pre-Indo-European origin in west France and England, the Ligurians in south France the Hamitic Iberians in Spain, the Mediterranean Etruscans in north and central Italy, the Italians in central Italy, the Venetians in northeast Italy, the Illyrians in south Germany, Czechoslovakia and Austria and the Scythians and Thracians in Hungary and in the Balkans. The reactions caused by this multiple concurrence of different cultural and ethnic provenances are a valuable help in determining the many peoples of Celtic culture existing from the late 4th century B.C. to the 2nd century B.C.—the La Tène C of Reinecke's chronology. Archaeological evidence is very scanty from the most easterly branches of Celtic culture in Greece (279 B.C., Delphi) and Asia Minor (278 B.C.).

The progress of Roman power during the 2nd century B.C. (222, Cisalpine Gaul; 181, Liguria; 121, Narbonensis) is the first step in the decline of Celtic glory which was finally extinguished on the continent by Caesar (50, Gaul), Drusus and Tiberius (15, Noricum). This is Reinecke's La Tène D. Celtic (La Tène) culture as a product of a certain historical and linguistic pattern therefore can be discerned only from the second part of the 5th century B.C. onward. It must be emphasized that to trace back the Celtic culture to the 6th or 7th century B.C. is a hazardous procedure.

La Tène A (450–400/390 B.C.).—The origin of Celtic culture is geographically concentrated within the above-mentioned narrow area. There are found the rich group of "chieftains' graves" in tumuli as well as the simple inhumations. The chronology is based on the Greco-Etruscan trade associated with anthropomorphic daggers, large heavy knives (*Hiebmesser*) and the *certosa* fibula and its derivatives, and with the typical Marne pottery embracing *vases carénés,* pedestaled globular pots and dishes. Ornamentation is achieved by scratching or painting the surface. The short 50-year period seems to have been enough to create the typical La Tène style characterized by S-shapes, spirals and round patterns with the mechanical repeated symmetry of every ornament. The La Tène style may be defined as a reaction of northern geometrism on southern naturalism represented by palmettes on the vessels. Scythian and Hallstatt influences are of only minor importance.

La Tène B (400/390–c. 300 B.C.).—The unity of the first period is now dissolved by the Celtic migrations. Four branches of La Tène culture therefore may be distinguished: (1) the nuclear branch in La Tène A territory, (2) the English branch in eastern England, (3) the Franco-Italian branch and (4) the north Alpine branch.

(1) The nuclear branch remained on the cultural stage of the 5th century B.C., continuing and enlarging the former standard. This is proved by the evolution of Marne pottery as well as by the local imitations of Greco-Etruscan oenochoae by Celtic bronzesmiths. The shapes of tankards with beak-shaped rims are accommodated to those of Marne pottery, as may be seen by the globular specimens from Waldalgesheim (Germany), Eigenbilsen (Belgium), Le Châtillon (France) and the towered specimens from Bouzonville (Lorraine) and Hallein (Austria). (2) The English

(TOP LEFT, BOTTOM CENTRE LEFT, BOTTOM CENTRE, BOTTOM CENTRE RIGHT AND BOTTOM RIGHT) BY COURTESY OF THE TRUSTEES OF THE BRITISH MUSEUM; (TOP CENTRE LEFT, TOP CENTRE, TOP RIGHT AND BOTTOM LEFT) PHOTO BELZEAUX-ZODIAQUE

ARTIFACTS OF LA TÈNE CULTURES. (TOP, LEFT TO RIGHT) BRONZE FLAGON DECORATED WITH CORAL FOUND IN A CELTIC CHIEFTAIN'S GRAVE IN LORRAINE, FRANCE; SCULPTURED STONE FROM SANKT GOAR ON THE RHINE (BOTH FROM LA TÈNE A PERIOD); TWO VASES EN TERRE BRUNE FOUND AT HAN DU DIABLE, CAMP DE CHALONS, FRANCE; HELMET OF LEATHER, IRON AND GOLD FROM AMFREVILLE-LA-CAMPAGNE, FRANCE (ALL LA TÈNE B). (BOTTOM, LEFT TO RIGHT) CERAMIC VASE FROM JONCHERY-SUR-SUIPPES, FRANCE, SHOWING CURVILINEAR DECORATION WHICH IS RARE IN LA TÈNE POTTERY; FINELY DECORATED SWORD SCABBARD (BOTH LA TÈNE C PERIOD); DECORATED BUCKET FOUND AT AYLESFORD, ENG.; BACK VIEW OF MIRROR FOUND IN AN IRONSTONE QUARRY AT DESBOROUGH, ENG.; ENAMELED BRONZE SHIELD FOUND IN THE THAMES AT BATTERSEA, ENG. (ALL FROM THE LA TÈNE D PERIOD)

branch's pottery (belonging to Early Iron Age B of local chronology) gives good information about the connections existing between Armorica (Brittany) and Britain by furnishing a rich group of pottery with scratched ornaments of La Tène style. (3) The Franco-Italian branch had not yielded sufficient material for a well-founded diagnosis by the mid-1960s, although the adaptation of aboriginal shapes of Etruscan provenance was probable. (4) For the north Alpine branch such a process is unquestionable. The first adaptation of the potter's wheel for the clumsy urns of Hallstatt tradition results in a distinguished series of flask-like vessels with well-polished surfaces and dishes with sealed ornaments on the inner surface (*Braubacher Schalen*). The Hallstatt (*q.v.*) tradition likewise is represented by the use of embossed bronze vessels and the continuation of situla style (sword from Hallstatt, upper Austria, situla from Kuffern, lower Austria). Long iron swords, lanceheads, heavy knives, La Tène B fibulae (with foot bent back toward the bow), torques and armlets with "seal-top" terminals are as usual in the whole region of phase B as the flat inhumations in coffins or covering of the body by stone heaps. The enrichment of the climax of La Tène art is demonstrated by almost innumerable decorated objects (*e.g.*, helmets, sword sheaths, torques, armlets, fibulae, bronze vessels and stone stelae).

La Tène C (c. 300–c. 100 B.C.).—The four different branches of phase B are continued, but there is an evident crossing process between the aboriginals and the newcomers demonstrated by pottery shapes of different kinds and the adoption of cremation by branch 4. Burial customs are consequently no longer decisive for the ethnological determination of a La Tène complex. Among the chief metal types are long iron swords with decorated scabbards and cordiform shapes, warriors' iron chains as sword belts, broad-bladed, heavy spearheads, wooden shields with iron bosses and supporters, iron scissors, iron torques with S-curved terminals, bronze fibulae with feet clasping the bow, women's bronze chain girdles and white glass armlets with a yellow paste on the inside. Armlets of lignite are rare. The first coins were brought to the Celts through the influence of the Macedonian and Greek colonies. This is the starting point for a typical La Tène coinage imitating the southern prototypes.

La Tène D (c. 100–50/15 B.C.).—Celtic power was now brought to an end by the perpetual pressure of German invaders from the north and by the Roman empire from the south. The Boii had to leave Bohemia, now the dominion of the Marcomanni, and the Belgae caused a flourishing late La Tène culture in England by the transfusion of fresh Celtic blood from the continent. There the impoverishment of cultural standards is most easily recognized in the coarse, comb-lined pottery.

Settlements give evidence of the typical peasant's implements: iron sickles, scythes, axes, saws, ploughshares, hammers and tweezers, the majority resulting from contact with Roman civilization. Silver coinage, based on Greek and Roman prototypes, is more abundant and a valuable source for the knowledge of Celtic personal names.

The La Tène D painted pottery seems to be a special product of branch 1. Branch 3 is enriched by early Roman pottery types (Arretine ware and Italian amphorae). Celtic culture survived only in Brittany, Wales and Ireland as the foundations of early medieval culture.

Settlements.—La Tène A and B had not furnished much material for the solution of this problem by the 1960s, but the use of open villages is probable. La Tène itself is a fortified and garrisoned depot of the Helvetii, with selected weapons of phase C's military equipment.

During the 1st century B.C. the Celts were erecting rampart fortifications on hilltops (*oppida*). The description of *murus gallicus* given by Caesar (*De Bello Gallico*) is verified by excavations on different *oppida,* the diffusion of which may be seen for the whole Celtic world north of the Alps: in Bibracte (France), Gleichberg bei Römhild (Thuringia), Manching (Bavaria), Stradonitz (Bohemia) and Oberleiserberg (lower Austria). There, in the eastern zones, *oppida* may have been built as defensive points against German raids.

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LATENT HEAT is the heat absorbed when any substance changes state without change of temperature; *e.g.,* when 1 g. of ice at 0° C. melts to form water at 0° C., 79.6 cal. are absorbed. Latent heats of fusion and vaporization are familiar examples of the phenomenon. Similar absorption or liberation of heat occurs in all changes of state; *e.g.,* sublimation, solution, dilution, expansion (*see* HEAT).

The mechanism of latent heat as explained by the kinetic theory depends on the motions of particles. As an example, atoms of hydrogen and oxygen in water are associated as molecules. As a result of the heat which water contains, the atoms vibrate toward and away from each other and the molecules themselves also rotate and slide past one another in a random manner. These movements represent kinetic energy which imparts a disruptive force to the molecules tending to make them fly apart from one another. This tendency is opposed by forces of attraction among the molecules; the balance between these two forces keeps the molecules separated and provides a reservoir of potential energy. Contrasted with the fluid state, molecules in ice are held relatively fixed and motion is primarily vibration around these regular positions. As a result of this restricted arrangement, both kinetic energy and potential energy are less in ice than in water. Passage from the ordered state (ice) to the random state (liquid water) is accompanied by a net increase in the energy content of each gram of water. The heat thus absorbed is called the latent heat of melting. Similarly the latent heat of vaporization is due to further removal of restrictions on motion in passing from liquid water to the even more random state (water vapour).

Latent heat is usually measured with a calorimeter which contains a weighed quantity of the substance to be studied (*see* CALORIMETRY). The latent heat of vaporization divided by the boiling point in °K. is usually equal to about 21 cal. per degree. (D. H. A.)

LATERAN COUNCILS, the ecclesiastical councils or synods held at Rome in the Lateran basilica. There were five of these, in 1123, 1139, 1179, 1215 and 1512–17. *See* COUNCIL: *Councils of the Western Church; see* also references under "Lateran Councils" in the Index.

LATERITE. The name laterite (from the Latin, *later,* "a brick") was given by F. Buchanan-Hamilton (1807) to the mantle of ferruginous rock which covers large areas in southern India. Similar material from west Africa, analyzed by P. Berthier (1820), yielded 2.8% silica, 8.6% alumina, 77.2% ferric oxide and 11.4% water. Laterite is recognized today as an iron oxide-rich residual weathering product which may be derived from a wide variety of rocks weathering under strongly oxidizing and leaching conditions. It is currently being formed in tropical and subtropical regions where the climate is humid. Lateritic soils are rich in hydrated iron, aluminum and titanium oxides, and may contain also kaolin minerals, but tend to be reduced in silica which is leached by waters passing through the soils.

Typical laterite is a porous, claylike rock containing the minerals göthite, $HFeO_2$, lepidocrocite, FeO(OH), and hematite, Fe_2O_3, titanium oxides, and hydrated oxides of aluminum. The aluminum-rich representative of laterite is bauxite. The structure of laterite is frequently pisolitic (pealike). Exposed surfaces of laterite are blackish-brown to reddish in colour and commonly have a slaggy, or scoriaceous, lavalike appearance. It is commonly lighter in colour (red, yellow, and brown) where freshly broken. It is generally soft when freshly quarried but hardens upon exposure. Primary, *in situ,* laterite has been called the high-level type, whereas secondarily transported, dissolved and detrital laterite have been called the low-level type.

Laterite occurs in India, Malaya, the East Indies, Australia, Cuba, the Hawaiian Islands, the equatorial regions of Africa and South America, sporadically in the United States, but also in Ireland at Antrim (*see* BOLE). Geologically ancient deposits of laterite add greatly to the range in distribution.

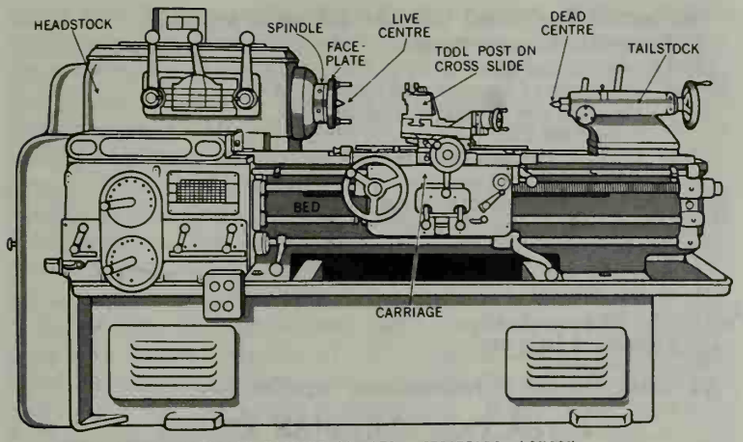
Laterite is therefore not uniquely identified with any particular parent rock, geologic age, single method of formation, climate *per se,* or geographic location. It is a rock product which is a response to a set of physiochemical conditions which include an iron-containing parent rock, a well-drained terrain, abundant moisture for hydrolysis during weathering, relatively high oxidation potential, and persistence of these conditions over thousands of years (perhaps a geological epoch).

Laterite has been used as an iron ore and, in Cuba, as a source of nickel.

See also BAUXITE; INDIA: *The Deccan Trap.* (W. D. KR.)

LATEX, a fluid found in the cells of angiospermous plants, consisting of an emulsion of various substances suspended in a watery medium in which salts, sugars, tannins, alkaloids, enzymes and other substances are dissolved. This laticiferous fluid circulates in branched tubes that penetrate the tissues of the plant in a longitudinal direction. It has an important function in conducting plastic substances in addition to acting as an excretory reservoir. The Para rubber tree (*Hevea brasiliensis*) is regularly tapped, the coagulated latex that it exudes being processed into rubber. Opium, which contains the alkaloid morphine, is obtained from the latex of the opium poppy (*Papaver somniferum*). *See* PLANTS AND PLANT SCIENCE: *Anatomy of Plants: Tissues: Laticiferous Tissue; see* also references under "Latex" in the Index.

LATHE, a machine tool which rotates material, usually metal or wood, between two rigid supports, called centres, so that it may be shaped with a cutting tool. Often a faceplate, or chuck, is attached to hold the work while it is faced, drilled, bored, threaded or lapped. When the cutting tool is held in the operator's hands, as is common in wood turning and some light machining, the lathe is called a speed lathe; but when the tool is rigidly clamped onto



BY COURTESY OF THE HOLBROOK MACHINE CO. LTD., STRATFORD, LONDON

PRECISION HIGH-SPEED ENGINE LATHE

a carriage which is moved along the bed of the lathe by power, the lathe is called an engine lathe. When the carriage receives its feeding motion from an accurately formed lead screw, driven by gears from the spindle, the machine is called a screw-cutting lathe.

The lathe, together with the drill press, is one of the earliest machine tools. French screw-cutting lathes for wood were used prior to 1569; they employed a lead screw, but the work was rotated by hand, intermittently in alternate directions, with ropes.

In 1774 John Wilkinson, of England, built the first precision machine for boring engine cylinders. Henry Maudslay, of London, developed in 1797 a sliding tool rest for metalwork which was moved along the lathe bed by a lead screw. Screws of different pitches were first used to obtain various tool-feeding speeds, but later a single screw was driven from the spindle and different speeds were obtained with a gear change box.

Back gears to provide a greater speed range of the spindle were added to the lathe in England in 1818, so that a three-step cone pulley with single back gears could deliver six spindle speeds. In about 1892 quick-change gears were introduced in the United States, permitting tool-feed speeds to be selected almost instantly. In 1905 the first single-pulley drive lathe, with a geared head to replace the step-cone pulley and back-geared drive, was built to permit selection of various spindle speeds by shifting a lever.

Lathes subsequently developed into a wide variety of sizes and types, some not more than a foot in length. The floor-mounted engine lathe is of heavy construction, powered by built-in electric motors and provides from 24 to 56 feeds, or threads, per inch, and 8 to 24 spindle speeds to give from 20 to several thousand r.p.m. The size of a lathe is designated by the diameter of the work that it will turn or swing over the ways for chuck or faceplate work, and the diameter and length of the work piece between centres. Its power capacity is indicated by the motor size. Cutting tools are of high-speed steel, sintered carbide or ceramics.

The engine lathe has been modified to produce special parts, such as railway-car wheels, crankshafts, camshafts, pulleys and gun barrels. Speed lathes are used for wood turning, spinning lathes for forming sheet metal, and polishing lathes for polishing and buffing parts held by hand against the rotating wheel. In the vertical turret lathe a turret replaces the single tool post. Other variations are the vertical boring mill, automatic chucking lathe, and hand and automatic screw machine. *See* also MACHINE TOOLS.

See Joseph Wickham Roe, *English and American Tool Builders* (1926); Orlan Wm. Boston, *Metal Processing* (1951); R. S. Woodbury, *History of the Lathe to 1850* (1961). (O. W. B.)

LATI, the name given about 1,000 people, including the Lati, Laqua and Kelao, in Tongking (Tonkin), northern Vietnam, close to the Chinese frontier. They call themselves *A'Khu,* "the men." They are divided into exogamous clans, live in compact villages, practise terrace rice cultivation and rear buffaloes and poultry. Ancestor worship, animistic attitudes and food taboos with sexual taboos form elements in their religion. Residence is patrilocal, but the transfer of the bride's residence is often deferred until she is pregnant. Funerals are directed by the elders of the community, and there is a second ritual a year later. Every individual is believed to have several souls, each of which has a different fate. The language is monosyllabic in form, with tones, and a complete decimal system is used in counting. Lati, Laqua and Kelao have been provisionally grouped with the Li dialects of Hainan Island in a new linguistic stock called Kadai, which is thought to be distantly related to both Thai and Indonesian.

See P. K. Benedict, "Thai, Kadai and Indonesian: a New Alignment in Southeastern Asia," *American Anthropologist,* "New Series," vol. xliv, pp. 576–601 (1942). (HU. DE.)

LATIMER, HUGH (?1485–1555), English bishop, reformer and martyr whose chief contribution to the religious changes of the 16th century lay in his preaching. He was born some time between 1480 and 1485 at Thurscaston in Leicestershire, the son of a prosperous yeoman farmer. Educated in the village school and at Clare college, Cambridge, he was elected a fellow there shortly before taking his B.A. and being ordained priest in 1510. In 1514 he became M.A. and in 1524 bachelor of divinity. Throughout the two decades before 1530 Latimer was active in university life and gradually acquired a reputation as a preacher. His early beliefs were entirely orthodox, and his bachelor of divinity oration consisted of a conventional attack on Luther's disciple Philipp Melanchthon. However, in 1525 he came into contact with a group of young Cambridge divines who were finding Luther's new doctrines more and more persuasive; he himself ascribed his change of beliefs—it seems to have amounted to the experience of a sudden conversion—to the ministrations of Thomas Bilney ("Little Bilney"), the spiritual leader of the group, who was to die at the stake in 1531. Latimer provoked the suspicions of his diocesan bishop, Nicholas West of Ely, and in 1527 was called before Cardinal Thomas Wolsey, who dismissed him with licence to preach wherever he liked. However, in 1529–30 his growing fervour involved him in trouble with enemies in Cambridge, from which he was saved by changing opinions at Henry VIII's court. He preached before the king during Lent 1530 and made sufficient impression to obtain appointment—an honour, not an office—as royal chaplain.

In Jan. 1531 he was advanced by the king's patronage to the living of West Kington in Wiltshire. By this time he had also made contact with the two rising hopes of the reformers, Thomas Cromwell and Thomas Cranmer. Yet all this did not protect him from being dragged into the heresy investigations stimulated by Sir Thomas More, who had succeeded the lukewarm Wolsey as chancellor in 1529. In Jan. 1532 Latimer refused to subscribe to certain articles, was excommunicated and imprisoned by Archbishop William Warham, and remained in danger until he made a complete submission in April. He spent the next few years in parochial work and in preaching both at court and in the west country. In 1533 he provoked a controversy at Bristol by his attacks on superstitions and insufficiencies in the clergy, but by now the tide was running his way, and his adversaries found themselves in jail. In 1535, thanks to Cromwell's favour, he was elevated to the bishopric of Worcester; by 1536 he was generally regarded as one of the leaders of reform, even though there is no sign of his playing any part in the various attempts of those years to introduce doctrinal changes. The Catholic reaction signaled by the Act of Six Articles (1539) forced him to resign his see; he later claimed that in this he was following Cromwell's advice that the king so wanted it, only to hear Henry in due course express regret at his decision. He was not the only or most suffering victim of Henry's duplicity, losing his main support at court with the sudden fall of Cromwell in July 1540.

For the rest of Henry's reign, Latimer remained in the shadows. Apparently he incurred suspicion of heresy at intervals and spent some time in the Tower, where he certainly was during the last few months before Edward VI's accession (Jan. 1547). The new reign, with its rapid progress toward Protestantism, gave him his chance. He refused to resume his bishopric, no doubt because he recognized that his talents did not lie in administration. It is certain also that he wanted to be free to preach without fear or favour. His sermons, which touched both issues and people in a fashion all their own, attracted large crowds and were much patronized by the court, though they did nothing to affect the violent politics of

the reign. As far as can be told, however, Latimer did much to popularize the idea of the Reformation, so that he was naturally marked for destruction when Mary Tudor brought back Catholicism from 1553 onward. He was at once arrested; in March 1554 he was taken to Oxford together with Cranmer and Nicholas Ridley, for a prolonged and acrimonious heresy trial which ended with his condemnation and burning on Oct. 16, 1555. Latimer's health, never good, quite broke down in prison and it was a very old and feeble man who unwaveringly resisted all pressure to recant. At the stake he immortalized himself when he exhorted his fellow victim Ridley with the famous words: "Be of good comfort, Master Ridley, and play the man; we shall this day light such a candle by God's grace in England as I trust shall never be put out."

Latimer was an unusual figure among the early English reformers. Never much of a theologian—he owed his views on the sacraments to Cranmer's writings and Ridley's instruction during their imprisonment—he was a man of straightforward convictions, simple faith and downright personality who contributed a strong dash of plain conscience to the debates of the day. Being preeminently a preacher with a splendid gift of vivid language straight to the point, his main influence was naturally on those who heard him; but his sermons were printed, and in any case his death made him a lasting inspiration. What he had to say on the social evils of the day—and he said a good deal—came from the heart, not the head; in the tradition of the moralist, he failed altogether to understand the deeper causes of the undoubted shortages, inflation and exploitation of the day, and was given to a search for scapegoats among the obvious targets—landlords and bishops. His powerful indignation and lively wit still make his denunciations attractive reading; if his diagnosis was wrong and his attack often unfair, it is still true that he showed courage of a high order in lambasting selfishness wherever he found it.

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LATINA, a province and its capital in the region of Lazio (Latium), central Italy. The province has an area of 2,248 sq.km. (868 sq.mi.), and a population (1961) of 312,289. It was formed in 1934 from Roma province and extends from the outer suburbs of Rome southeastward to the mouth of the Liri, the administrative frontier between Lazio and Campania. Inland the province is dominated by the heights and foothills of the Lepini, Ausoni and Aurunci mountains. On the side facing the Tyrrhenian sea are the lowlands, most of them reclaimed, of the Pontine marshes of Fondi and of Formia. Wheat, corn (maize), vegetables and grapes are grown, and cattle and poultry are reared. Gaeta, Terracina and Formia are ports. There is a petroleum refinery at Gaeta and pharmaceutical and food industries are scattered in several towns. The areas around Monte Circeo and Formia are popular with tourists. The main Naples-Rome rail and highway connections pass through the province. The town of Latina (pop. [1961] 49,668 [commune]) was built in 1932 and has a carefully planned layout. Both town and province were called Littoria until 1947.

For the classical history of the area *see* LATIUM. (G. KH.)

LATIN AMERICA. As the term is generally understood, Latin America comprises the entire continent of South America, Central America and Mexico (called Middle America), and the islands of the Caribbean. "Hispanic America" has often been suggested as a more suitable designation since it specifically indicates the region's Spanish and Portuguese heritage. However, the Indian and Negro heritage, as well as American, British and French cultural and colonial influence, nullify any advantages of such a change. Despite territorial contiguity and, for much of the area, ties of a similar culture, history and aspirations for the future, the physiographic, climatic, economic, political, ethnic and linguistic differences make the term Latin America as connoting a homogeneous region fall short of a true description. Only in deference to popular usage and for lack of a better term, the area remains Latin America. *See* also CENTRAL AMERICA; MIDDLE AMERICA; SOUTH AMERICA; WEST INDIES.

This article is divided into the following sections:

I. The Pre-Columbian Period
II. The Colonial Period
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  B. Political and Religious Institutions
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  D. Social and Cultural Life
  E. Colonial Brazil
III. The Independence Movement
IV. Reaction and Anarchy, 1825–1850
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VI. Between the Wars: 1918–1939
VII. World War II
VIII. The Postwar Years
IX. Organized Labour
X. Communism
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I. THE PRE-COLUMBIAN PERIOD

Men of Mongoloid stock entered the Americas at least 20,000 years ago, probably from Siberia by way of Alaska. They spread over North and Middle America, reached South America by way of the Isthmus of Panama, and between 3,000 and 5,000 years ago, reached the tip of South America. Evidence of other major migration routes such as a trans-Pacific route from Asia directly to Peru, Middle America or British Columbia is, as yet, unsatisfactory. However, certain classical Maya art motifs, such as seated cross-legged figures, hint at the possibility of such an event. Older beliefs concerning land bridges and lost continents are now rejected.

Until recently the pre-Columbian Indian population has been estimated at 15,500,000. However, researches have recently indicated a population that large in central Mexico alone, and any definitive total must await further investigation. Their cultures ranged from very primitive to highly developed. They may be divided into six major cultural groups (each composed of several language and political groups) as follows: (1) Pima-Pueblo (southwestern United States and northern Mexico); (2) Nahua-Maya (central Mexico, Yucatán and Guatemala); (3) Circum-Caribbean and Semi-Marginal (Central America south of Guatemala, Panama, northern and western Colombia, Venezuela west of the Orinoco, the Greater Antilles and the western headwaters of the Amazon); (4) Central Andean (western Ecuador, Peru and northwestern Bolivia); (5) Marginal tribes of South America (southern Chile, most of Argentina, eastern Bolivia, Uruguay, east-central Brazil northward to the Brazilian bulge); and (6) Tropical Forest and Southern Andean tribes (occupying the Lesser Antilles, the Amazon basin, the western half of the Orinoco flood plain, the Guiana highlands, and much of the east coast of Brazil south to the Uruguayan border, then west to Paraguay and central and northern Chile). Within these groups only the central Mexican, Maya, Chibcha and Andean Indians had reached a high level of culture. The others varied from Paleolithic to late Neolithic.

Within their general cultural groupings, the numerous tribes into which the aborigines were divided continuously fought for the control of better lands. Defeated tribes retreated into less hospitable areas, were gradually exterminated, or paid tribute to their conquerors. In a sense the Spanish and Portuguese conquest was but another phase in the struggle for control of land and labour. The Indian tribes were divided into hierarchies of chiefs, nobles, priests, commoners, servile labourers and slaves. The idyllic life of the noble savage did not exist on the American continent; the struggle for existence and status was vicious.

Diversity marked much of Indian life. In addition to the internecine struggle, there were wide variations in physique and language. Languages derived from many basic roots and the dialects have been estimated to number 1,700. Even the great empires were not linguistically united. The Incas forced upon the people they subdued as a lingua franca Quechua, a language they themselves had adopted from a more advanced neighbouring group they had conquered. The Aztecs governed peoples with a mélange of dialects. Tribes no more than 75 or 100 mi. apart spoke different dialects if not different languages. Buildings varied from stick and thatch hovels to the magnificent stone palaces of the Incas and the temple-topped pyramids of the Maya. Primitive

tribes wore little more than breechcloths to cover their nakedness while the people of the high civilizations wore elaborate costumes, often covered with exquisite featherwork. Advanced groups wove fine cotton and woolen cloth; others contented themselves with hides and bark cloth. Techniques and artistic sensitivity in the making of pottery and statuary covered a wide spectrum of differences. While the Maya possessed a system of writing, a vigesimal number system and a calendar more accurate than that used by the Europeans, the Incas relied on mnemonic devices to keep historical and statistical accounts. Other groups simply depended upon memory or pictographs.

Agricultural techniques and basic crops also varied greatly. Only corn (maize)—apparently first domesticated in Mexico—was raised throughout the new world, although the cultivation of beans and squash was also widely disseminated. While North American Indians planted mainly seed crops—corn, beans and squash—the South American and West Indian peoples preferred tubers, such as cassava (manioc) and sweet potatoes. Because of its importance in the diet of the early conquistadors, cassava has been called the bread of the conquest. The white potato, native to the Andes, was raised in large quantities in the higher altitudes there where corn would not grow well. Perhaps the greatest deficiency in the Indian diet was the lack of a plentiful meat supply. Except for guinea pigs and dogs, which were often raised for food, only in the Andean region, where the llama and alpaca were found, was there a dependable, if small, source of meat. Wild game and wild fowl were fairly abundant in some areas. It has been suggested that the shortage of meat might have been responsible for the widespread practice of cannibalism. Agricultural techniques ranged from fire agriculture (the milpa) in which corn was planted in burned-over forest land in a hole punched in the ground with a stick to intensive irrigated, fertilized and terraced agriculture. At best, Indian agriculture was an intensive hoe culture since there were no draft animals to draw a plow. Through their centuries of occupation of the new world the Indians had found the most fertile and productive areas for their techniques, and there the most populous empires developed. To a great extent, early Spanish conquest and settlement simply followed the lines of available food, labour and cultivable land.

In addition to the more advanced peoples such as the Aztecs (*q.v.*), several groups on a lower cultural level are worth noting. The Araucanians of Chile, a high agricultural group, were only partially conquered by the Incas. Soon after the Spanish conquest began, they acquired horses and used them to good account, tenaciously resisting the white invaders. The Puelches and Tehuelche of the La Plata region, rather primitive foodgatherers, also became horsemen and exacted a heavy toll from the Spaniards. They were not completely pacified until the 19th century. In northern Mexico the Apaches and Comanches presented a similar problem. But the neighbouring Pueblos, except for a few sharp rebellions, were generally peaceful. The Guaraní of central South America, just becoming agriculturalists, proved rather docile. The Spaniards and Portuguese used them as farm labourers and slaves while the Jesuits organized them in missions. Brazilian Indians, such as the Tupí, were culturally among the most backward groups in the new world. Their low culture status undoubtedly contributed to their gradual disappearance, under the strain of working on the sugar plantations. Many Brazilian Indians fought the Portuguese to the bitter end; others aided the Europeans in establishing settlements.

In sum, several Indian peoples capitulated with hardly a struggle, while most resisted the Europeans to the best of their abilities, usually in vain. Their descendants, both pure-blooded and mixed, live scattered over the length and breadth of Latin America, in most places the aliens and dispossessed in their own land. *See* also INDIAN, LATIN-AMERICAN.

II. THE COLONIAL PERIOD

Spanish and Portuguese expansion into the new world was but a facet of their dynamic national policies. Portugal was a wealthy, expanding, trading nation with a large African and island empire. The leadership of Ferdinand and Isabella, the

FROM "HANDBOOK OF SOUTH AMERICAN INDIANS"

FIG. 1.—MAP SHOWING DISTRIBUTION OF SOUTH AMERICAN INDIAN CULTURES

"Catholic kings," transformed Spain into a national state marked by growing royal power and centralized administration. They kindled a wave of nationalist and religious fervour that eventually led to the expulsion of the Moors and Jews and carried Spaniards beyond the peninsula. Soon they were fighting in Italy, the Netherlands and central Europe to secure the domains of Charles I (better known to English-speaking people as Charles V, the Holy Roman emperor) and Philip II and to contain Protestantism. Overseas they fought to enlarge Spain's domain and to convert the heathen Indian. As with the other nations of western Europe, Spain and Portugal were affected by the commercial revolution, and their merchants and crowns were interested in new trade contacts. An ardent, revived religious and nationalistic spirit, a drive for trade and land, a military caste seeking adventure and rewards, monarchs desirous of expanding and unifying their realms, all contributed to the Iberian conquest of the new world.

To say that "gold, glory and gospel" were the major motivations of the Iberians is a misleading oversimplification. It is true that many individuals who participated in the incredible adventure of new world conquest sought plunder, and that priests converted the heathen. But to call this the Iberians' motivation is the equivalent of saying that western United States was settled by glory-mad cavalrymen, gold-hungry forty-niners and mountain men, and zealous missionaries. Iberians, during their 325 years of dominion, left an indelible impression upon the culture and life of the lands they occupied. Spain preserved an Indian nobility, and many Spaniards took Indian wives. As soon as the wars of conquest and plunder were over, Spaniards and Portuguese staked out land for agriculture, founded cities, opened trading posts, and prospected for mines, advancing their nations' realms. They established the church of their faith and converted millions to Christianity. The evils and cruelties of the Iberian conquest

cannot be overlooked, but they were the horrors common to all European colonial systems.

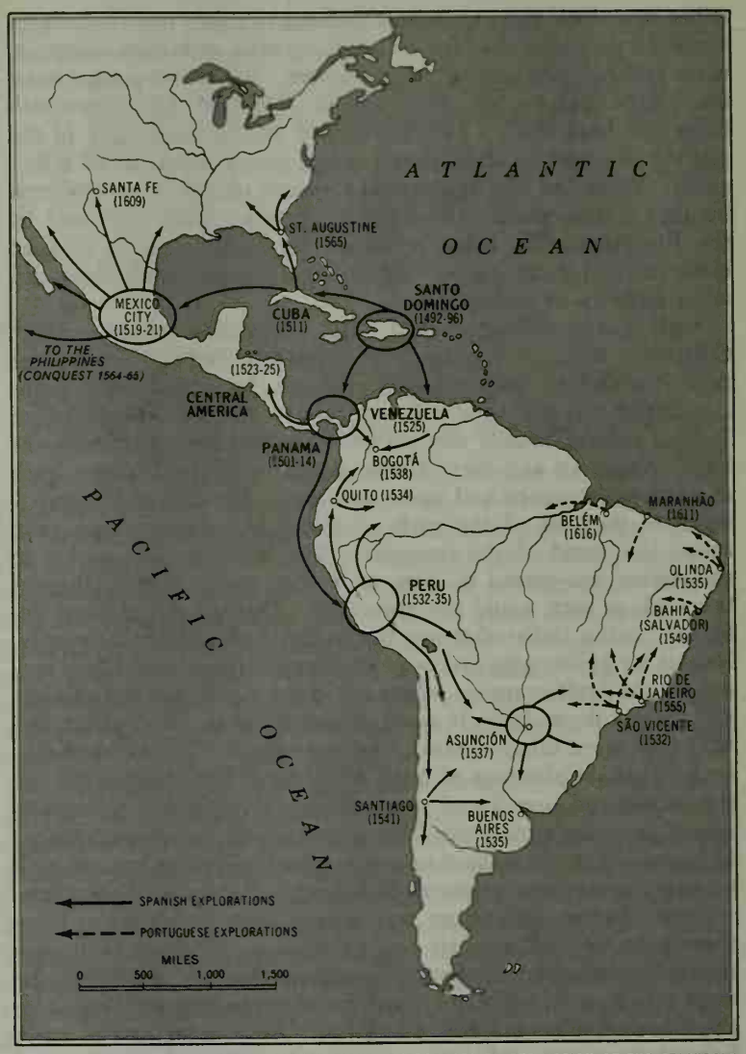
A. Discovery, Conquest and Settlement

Despite several earlier landings in the new world, Christopher Columbus (*q.v.*) is considered its discoverer because "he had the good fortune to represent a nation which was enterprising enough to follow up the explorer with the farmer, miner and priest, all equipped to create permanent homes in a new world." (Hubert Herring, *A History of Latin America*, p. 118, Alfred A. Knopf, Inc., New York, 1957). By a combination of study, meditation, intuition and miscalculation, Columbus became convinced that Asia lay within a reasonable distance west of Europe. Rebuffed by several royal courts, he finally managed to enlist the aid of influential Spaniards, and Queen Isabella of Castile was persuaded to support his venture. Commercial and possibly imperial expansion were the incentives behind royal support. The method of financing the voyage is obscure. Isabella probably borrowed from the funds of the knights of the Santa Hermandad and levied a large fine upon the town of Palos, for some unrecorded offense, to be paid by outfitting the expedition. She granted Columbus numerous high offices and commercial privileges and concessions, contingent upon a discovery. At Palos several merchants aided Columbus by recruiting crews from their regular seamen in return for a promise of a portion of his share of the profits. After a 71-day voyage, the expedition struck the Bahama Islands. Sailing southwest, Columbus then discovered Cuba and the island of Haiti (which he called Hispaniola) before returning to Spain in March 1493.

Upon Columbus' return, the Spanish crown immediately prevailed upon Pope Alexander VI to issue a series of bulls in 1493 which, supplemented by the Spanish-Portuguese treaty of Tordesillas of 1494, defined the Portuguese and Spanish spheres of exploration and settlement. West of a line drawn from pole to pole 370 leagues west of the Cape Verde Islands, Spain was given a free hand; Portugal had equal rights to the east. The pope made these privileges contingent upon conversion to Christianity of the heathen natives. Since the line intersected the eastern bulge of Brazil, it justified Portuguese activities in the western hemisphere. (*See* Tordesillas, Treaty of.)

Columbus returned to Hispaniola in Nov. 1493, to establish a permanent colony with an expedition of 17 ships, 1,500 men including 12 missionaries, seeds, livestock and farming implements. He planned to found a city to serve as a base for trade, colonization and further exploration. Columbus left the colony to explore fruitlessly the coast of Cuba seeking news of Japan. Gold discoveries and opportunities to abuse the natives soon demoralized the colonists; disease carried off many and food began to run out. Fixing an Indian tribute to be paid in gold yielded only meagre quantities. Despoiling the Indians of their food, enslaving those who resisted, and imposing forced labour to wash gold from stream beds and grow patches of cassava neither fed the Spaniards nor produced great amounts of precious metals. The first ten years saw little beyond the establishment of a permanent settlement with its capital at Santo Domingo. Discouraged by repeated failures and poor results, the "Catholic kings" turned from the Indies (as the new world was called) to European affairs, gradually reduced Columbus' broad powers and monopolies, and in 1499 replaced him with another governor, Francisco de Bobadilla, who returned Columbus to Spain in chains.

When Nicolás de Ovando arrived in 1502 to serve as governor with an expedition of 2,500 persons, including 73 families, the colony numbered only 300. In a short while more than 1,000 of Ovando's group died. During the six years of Ovando's governorship conditions were stabilized. New cities were founded, gold output expanded and food production increased under a system of forced Indian labour supplemented by slavery. With a permanent beachhead in the Indies, it was now possible (and the attrition of the Indian population of Hispaniola made it necessary) to begin the conquest of other islands in the West Indies as well as portions of the Caribbean coast. Having served its purpose as the advance base of the conquest, Hispaniola sank into decadence.



FROM B. DIFFIE, "LATIN AMERICAN CIVILIZATION"; REPRODUCED BY PERMISSION OF THE STACKPOLE COMPANY

FIG. 2.—MAP SHOWING SPREAD OF SPANISH AND PORTUGUESE CONQUESTS FROM PRIMARY CENTRES

With the gradual royal nullification of Columbus' rights, the crown permitted other men to explore and colonize in the Caribbean. Alonso de Ojeda led an expedition which included Amerigo Vespucci (*q.v.*) in 1499 and explored the northern coast of South America from the mouth of the Orinoco west to Lake Maracaibo. Vespucci's descriptions and recognition of South America as a continent led the cartographer Martin Waldseemüller to name it after him in 1507.

In 1500, Vicente Yáñez Pinzón explored the northern coast of Brazil from Cape São Roque to the Guianas, discovering the mouth of the Amazon, while in the same year Diego de Lepe explored the coast of the Guianas and Rodrigo de Bastidas in 1501 and 1502 the coast from Lake Maracaibo to Nombre de Díos, Panama (just south of modern Colón). The discovery of pearls along this coast led to the establishment of a lucrative industry based on exploiting Indian divers. Juan de la Cosa in 1504 explored the Gulf of Urabá (Darién) in the crook between Panama and South America.

Following Columbus' last voyage in 1502–04, which explored from Honduras south to Panama, Pinzón and Juan Díaz de Solís in 1506 explored the east coast of Yucatán and the Gulf of Honduras. Along with the stabilization of Hispaniola, these explorations led to a rash of colonizing activity. Juan Ponce de León began the conquest of Puerto Rico in 1508 and went on to discover Florida in 1513. Juan de Esquivel began the settlement of Jamaica in 1509, while in 1511 Diego Velázquez de Cuéllar started the conquest of Cuba, founding Havana in 1515. Thus ended the first stage of Spanish exploration, the conquest and settlement of the islands of the Caribbean. Alonso de Pineda completed the mapping of the coast of the Gulf of Mexico in 1519 by sailing west from Florida to about modern Veracruz in Mexico and dis-

covering the mouth of the Mississippi river on the way.

By far the most ambitious colonization attempt was that of Alonso de Ojeda and Diego de Nicuesa along the coast of Panama and northwestern Colombia in 1508–1511. After the loss of over 1,000 men and the deaths of the leaders, a united colony was finally established under Vasco Núñez de Balboa (*q.v.*) and Francisco Pizarro (*q.v.*). Balboa, following Indian stories, crossed the Isthmus of Panama in 1513 to discover the Pacific ocean. Despite Balboa's attempts to curry royal favour, in 1514 Pedro Arias de Ávila, usually called Pedrarias Dávila, arrived with 1,500 men to become governor of Castilla del Oro (modern Panama and Costa Rica). Most of Pedrarias' men were dead within a year, but his energetic policy completely transformed the area. By 1519, when Pedrarias executed Balboa, allegedly for treason, exploration was pushed to the Pacific coast and the city of Panama established at the western end of the road crossing the isthmus. The exploration of the west coast of Central America and Mexico was done by Gaspar de Espinoza (1516–19) and Andrés Niño and Gil González Dávila (1522–23) who sailed north from Panama as far as Nicaragua. Pedrarias then began sending men northward into Central America where he finally encountered expeditions sent south overland from Mexico by Hernán Cortés (*q.v.*).

Diego Velázquez de Cuéllar, conqueror of Cuba, laid the foundations for the conquest of Mexico. In 1517 and 1518 Velázquez sent out expeditions headed by Francisco Hernández de Córdoba and Juan de Grijalva which explored the coasts of Yucatán and the Mexican Gulf. Velázquez commissioned Cortés to outfit an expedition to investigate their tales of great wealth in Mexico. Spending his own fortune and a goodly portion of Velázquez', Cortés left Havana in Nov. 1518 following a break in relations with Velázquez. Landing in Mexico, Cortés freed himself from Velázquez' overlordship by founding the city of Veracruz and establishing a town council (*cabildo*) which in turn empowered him to conquer Mexico in the name of Charles I. Divining that Mexico was a fabulously wealthy realm held together by sheer force and that the Aztec ruler Montezuma held him in superstitious awe, Cortés pushed into central Mexico with only about 500 Europeans and several thousand Indian allies as soldiers and porters. In an incredible campaign lasting two years, Cortés took the capital city of Tenochtitlán (Mexico City) on Aug. 13, 1521. His success was the result of a combination of factors: the hatred of the conquered tribes for the Aztec overlords; Montezuma's belief that Cortés was a returning god; Cortés' personal qualities of leadership and diplomacy; European arms—crossbows, muskets and steel swords—and horses; disease; and the aid of Cortés' interpreter-mistress, Malinche.

Once in control of central Mexico, Cortés dispatched expeditions to explore northward to the Gulf of California and southeast into Guatemala and Honduras. The Gulf of California was discovered in 1532 and Lower California the next year. Not until 1539 did Francisco de Ulloa explore the gulf and prove that Lower California was a peninsula, not an island. Juan Rodríguez Cabrillo, in 1542, explored the coasts of Lower and Upper California to about 40° N. latitude.

In a search for gold and a new strait to the Pacific, Pedro de Alvarado (*q.v.*), Cortés' lieutenant, organized an expedition recruited from men disappointed in their share from the conquest of Mexico. They began the conquest of the Maya in Yucatán and penetrated south and southwestward into the present Mexican state of Oaxaca and the Pacific coast of Central America in 1523–24. The next year, Cristóbal de Olid went to Honduras, followed by Cortés in 1525. During the latter expedition Cuauhtémoc, the last king of the Aztecs, who was forced to accompany Cortés, was hanged for allegedly plotting Cortés' death. There was little gold, the land was poor, and the war was a difficult, drawn-out one that yielded little glory. Meanwhile, Pedrarias in Panama had sent expeditions into what is now Costa Rica and Nicaragua. Pedrarias' and Cortés' men soon met in armed clashes. A royal settlement relieved Pedrarias as governor of Panama in 1526 and named him governor of Nicaragua, a post he held until his death. Later, the entire area north of Panama was attached to Mexico as the captaincy general of Guatemala. Generally speaking, this area was neglected because of its lack of economic opportunities, and, with the exception of Guatemala where a brilliant nucleus of culture flourished, it became one of the backwaters of the Spanish empire in America. During the absence of Cortés in the south, anarchy broke out in Mexico. Cortés felt compelled in 1528 to return to Spain to plead his case before the king. Mexico fell into the hands of his enemies.

Cortés' conquests as well as those of his lieutenants were carried out with a minimum of bloodshed. In contrast, the adventurers who followed, penetrating northern Mexico and governing virtually unchecked, opened a chapter of wholesale pillaging and bloodletting until the appointment of an *audiencia* (an administrative-judicial tribunal) under Bishop Sebastián Ramírez de Fuenleal. Of one of this group, Beltrán Nuño de Guzmán who conquered the province of Pánuco, L. B. Simpson wrote: "Flourishing provinces were permanently depopulated and the hatred and despair of the victims mounted to such a pitch that they eventually rose against the Spaniards in the wild rebellion known as the Mixton War . . ." (Lesley Byrd Simpson, *Many Mexicos,* p. 34, University of California Press, Berkeley, 1957).

Much of northern Mexico and the southwestern United States owes its exploration and eventual colonization to the adventures of Alvar Núñez Cabeza de Vaca (*q.v.*). In 1536 he and three companions were found wandering in northern Mexico, the last survivors of Pánfilo de Narváez's expedition of 300 men shipwrecked in Florida eight years before. Cabeza de Vaca's stories of his journey from Florida to northwestern Mexico led to the organization of expeditions to explore the territories he had traversed. Hernando de Soto (*q.v.*), financed by a fortune accumulated during his participation in the conquest of Peru, landed in Florida in 1539 with about 600 men and roamed over what is now the southeastern United States until his death in 1542. He discovered no wealth; the survivors sank his body in the Mississippi and straggled back to Mexico. Fray Marcos de Niza and a Negro companion of Cabeza de Vaca named Esteban were sent by Viceroy Antonio de Mendoza in 1539 to retrace Cabeza de Vaca's steps in northern Mexico. Fray Marcos reported the existence of Seven Golden Cities, one of which was said to be larger than Mexico City. A 300-man expedition led by Francisco de Coronado (*q.v.*) left Compostela in western Mexico in 1540; for two years they searched in vain for a golden empire, meanwhile wandering over New Mexico, Arizona, Texas, Oklahoma, Colorado, Kansas and Nebraska. The failures of De Soto and Coronado, coupled with fruitless searches for a sea-to-sea passage via the Colorado river and the futile explorations of Rodríguez Cabrillo, dampened for the time being further interest in expansion in North America. Spanish policy turned toward settling and developing what had proved fertile and productive, exploiting the mines which were being discovered with increasing frequency and preaching the gospel. Only Florida was colonized in the 1560s to protect the Bahama channel against pirates and European interlopers.

Silver mining on the west coast of Mexico supported the establishment of several stable and prosperous communities which late in the 16th century were the scenes of renewed interest in what is now southwestern United States. Juan de Oñate, nephew of one of the conquistadors of western Mexico, finally managed to plant the first colony in New Mexico, founding San Juan in 1598, and made a series of explorations ranging from the Colorado river east into Kansas. Oñate's hopes of finding great silver mines and using the labour of the sedentary Pueblo Indians proved abortive. New Mexico remained a tiny outpost surrounded by fierce Indians until the spread of missions over the next 200 years added this area to the cattleman's frontier.

After the voyage of Ferdinand Magellan (*q.v.*) it was recognized that the new world itself was not only a barrier to the far east (instead of being an extension of it), but also that it hid a tremendous ocean. When the Spaniards controlled the Mexican Pacific coast, they attempted to discover a strait from the Atlantic to the Pacific—a fruitless search resulting only in the exploration of the west coast from Oregon south to Panama. They also attempted to find a dependable route across the Pacific. Acting on royal orders to annex the Philippines to the viceroyalty of New

Spain (Mexico), Viceroy Luis de Velasco dispatched an expedition in 1564 under Miguel López de Legazpi with Andrés de Urdaneta second in command. Legazpi remained to conquer the Philippines. Urdaneta, discovering the Japan current, followed it to the California coast and thence south to Acapulco.

The so-called Manila galleon soon plied regularly between Manila and Acapulco to trade Mexican silver for eastern wares, particularly raw silk which was woven in Mexico. In 1583 an *audiencia* was established in Manila subordinate to the viceroy in Mexico City. (*See* also PHILIPPINES: *History*.)

Expansion south of Panama did not begin until after 1524, although Balboa had heard Indian tales of a land of gold to the south named Birú (Peru) which were also heard by Pascual de Andagoya who had managed to reach the equator on the Pacific coast in 1522. Francisco Pizarro and Diego de Almagro began their attempts to follow up these stories in 1524. After incredible hardships fighting adverse currents and winds, they reached a point in Ecuador about 9° S. latitude in 1527 and were able to confirm the existence of an Indian empire. Pizarro returned to Spain and received a patent from Charles I to conquer these new lands and divide them between himself and Almagro. Pizarro, with an expedition composed of about 183 men and 37 horses reinforced periodically by volunteers and adventurers from Panama and Mexico, reached Cajamarca in northern Peru in Nov. 1532. In Feb. 1533 Almagro arrived with reinforcements. Atahualpa (*q.v.*), the Inca who had just defeated his half brother, Huáscar, for control of the empire, was treacherously seized during a visit to the Spaniards' camp. Despite the payment of a ransom with a modern equivalent of perhaps $17,000,000, the Spaniards put Atahualpa on trial for inciting rebellion, charging him, among other things, with being an idolator and bigamist. Found guilty, he was persuaded to be baptized in order to be executed by the garrote instead of by burning. More than two years of hard fighting were necessary to subjugate the empire. During this time Pizarro founded the city of Lima (1535) to facilitate bringing supplies from Panama by sea.

Almagro led an expedition to conquer Chile in 1535. Losing many of his force of Spaniards and Indian porters on the trip south, Almagro found a land without gold, peopled by fierce Indians. Dejected, he turned north, crossing the Atacama desert to reach Peru. Only a handful of his men reached Cuzco, the old Inca capital, which Almagro seized and declared to be his. In the shifting fortunes of the civil war which followed for possession of Cuzco, Almagro and then Pizarro were slain.

Deciding to enforce order in Peru and revamp Spanish-Indian relations, Charles I dispatched Blasco Núñez Vela as viceroy with a set of new regulations (the New Laws) designed to protect the Indians from excessive exploitation. Gonzalo Pizarro, a half brother of the assassinated Francisco, led a revolt in 1546 which succeeded in defeating and beheading Núñez Vela. Charles then sent a *visitador* (a combination inspector, expediter and trouble shooter), Father Pedro de la Gasca, who by adroit diplomacy undercut Gonzalo's support, defeated him and his few remaining followers and re-established royal authority in Peru in 1548.

Pedro de Valdivia, to whom Pizarro had given Almagro's concession, achieved the distinction of conquering Chile. In 1540, after terrible hardships, Valdivia's expedition reached Chile and began the slow conquest of the land from the fierce Araucanian Indians. After supporting Gasca (who reconfirmed his concession), Valdivia returned to Chile to prosecute his campaign. . Chile offered neither wealthy civilizations to plunder nor mines to exploit. But the land was fertile, the Indian population ample, if warlike. Valdivia granted land in large tracts, but often the would-be conquistador had to work with his Indians—and keep his weapons handy. Valdivia founded the city of Santiago de Chile in 1541, Valparaíso in 1544 and Concepción in 1550. An expedition sent over the Andes into what is now western Argentina founded the cities of Mendoza (1561) and Tucumán in 1565.

Valdivia's most formidable opponents were the chiefs Lautaro and Caupolicán. According to tradition, Lautaro had learned Spanish military tactics while serving the conquerors as a stable boy. Lautaro defeated and captured Valdivia in 1553 and had him executed. In turn, Lautaro and Caupolicán were eventually captured and killed. Lautaro is now regarded as a Chilean national hero, immortalized in the epic poem *La araucana* by Alonso de Ercilla y Zúñiga. After a half century of war, peace was finally agreed upon when the Spaniards recognized the Bío-Bío river as the southern boundary of Chile, permitting the Araucanians to roam free to the south.

Peru served also as the nucleus for expansion eastward and northward. After the fall of the Inca empire, Francisco Pizarro commissioned Sebastián de Belalcázar to secure the kingdom of Quito (Ecuador). Belalcázar, with the aid of Almagro, carried out his commission and founded the city of San Francisco de Quito in 1534. In 1540, Gonzalo Pizarro led an expedition from Quito over the Andes into the Amazon valley in search of cinnamon. Finding themselves in sore straits, they built a number of boats to help forage for food. Francisco de Orellana took the boats and with a group of men sailed down the river to the Atlantic. Whether Orellana was carried away by the current or deserted is still a moot question. Gonzalo returned to Quito with a handful of survivors. Meanwhile, Belalcázar was working north from Quito, incorporating northern Ecuador and southern Colombia into the Spanish domain. He eventually pushed his way to the highlands of Colombia, the homeland of the Chibcha Indians. There he met two other expeditions. One, led by Nicolaus Federmann, a German in the service of the banking house of Welser (*see* VENEZUELA: *History*), had come southwest from Venezuela. However, the second expedition under Gonzalo Jiménez de Quesada, who had come up the Magdalena river from the Caribbean coast, had reached the area first by a few days. The three men agreed to submit their case to the crown for judgment. Quesada was made a nobleman and alderman of the city of Santa Fe de Bogotá which he had founded in 1538; Belalcázar was made governor of Popoyán in southern Colombia; Federmann received nothing.

Federmann's presence was the result of an unusual chapter in the early history of the Indies. After the failure of Ojeda's expedition to northern South America, the area was deserted except for pearl fishers, slave hunters, and an abortive attempt to found an ideal Indian state by Fray Bartolomé de las Casas (*q.v.*). In 1528 Charles I mortgaged Venezuela to the banking house of Welser of Augsburg, Ger., as a hereditary fief conditioned upon their developing the area. A complex formula was set up for dividing the produce of the mines, and the Welsers could enslave all the necessary Indian labour. Ambrosius Alfinger arrived in 1528 as governor. Failing to find gold, he set the colony upon an economic base of slave trading. Killed by Indians in 1531, he was succeeded by Georg Hohermut von Speyer as governor and Nicolaus Federmann as captain general. Federmann's expedition to the highlands near Bogotá was one of several fruitless attempts by him and von Speyer to recoup the colony's fortunes. Charles I canceled the contract in 1547. With the discovery of gold in 1560 the colony was placed on a more permanent footing, although it remained basically a peaceful out-of-the-way agricultural area.

The final major area of Spanish exploration, conquest and settlement was the Río de la Plata. Juan Díaz de Solís discovered the great estuary in 1516; Magellan explored it in 1520; Sebastian Cabot sailing up the Paraná river in 1526 ascertained that it was not a strait to the Pacific. Cabot picked up a number of silver trinkets which had filtered eastward from Peru. Believing himself to be close to their source, he named the region Río de la Plata ("river of silver"). A full-scale attempt at colonization was made in 1535 by Pedro de Mendoza (*q.v.*) who had received a royal patent to all lands from the Río de la Plata to the Straits of Magellan and then west to the Pacific. Theoretically, Chile had been granted twice: first to Almagro and then to Mendoza. Mendoza's expedition of 11 ships and 1,200 men soon came to grief on the inhospitable pampas occupied by hostile natives. Santa María de Buenos Aires, named after the patroness of the voyage, was the scene of starvation and cannibalism by the whites until it was destroyed by Indian attacks. Mendoza died at sea while returning to Spain for aid. The remnants of the expedition were led northward by Mendoza's lieutenants, Juan de Ayolas

and Domingo Martínez de Irala, who founded the city of Asunción. Ayolas was lost in an unsuccessful attempt to reach Peru. Under Irala's guidance and by virtue of the docile nature of the Guaraní Indians, Asunción prospered. Large grants of land and Indians, as well as open polygamy, made Irala quite popular and, except for the years 1542–43 when Alvar Cabeza de Vaca ruled as governor, he governed until his death in 1556. Buenos Aires was refounded in 1580 by Juan de Garay to serve as a seaport for Asunción.

The settlement of Buenos Aires in 1580 marked the end of the second, or continental, stage of Spanish expansion. Spain now concentrated upon filling in the broad areas staked out during the first century and only slowly expanded the limits of its dominion. The three major areas of new expansion were northward from Mexico toward California and Texas, southward from the central valley of Chile, and into the plains surrounding the Río de la Plata and the Paraná river.

Frontier Missions.—Missions founded by Franciscans and Jesuits were of great importance in the later colonization movement. Inspired by a mixture of paternalism, commercialism and Christian ardour, the missionaries settled large numbers of nomadic and seminomadic Indians in villages called variously *reducciones* ("reductions"), *congregaciones* ("congregating cities") and *pueblos de indios* ("Indian villages"). There, under theocratic control, land was brought under cultivation and the frontier stabilized and moved outward, even beyond the *presidios* ("forts") set up to protect the frontier from Indian encroachment. The Indians were Christianized, but the strict control of the religious orders (who used the stocks and the whipping post) failed to prepare them for an independent life. In many instances the missions became plantations whose produce competed in the market with privately grown crops, resulting in bitter feeling between the settlers and the missions. This conflict was especially apparent in the La Plata region. Many missions established in Paraguay became the especial targets of slave raiders operating westward out of Brazil. Along the northern border of Mexico into Lower California and what is now the U.S. southwest, the missions served as a chain of outposts protecting the area against foreign encroachments and providing bases for administration. All told, the missions were successful in securing many frontier regions and bringing their neophytes, on the surface, at least, into a useful (by western standards) and Christian life.

But the indoctrination often lasted only as long as the natives were under the surveillance of the fathers. Once released from discipline, many reverted to their old ways. The missions stabilized the frontier and prepared the way for further European advances but they failed to civilize the Indians.

Foundation of Brazil.—Brazil was conquered and settled by the Portuguese, whose claims were based upon the treaty of Tordesillas. No concrete evidence has yet been discovered to show that the Portuguese government was aware of the existence of Brazil before Pedro Álvares Cabral, leading an expedition to India, had been blown off his course and made a landfall on April 22, 1500.

Cabral's landfall coincided with the start of Portugal's exploitation of the India trade by way of the new-found route via the Cape of Good Hope. Brazil offered small inducement to Portuguese investment, its chief products being brazilwood (used for making a red dye), nuts and some tropical animals as curiosities. However, Portugal did not neglect Brazil, giving it as much attention as its comparative value merited. An expedition under Amerigo Vespucci explored the coast in 1501–02 to establish the economic value of Cabral's landfall. Several minor expeditions cut brazilwood, explored the coast, left some *degredados* ("criminals," usually convicted of minor crimes) behind, and set up transient trading posts. Food crops were planted immediately as distance precluded any significant food imports. In 1503 the Portuguese crown awarded Fernão de Noronha, a converted Jewish nobleman and merchant, a concession to cut brazilwood for three years. As a result of this action settlements near Pernambuco (Recife) and Bahia (modern Salvador) were founded, an agricultural base was established, and numbers of Jews newly converted to Christianity emigrated to Brazil to escape the Inquisition's surveillance. In the words of the Brazilian historian Pedro Calmon, "To the Orient went the warriors; to Brazil the peaceable New Christians . . . . When others thought of nothing but gold mines and the profits of oriental drugs, they cultivated the earth . . . giving a purely agricultural aspect to the conquest of Brazil and determining its destiny." (Pedro Calmon, *História da civilizacão brasileira,* quoted in Bailey Diffie, *Latin American Civilization,* p. 638, The Stackpole Company, Harrisburg, Pa., 1945.)

Both Noronha and the Portuguese crown profited from the arrangement, but incursions by Spaniards, Englishmen and particularly Frenchmen dictated the necessity of defense by the mother country. Cristóvão Jaques in 1516 destroyed a French fleet leaving Brazil and established a trading post in Pernambuco which began the first cultivation of sugar cane in Brazil in 1521. Jaques' settlement was destroyed by the French in 1530. The Portuguese crown was then forced to reconsider its Brazilian policy. Towns and villages were growing in the harbours and islands along the coast; the gestation period was clearly over. Portugal then needed an aggressive policy to secure Brazil and prepare for further expansion.

In 1530 Martim Afonso de Sousa was sent with a fleet to drive out the French, to set up new settlements and administrative systems, and to recommend a form of colonization adapted to Brazil's needs. He carried out his assignment in excellent order: he established Portuguese claims to northern Brazil and founded settlements near Bahia, Rio de Janeiro and present day Santos, the latter destined to become the entryway to the rich province of São Paulo. Brazil's new government, however, was set up before Martim Afonso returned to Lisbon.

John III in 1533 divided Brazil into a system of *capitanias.* These were large grants of land to an individual (called a *donatário*) endowed with ample economic and political privileges in return for his pledge to secure colonists and develop his grant. These strips of land running from the Atlantic coast to the line of demarcation might be roughly compared to the English proprietary colonies in North America, except that the Brazilian *donatários* received greater feudalistic powers. Along with tax exemptions and certain monopolistic privileges, they were given the right to enslave Indians for their estates and sell a certain number in Portugal each year. The *donatários* laboured hard at peopling and developing their grants; many sold or mortgaged their property in Portugal and moved to Brazil. Enormous sums of money were spent in transporting families and opening new agricultural districts. Only the captaincies at Pernambuco and São Vicente were financial successes, but the primary objective of securing the coast with permanent colonies was achieved. To supply the needed unity, John III named Tomé de Sousa a captain general in 1549 to head a central government. He founded the city of Bahia as his capital and it was an immediate success. Six Jesuits accompanied Sousa and became the forerunners of a most influential group in the new country.

Agriculture was now well established, and the main products (cacao, cotton, corn, sugar cane and cattle) were grown in adequate quantities to support the home population and provide exports. Labour was a desperate problem. The settlers, interested in raising commercial crops for export, needed labourers to cut wood and to work in the fields and mills. Indian enslavement was not wholly satisfactory because of the low cultural level of the Brazilian tribes. Negro slaves were introduced during the 1520s, and despite interruptions in the slave trade, they were brought over in large numbers during the entire colonial period until well into the 19th century. *See* also BRAZIL: *History.*

B. Political and Religious Institutions

Government.—Spanish governmental institutions in Latin America were the products of experience and circumstance. Although altered in several important ways in the late 18th century, the system's major lines were set as early as 1550. No critic of the Spanish colonial system can gainsay the fact that it apparently functioned no worse than other contemporary colonial administrations in maintaining law, order and respect for authority.

Power in the Spanish political system, in theory, was vested absolutely in the person of the king. In reality, the crown's power was circumscribed by many traditional privileges enjoyed by the nobility, clergy, chartered communes and favoured occupation groups. Although there were fewer such privileges in Latin America than in Spain, they still existed. Spanish dominions on the peninsula, as well as overseas, were divided into kingdoms. In Spain the kingdoms possessed few rights; their *Cortes* ("parliaments") met for traditional ceremonies reminiscent of freer days and to vote the king taxes according to his dictates. Early attempts to set up a regional congress in the Caribbean to present the area's wishes to the crown were firmly squelched. In Latin America the kingdoms were simply administrative units. But, barring a direct royal command, distance permitted administrators there to evade enforcing unpopular royal decrees.

Over-all administration and supervision of Latin America was the responsibility of the Royal and Supreme Council of the Indies in Madrid. This colonial office, responsible only to the king, had its origin in the work of Bishop Juan Rodriguez de Fonseca who aided Columbus in organizing his second expedition in 1493. Fonseca never visited Latin America, but he enjoyed the absolute confidence of the Spanish monarchs and informally organized an extensive bureaucracy to facilitate his work. A portion of that bureaucracy was given official status in 1503 as the Casa de Contratación to act as the crown's agent in all commercial and financial dealings with Latin America. Fonseca died in 1524, and Charles I set up his office formally as the Council of the Indies to act as the crown's over-all agent. The council prescribed all policies and saw to their administration. Its powers were immense. The council prepared laws and regulations concerning administration, taxation, justice, police, defense and boundaries in the name and with the approval of the king. It nominated all appointees, maintained continuous correspondence with officials in the Indies, supervised the crown's patronage of the church, acted as a court of last resort, investigated royal officials and their actions, and censored all books proposed for export to the Indies. After the death of Philip II in 1598 and the advent of less ambitious monarchs, the council exercised greater initiative. On the whole, the council was a hard-working organization. Councilors at times lacked ability, but others who possessed vigour and were experienced in the Indies served well.

One of the council's tasks was to codify the voluminous legislation dealing with Latin America's problems. By the middle of the 17th century an estimated 400,000 edicts had been issued. Delayed by numerous setbacks, it was not until 1681 that the council issued its celebrated *Compilation of the Laws of the Indies*, which reduced the number of laws to about 6,400. (*See* INDIES, LAWS OF THE.)

Spanish government in Latin America evolved by trial and error. Columbus established the first government in the new world in Santo Domingo by virtue of his concession from the Catholic kings. Unprepared for the complexities of ruling this vast domain, Columbus was soon in serious difficulties and the crown replaced him with a royal governor. Meanwhile, the expansion of the Spanish domain was being accomplished by *adelantados* (lit. "those who go before") clothed with the power of royal concessions. Too ruthless to be trusted with government, they were gradually replaced by governors sent from the homeland. But even governors proved to be unpredictable and unreliable. At Santo Domingo an administrative-judicial tribunal called an *audiencia* was tried as early as 1511. Although more reliable than governors, the *audiencias* suffered from the weakness of divided authority among the *oidores* ("judges") of an *audiencia*. The final solution was the decision to appoint in the major administrative units a single strong executive (the governor) and an *audiencia* to act as advisors. (It should be noted, however, that the *audiencia's* prime function was as a court of law.) The governor-*audiencia* form of government which was initiated in the 1530s characterized Spanish America until independence.

Spain divided Latin America into viceroyalties. At first only two were set up—New Spain to administer all lands north of Panama, plus Venezuela and the Caribbean Islands, and Peru to administer the balance of South America. Ultimately under the Bourbon kings the Indies were divided into four viceroyalties: New Spain (Mexico, Central America and the Caribbean), New Granada (Colombia, Venezuela and Ecuador), Peru (Peru, western Bolivia and Chile), and La Plata (Argentina, Uruguay, Paraguay, southern Chile and eastern Bolivia). In turn, the viceroyalties were subdivided into districts called kingdoms, and were so referred to in official documents; over each kingdom was placed a governor and an *audiencia*.

The viceroy constituted the king's alter ego. He was paid a munificent salary and lived sumptuously. Appointments were usually for three years but actually were held at the king's pleasure. As chief executive, the viceroy was empowered to supervise the execution of all laws and edicts in the viceroyalty. Hence, the bureaucracy and the police power were under his direction. Any feudalistic tendencies that might have existed were now effectively checked. As governor of the kingdom in which the viceregal capital was located, he sat as president of the *audiencia* which might advise him but could not curb him. He had complete powers of patronage over the church, supervised the administration of Indian tribute grants, oversaw the treatment of the Indians to prevent abuses, filled many civil and judicial offices, and took whatever measures might be necessary to meet emergencies. He also was responsible for supervising the defense of his realm in general and protecting his district in particular. The viceroy's power, however, was hemmed in with restrictions. Primarily his job was to supervise the execution of policies and laws drawn up in Spain. Important subordinates were appointed and removed by the king; he had little room for discretion since almost every directive was ringed with minute administrative regulations; all larger matters of policy and major projects had to be referred to Madrid. Although it possessed only advisory powers, the *audiencia* could still place annoyances in the viceroy's path. And, in common with other officials, the *oidores* could communicate directly with Madrid to give their version of the viceroy's activities.

Districts distant from the viceregal capital which posed special problems were organized as captaincies general. Captains general were responsible to their respective viceroys and received their instructions from Madrid through them, but they acted in their respective districts much like the viceroys in their capitals. For practical purposes the captain general was virtually autonomous. He was appointed directly by the king, had the right of direct communication with him and enjoyed a great deal of independence because of the distance from the capital. An *audiencia* was assigned to each captaincy general to exercise judicial and advisory powers, and the captain general sat as its president. The offices of viceroy and captain general reflect a characteristic of Spanish government in the Indies: the distrust of officials and the division of authority and responsibility to curb them.

A third type of district was one having neither a viceregal nor a captaincy-general's capital located in its territory. The executive power in all civil matters was then placed in the hands of the president of the *audiencia*—hence, the term *presidencia* for such a district—whose actions were subject to review by the viceroy. Military jurisdiction in these districts was usually placed under a separate official, often the viceroy or captain general. *Presidencias* were usually located in isolated regions where emergency situations were less likely to occur.

Audiencias, it must be remembered, were primarily judicial organs. They were the supreme court for all minor cases in their district (appeal could be made to the Council of the Indies only in cases involving over 10,000 pesos); they exercised original jurisdiction in all cases involving crown interests; and they had special authority in cases involving Indians as well as an obligation to protect Indians. They also acted in a surrogate capacity. *Audiencias* were often empowered to investigate the affairs of royal officials, and they could try viceroys, captains general and their own presidents. *Audiencias* were supreme in judicial matters, and even the viceroy could not interfere.

Local administration was carried out by two types of officials: governors and *corregidores*, who possessed similar powers. Local administrative units were not set up in any systematic way; they

simply evolved. Generally speaking, a governor had jurisdiction over a fairly large territory, often near the frontier, having its origin in a grant to an *adelantado*. Governors possessed executive and judicial powers and the responsibility for organizing local defense. *Corregidores'* districts were smaller, and their duties included the local administration of government and justice, supervision of Indian forced labour on public projects, and the collection of taxes and Indian tribute money for the crown. In remote and poor districts similar duties were performed by an official called an *alcalde mayor*. There were two types of *corregidores:* (1) the *corregidor de indios,* appointed by the viceroy, who lived in an Indian town and supervised Indian affairs; and (2) the *corregidor de españoles,* appointed by the crown, who resided in a Spanish town and oversaw the work of the town council. Complaints of venality and corruption were frequently directed against the *corregidores* who, while quite important in their districts, were poorly paid. The *corregidores de indios* were often accused of mulcting their poor charges. A classic accusation ran: "They sold stockings to Indians without shoes and saddles to Indians without horses."

Government on the communal level was carried on by the *cabildo* ("town council"), an institution of great antiquity. The *cabildos* were charged with the prosaic tasks of levying local taxes and administering public services. *Regidores* ("council members") were elected by property-holding citizens at first. Later, the crown sold those offices and many became hereditary. Crown interests were looked after by the *corregidor* who sat with the *regidores* and often completely dominated the council. In matters of great importance a *cabildo abierto* ("open council meeting") could be called in which all property owners in the community participated. Traditionally, historians have held the *cabildo* to be an institution whose powers consisted of supervising street cleaning and the activities of beggars. Others now contend that the *cabildo* was an instrument by which the colonials were able to thwart royal edicts and its importance increased with its distance from the capital, since there the viceroy or captain general attended all *cabildo* meetings. In any case, during the conflicts which led to the wars of independence it was a decisive instrument in the hands of the dissidents.

MODIFIED FROM M. W. WILLIAMS, "THE PEOPLE AND POLITICS OF LATIN AMERICA"

FIG. 3.—MAP SHOWING POLITICAL ORGANIZATION OF LATIN AMERICA IN 1784

Three other types of local government existed. First, during the 16th century groups of Indians were assigned to Spanish conquistadors as a reward. Called encomenderos, the conquistadors were permitted to collect tribute from these Indians in return for protecting, Christianizing and civilizing them. (See *Land and Labour,* below.) In many instances these Spaniards assumed the powers previously held by the Indian village chiefs, including the administration of justice. The powers of the encomendero declined with the disappearance of the encomienda in the late 16th and 17th centuries. His duties were then assumed by the *corregidor de indios*. Second, in order to facilitate their rule, the Spaniards, in many instances, recognized the traditional chiefs or caciques who were given much power in ruling their villages. Third, there were the newly formed Indian towns which were given governmental structures similar to the *cabildo* with the *corregidor de indios* overseeing their work. Another type of Indian settlement was the missions whose government was an absolute theocracy run by missionary priests of various orders.

A new government institution, the *intendencia*, was introduced in Spanish America in the 1780s to centralize and improve local administration, and to tie local administration directly to the crown rather than through the viceroy. *Intendencias* superseded *gobiernos* and *corregi-*

mientos: 200 of the old officials were replaced by 12 *intendentes*. Working through *subdelegados* (in charge of districts), the *intendentes* had executive, judicial and military power. Their major responsibilities were tax collections, monetary disbursements and encouragement of economic activities. They were generally successful in new frontier areas but had indifferent results in older districts. An unforeseen side effect was the stimulation of *cabildos* to undertake local programs of reform.

Two other Spanish governmental practices are noteworthy. An inspection called a *visita* could be started secretly to investigate general conditions and specific complaints. On the basis of the *visitador's* recommendations, officials might be dismissed and prosecuted or royal policy revamped. The second unique institution was the *residencia*, a judicial review of an official's conduct at the end of his term of office. Inviting the public, the *residencia* tribunal investigated any charge, and if convinced of its truth, it could recommend heavy fines, confiscation of property or imprisonment.

Despite criticism, the Spanish accomplishment of ruling the Indies for 325 years is only matched by its achievement of having conquered it.

Church.—For the Spaniards the spread of the conquest was synonymous with spreading the gospel. As early as 1493 in the bull awarding the Spanish kings the right to colonize the Indies, the papacy enjoined them: "And in addition we order you in virtue of holy obedience to send to the aforementioned islands and mainland learned, God-fearing, experienced and skilled missionaries who will exert all their powers in instructing the inhabitants in the Catholic faith and imbuing them with good morals." (*Inter catera,* May 3, 1493.) But early attempts at conversion were neither successful nor fervent. The job was placed in the hands of encomenderos given the right to collect tribute from the Indians in return for protecting and Christianizing them. While the number of conversions cannot be estimated, the system in the West Indies, at least, can be judged a failure in that the Indians there were exterminated by the severity of the encomenderos' demands. Attempts by horrified priests to save the remaining Indians of the region came too late.

In the Spanish dominions the church and the state were closely tied one to the other. The system known as the *patronato real* ("royal patronage of the church") was based upon two papal grants of power to the kings of Spain. The first bull, promulgated on Nov. 16, 1501, granted the Castilian crown the privilege of collecting all tithes in the Indies on the condition that the crown be responsible for the maintenance of the church and conversion of the Indians. To facilitate episcopal organization Pope Julius II issued the second bull on July 28, 1508, granting Ferdinand the patronage of the church in the Indies including control over all clerical appointments, the founding and erection of all ecclesiastical buildings, financial aid, ecclesiastical government, and communication between Rome and the clergy. In essence the Roman Catholic Church became the Spanish national church.

Large-scale conversions of Indians began with the conquests of the mainland. The priests accompanying the early expeditions righteously destroyed temples and idols, and denounced heathenism; wholesale conversions began when missionaries arrived from Spain. Taking full advantage of real and imagined resemblances between the Indian religions and Christianity, the fathers presented their faith in a favourable light. Indians accepted baptism with great zeal. Some, in fact, were baptized several times, being quite carried away by the rites as well as the tokens given them by the fathers. Bishop Zumárraga of Mexico City wrote in 1531 that about 1,500,000 had been accepted into the faith by the Franciscans alone. Despite the efforts of the fathers to master Indian languages and translate Catholic belief into understandable terms, it is highly doubtful that the Indians fully appreciated Christian beliefs. They grasped the idea of the promise of afterlife, but fitted these beliefs and those of monotheism into older conceptions. Even today while those of European background adhere to orthodox practices, the Indians often worship the old gods in private. Ancient rituals, feasts and celebrations blended into the new religion.

Philip II established the Inquisition in Latin America in 1569 to protect his subjects from heretics, Jews and Muslims. Despite stringent immigration laws excluding these people as well as newly converted Christians, many managed to enter the Indies often to escape the Inquisition in Spain. It was to the Jews and new Christians that the Inquisition directed its attention. The Protestants were mainly captured seamen and adventurous merchants. Some recent interpreters emphasize that while all the notorious methods of the Inquisition were used, the actual number of burnings at the stake were few—probably about 100 in Mexico City and Lima together during the entire colonial period. In addition to its religious and moral purposes, the Inquisition also had the political function of defending the state, whose stability was identified with religious orthodoxy. In its role as political censor the Inquisition impeded the dissemination of the new ideas of rationalism by books and in university teaching. How effective the Inquisition was is a moot question. While it could not completely prevent the spread of liberal ideas, it most certainly made their dissemination difficult. During the early years the church was represented by regular clergy (usually Franciscans, Dominicans, Augustinians and Jesuits) imbued with a burning desire to spread the gospel. Once the initial missionary stage passed in a given area, seculars replaced the regulars. A marked degeneration in the character of the clergy was then often noted, and many clerics became interested in building sinecures for themselves. Some, in fact, became rather efficient exploiters of Indian labour and extortioners of the Indians' scant earnings for the performance of the sacraments. Still, the church was often the only buffer between rapacious whites and the natives.

The Jesuits constituted a group of clerics of exceptional importance. Carefully selected novices were trained under severe discipline and members frequently distinguished themselves. Their accomplishments included the opening and staffing of numerous schools and colleges, writing great numbers of historical and regional studies, and generally dominating the colonies' intellectual life. They also carried out the pioneers' task of securing frontiers and subduing the natives by introducing civilization and Christianity under the tight, well-ordered mission system. The order became wealthy, owning large estates and many slaves. Following the examples of Portugal and France, Charles III expelled the Jesuits in 1767 in fear of their growing power. In retrospect, their influence upon colonial life was not as large as might be supposed. In education they worked largely with the elite, and their literary labours were usually in Latin, not the vernacular. While their expulsion caused the loss of many teachers and led to a decline in the quality of theological education, it also resulted in greater secularism and the introduction of the ideas of the Enlightenment in the schools. Perhaps the Jesuits' most ephemeral work was among the Indians on the missions. Because they failed to give their charges training in responsibility or more than a superficial veneer of Christianity, many Indians reverted to barbarism when the missions were disbanded.

As an institution, the church became quite wealthy; in Mexico it was estimated that it owned half of the land and held many mortgages. Allied with the most conservative elements in society, the church became a bastion of royalism and until well after the era of independence, a stormy petrel of Latin-American politics.

C. Economic Life

Land and Labour.—Legalisms and Christian theology pressed the Spaniards hard in justifying their conquest and expropriation of Indian land and labour. Despite the grant of the rights of dominion by the papal bulls of 1493, a rationalization was also necessary. Unlike those of the English, Spanish legal practices scrupulously protected Indian property rights; the greatest debates concerned the question of the political rights of non-Christians conquered by Christians.

Columbus faced the problem of determining the Indians' legal status immediately after establishing the first settlements in Santo Domingo. He attempted to assuage his disappointment at finding neither gold nor the Indian spice trade by sending Indians to Spain to be sold as slaves. Isabella refused to allow the enslavement

of her "subjects and vassals" and forbade the trade. Unfortunately, the royal resolution was sapped by the prospect of the revenues coming from licensing the Indian slave trade. For years the crown vacillated, but in time a number of practices evolved. Slavery could be imposed upon Indians only for rebellion, cannibalism, and resistance to Spanish occupation and Christianization. These criteria were often disregarded. After the promulgation of the New Laws of 1542 the practice of enslaving Indians declined and most Indian slaves were emancipated. In the Caribbean area emancipation came too late; the Indians had died off. Negro slave labour replaced Indian slavery.

Imposition of forced labour upon Indians dates from Columbus' demand that they deliver gold or other goods to Europeans as tribute, a practice developed during the reconquest of Spain from the Muslims. But the demand for labour, only partially satisfied by slavery, led to the introduction of a new system. Indians were "commended" to a Spaniard, called an encomendero, who was responsible for protecting, Christianizing and civilizing them in return for a tribute (due to the crown but assigned to the encomendero) collectible in gold, in kind or in labour. As it evolved, the system yielded chiefly labour for the encomenderos to work their landed properties. Fearful lest the encomenderos emerge as a new feudal class, the crown attempted to restrict and abolish the system. Despite widespread resistance, delays and compromises, the encomienda system gradually died out. To fill the need for labour, a new system evolved called the *repartimiento* ("division"). Labour levies were placed upon Indian villages for men to work for the public interest. This concept included not only work on roads and churches but labour on plantations and in the mines owned by Europeans. The Indian workers were paid modest cash wages from which the crown's tribute and the church's tithe were deducted. As the Spaniards secured control of more and more Indian land, converting whole villages to tenancy, the *repartimiento* succumbed, to be replaced by peonage—a system by which debt (often inherited) tied the worker to the landlord until it was paid. With the landlord keeping the records, few peons ever worked their way out of debt.

Spanish control of the land evolved in a more straightforward manner. An encomienda was not a land grant; it gave the holder a right only to collect the tribute, often in labour, from a group or village of Indians. Generally speaking, Spanish law recognized villages, sites of fixed residence and lands under permanent cultivation as private Indian property. Hence, lands of nomads or seminomads, or those practicing shifting agriculture, were considered open lands which could be granted by the crown or claimed by individuals prepared to pay for the patent. In addition, European agricultural techniques, particularly the use of the plow and the introduction of livestock, made vast areas which were useless to Indians valuable to Europeans. Spanish control of the land was achieved basically by laying claim to and occupying or being granted unused lands and then securing control of the cultivated lands where Indian titles were recognized. Encomenderos often purchased Indian lands. Unfortunately, many times Europeans used bribery, fraud or force. Indian land was frequently lost to Spaniards who had superior knowledge of and ability to manipulate land law. By acquiring empty lands and keeping a steady pressure upon Indian landowners of the settled regions, Spanish domination became an established fact. Bit by bit the Indian villages were incorporated into Spanish holdings and villagers became tenants on their ancient holdings. The encomienda, the *repartimiento*, and eventually peonage supplied the Spanish land owner with his needed labour.

Mining.—One widely held misconception concerning the economic life of Spanish America is that the basis of the wealth of the Indies was the plunder obtained from the Indians. Plunder amounted to about 25,000,000 pesos, according to the estimate of Baron Alexander von Humboldt, a sum exceeded by the output of the new mines opened by the Spaniards in the 10 years following 1545. Indian mines are a long-standing fiction. Indian cultures were still in the Stone Age, and except for some copper diggings, there was no organized underground mining. While the Incas smelted some copper ore, almost all the gold and silver came from panning stream beds or the discovery of nuggets. Spanish prospectors and Indians bringing curious rocks to the Spaniards were the discoverers of the mines of Spanish America. Fabulous Potosí in Bolivia, for example, was found in 1545 by a shepherd who pulled out a clump of grass as he fell and saw nodules of silver clinging to its roots.

Fixing the exact value of the output of precious metals in the Spanish and Portuguese colonies is impossible because of the unreliability of the statistics available, gaps in the record, and, of course, widespread smuggling activities. Humboldt's estimates are the best available. He sets the total output for the separate colonies for the years 1492 to 1803 as 4,851,200,000 pesos of gold and silver for the Spanish dominions and 855,500,000 pesos for Portugal's—a grand total of 5,706,700,000 pesos. Output during the first half century after 1492 was small, but it continually rose. In fact, for the first 30 years the yield of the pearl beds off the coast of Venezuela was larger after 1492 than the wealth derived from mines and plunder. In the long run the output of Latin-American mines was prodigious, approximating 90% of the world's silver and gold output by 1800. It rose steadily until the wars of independence brought the industry to a halt.

A significant factor in the American mining industry was the introduction of European methods of mining and treating ore. Much of the silver was extracted with the use of mercury by a local invention called the patio process perfected in Pachuca, Mexico, in 1557 by Bartolomé de Medina. Silver was by far the most important of the precious metals, gold being only a fraction of the value. Among the largest and most famous of the silver producers were the mines of Cerro Gordo de Potosí (discovered in 1545) in Bolivia; and in Mexico, Zacatecas (1546), Real del Monte, Pachuca (1552) and Guanajuato (1558). In the 17th century San Luis Potosí and Bolaños were discovered in Mexico. Gold came mainly from the Ouro Preto region of Brazil, with significant quantities from the Chocó and Antioquia regions and the Cauca river valley in New Granada and placers in the central valley of Chile. Brazil was the largest gold producer in Latin America until the middle of the 18th century when New Granada's output increased and remained greater than Brazil's until the end of the colonial period.

The mining industry has often been listed as a cause of decadence but the truth is that it stimulated the economies of Latin America by providing a market for the products of farm, ranch and workshop—food for the miners, horses for the mines and carts to carry bullion. It also provided the colonies with the wherewithal to pay for needed imports and royal taxes. The great cities of the colonial period with their celebrated religious and secular architecture were ordinarily supported by the mines. At the same time it was one of the bases of the commercial revolution that transformed western Europe.

Agriculture.—During the colonial period, agriculture flourished in Latin America. From the first, the Spaniards encouraged food production. The crown ordered seeds, livestock and farm equipment to be included in Columbus' second expedition. Spanish conquests spread as the food base expanded. Settlers opening new areas were subsidized until their farms came into production. Cattle ranches and cultivated fields backed up the frontier. For every fortune amassed in mining or commerce, there were several made in raising cattle, sugar or cacao. About 90% of the people derived their livelihood from agriculture.

Indian contributions to the new world's larder were as important as were those of the Spaniards. Indigenous crops included corn (maize), potatoes, yams, manioc, squashes, pumpkins, certain beans, chili peppers, cacao, vanilla, nuts and melons. Medicinal crops of the new world were cinchona (quinine), coca (cocaine), ipecac, sarsaparilla and cascara. Tobacco was in a class by itself. With the exception of corn, these products were cultivated by the Indians only in certain localities; the Spaniards carried them, or knowledge of their use, to all parts of the Indies, as well as to Europe. The European contribution included the cereal grains—wheat, rice, barley, rye and oats—innumerable garden vegetables; fruits (bananas, oranges, lemons, limes, peaches, plums, apricots, apples, pears, cherries, grapes); sugar cane; coffee; the coco palm;

and silk culture. Equally important was the importation for work and food of horses, donkeys, cattle and oxen, sheep, goats, hogs and chickens to supplement the Indian's llama and wild turkey. Besides meat, they provided eggs, dairy products, textile fibres and leather. The Spaniards also introduced the plow drawn by a draft animal, the wheel, iron tools (including spades, saws and nails), and knowledge of digging deep wells and pumping water. As a result, the larder of the Americas was increased and the area that could be exploited for food was expanded.

Despite the advances made in agriculture, certain natural and man-made factors limited Latin America's capacity to produce food. Much of the land was nonarable; many areas had no market, domestic or foreign, for their produce; poor transportation cut off many areas; the social outlook induced landowners to raise only enough of a surplus to satisfy their need for cash; and, finally, the concentration of land in the hands of an aristocracy more interested in the social value of a large acreage than the economic value of its output permitted much good land to lie fallow.

Commercial agriculture yielded large profits. Although most farm products were either consumed by the grower or marketed locally, agricultural exports were of significant value. They comprised sugar, tobacco, hides, coffee, cotton, cacao, vanilla, rice, indigo, cochineal and logwood. For example, by the end of the 18th century, La Plata was shipping more than 1,000,000 hides a year.

Manufacturing.—Most of the manufactured goods needed in colonial Latin America, except those of high quality or requiring scarce materials, were produced by local artisans and craftsmen. High prices for imported goods constantly stimulated colonial manufactures. Spanish policy was directed more toward keeping trade in Spanish merchants' hands than in promoting home manufacturing at the colonies' expense. Since Spain was barely self-sufficient in manufactures, it was believed that export of manufactured goods would only raise prices. Furthermore, many of the manufactured goods sent to the colonies were purchased abroad. Keeping these imports small, it was believed, would keep precious metals in Spain.

When the Spaniards conquered the high culture areas of the mainland, they found Indian artisans of great skill who were immediately employed under European direction. The techniques of both cultures soon blended. New products to satisfy European desires included glass, metal and leather goods, gunpowder and soap. The Indians' skill in weaving cotton, alpaca and llama wool was applied to sheep's wool, linen and silk. In time large establishments were set up to weave cloth (called *obrajes*), cast cannon and church bells, and build ships. Supplemented by a widespread home industry, these workshops supplied almost all the colonies' needs for products as diverse as cloth, clothing, shoes, saddlery, furniture, ceramics, building supplies, ships, naval stores and supplies, cooking utensils and iron tools. The processing of food in Latin America (*e.g.*, flour milling, dairying, meat salting, sugar refining, tobacco curing and cigar making) was for home consumption or export. The few restrictions imposed were upon manufacturing competitive specialties. Their object was to limit, not prohibit, production, and they were frequently violated with the approval of local officials. Colonial manufacturing supplied the people with most of their daily necessities.

Commerce.—Among the pre-Columbian Indians, trade was but a minor activity limited by the lack of a money system, the absence of roads and draft animals, and by hostile tribes. As sailors, the Indians were woefully backward. It was the Spaniards who linked the Indies with each other and with Europe. By introducing a medium of exchange, a central government and single language, transportation systems by seaworthy ships and by roads for animal-drawn wheeled vehicles, Spain created American commerce.

Spain imposed few restraints upon trade among and within its American kingdoms, and these were chiefly to require licences, the payment of taxes and inspection to control the movement of bullion and the slave trade. Trade among the kingdoms in local merchandise was small and limited to specialties. It was naturally restricted because the kingdoms produced similar export items; their exports had a market in Europe, not America; and transportation was costly. In any event, the restrictions placed upon a small number of products were often overlooked. The local public market was an active and important centre of colonial life. Trade was freely carried on to feed the numerous cities, supply the haciendas, and provision the mining districts. Imported articles had to be distributed and products for export collected. These shipments from the ports of entry to the market could be very long, *e.g.*, from Panama to Chile.

Overseas trade was, perforce, wholly European in origin. One of Columbus' objectives was to open a trade route with the far east. Spain set up numerous minute regulations concerning foreign trade, but, viewed against the background of the times, its restrictions were not unreasonable. Unlike other European nations, Spain was sparing in the authorization of monopolies in the Indies trade. Columbus had been given concessions, not a monopoly, and a decree of 1495 opened trade with new lands on condition of securing a licence. During the first years of the 16th century, licences were given to Italian and German as well as Spanish merchants, reflecting the cosmopolitan interests of the Spanish crown. The Casa de Contratación ("house of trade"), set up in 1503, regulated the American trade. The Casa acted as the crown's agent for dealing with trade, navigation, immigration and tax collections, sat as a court of admiralty, and maintained the archives of the Indies.

From its beginnings trade between Spain and Latin America was large. Fleets of from 15 to 30 vessels were not uncommon. This wealth attracted interlopers and pirates; ships and bullion were lost. The wars of Charles I forced him to modify earlier policies. As early as 1522 ships were taxed to cover the cost of patrol vessels; in 1526 they were required to sail in groups; in 1538 foreigners were barred from the Indies' trade. A system of more or less regularly convoyed fleets was established in 1543. Freedom to sail unprotected had become freedom to be captured. An earlier policy of restricting the ports in Spain and the Indies between which trade could be carried was further tightened: fleets left Seville and Cádiz, one part going to Veracruz for the Mexican trade, the other to Cartagena (modern Colombia) and Nombre de Dios (after 1584 to Porto Bello), Panama, from which goods were transshipped to Lima; after great fairs, the ships reassembled at Havana and returned to Spain. These ports were the natural entrepôts. The major drawback of the system was its rigidity. Trade was monopolized by the guild merchants of a few cities who fought to defend their vested interests, and it led to the neglect of northern Mexico and La Plata. A booming contraband trade developed in the Caribbean and La Plata regions. During the 18th century the commercial controls were revamped. Regular convoys, disrupted during the War of the Spanish Succession (1701–13), were finally discontinued in 1740. With the decline of piracy, a growing number of fast register ships were allowed to sail alone. Regular packet sailings were inaugurated in 1764.

Spanish and Portuguese successes in Middle and South America attracted the attention of the nations of northern Europe. Piratical activities were paralleled by expeditions to found settlements or seize established colonies. Spain and Portugal successfully repulsed several major French, Dutch and British expeditions. But by the mid-17th century the interlopers were more successful, and Spain soon lost Jamaica, the Lesser Antilles, the Guiana coast, Belize and Louisiana. However, repeated attempts to seize Panama and the northern coast of South America failed. Where the Spaniards and Portuguese had firmly established themselves and their cultures, northern European incursions were failures.

After the Seven Years' War (1756–63) Charles III issued a series of regulations which liberalized the old trade system. Between 1765 and 1789 Spain opened trade between all major American and Spanish ports with only the formality of registering and paying a small duty. In essence any Spaniard might trade directly from any part of Spain with any part of the Indies. Río de la Plata was organized as a viceroyalty in 1776 to promote its hide exports and combat smuggling. Finally, the Casa de Contratación was abolished in 1790. Trade between Europe and the Indies increased, contraband declined as did prices, and the Indies were better served. By the end of the colonial era, Spain's American provinces were more prosperous than ever before.

Spanish tax policy in Latin America evolved without plan. At first, tax rates were low and exemptions many. Later, as the wealth of the colonies grew and the motherland's needs became more insistent, the tax burden mounted. The major sources of revenue were the *quinto* ("royal fifth") deducted from all newly mined gold and silver, a multitude of trade taxes and the Indian tribute. About half of the taxes collected were used to pay the costs of government in Latin America. Taxes were not as heavy as those in Spain itself, and they are not considered—except for the Indian tribute—a major cause of colonial dissatisfaction.

D. Social and Cultural Life

Spanish America was a complex mixture of races and classes. Highest social status was held by the peninsular-born Spaniards (*peninsulares* or *gachupines*), particularly those with noble blood or appointed to a government or church position. Second place was held by the creoles, pure whites born in the Indies, whose occupations ranged from landowners to artisans. Many *peninsulares* in Latin America also were artisans and small merchants, but they considered themselves superior to the creoles by virtue of their European birth. Although legally equal, creoles found themselves systematically excluded from all positions of power, for crown policy was to prefer Spaniards over creoles. In any event, the two antagonistic groups constituted the dominant class. Next in the hierarchy were the mestizos of mixed Indian and white blood. Emancipated from paying tribute and the Indian village, they found jobs as artisans, muleteers and overseers. In economic status some overlapped the lower creoles, and the more successful even managed to buy "certificates of whiteness." Beneath the mestizo was the pure Indian. Although Indian nobles possessed some status as rulers of their people, they found little acceptance among the whites. Indian commoners were the farm labourers and casual workers, except for the *mansos,* "untamed, non-Christian" nomads. At the bottom of the social ladder was the Negro, generally a slave. Some mulattoes and freed Negroes managed to reach a status equal to that of the mestizo.

Schools in the European sense did not exist in the Indian cultures. Children learned by working along with their parents. Schools were set up by the Spaniards at first to facilitate proselytizing activities, and throughout the colonial period the church maintained schools for training a few Indian children. Only sons of privileged families were educated. Illiteracy may have been as high as 90%. Universities were not neglected. As early as 1538 the Dominican school at Santo Domingo was accorded university status by a papal bull. The first true universities were those of Mexico (1553) and San Marcos (Lima, 1572) authorized by the king in 1551. All told, colonial Spanish America boasted some 25 institutions of higher learning of varied calibre that trained ecclesiastics, lawyers and doctors. Curriculum and faculty were only occasionally brightened by the presence of an original scholar such as the Mexican Carlos de Sigüenza y Góngora (1645–1700). Late in the 18th century, scientific and philosophic ideas derived from the Enlightenment appeared in various universities. The Mexican School of Mines (1791) was the first technical school in the new world.

Spanish America inspired and spawned a host of writers. The Spanish conquest was one of the best-reported events in history. Two outstanding works were Fray Bartolomé de las Casas' (1474–1566) *History of the Indies,* a remarkable account for its time which included eye-witness testimony and information gleaned from the participants and primary sources now lost; and Bernal Díaz del Castillo's (*c.* 1492–*c.* 1581) *True History of the Conquest of New Spain,* in which an old campaigner set down in stirring language his experiences in that fantastic adventure. Among the many studies of Indian life, the monumental *Royal Commentaries of the Incas* by Garcilaso de la Vega, El Inca (1539–1616), the son of a Spanish officer and an Indian princess, is recognized as a prime source on the lives of the Incas. The most eminent writer of the colonial period was, surprisingly, a woman, Sor Juana Inés de la Cruz (1651–95) "the tenth muse," who from behind the walls of a convent in Mexico City wrote love lyrics collected as *Sacred and Profane Poems.* Possibly the outstanding scientist was Sigüenza y Góngora, world-famed as an astronomer and mathematician who also dabbled in history, poetry and philosophy.

E. Colonial Brazil

By 1550 Brazil was securely Portuguese but exploited by a growing number of predators. A French force occupied an island in the bay of Rio de Janeiro in 1555, and an expedition led by the governor general of Brazil, Mem de Sá, was necessary to drive them out. To secure the area De Sá founded Rio de Janeiro in 1567. French and English encroachments continued but enjoyed little permanent success. However, Portugal itself fell under Spanish rule in 1580 when Philip II seized the vacant throne. Brazil was a fine addition to Philip's empire: its 17,000 Europeans controlled about an equal number of Indians and Negro labourers who turned out 180,000 arrobas (one arroba = 25.36 lb.) of sugar a year. In Bahia alone there were more than 100 citizens with fortunes of $100,000 in modern purchasing power. Twenty years later the population was estimated at 25,000 whites, 18,000 Indians and 14,000 Negro slaves and the capital investment at $22,000,000. Philip left Brazilian affairs in Portuguese hands; the Brazilians used their opportunity to push westward across the line of demarcation and trade with the Spanish colonies.

Under Spanish rule Brazil acquired Spain's enemies, and in 1630 the Dutch managed to establish themselves in Pernambuco. During the Dutch occupation, which lasted until 1654, Brazil's sugar economy boomed with Dutch capital and new markets. Despite being granted full equality with Netherlanders and full liberty of conscience, the Brazilians never accepted the foreign heretics. Expulsion of the Dutch plunged Brazil into a depression because of the loss of sugar markets and the competition of cheaper West Indies sugar.

Peopling Brazil was a difficult task. Forests taxed the strength of the most ambitious and with the stubborn Indian resistance, one *donatário* was moved to write the king: "The land you granted us in leagues we have had to conquer in inches." But the restless Brazilian frontiersmen continued to push north and south, as well as westward. The 17th century witnessed a tremendous burst of activity as the northern edge of the Brazilian bulge was settled to eliminate French and Dutch interlopers and Manaus, a thousand miles up the Amazon, was first settled in 1660. At the same time a wave of settlement moved up the Rio São Francisco as the Indians were driven out and cattle ranchers moved in. A third area of expansion was São Paulo in the south. Cut off by an escarpment from the coast where São Vicente (near modern Santos) cultivated sugar, São Paulo, on the plateau, found wealth by taking advantage of its position of easy access to the interior. Large slaving expeditions from São Paulo filled the demand for slaves with Indians when the African supply of Negroes was insufficient. These expeditions, whose members were called *bandeirantes,* penetrated as far west as Paraguay, raiding the Jesuit missions and forcing the fathers to move west. Attempts by Portuguese Jesuits to control slavery proved unavailing, and the order in Brazil even had Negro slaves of its own. It was due to the activities of the *bandeirantes* that Brazil was able to claim its present southwestern boundaries far to the west of the line of demarcation. By the 1740s settlements extended as far south as Rio Grande do Sul, and by the 1780s as far west as the present Brazilian border. Of particular importance was the founding of Tabatinga (1780) on the upper Amazon which fixed Brazil's claims there. Negro slaves were of prime importance, and by the end of the colonial period, they numbered about 1,000,000, constituting the backbone of plantation labour. Brazilian Negroes were not always docile. Several large revolts and the setting up in the jungle of slave kingdoms called *quilombos* (one had 20,000 people) marked the colonial era. *Bandeirantes* made excellent slave catchers and broke up the runaways' *quilombos.*

Sugar remained the major Brazilian agricultural export during the colonial period until gold was discovered in the state of Minas Gerais by *bandeirantes* in 1692. Diamonds were discovered in 1729. An estimated $1,000,000,000 in gold and 3,000,000 carats of diamonds were exported. The rush peopled large sections of inland Brazil and supported the badly slumping economy by providing

a medium of exchange. Following the gold rush, Brazil experienced a number of other booms in cotton, tobacco and coffee. The output of each rose and fell precipitously. Like the Spanish colonies, Brazil manufactured most of its own needs, importing only luxury goods. Brazilian manufactures were much like those of Spanish America, except that output was smaller because of lower purchasing power. In 1785 the Portuguese attempted to halt all manufacturing in Brazil in order to divert labour into sugar raising. While not completely successful, the order aroused discontent with Portuguese rule. Portugal's commercial policies never were as comprehensive as Spain's. Anglo-Portuguese treaties gave British goods special status although they had to be carried in Portuguese ships. Some foreigners were licensed for the Brazilian trade, but trade with nations other than Portugal was generally forbidden. Portugal also used a convoy system, which was not abolished until 1801. Several monopoly companies were set up to encourage the development of certain sections of Brazil.

Brazilian society was rent by a dual division: landowners and landless, whites and coloured. Landowners ruled their large estates as petty kings, while the landless had many obligations but few rights. Many Europeans who did not own land owned slaves, hiring them out and living on the slaves' earnings. Since the Brazilian Indians were nomadic and warlike, they were accorded few rights. To the end of colonial days Indian and Negro slavery flourished. A large group of mixed bloods appeared very early, for Indian and Negro women readily accepted the whites and miscegenation was a characteristic of the Portuguese colonist. Many mulattoes were rather well off, being recognized, educated and endowed by their fathers. Education was the prerogative of a small group, many of whom attended the excellent Jesuit schools. However, Brazil never had a university, and rich young men went to Portugal to complete their education. In letters Brazil lagged behind Spanish America. Two writers, both Jesuits, José de Anchieta and António Vieira, are noteworthy. The greatest handicap to literature was the lack of a printing press; the first one was not set up until 1808.

Church and state were closely allied in Brazil, the crown having rights of patronage similar to those enjoyed by the Spanish kings. Not until 1550 was a hierarchy established in Portuguese America. The power of the Jesuits was great until their expulsion in 1759, although they were not able to suppress Indian slavery.

Brazilian government functioned on two sharply divided levels. The central government had little control over local affairs. Portugal never evolved an administrative system as highly centralized as Spain's, although the India council in Lisbon and its successors, the Overseas council and the marine and overseas ministry, had similar powers. A central government was provided in 1549 by a captaincy general with its capital at Bahia. In 1572 a secondary capital for the south was established at Rio de Janeiro, which became the capital in 1763. A viceroy was appointed in 1640, although the country's title was not officially changed for a century. Constant threats of invasion, Indian and Negro revolts and troubles with Spain along the borders, kept Brazil on a semi-military footing. While the *senado da câmara* ("city council"), resembling the Spanish *cabildo,* administered the cities, the power in town and country was wielded by administrative and military officials called *capitaes móres* who, because of virtual isolation and their control of the militia, were veritable autocrats.

By the 19th century, Portugal had staked out a magnificent empire in South America, but it was one marked by an inefficient government and serious social and economic imbalances.

III. THE INDEPENDENCE MOVEMENT

The outbreak of the wars of independence is ascribed to several causes of differing importance and urgency. Most downtrodden of the Latin Americans were the Indians who, sunk in hopelessness, waited in vain for a leader and a slogan. But the most basic cause of the revolution was the antagonism between the creoles and the *peninsulares* derived from the latter's snobbishness, aggressiveness and preferment in appointments to positions of status and prestige. Keeping the creoles loyal was the key to maintaining Spanish rule, but they were becoming conscious of being Americans. Spain's control of American political and economic life was also resented, although the stricter regulations were evaded and economic controls had been relaxed. These long-standing annoyances were aggravated by more immediate predisposing causes. After 1780, as Spanish America became more prosperous, the creoles began to chafe at Spanish direction and the emptiness of the few honours—*e.g.,* membership in the gaudily costumed militia—given them. Young creoles completing their education abroad returned with new ideas of freedom and liberty derived from John Locke, the American Revolution, and the Enlightenment, which mixed with Catholic doctrines sanctioning opposition to tyranny. England looked with approval upon plans to overthrow the Spanish regime and its restrictive trade policies. Even the Jesuits, disaffected after their expulsion from Spain and Latin America in 1767, criticized Spain, as did the Freemasons. The church itself tried to perform its political function of supporting the monarchy through the Inquisition and the schools, both of which combated the more unsettling ideas of the Enlightenment, but taxes levied on church property during the Napoleonic Wars turned many churchmen into only lukewarm adherents of the monarchy. The new outlook which questioned poverty, servility and autocracy in government and economics found supporters among young creoles, some clerical professors and many of the lower clergy who were creoles or mestizos of poor social origins. Supporters of independence could be found on all levels among the religious, but their number was greatest in the lower ranks.

Napoleon contributed the immediate cause of the revolt by invading Spain. (*See* SPAIN: *History.*) Napoleon's move was precipitated by a palace revolution in which Prince Ferdinand deposed his father, Charles IV, and Manuel de Godoy, the prime minister and queen's lover. But Napoleon forced both monarchs to resign and placed his brother Joseph Bonaparte upon the Spanish throne in 1808. French troops drove the Spanish guerrilla forces back to Cádiz where they formed a central junta ("committee") to act as Spain's government. Napoleon's agents carried the news to Latin America. *Peninsulares* and creoles rejected Joseph. But with Ferdinand in exile and Joseph in Madrid, who possessed the power to issue orders? Creoles claimed that as "kingdoms," sovereignty had devolved upon Latin America. *Peninsulares* held that the organs of government should continue as before, taking orders from Cádiz, since they were "kingdoms" only for administrative purposes. In time the creoles learned that in order to exercise sovereignty they would have to win independence.

The creoles, at first, had no clearly defined goals. They wished to better conditions without destroying the fabric of society. Aside from high-sounding generalities concerning the rights of man, their leaders advanced political principles only under the spur of expediency. At the beginning the creoles wished equality within the empire, local autonomy and further relaxation of economic regulations. But faced with the fear of an Indian social war and the *peninsulares'* intransigence, the patriot forces were soon fighting for political and economic independence under a creole oligarchy. Freedom came to mean national independence, not political or social liberty.

Revolts against Spanish rule had occurred several times before in Latin America. Tumults protesting administrative actions or tax exactions, such as the Revolt of the Comuneros in 1781 in New Granada, had occurred from time to time. Túpac Amaru II (José Gabriel Condorcanqui), a descendant of the royal Incas, led the mistreated Indians of Upper Peru (modern Bolivia) in a social war marked by massacre and butchery. The revolt was crushed in 1783 and the principals barbarously executed. A more portentous revolt was led by Francisco Miranda. A Venezuelan creole with an unbelievable background as soldier, traveler, raconteur and roué, Miranda settled in London and the British government gave him a pension to organize a revolt against Spanish rule. After a fiasco in 1806, he returned in 1810 when the creoles of Caracas set up an independent junta; he was proclaimed commander in chief but capitulated in July 1812. Miranda was turned over to the Spaniards by a group of his officers, including Simón Bolívar, who believed he had betrayed them. Miranda died in prison in Cádiz in 1816.

Mexico.—News of Ferdinand's abdication precipitated a delicate political situation in Mexico. Not trusting the viceroy José de Iturrigaray, the peninsular *audiencia,* on Sept. 15, 1808, deposed him, arrested the creole leaders, and set up their own appointee as viceroy. Meanwhile, in Spain, the Cádiz junta voted to set up a regency to rule in Ferdinand's name and called a *Cortes* to write a new constitution. In Sept. 1810 a viceroy appointed by the regency arrived. A constitution influenced by liberal ideas of the Enlightenment was promulgated in Cádiz in 1812.

A creole "literary club" in the provincial capital of Querétaro plotted a revolt for Dec. 1810. Informed that the plot had been discovered, one of the members, Fr. Miguel Hidalgo y Costilla (*q.v.*), a creole parish priest at the village of Dolores, with virulent hatred of Spain and a library which had caused him trouble with the Inquisition, called together his Indian parishioners and dedicated them to the revolt with "the Cry of Dolores": "Long live our Lady of Guadalupe (the patron saint of Mexico); Death to the Spaniards." The date, Sept. 16, 1810, is Mexico's Independence day. Soon Hidalgo led an army of 60,000 natives whom he could barely control. At Guanajuato, after the city surrendered, they slaughtered creoles and *peninsulares* alike. Shocked by the social war, creoles and *peninsulares* closed ranks. Failing to take Mexico City, Hidalgo retreated northward and after a few successes was captured, defrocked and shot on July 31, 1811. The Indian as a social group never again entered any of the wars for Latin-American independence. Fr. José María Morelos y Pavón, a mestizo, then took over Hidalgo's army. Morelos demonstrated unsuspected ability. He seized much of Mexico; organized the semblance of a government, despite squabbles; and called a convention at Chilpancingo in 1813 which formally declared Mexico independent and the next year drafted the constitution of Apatzingán, the first attempt at a Mexican fundamental law. A royalist army under Agustín de Iturbide, a creole, defeated Morelos who was captured and shot on Dec. 22, 1815. The patriot army collapsed; most of the leaders still alive accepted an amnesty. Only Vicente Guerrero, an Indian, remained in the field with a guerrilla force. Félix Fernández, destined to be first president of Mexico under the name Guadalupe Victoria, hid out alone in the mountains of Veracruz. Mexico entered five years of relative peace.

Restored to his throne in 1814, Ferdinand VII had rescinded the liberal constitution of 1812, but was forced to promulgate it again in 1820 after a successful liberal revolt in Spain. The reactionary *peninsulares* hatched a plot to provide Iturbide with an army ostensibly to wipe out Guerrero but really to have him declare Mexico independent and free from the liberal constitution. Iturbide betrayed his supporters by issuing on Feb. 24, 1821, his three-point Plan de Iguala calling for: (1) adherence to Roman Catholicism; (2) independence, preferably under a monarchy; and (3) equality between those born in America and Europe. Joining forces with Guerrero, the Army of the Three Guarantees entered Mexico City on Sept. 27, 1821. At the same time, the captaincy general of Guatemala also declared its independence and was annexed to Mexico, only to break away in 1823. A revolution begun by a radical reformer was consummated by reactionaries out of fear of a too-liberal Spain and seized by an adventurer who was all things to all men.

Spanish South America.—In the 14 years of hard fighting necessary to emancipate South America, Simón Bolívar and José de San Martín (*qq.v.*) played leading roles. Bolívar, a wealthy Venezuelan creole, was tutored by an ardent disciple of Rousseau who according to legend induced him to swear to emancipate his homeland. Bolívar was in the forefront of the patriot organization which welcomed the return of Francisco Miranda and declared Venezuela independent on July 5, 1811. After the capitulation of Miranda in 1812, Bolívar recruited a few hundred men in New Granada and crossed the Andes into Venezuela in March 1813, where he was hailed as *El Libertador* ("The Liberator"). Defeated in 1814, Bolívar returned to New Granada to become commander of another fruitless struggle.

April of 1815 found Bolívar in Jamaica. There, in his famous *Jamaica Letter,* he pledged himself to continue the struggle and to lead his compatriots to learn to govern themselves. With Haitian aid he returned to the fray. But after fulfilling his promise to Pres. Alexandre Sabés Pétion of Haiti of declaring all slaves free, he left just ahead of the Spanish troops.

The Liberator's ultimate attempt was in Jan. 1817, when he established his headquarters at Angostura (now Ciudad Bolívar) on the Orinoco. He was joined by the horsemen of the Orinoco plain commanded by José Antonio Páez and several thousand adventurers released by the end of the Napoleonic Wars. Two years were spent training an army. Convinced that he could not take Caracas, Bolívar conceived the plan of crossing the Orinoco plains, scaling the Andes, and falling upon the unsuspecting Spanish garrisons in New Granada. The plan worked. Defeating the royalists at Boyacá (Aug. 7, 1819), Bolívar took Bogotá. Returning to Angostura in Dec. 1819, he declared the union of Venezuela, New Granada and Ecuador into a new state, Gran Colombia. Bolívar defeated the royalists in Venezuela decisively on June 24, 1821, at Carabobo. On Aug. 30, 1821, a convention meeting at Cúcuta, Venez., adopted a constitution dictated by Bolívar establishing a highly centralized government to rule Gran Colombia from Bogotá. However, separatist sentiment plagued the new nation from the start.

Bolívar turned south in Dec. 1821, toward Ecuador where a band of patriots had declared independence in 1809 only to be crushed. Earlier, his lieutenant, Gen. Antonio José de Sucre, had liberated Guayaquil and, in the battle of Pichincha, May 24, 1822, defeated the royalists near Quito. Bolívar, joining Sucre, persuaded Ecuador to accept union with Gran Colombia. He then marched to Guayaquil to meet with José de San Martín concerning the liberation of Peru, the last royalist bastion.

San Martín represented the War of Independence in the south. The La Plata revolution had had an unusual course. In 1806 and again in 1807, a British force attempted to occupy and annex Buenos Aires, only to be expelled by the creole militia, under the command of Santiago de Liniers, after the viceroy fled. Incensed at the viceroy's desertion, the *porteños* (people of Buenos Aires) in a *cabildo abierto* elected Liniers their commander, and he was named acting viceroy by the crown. Liniers tolerated British merchants and contraband trade; his successor, Viceroy Baltásar de Cisneros, wished neither. Mariano Moreno presented the creoles' arguments to Cisneros: either free trade or face growing contraband and revenue loss since Spain was blockaded by the British. The viceroy accepted reluctantly. At the news of Ferdinand's abdication, another *cabildo abierto* on May 22, 1810, organized a provisional junta to rule in the king's name.

From 1810 to 1816 the junta struggled with varying success to govern the region. Republican fought monarchist and *porteño* fought provincial while the peripheral areas broke away. After repulsing a small *porteño* force, José Gaspar Rodríguez Francia, in 1813, declared Paraguay free of both Spain and Buenos Aires. Uruguay's independence was harder to come by. Viceroy Francisco Javier de Elío settled in Montevideo after the formation of the *porteño* junta and was supported by Portuguese troops from Brazil. José Gervasio Artigas had to fight royalists, Brazilians and *porteños* to free *La Banda Oriental* ("the east bank" of the La Plata, modern Uruguay) which did not become independent until 1828. Manuel Belgrano managed to hold the western provinces of La Plata under the junta, but his campaign into Upper Peru in 1813 met defeat. With the United Provinces of Rio de La Plata seeming ready to dissolve, a congress was called in 1816 at Tucumán, which declared independence (July 9, 1816), wrote a constitution, and elected Juan Martín de Pueyrredón supreme director.

After Belgrano's defeat, José de San Martín was appointed his successor. San Martín, the son of a Spanish officer, was born in northern Argentina. After 22 years' service with Spain, he transferred to the *porteño* army. A deep believer in independence, he was also an avid monarchist. To secure Argentina's independence, San Martín decided upon an audacious plan to drive the royalists out of Peru: cross the Andes, liberate Chile, then sail north and free Peru! Chile had already been the scene of an unsuccessful revolt. Bernardo O'Higgins, Juan Martinez de Rozas and the three Carrera brothers had led a revolt in 1814, but were defeated, as much by dissension among themselves as by Spanish power. San

Martín needed three years to prepare for the invasion. Deceiving the Spaniards as to his route, San Martín crossed the Andes with cannon and supplies, and entered Santiago after winning the battle of Chacabuco, Feb. 12, 1817. O'Higgins declared Chile independent on Feb. 12, 1818; the last royalist forces were routed at the battle of Maipo, April 5, 1818. O'Higgins assembled a fleet under Lord Thomas Cochrane (later earl of Dundonald), an English sailor of fortune. Cochrane landed San Martín's 6,000 men near Lima in Sept. 1820. The city was finally taken in July 1821, and San Martín then declared Peru independent. But a stalemate ensued. Except for Lima, which was not enthusiastic for independence, the Peruvian creoles were staunchly royalist. At this point San Martín turned to Bolívar for help, meeting him in Guayaquil in July 1822.

What transpired during the interview of Guayaquil will never be known; the talks were held in secret. The most probable reconstruction is that San Martín offered to serve under Bolívar and advised him that Peru would only be stable under a monarchy. Bolívar, in an exuberant mood, turned down both proposals. Sending Bolívar a horse and brace of pistols as a token of his esteem, San Martín returned to Buenos Aires and sailed for Europe where he died in exile.

Bolívar journeyed south to deliver the final blow at royalist power. To the north, Gran Colombia was breaking apart; in Peru the royalists outnumbered Bolívar's forces. Bolívar arrived in Peru in 1823, but the honour of commanding the army went to Antonio José de Sucre who defeated a larger and better armed royalist force at Ayacucho, Dec. 9, 1824. While Bolívar organized the Peruvian government, Sucre mopped up royalist opposition in Upper Peru. Despite Bolívar's personal plea to unite Peru and Upper Peru, a new nation was formed out of the latter named República Bolívar, and declared independent in 1825. Later it became Bolivia. Bolívar agreed to write its constitution, and Sucre was elected the first president.

Bolívar's last five years were unhappy ones. As San Martín before him, he failed to establish a responsible government for Peru. Returning to Bogotá to save Gran Colombia from disintegrating, he soon discovered that only with the spell of a personal appearance could he have his way. Gran Colombia dissolved in 1830. Dying of tuberculosis, Bolívar left Bogotá to go into exile but died at Santa Marta on the coast. His legendary last words were: "Those who have served the revolution have plowed the sea."

Securing recognition as independent states took varying degrees of time. Spain did not recognize Mexico until 1839 and Honduras, the last, in 1895. Cuba and Puerto Rico remained as colonies until 1899. The United States and Great Britain recognized all the independent states during the mid-1820s, and in 1823 they received the protection of the Monroe Doctrine and the British fleet.

Brazil.—In contrast to Spanish America, Brazil achieved independence with little bloodshed. Brazilian independence had its precursor, too. Joaquim José da Silva Xavier, a Jack-of-all-trades from Minas Gerais, nicknamed after his last occupation, *Tiradentes* ("toothpuller"), led a *mineiro* revolt against high taxes and low wages, only to be captured and beheaded in 1792. Brazilians had grievances similar to those of Spanish Americans; in addition, Brazil was a vigorous expanding country, conscious of its nationality, tied to a decadent state.

Napoleon's invasion of Portugal in 1807 forced the royal family to flee to Brazil. Prince Regent John, determined to make something of his new homeland, rebuilt Rio de Janeiro and started the first printing press, the first bank, museum, library and medical school. He permitted trade with England, and soon the English dominated the economy. John VI was proclaimed king of the United Kingdom of Portugal, Brazil and Algarves in 1816, placing the two nations on a plane of equality. John earned the Brazilians' respect by hard work and his love of the country.

A revolt in Lisbon in 1821 forced John to return, leaving his 23-year-old son Dom Pedro as regent. When Dom Pedro, too, was ordered to return, Brazilians pleaded with him to remain. On Sept. 7, 1822, on the banks of a small stream, the Ipiranga, he tore the Portuguese emblem from his uniform shouting: "Independence or death" (the "Cry of Ipiranga"). Portuguese garrisons in the north put up a short resistance. Independence was consummated on Dec. 1, 1822, when Pedro I was crowned emperor of Brazil. Portugal recognized Brazilian independence in 1825.

The Heritage of the Wars of Independence.—Many of the problems which beset Latin America in achieving independence still plague the region today: poverty, economic colonialism, overly large estates, semiservile labour, disease and malnutrition, illiteracy, poor transportation and communication, rigid class distinctions, governmental inefficiency and instability. Public spirit and discipline left with crown officials and garrisons. Political responsibility and maturity were absent everywhere. Personal allegiance to political bosses became the order of the day, while the masses remained apathetic. Mines and banks could not operate, but large landholdings became larger. Church-state struggles after the end of the royal patronage added to the unrest. Worst of all was the neglect of the basic problem of all Latin America: the rural labourer, usually an Indian, and the land. In essence, the wars of independence failed to do more than oust *peninsulares* in favour of creoles and some mestizos. (M. D. Be.)

IV. REACTION AND ANARCHY, 1825–1850

For a quarter of a century after 1825 the new republics were plagued by social and economic paralysis and political chaos. Deeply imbedded prejudices and customs remained, as did a colonial mentality and an intellectual dependence upon Europe. Latent social disorganization was everywhere in evidence. Different civilizations and stages of culture existed side by side.

The working groups, "a melancholy sea of illiterates," had no sense of their stake in good government. African slavery remained in either legal or extralegal form. The large Indian population, accustomed to servitude, showed a strong desire to isolate itself from Europeanized sectors, thereby surrendering any political privileges they might have claimed as citizens. Mestizos and mulattoes, more aggressive than the Indians but distrusted by the creoles, were essentially a frustrated and unruly lot. Their prototype was the gaucho (cowboy) of Argentina and *llaneros* (plainsmen-cowboys) of Venezuela and like them the mestizos and mulattoes often welcomed the opportunity to join private armies in order to strike out against their supposed oppressors. The privileged groups were the only social elements with permanent standards and values. They were blind to the evils that their systems might bring to societies that had not elaborated acceptable substitutes for the displaced Spanish and Portuguese kings and the weakened Roman Catholic Church. The members of the privileged elements (the elites of land and church and the intellectuals) were individualistic to the point of being anarchistic. The laws they wrote were to be applied to others, not to themselves. It is with the failure of the privileged groups to couple liberty with law in mind that the tumultuous quarter-century after independence should be viewed.

Political Groups and Issues.—Within the larger framework of extreme individualism two groups vied for power. Between 1825 and 1850 each group assumed that the primary problem of the new republics was a political one. One group, generally referred to as liberals, was led by the intellectuals of the cities; the other group, commonly designated conservatives, was directed by the aristocrats of the countryside. Those who looked to the intellectuals were in general oriented toward northern Europe and the United States, and were anticlerical. They favoured a federal type of government with narrowly delimited executive power, and they were so strongly committed to liberty and the right of individuals that they professed to prefer disintegration to tyranny. Those who accepted the leadership of the landed elites were essentially Spanish in their outlook and encouraged the church to continue as the interpreter of the social value system. They desired efficient, centralized states directed by strong executive to such an extent that they seemed to favour tyranny to disintegration.

Before 1830 the landed elites had established their ability to neutralize the intellectuals. Their victory over the intellectuals was one of the rural areas over the urban centres, or, as the Argentine president Domingo Faustino Sarmiento said, "of thirteenth

century feudalism over nineteenth century liberalism." The success of the elitists did not mean either the total defeat of the intellectuals or the resolution of the differences that had separated the contenders for power. The intellectuals retained sufficient influence to keep alive islands of radicalism that prevented the aristocratic elements from achieving completely the social rigidity their system demanded. Arrangements were made and compromises were reached on basic issues. The Conservative political leadership was able to reaffirm the area's attachment to its Spanish-Catholic heritage but the intellectuals continued to encourage the flow of ideas from abroad, and by 1850 France had become a cultural prop for all of Latin America. By mid-century, too, even the Liberals had generally conceded that, in practice if not in theory, a strong executive was absolutely essential to orderly government; when representatives of the Liberals did attain power it was not unusual for them to disregard democratic forms. It often appeared that liberalism was invoked in order to impose tyranny. The new states, defeated in their efforts to win for themselves the religious patronage that the Spanish and Portuguese crowns had enjoyed, had accepted the privilege of presentation of lists from which the Vatican selected the high ecclesiastical officials to serve in the republics. The anticlericals intensified their efforts to circumscribe the church's temporal activities—the registration of births and deaths, participation in marriages, control of cemeteries, leadership in education, participation in politics and economic activities—which gave that institution such strength as to make it a threat to the viability of any administration.

The importance of the issues that were delineated and then compromised by the contending power groups should not be discounted but they alone do not explain the state of Latin America after three decades of independence. There were other considerations of equal or greater significance.

Violence.—In the political area, probably the most far-reaching development before 1850 was the elevation of violence to the level of a political fundamental. In order to seize the initiative from the intellectuals, the landholding elites had recourse to the military forces that had been nurtured to maturity during the wars of independence. Their victory, thus, was one of violence, and success through violence engendered more violence. Armies soon came to serve a dual political function. They acted as the final arbiters of political matters and they provided the guarantee that the privileged groups could fight among themselves over their political, social and economic preferences without creating a power vacuum into which the masses might rush.

Once force was injected into politics the juridical concept of representative democracy was ignored. Facts prevailed against constitutions—sometimes against their letter, usually against their spirit. Differences were settled by the breaking of heads rather than the counting of them. Bullets replaced ballots. Those who rose to power tended to monopolize it to such a degree that quite often their holds could be ended only by the bloody remedy of revolution. There was no place in such political systems for the popular masses, who constituted as much as 90% of the population in certain of the republics. They were, in effect, driven into a political wilderness.

Caudillism.—Violence paved the way for the *caudillos*. They were violent men of destiny who broke all the bonds of national and social order. They were individualists who could not be restrained by party or ideology. To them electoral platforms were written to satisfy a formality and not a necessity. In the words of the Argentine sociologist Carlos Bunge, they were "rulers by the will of men without will." Some *caudillos* were generals from the wars of independence, who, in the course of the 15-year-long struggle for freedom, first lost contact with the people and then developed a proprietary interest in the states that their swords had helped to create. They were the liberators who turned upon the liberated. Some of the *caudillos* were mere adventurers who profited from the widespread disorder of the day. Many were *hacendados* ("large landowners") who took to the field to redress grievances against the central government or in response to the need of property owners for protection that the states did not provide. Once in possession of an army it was but a short step to using it for the purpose of achieving high public office.

The *caudillos* bore a striking resemblance to Max Weber's "charismatic leader." They regarded themselves as indispensable and in office they exercised personal authority regardless of the representation of collective interests. Since the objectives of the *caudillos* were primarily personal they were forced to rely upon their personal magnetism to win followings. They had to be *muy hombre* ("very much a man"). Personalism in politics, consequently, became a fetish. Political parties were little more than *ad hoc* associations of friends, strong in victory, only to disintegrate in defeat. Prior to 1850 Chile and Colombia offered the only exceptions to the rule. If personalism was one of the strengths of the *caudillos* it was also one of their major weaknesses. Because their regimes were built on personalism, they were seldom able to consolidate their power sufficiently to pass it on to chosen successors. The opposition understood this phenomenon and was secure in the knowledge that sooner or later power might be expected to revert to it.

An often overlooked characteristic of the *caudillos* was their ideological and philosophical sterility. Although acts of brutality and destruction of property usually went along with the seizure and consolidation of power by *caudillos*, no *caudillo* before 1850 ever threatened a basic principle of the elite system of values. Except in Haiti and Brazil, they invariably paid lip service to the republican system of government. All spoke of government by the people and no one of them felt secure until he legalized his administration by holding an election. They were no more successful than were regularly elected officials in bringing order out of political chaos. They added nothing new to the church-state issue. They were economic traditionalists at least to as great an extent as were those who opposed them. By the time they achieved power they were generally rich in land and the constitutions they wrote reflected their property-owner mentality. Thus it was that in every major political, social or economic area the *caudillos* tempered their actions with enough discretion always to make themselves appear safe. Each one stopped short of revolutionizing the existing social and economic systems.

Not one of the republics of Latin America was spared the price of political tumult born of *caudillism*. Argentina fell into the hands of "bloody" Juan Manuel de Rosas, who was raised to power by a combination of reactionary churchmen, wealthy landowners and the gauchos of the Argentine pampas. Brazil experienced over a decade of civil war after 1835 led by *caudillos* who threatened to divide Brazil as the Spanish area had been splintered earlier. Mexico barely survived the machinations of the superficially brilliant Antonio López de Santa Anna, who tempered tyranny with treason. The Central American federation collapsed in a fit of quarrels kept alive by petty tyrants. Colombia, Bolivia, Peru, Ecuador and Uruguay were surrendered to war lords and adventurers. Paraguay and Venezuela enjoyed rather prolonged periods of paternalistic dictatorship punctuated by blood baths perpetrated upon the citizenry by power-hungry politicians in military uniforms. Haiti, neglected by Europe and shunned by a race-conscious United States, stumbled from one despot to another and the Dominican Republic was shaken by the onslaught of "the Haitians," the aggressiveness of its own strong men and the ambitions of Spain. Only Chile, after a period of extreme anarchy, in the 1820s evolved a political system that fettered the man on horseback. There the landed oligarchy, comprised of not more than a few hundred families, seized power and through a combination of aristocratic supervision and autocratic administration guaranteed its control. The military forces were brought under civilian leadership. The president was given extensive control over a highly centralized government. The church was given full partnership with the state; the franchise was limited by property and literacy qualifications to the point where not more than 10% of the population could qualify for the vote. The requisites for office holding eliminated all but a few thousand.

The Economics of Anarchy.—Although violence and *caudillism* were essentially political phenomena, no major area of activity was spared the pervasive anarchy they generated. Particularly did the disorderliness of the 1825–50 period add to the economic

problems inherited from the mother countries and the wars of independence. The crucial economic problem of the new republics was the system of land tenure, the peculiar feature of which was the large estate or the *latifundio*. Rooted in the colonial period, the *latifundio* was consolidated during the years after independence as the republics recklessly distributed their public domains to political favourites, and then protected the new holdings with tax systems that taxed the product of the land but not the land itself, and legal systems that provided for primogeniture and debt slavery or peonage. Once in debt the Indian was obligated to the *patrón* until the money was repaid. Since he ordinarily found it impossible to regain solvency, if he had ever enjoyed such a blissful state, his labour obligations tended to become permanent. There was no place in such a tenure system for the growth of a property-owning middle class such as appeared in the U.S. before 1850.

To the heavy burden of the *latifundios* and peonage were added other economic problems of somewhat lesser long-range consequence but immediately important to the struggling nations. First Spain's colonial policy, and after independence the fact that the new republics were outside the well-established international trade routes, served to isolate Latin America from Europe and thus to prolong the time needed for European traders and financiers to acquire a somewhat realistic working knowledge of the republics. Violence also delayed the rehabilitation of many of the mines that suffered from destruction and neglect during the war years—mines that might have provided the means of earning an important part of the foreign exchange that Bolivia, Peru, Colombia and Mexico needed so desperately. Finally, the recurrent political plots and uprisings strengthened the well-developed propensity that domestic capitalists had for investing in rural properties because of the indestructibility of land and the prestige associated with it in agricultural communities.

Learning and the Arts.—The ravages of civil war left little time, money or inclination for developing learning or the arts. Antagonism of the new governments to the clergy resulted in the neglect and disappearance of many colonial educational institutions and the loss of educational and professional services of the religious teaching orders. Meanwhile, the new republics, concerned with other problems and lacking in financial resources, did little to promote public education. Only Chile, which in the 1840s combined stability and wealth, was able to give impetus to learning at all levels. The arts suffered from the general decline of wealth. Almost no new churches and very few public buildings were constructed. There was little demand for art other than religious art. Literature fared somewhat better because it was made to serve political ends. Men of letters were generally on the side of justice, by which was meant justice for the privileged groups. Often from homes in exile—Chile and Uruguay were the favourite refuges from Argentina—writers carried on their campaigns against tyranny. The school-teacher president of Argentina, Domingo Faustino Sarmiento, spent many of his most productive years fighting the tyrant Rosas from across the Andes in Chile. Esteban Echeverría described the crimes of Rosas and articulated the needs of his homeland from Uruguay. Through the efforts of Echeverría, the Chilean, José Victorino Lastarria, and others, romanticism was accepted in poetry and then spread to drama and the novel.

V. ERA OF MATERIAL PROGRESS: 1850–1914

For a quarter of a century after independence was achieved the conviction persisted that the problems of the inchoate republics could be resolved if only workable political systems could be found. The small politically articulate element of society threw vast amounts of effort into what proved to be a fruitless search for exclusively political solutions to the dilemmas of the area. An enormous amount of property was destroyed as opposing elements uncompromisingly supported either arbitrary or rational politics as the most direct means of attaining their objectives through constitutionalism. The price was so great, the wounds so deep, that many of the republics still have not fully recovered. But as early as the 1840s in Chile and by the 1850s and 1860s in Argentina, Brazil and Mexico, many within the responsible elements of society had agreed that the purely political approach had failed. They looked to Great Britain and the U.S. for alternatives and the experiences of those countries taught that the successful functioning of democratic representative government, the ultimate goal of the Latin-American republics, was closely related to economic progress and that order was requisite to both. Economic development became an obsession in several of the republics. It dominated the era from 1850 to World War I as completely as politics had dominated the antecedent era.

Latin America turned to economic solutions to its problems just as the world economy under European leadership was fostering a high degree of regional and international specialization. The basic effect of this development was to divide the world into industrialized nations on the one hand and nonindustrialized countries on the other. Latin America fell into the latter category. Mining traditionally oriented toward export, was now greatly expanded. Agriculture was commercialized and given the same orientation. Enormous acreages were put to the plow for the first time in Argentina, Brazil and Uruguay. Barbed-wire fences, blooded bulls and refrigeration combined to transform cattle raising into a highly complex, modern enterprise. At the end of the century bananas became the economic backbone of several of the Caribbean republics.

Prolonged cycles of good markets enriched landowners to the point where many of them could afford to live in the capital cities or in Europe. Absentee landlordism, with all of its abuses, became prevalent in such countries as Argentina, Brazil, Chile and Uruguay. As the tempo of international trade increased nations became the slaves of their mines and fields as minerals, livestock, cereals and coffee provided the means of payment for imports of machinery and tools and the soft goods to which an expanding consumer class had become accustomed. Prior to World War I the dependence of the republics upon export markets did not often give rise to serious problems because the consumption of primary products by the manufacturing nations showed a strong tendency to expand and Latin America was ordinarily able to dispose of all it produced for export.

Foreign Capital and Technicians.—The orientation of their economies to overseas markets made the republics more economically dependent upon Europe and the United States. The shift to large-scale commercial agriculture was financed through foreign-controlled banking institutions. The modernization of mines, beyond the economic capacity of domestic capitalists to carry out, fell to foreign investors, although in Chile domestic capital was heavily invested in the mineral economy. Commercial agriculture and modern mining involved the expansion of transportation and public utilities whose development was assumed by foreign capitalists and foreign technicians.

Foreign capital entered the republics without serious restraints of any kind, and the foreign investor showed a distinct preference for those states where the leadership displayed a reasonable capacity to maintain order. Thus it was that foreign venture capital went primarily into Brazil, where a respected monarch (Pedro II) moderated the differences of disparate groups; into Argentina, where a landowning aristocracy firmly controlled the government; into Chile, where power was shared by the landowners and the entrepreneurs of commerce and mining; and into Mexico, where Porfirio Díaz' policy of "bread or the club" had brought order and stability out of extreme chaos.

Great Britain was easily the largest supplier of funds in South America as its capital went into commerce, utilities, railroads, shipping, mines and agriculture. By 1914 Argentina was an economic colony of Great Britain. "Take Canada from us, but not Argentina," cried one Englishman. The United States did not become a creditor nation until World War I, but before that time United States private capital began flowing into the Caribbean and Central American agriculture and Mexican mines, railroads and petroleum fields. By 1914 the United States was the largest foreign investor in Middle America. Foreigners had approximately $8,500,000,000 invested in Latin America when World War I broke out; one-third in Argentina, one-fourth in Brazil and one-fourth in Mexico. In many enterprises, including railroads, min-

ing and bananas, the investment of foreigners greatly exceeded that of the nationals.

Technicians and managers, ordinarily from Great Britain and the United States, poured into the republics to fill a scientific and technological void left by the humanistic training that the institutions of higher learning continued to impart. In general the teaching of the sciences fell to the military academies. Except in Brazil, where army engineers were active, foreign engineers were primarily responsible for the construction of railroads and ports, and they supervised the work of thousands of native labourers.

Immigration.—The economic expansion induced by foreign capital and technicians provided job opportunities in field and factory for millions of unskilled and semiskilled labourers from Europe. Steamships disgorged most of their human cargo at Rio de Janeiro and Santos (the port for São Paulo) in Brazil, Buenos Aires in Argentina and Montevideo in Uruguay.

Underpopulation had been a recognized problem in Latin America ever since the independence era. In 1823 Brazil, comprising approximately half the South American continent, had only 4,700,000 inhabitants. Uruguay had a population of only 60,000 when it began its struggle for freedom from Spain. As late as 1852 Argentina's population was about 1,200,000. In a bid for immigrants, several states rewrote their constitutions to provide for freedom of worship for non-Catholics. The Argentine theorist Juan Bautista Alberdi at mid-century declared that "to govern is to populate." The Argentine constitution of 1853, which he fathered, enjoined upon the government the responsibility of promoting European immigration. What Alberdi had in mind was the filling in of the great expanses of his country with landowners, not farm hands, for at the time he wrote there was no real shortage of workers in the republic.

A new dimension was given to the problem of underpopulation as a result of the course that economic development took after 1850. With ready markets in Europe for their products, landholders not only were discouraged from parting with their holdings but bid prices up in enlarging them. They wanted farm hands, railroads, better port facilities and more public utilities. Also, the growth of retail trading and the beginning of the factory system required many more workers than could be provided locally.

Although several of the republics desperately sought immigrants after 1850, they did not at first find it easy to attract the restless from Europe. Most of those people preferred the United States, with its abundance of cheap land and its rapidly growing industrial system. Also, Latin America's reputation for political and economic instability was disturbing to potential settlers from abroad. *Latifundism* tended to exclude the newcomers from the ownership of land. Much of the area where lands were available was in the tropics and there was little industrial growth anywhere. Transportation and communications were poor; educational and medical facilities, primitive. Brazil tolerated Negro slavery until 1888 and Europeans were reluctant to work alongside slave labour. As late as the 1870s, in both Argentina and Chile, marauding Indians periodically encroached upon unsettled areas.

There were countervailing forces. Political discontent, famine and grinding poverty in Europe drove many to take refuge wherever they could find it. In the republics there was some house cleaning as groups determined to promote material progress gained ascendancy and demanded order. So Europeans emigrated, at first in small numbers as traders and miners from the British Isles, and as farmers, mostly from Switzerland and the German principalities, and later in swarms from Italy, Spain and Portugal.

Latin-American statistics on immigration are notoriously unreliable. According to those that appear most trustworthy, the swarming to Argentina began in the 1880s. In the single year 1889 the number of newcomers entering the republic reached 219,000. (Figures for departures are not available.) Between 1857 and 1900 Argentina had a net inflow of 1,200,000 (equal to the total population of the nation in 1852). The peak year in Argentina was 1913 when 302,000 entered and 157,000 departed. By 1914 Argentina had received 4,660,500 immigrants, for a net gain of 2,640,000, most of whom were still alive when World War I broke out. Of those who remained between 1857 and 1914, Italians numbered about 1,200,000 and Spaniards about 1,000,000.

The impact of the immigrants upon Argentina was profound. The nation's population expanded to 10,215,787 by 1924. The population of the rich pampas increased 625% and the republic's total agricultural acreage increased 60 times between 1865 and 1914. The immigrants helped to introduce farm machinery and the mechanical arts, and to hold the frontier against the Indians until the latter were finally subdued by General Julio Roca in the late 1870s. They also added to Argentina's contacts with Europe. Their labour raised land values and made railroad building feasible. They popularized dairy products and vegetables in the Argentine diet, and mongrelized the Argentine language. The Italian immigrants, who ran the country stores and victimized the gauchos, became the whipping boys of Argentine literature, while the shiftless gaucho assumed the role of a national hero. The flood of immigrants made Argentina more racially European than any other republic of Latin America with the possible exception of Uruguay. But, in the final analysis, the immigrants' greatest influence was probably felt in the city of Buenos Aires. Unable to buy land and unwilling permanently to accept the hard terms of rural employment and tenancy, they flowed into the capital city. There they entrenched themselves in the retail trade, small factories, the building trades and in the maintenance department of public utility companies. In the burgeoning capital the rootless thousands, caught between the old world and the new world, quickly developed social types that were new to Argentina and added to the European content of its way of life.

Those who emigrated to Uruguay came from the same places and at about the same time as did those who made their way to Argentina, and the contributions of the two groups were basically the same. By 1889, Montevideo with a total population of 214,000 contained 100,000 foreign born. By 1900 the newcomers possessed more than half of the declared national wealth.

Chile did not have a shortage of labour but actually exported labour throughout the 19th century. The only land the republic had to give away was heavily wooded and in areas where the rainfall was far greater than advisable for profitable agriculture. But the stability of the republic early made it attractive to German settlers. Moving into the forested regions around Valdivia and Puerto Montt as early as the 1840s, and later occupying part of the island of Chiloé, the Germans, although always constituting a relatively small portion of the total population, were able to put their imprint on much of the area south of the Bío Bío river. By the middle of the 20th century the Germans of the area played an economic, educational and military role in the region out of all proportion to their numbers.

The most dependable figures available indicate that between 1851 and 1888 an average of about 10,000 newcomers a year entered Brazil and that the flow of immigrants reached its peak during the decade following the abolition of slavery. Approximately 2,500,000 *émigrés* from Europe entered Brazil between 1888 and 1914. Over 50% went to the state of São Paulo; the states of Rio de Janeiro and Rio Grande do Sul were other important recipients. As in the case of Argentina, Italy provided the largest single bloc of newcomers but in Brazil the Portuguese rather than the Spaniards held second place. Although the Germans never entered Brazil in large numbers—probably not more than 100,000 by 1914—they prospered and had large families, and by 1924 numbered 360,000. Their influence in the state of Rio Grande do Sul was and is as pronounced as that of the Germans in southern Chile. In general, they showed less adaptability than did the Germans who came to the United States because they were concentrated in remote and thinly populated areas and were left to organize their own economic, social and educational life. Japanese emigration to Brazil began in 1908. Only a few thousand entered the republic before World War I but between 1920 and 1940 approximately 200,000 followed; they engaged in all types of agriculture and trade.

Over-all, the role of the immigrant in Brazil was similar to that of their counterparts in Argentina and Uruguay. Their labour made possible large-scale commercial agriculture—in Brazil it

was coffee. They became the principal source of labour in the cities of São Paulo and Rio de Janeiro. It may be said without qualification that those areas of Brazil where the immigrant went have prospered much more than have those regions where he refused to settle. The city of São Paulo, the Chicago of Latin America, is the handiwork of the newcomers and their descendants and the greatest monument to the immigrant in Brazil.

Migration to the other republics, when of numerical significance at all, was for the most part non-European. By 1875 more than 74,000 Chinese had entered Peru to work on the sugar plantations, in the guano deposits, and on railroad construction projects. Lima still has a large Chinatown. In 1861 there were nearly 35,000 Chinese in Cuba. By 1899 the number of Chinese in Cuba had declined to less than 15,000. Negroes from the British West Indies entered Panama in large numbers during the construction of the Panama canal. They were also brought into the coastal areas of Honduras, Nicaragua, Guatemala and Costa Rica when the banana was commercialized, about 1900.

Haiti, with one of the densest populations in the western world, traditionally has exported labour, principally to the Dominican Republic and Cuba. In periods of prosperity the Haitian workers have been welcomed; in depressions they have often been made to bear the brunt of attacks of Dominican and Cuban demagogues beating the drums of nationalism. Mexicans, like Haitians, have emigrated. The ability of the U.S. to absorb Mexican farm labour has served as a safety valve for Mexico as it seeks to industrialize to provide jobs for its ever-growing labour force.

Technological Change and Economic Development.—Aided by capital, technicians and labour from abroad the economic and technological advances of the 1850–1914 period were spectacular given the area's inheritance from the colonial era and the anarchic quarter-century following independence. Railroads were laid from mines and farming centres to the ports. In all, 60,000 mi. of railroads were built by 1914, including 21,800 (1914) in Argentina; 15,800 (1913) in Mexico; 15,445 (1913) in Brazil; 5,000 (1913) in Chile; and 1,656 (1913) in Peru. River steamboats were put on the Magdalena, Orinoco, Amazon, São Francisco, Jacuí and La Plata-Paraná river systems. Old port facilities were renovated, as in Rio de Janeiro and Veracruz, and new ones were built. The port of Buenos Aires was dug out of the mud of the Río de la Plata. Rosario, Arg., became one of the greatest grain-shipping ports in the world when a port was completed there after 1900. Steamship lines were subsidized in an effort to increase contacts with Europe and the United States. Before the end of the century hundreds of vessels flying British, French, Italian, German and United States flags were carrying raw materials, finished products and immigrants to all parts of the area but particularly to Argentina and Brazil. Private and public capital combined to put over 100,000 mi. of telegraph lines in operation by 1914. The area had submarine cable connections with Europe by 1876 and with the United States by 1894. The first telephone systems were introduced in the 1880s, and the first modern water and sewer systems were begun in the 1850s. Gas began to replace whale oil for public lighting in the 1850s and by the 1890s electricity in turn had begun to supplant gas. During the era public transportation in the larger cities passed through three phases. Beginning with horse-drawn coaches it progressed to horse-drawn streetcars and to electric trolleys. Before 1910, Buenos Aires had in operation an excellent cross-town subway.

As a result of economic development during the era, Argentina became one of the world's major breadbaskets. Brazil strengthened its claim to the title of "coffee king." Chile became the leading exporter of natural nitrates. Mexico became one of the world's largest producers of petroleum by 1911. The total international trade of the area rose from slightly over $1,000,000,000 annually in the early 1890s to $1,800,000,000 in 1907, and $3,100,000,000 in 1913. In the latter year Latin America accounted for 6.5% of the world's imports and 7.9% of its exports. The growth of trade and commerce in the more advanced countries gave a strong impetus to banking and insurance, a development which did not come about until after World War I in such countries as Colombia and Venezuela and the Central American republics.

Consequences of Economic Change.—In the republics that had by 1914 established their leadership in the technological fields, the economic transformation brought nearer into balance the wealth, income and population of the rural areas and the urban centres. The added importance given to land by the commercialization of agriculture was counterbalanced by the fact that the cities were the first to feel the effects of economic expansion because the industrial and commercial sectors, centred in the cities, received the greatest share of the capital and skills from abroad. The new and relatively well-paid management element associated with transportation and finance was essentially urban. The urban centres were the chief benefactors of the growth of both internal commerce and international trade. Villagers and those newly arrived from Europe, discontented with the terms of employment and tenancy in the rural areas, took advantage of cheap modern transportation to move into the cities and Latin America, at this time, entered a sustained period of rapid urbanization. Buenos Aires trebled its population between 1895 and 1914, as did Montevideo between 1887 and 1914. São Paulo's population spurted from 65,000 to 350,000 between 1890 and 1910. During the same years Pôrto Alegre grew from 52,000 to 130,000. Chile's population was 43% urban that year. On the other hand, the Indian countries, such as Paraguay, Bolivia, Ecuador, Nicaragua and Honduras remained overwhelmingly rural, as did Brazil, where in 1914 at least 85% of the population was rural.

Two new social-economic elements emerged in the cities. They were the entrepreneurs, managers and technicians of industry and commerce, who were added to the middle groups of society, and the urban industrial working class.

The Politics of Progress.—By the outbreak of war in Europe in 1914, the economic transformation and the growth of cities had had a significant impact upon the political life of the republics. In Uruguay, Argentina, Chile and Mexico the new social-economic groups of the cities were making common cause with dissatisfied intellectuals and professionals against the political hegemony of the old elites. The intellectuals had good reason to welcome the new groups as political allies. The alliance of the intellectuals with the elites originally had been dictated by economic necessity rather than ideological compatibility and consequently when their earnings eroded rapidly under the inflationary pressures that accompanied heavy investment in long-range enterprises, there was little left to keep the old working relationship alive. On the other hand, the intellectuals had much in common with the new business elements. Both groups were centred in the cities, were oriented overseas, supported rapid technological development, favoured public education as a means of limiting the influence of the church, and opposed the use of force in politics.

The urban labouring groups provided the popular support for the new middle sector politicians who opposed the entrenched leadership. Politically immature and organizationally weak, urban labour came under the influence of the middle sectors after a brief and stormy association with leaders who had been brought up in the traditions of anarcho-syndicalism then prominent in southern Europe. Political affiliations with the middle groups gave labour a certain respectability; in turn, worker militancy and intractability gave the new political forces an aggressiveness they would not otherwise have had.

The leaders of the new urban political alliance lacked practical experience in the formulation of policies but this did not deter them. They promised economic progress and social democracy. To the political and moral abstractions which the intellectuals had fought for during the independence wars, the new politicians added the demand that a greater share of the material and cultural benefits of 20th century technology be made accessible to a greater part of the population.

Nationalism and a New Type of Militarism.—Political nationalism and a more professionalized military class were important by-products of the political thinking that resulted from the influx of tens of thousands of hardworking immigrants, the construction of railroads and investment in industry. Politicians began to envisage the day when their countries would teem with productive citizens and the empty spaces and corners of the re-

publics would be needed to provide living space for growing populations. National boundaries, consequently, had to be guaranteed and, when possible, expanded. Although most international disputes were settled without resort to force, military establishments were strengthened in almost every republic often in order to back up the claims of politicians.

The new emphasis upon the army as an instrument of national policy had at least two important consequences. A costly arms race developed, and the republics, feeling that the stakes were rising, turned increasingly to military professionalization. Also, the rise of modern armies equipped with costly armament marked the death knell of the provincial *caudillo* who had only his personal fortune with which to outfit his private army and keep it in the field.

Catholicism and Anticlericalism.—Between 1850 and 1914 the position of the Catholic Church in Latin America became increasingly unstable. Severe anticlerical laws were put in force, for example, in Mexico, Venezuela, Chile and El Salvador. In several countries church and state were separated and at the same time the church was burdened with strict state control. Although retaliatory vengeance for clerical political activities continued to be a cause for assault upon the church, a greater consideration as the century grew to a close was the emergence of social-economic groups in the cities whose members attacked the church as an obstacle to economic and social progress. Under the new leadership, anticlericalism to a degree became, according to J. Lloyd Mecham, a political philosophy and a plan of action pointing the way to the modern world. The great mass of the people were unaffected by the attacks upon the church. Communities went along as before. They retained their patron saints, whose names were sometimes added to the names of the towns. Families had saints which they honoured. Other saints were expected to protect certain occupations or guard specialized groups.

Education and the Arts.—In the rush to modernize, learning was left behind. There were numerous exponents of educational reform but few projects got beyond the planning stage because leaders in education seldom possessed the capacity for political leadership that would have enabled them to translate their theories into practice. But in any event to incorporate a large mass of indigenous peoples would have been a herculean task. The Catholic Church continued to dominate primary and secondary education, despite steadily growing support in favour of public instruction. Between 1850 and 1914 the Catholic University of Chile, in Santiago, founded in 1888, was probably the outstanding addition to the church's list of institutions of higher learning.

Only Argentina, Chile and Uruguay, each of which had homogeneous, largely European populations, made major achievements in public education between 1850 and 1914. In response to the demands for a more responsible citizenry and the requirements of the new technical age, but above all because of the driving determination of Pres. Domingo Faustino Sarmiento to create a literate nation, Argentina moved ahead rapidly to become the educational leader of Latin America, a position that it has never relinquished. Matriculation in Argentine normal schools increased from less than 1,300 to more than 7,200 between 1890 and 1912 and in the same period enrollment in public and private elementary schools rose from about 300,000 to 720,000. Enrollment in the University of Buenos Aires reached 4,600 in 1915. The University of La Plata, founded at the turn of the century, became one of the great institutions of the area before Juan Perón dispersed its faculty during the decade after 1946. Although Chile failed to maintain the very fine record it had set in the 1840s (*see* CHILE: *History*) it ranked in the prewar period as a leader in the field of public instruction. By 1908 enrollment in public elementary schools stood at 240,000 and 18,700 in public secondary schools by 1910. Uruguay placed the emphasis upon elementary instruction while establishing the principle of free and obligatory education under secular control at all levels.

Although important changes did take place, the economic-technological transformation stopped considerably short of generating a social revolution. Inequities became more pronounced as industry and commerce gave rise to more and greater fortunes than farms and mines had ever supported. Gaudy homes went up in exclusive residential districts. Conspicuous consumption was appreciably more evident in the cities than it had been on the haciendas. Novelists geared their writings to the new rich who wished to read of themselves in glittering palaces and traveling abroad. Portrait painting was popularized as the number of those who could afford such luxury multiplied. Academies of arts were founded and national museums were established. History societies flourished, as the new nationalism aroused interest in the past, and archives were searched for evidence to support boundary claims. A few cities, notably Rio de Janeiro and Buenos Aires, supported operas. The demand for newspapers grew as learning slowly filtered down to the urban working elements and immigrants bought foreign-language newspapers in order to keep abreast of developments in Europe. But the rigid system of social classes remained largely intact. "The darker one's skin the lower one's social position" remained the rule. Although gradations were pronounced, the essential division in the social hierarchy was between the dominating privileged classes and the people. The Indians were left to vegetate on the outskirts of civilization in peasant communities that lived by aboriginal or medieval cultural patterns. The interpreters of society either ignored the masses or treated them in a residual manner. Many Brazilians wrote against slavery, but they attacked that institution on moral rather than social grounds.

The End of an Era.—Well before World War I there were many indications that large parts of Latin America were breaking with their Spanish and Portuguese pasts and moving toward their goals of becoming mature, modern nations. Slavery as a legalized institution in the western hemisphere was finally ended in 1888 when Brazil decreed the emancipation of approximately 850,000 Negroes then held in bondage within its borders. The following year Brazil forswore monarchism, which had become an anachronism in the new world, in favour of republicanism, thus bringing its political system into line with the other hemisphere nations.

The republics established an enviable record for the peaceful solution of controversies, especially in the settlement of boundary disputes. The more recalcitrant cases were submitted to arbitration and before World War I arbitration had for practical purposes become a part of international law as it applied in Latin America.

The modern political limits of the area were drawn when Cuba won its freedom from Spain (1899) and became an independent republic in 1902, and the number of nations was raised to 20 when Panama separated from Colombia and achieved sovereign status in 1903.

All the republics were invited to the second Hague Peace conference held in 1907. Although the position taken by the Latin-American delegates against armed intervention for the collection of debts was accepted only after significant modification the conference was important because it was the first of world-wide scope in which the Latin-American republics participated.

As the 20th century began, the republics were deeply conscious of the fact that their future was clouded by an ominous shadow cast over them by the United States. The "Colossus of the North" controlled Cuba through the Platt amendment. It had created Panama. Pres. Theodore Roosevelt's big stick policy had not only sanctioned interventions in Latin America but had claimed for the United States a monopoly of the right to engage in it, thereby making the United States not only the policeman of the hemisphere but its judge as well. President Taft's dollar diplomacy was followed by the sending of marines into the Caribbean and Central America. President Wilson did little to quiet the fears of the Latin-American leaders when he intervened in the internal affairs of Mexico by more or less openly calling for the overthrow of Dictator-Pres. Victoriano Huerta. By 1914 the United States furnished 32% of the imports of the entire area and took 36% of the exports of the republics. (For the Pan American Union *see* below under *Latin America in International Organizations.*)

World War I.—Distrust of the United States had much to do with the official attitudes of the Latin-American republics in

World War I. Despite great sympathy on the part of the privileged groups for France, only eight of the countries declared war against Germany, and only two, Cuba and Brazil, offered military aid. Seven of the eight republics that declared war were dominated financially by either the United States or Great Britain. Only Brazil made its choice with comparative freedom. Five of the republics broke relations, and seven, including Argentina, Chile, Colombia and Mexico, remained neutral. Mexico was actually pro-German. Early in the war international trade was brought to a near halt, but by the end of the conflict the republics were supplying food and strategic materials in abundance. The foreign commerce of the 20 republics rose to $3,900,000,000 in 1918 after having fallen to $2,200,000,000 in 1914. The fact that under the stress of war the Allies failed to provide the manufactured goods to which the population had become accustomed gave a fillip to domestic manufacture of consumer goods.

VI. BETWEEN THE WARS: 1918–1939

By the end of World War I it was quite apparent that the 20 republics were in widely varying states of development and that the differences among them were actually increasing. Bolivia, Ecuador, Paraguay, Peru, Venezuela, and the Caribbean and Central American republics, except Costa Rica, lived in the mid-19th century. They were politically immature, plagued by meaningless revolutions, economically backward and burdened with foreign debts, and generally lacking in social awareness.

Colombia was in a category by itself. It was dominated by a narrow oligarchy that at times had shown unusual administrative skill, but the structure of the country retained most of its colonial features and the nation was just beginning to enter international markets. With tremendous potential compared to many of its neighbours, it was nearly prostrate from civil strife that bordered on anarchy.

By 1920 Argentina, Chile, Costa Rica, Uruguay and Mexico were clearly in the vanguard, and Brazil joined them in the 1930s. It is with these six republics, containing two-thirds of the land area and two-thirds of the population, and annually producing approximately two-thirds of the gross product of the 20 republics that the remainder of this article is primarily concerned. Between 1918 and 1960 it was in these republics that one found most of the region's dynamism, its new self-confidence, its desire to create and its very conscious groping for self-expression. It was to the six republics that, for one reason or another, the other republics looked, when they looked at all, for leadership.

Political Recognition of the Popular Masses.—During the century after independence the leaders of Latin America had at first sought essentially political and then economic solutions to the problems of the republics. Between World War I and World War II the leadership in the more progressive republics not only merged politics and economics but added a social ingredient to their ideology. Social-economic problems were made the fundamental political problems. Democracy, which earlier had been thought of primarily as a theory of government and which in practice was more nominal than real, was expanded to include economic and social democracy. The exaggerated individualism of the 19th century gave way to an emphasis upon social solidarity. The concept of the state as a passive organism, limited largely to maintaining order and collecting taxes, was supplanted by a concept of the vital state that would provide leadership in the economic and social fields as well as in the political. Politicians spoke more of social justice, less of legal justice; more of social equality, less of political equality; and the masses came to prefer good government to self-government as they knew it.

There was a twofold explanation for the new concern with the issue brought to the surface by the transformation of the pre-World War I era. The urban working groups, aroused by the knowledge that the stirrings of European workers immediately after the war had won official recognition of their problems, demanded action on their behalf. The middle sector politicians, in their struggle for power with the old elites, had been forced to go to the workers for electoral support. Once the workers were brought into the political arena their social anxieties, frustrations and discontents could no longer go unheeded.

Under the influence of the new political philosophy the traditional concept of the role of private property in society was challenged. The Mexican constitution of 1917 defined private property in terms of social function. The Chilean constitution of 1925 established the superiority of the state over private property.

By 1930 there were numerous indications of the growing concern over working conditions and the welfare of workers. Article 123, often called the Magna Carta of Mexican labour, of the constitution of 1917 not only enjoined the state to foster a strong Mexican labour movement but recognized labour as a status, a way of life, for which the minimum essentials must be guaranteed. By the end of the 1920s Uruguay had adopted legislation providing for the eight-hour day, minimum wages, equal pay for equal work, protection on the job, and fixing the terms under which minors might be employed and workers might be separated from their jobs. Article 56 of the Uruguayan constitution of 1934 made the state responsible for promoting the organization of trade unions, enacting standards for the recognition of their juridical personality, and promoting the creation of tribunals of conciliation and arbitration. The Costa Rican constitution of 1925 contained elaborate guarantees to both urban and rural labour. The Chilean labour code of 1931 embodied radical principles and general practices regarding labour. In Brazil, Pres. Getulio Vargas put many social measures into law: a minimum wage, old-age pensions, accident insurance, workers' savings banks, vacations with pay, cheap housing. As early as 1925 the Chilean government wrote an imaginative program of social security, including an elaborate structure of social security funds to which workers, employers and the state contributed. Uruguay carried on public works programs as insurance against unemployment. In Mexico, Pres. Lázaro Cárdenas spoke of "land for those who worked it."

Material gains and social welfare for the workers were often delayed and seldom measured up to expectations, but the self-respect and the sense of belonging to the nation that the new official attitude gave the labourers in Mexico, Uruguay and Chile was immediate and profound. On the other hand, the failure of Argentina's "don't-touch-agriculture" leadership of the 1920s and the 1930s to give recognition to the workers prepared them mentally for the acceptance of Perón's quasi-Fascist administration in the 1940s.

State Interventionism.—In the 1930s the national governments in several of the more advanced states rejected the laissez-faire doctrines of the 19th century. They broadened their economic responsibilities in search of faster and better ways of fulfilling the social obligations they had assumed. The governments justified their action on three grounds: (1) Industry could not survive without protection from outside competition and only the state could provide that protection. (2) Since the accrual of domestic private capital was slow, the state, with its ability to accumulate capital relatively rapidly through taxation and foreign loans, must intercede in the industrial sphere. (3) Solicitude for the labouring classes required that the state exercise some control over the prices of necessaries.

The economies that the governments sought to vitalize were reeling from repeated blows. The international economy had been severely jolted by World War I and had not been reconstructed in the uncertain political and economic environment of the 1920s. Economic nationalism in Europe had placed at a disadvantage countries, such as those of Latin America, that depended upon the export of primary products. The fact that each republic continued to rely on one or two basic exports had weakened further their bargaining position in the new world economy. The economic dislocations and problems of the 1920s were heightened by the depression of the 1930s, which saw the drying up of foreign loans, the complete collapse of the world economy, and widespread defaulting on debts. Chile's and Bolivia's exports dropped 80% between 1929 and 1932.

There were many instances in the 1930s of states investing directly in economic enterprises, as, for example, in Uruguay and in Mexico following the nationalization of the railways and the expropriation of the foreign-owned oil properties. But before

World War II the general practice was for governments to limit their intervention to placing restrictions on imports, using exchange controls, licensing arrangements, imposing embargoes in order to promote domestic manufactures, and creating autonomous and semiautonomous institutes to assist designated sectors of the economy. The manufacturing sector of the economies made significant advances in the 1930s, probably as much because of the impetus given by the depression, when the foreign exchange situation left no alternative to domestic production of a wide range of manufactures, as to state promotion and planning. While manufacturing made appreciable gains there was a marked decline in capital invested in transportation as revenues dropped and funds for upkeep and replacements were not forthcoming from other sources. Agriculture, still the principal source of foreign exchange for a majority of the republics, was neglected.

Social Mobility.—The interwar years produced social mobility and social ferment on an unprecedented scale. Increased opportunities for learning, coupled with the growing demand for intellectual and technical skills in the public and private bureaucracies and in education, permitted many persons from the lower groups to achieve middle sector status. Employment opportunities in factories, commercial establishments, public utilities and the building trades attracted hundreds of thousands from the rural villages into the burgeoning cities.

In Uruguay, Argentina, Chile and Costa Rica, where the populations were overwhelmingly European, there was little change in the ethnic composition of the social groups or the cities. But in Mexico the middle classes, the skilled working classes and the cities all experienced a heavy Indian infiltration, and in Brazil there was a noticeable Africanization of the major industrial and commercial centres. Labourers who had become members of the middle class, and farm hands who had become industrial workers experienced the frustrations inherent in passing from one social-economic group to another. The new social milieu placed those who knew the lower levels of society from first-hand experience beside those who had only a paternalistic interest in or a theoretical understanding of the working element. Those who depended upon labour leaders to defend their interests often worked for individuals who had an abhorrence for the labour movement. Those who had never owned property and were little concerned with property rights or infringements upon private enterprise were thrown together with persons strongly committed to the defense of private property and personal initiative. The clashes that resulted from the coming together of two essentially different cultures were often bitter and there was much pulling and hauling as groups fought for advantage. But there was also a sharpening of the focus on the goals and aspirations of the people as they struggled with the crisis of growth, and there was no turning back of the clock as the workers retained, at least in principle, the gains they won.

The Family in a Changing Society.—Under the pressures of modern life the family, which traditionally had served a political as well as a social role, began to weaken. This was particularly true in the cities where private dwellings began to give way to cramped apartments. Economic pressures forced many middle-class women to find employment outside the home; increased education and job opportunities for girls gave them a new freedom. Modern means of transportation encouraged young people to travel and make associations outside the family. Cinemas, clubs and public parks bid against the family for the leisure time of its members. Youths left their homes to go into education, business and the professions, and returned home with information that permitted them to reach decisions independently of the older members of the household. The new independence helped to weaken allegiance to the family as a political unit and there was a strong tendency to transfer this allegiance to political parties. Political parties provided a common ground for those who had similar objectives based on education and occupational interest and on social relationships outside the home.

The New Militarism.—The role of the military establishment underwent basic modifications between the two wars. The young men who had entered the armies at the turn of the century had now come to power. They were from the same social-economic groups as the new civilian leadership; as the economic and political influence of the middle sectors rose, the officers' inclination to associate themselves with the old elites declined. The officers, meanwhile, had learned to accept the working elements, if not always to trust them. Like the middle sector leadership, the officers of the armed forces supported nationalism as a means of achieving rapid industrialization.

Professionalization of the military forces did not have the effect of keeping them out of politics, but it did lead to a new concept of the military's role in government and society. Under the influence of the new concept the officers tended to discard their historical subservience to an all-powerful strong man. Instead, they organized in such a way that when intervention took place it was in the name of the armed forces rather than of an individual, and government was by juntas in which all branches of the armed forces were represented. While the earlier military leaders had been content to declare for the general will, the new military statesmen felt compelled to define the content of the will. Several of the Caesar-statesmen who won recognition during the 1930s showed a distinct preference for Nazism and Fascism.

Nationalism.—As a result of both external and internal developments during the 1920s and early 1930s, cultural nationalism was given wide play in the Latin-American area. France, to which Latin America traditionally had looked for cultural inspiration, failed after the war to regain its cultural hegemony in the western world. The stream of immigrants from Italy, Spain and Portugal diminished under the impact of the depression. This development served to loosen the area's ties with the Mediterranean region and the separation became more complete as those who had migrated before 1920 adapted themselves to their new surroundings. Simultaneously, financial leadership in the world passed from Great Britain to the United States, whose people were considered cultural barbarians by the Latin American elites. These conditions were made-to-order for the new middle sector political leaders who were bidding for power against the old elites. They argued that since Europe was losing its cultural position and Latin American ties with the area were weakening, the old elites, "who lived with their feet in America and their heads in Europe," should be repudiated. They also contended that the decadent neo-European culture the elites had imposed upon Latin America could not withstand the increased pressures of an economically dominant United States. Finally they declared that since in the new order each social sector was worthy of representation in government it must be assumed that each group had something worthwhile to contribute to the national personality. It followed from these arguments that Latin America was obliged to look inward and search out the best that each of its social groups had to offer, and then to integrate the whole into a culture that would be truly representative of the national essence.

In the 1920s intellectuals had taken the lead in promoting the nationalization of their cultures and they had directed their appeals to the learned components of society. With the onset of the great depression, the states, at the same time that they expanded their social and economic responsibilities, seized the leadership from the intellectuals and cultural nationalism was promptly merged with and subordinated to economic nationalism. This integrated nationalism was brought down to the masses in concrete and politically charged form. As such it was soon raised to the level of a major political ideology and there it has remained. The glorification of a narrow nationalism was used to unite all elements in the swelling resentment against the exactions of economic imperialism and to cultivate the national spirit while undermining the atomistic assumptions of liberalism. It served as a vehicle for the adoration of collective power. In its more virulent form the new nationalism became anti-imperialism and more specifically anti-United States. At first it was directed against United States political intervention and cultural infiltration of the republics. Later it was manifested in attacks upon U.S. investors, who, it was generally charged, were depleting the area of its irreplenishable natural resources and discriminating against national employees.

VII. WORLD WAR II

The Good Neighbor policy (*see* below under *Latin America in International Organizations*) had convinced the Latin American republics of the sincerity of the United States. When the second global war broke out, all of them except Chile and Argentina were prompt to throw their support to the Allies. By the end of Jan. 1942, nine of the nations had declared war on the members of the Axis and nine others had severed relations with the enemy. The war declarations became unanimous when the Fascist-oriented leadership in Argentina finally declared war in March 1945, and thereby qualified for a seat in the United Nations.

As in World War I, Latin America's contribution to the Allied cause was largely in the form of foodstuffs and strategic materials. Brazil, however, sent an expeditionary force to the Mediterranean, and a Mexican air force squadron fought in the Pacific theatre of operations.

The Allied demands for foodstuffs and minerals resulted in nearly full employment in Latin America during the war years and lifted the gross product of the area to unprecedented heights. Increased industrial production for domestic consumption was achieved by placing added burdens on existing plants and equipment because the wartime economies of the Allies did not provide for the export of capital goods, except in most unusual circumstances. There was a moratorium on strikes. Labour-employer issues and social welfare demands were reduced to a secondary position as politicians (in Mexico, Chile, and Brazil, for example) and Communists and Communist sympathizers everywhere called for an end to class conflicts in the face of the grave threats from abroad. The United States, whose overriding consideration was strategic, helped to maintain stability in the area by providing incumbent regimes with military and economic aid.

VIII. THE POSTWAR YEARS

Industrialization was a principal obsession of the peoples of Latin America after World War II and heavy industry became the symbol of national progress. Figuratively speaking, the fiery furnaces of real and anticipated iron and steel plants fused the goals of the working elements and the hopes of the privileged groups into a national will, the expression of which was reflected in all major areas of human activity.

Latin America had been formulating its new views on industrialization for some time before they found expression after the defeat of Germany. The extractive and processing industries that had been promoted so assiduously before World War I and during the 1920s had not lived up to expectations. They drained off natural resources without, in most cases, providing real impetus to other sectors of the industrial economy. Industrial production, even at the expanded rate of the war years, had not brought the hoped-for economic emancipation, since the machines, and many of the raw materials and the fuels needed for the production of semidurable goods, had to be imported. World War II had shown the inconvenience of dependence upon the outside world for replacement parts and machine tools. Finally, it had become evident that the great powers were, in fact, great manufacturers. This meant that if the republics were to gain worldwide recognition and respect they must, among other things, have steel plants and make machines.

Much of Latin America's industrial expansion has been and continues to be financed through inflationary borrowing. An intermittent phenomenon in Latin America since the late nineteenth century, inflation surged upward in the late 1930s and since World War II has spiraled in several countries, notably Argentina, Bolivia, Brazil and Chile. Rampant inflation has tended to direct capital toward short-run speculative ventures, rather than basic industry requiring relatively long maturation periods. Industrial development, far from contributing to internal equilibrium, has in fact more typically distorted the economies by contributing to regional concentration of income. This is because industry has invariably grown up in the main urban centres where a steady demand for consumer goods exists and where skilled labour is most readily available.

As it has turned out, a large part of Latin America's commitment to industry has been made at the sacrifice of the agricultural sector. Between 1945 and 1965 farm production barely kept pace with population growth; the annual rate of increase of livestock was only 1.8%, compared with a population increase of 2.8%. In order to feed their people adequately some countries have had to shift to subsistence agriculture from commercial agriculture, the principal source of foreign exchange for all the republics except Bolivia (tin), Chile (copper), Mexico (tourism), Peru (industrial ores) and Venezuela (petroleum). As of the mid-1960s the agricultural sector contributed less than 20% of the gross product of the republics.

Little progress has been made in the redistribution of land. The revolutionary governments of Mexico, Bolivia and Cuba have seized and divided land with little regard for the original owners. In Venezuela, the government has had the means to pay for land that it has acquired for redistribution to peasants. Elsewhere, nations and international technical experts and legislators search for legal means to penetrate on a broad front the tight ranks of landholders, who in Latin America exercise political power out of proportion to their economic contribution.

Land redistribution tends to capture the imagination of the public, but as a short-range goal increased production may be equally as important and as difficult of solution. In many areas agricultural techniques are incredibly outdated. Landholders in general seem unconcerned about modernizing their methods and equipment. Many do not have the means to modernize should they choose to do so, while others are reluctant because of the threat of expropriation which is ever present.

State Intervention and the Military.—The clamour for rapid industrialization invited increased state intervention in economic life. Domestic private investors could provide only a small part of the necessary capital. Foreign investors were reluctant to enter the "politically charged" power and transportation fields, particularly when the threat of expropriation hung over them constantly. Nationalists successfully prevented the investment of foreign capital in a large number of activities closely related to natural resources. The national governments, on the other hand, could and did raise capital through taxation and by borrowing abroad.

Examples of large-scale government participation in industrial enterprises are numerous. In Brazil, Volta Redonda, the largest iron and steel plant in Latin America, is government controlled. The Brazilian government is the owner of numerous hydroelectric facilities, and Petrobras is a government-controlled petroleum monopoly. In Argentina the government controls the railroads and the petroleum industry. In Chile the central government has a direct interest in the production and sale of natural nitrates and controls the iron and steel plant near Concepción. A saturation law gives an agency of the Chilean government power to exclude further investment in areas where production is deemed sufficient. In Colombia the iron and steel plant at Paz del Río has the unqualified support of the government. In Mexico the government through Pemex operates a petroleum monopoly, and the railroads are nationalized. The Nacional Financiera, most of the stock of which is owned by the Mexican government, is the channel for negotiating and administering loans obtained from abroad and is the principal source of funds for industrial development in the country. In Uruguay the government controls the production of electricity and operates the telephones, railroads, the port of Montevideo, insurance banks and the meat-packing industry; it also imports and distributes coal, distills alcohol and manufactures all cement used for public works. In Bolivia the central administration produces and markets most of the country's tin.

Military officers have in general supported state intervention and have profited from it. The influence that the armed forces enjoy has opened to officers the way to high positions in the semiautonomous and autonomous institutes set up by the states to promote industrial growth. In a majority of the countries officers holding such positions receive some credit applied to their military service because such posts have been decreed to be of military interest. This development strongly suggests that even if the military services withdraw from direct participation in politics

they will continue to exercise considerable influence over economic and social programs.

Economic Diversification.—By the 1960s industry and commerce accounted for 50% or more of the gross products of Argentina, Brazil, Chile, Colombia, Mexico, Uruguay and Venezuela. At that time about 15% of the total labour force of Latin America was in manufacturing as opposed to about 45% in agriculture and 30% in service occupations.

Industrial development has contributed appreciably to diversification within those sectors of the economies producing for internal consumption. The more highly industrialized countries are today producing a major share of their textiles, appliances, pharmaceuticals and building materials, and are moving ahead in the manufacture of industrial chemicals. The republics have enjoyed only limited success in modifying the composition of their exports. Even as late as the postwar years they continued to export the same primary materials that they exported before World War II and a considerable portion of their foreign exchange earnings continued to come from a single commodity. Comparison of figures for 1948 and 1964 reveals that in the latter year more than half of the republics continued to rely upon the same commodity as they did in 1948, and that in 1964 about one-half of the republics were more dependent or as dependent upon a single export commodity than in 1948. For most years between 1960 and 1965 11 of the 19 republics (figures are unavailable for Cuba) depended upon a single commodity for more than 50% of their foreign exchange earnings. They were Brazil, Colombia, Costa Rica, El Salvador and Guatemala (coffee); Bolivia (tin); Chile (copper); the Dominican Republic (sugar); Ecuador (bananas); Venezuela (petroleum); and Uruguay (wool).

Foreign Trade.—To a greater extent than in the case of the countries that have reached a higher level of industrial development, the economies of the Latin-American republics have remained geared to overseas markets. Throughout the 1950s it was common in many of the countries for the value of exports to run one-fourth to one-third of gross national production. This situation, generally considered unfavourable by the leadership of the republics, has tended to increase Latin America's share of world trade. This share reached 11% in 1948 but had declined to about 6% by 1964, as the prices of the area's principal commodities dropped precipitously. Four countries—Argentina, Brazil, Mexico and Venezuela—in 1964 accounted for 59% of Latin America's (excluding Cuba's) total imports and 67% of its total exports. Among the outside countries trading with Latin America, the U.S. in the 1960s ranked first and West Germany second. Approximately 10% of the area's total trade results from the exchange of goods between the republics themselves.

The quite limited trade between the republics has given rise to a marked effort to expand their regional ties. The first major effort, the Central American Common Market (CACOM), encompassing El Salvador, Guatemala, Honduras, Nicaragua and Costa Rica, created in 1957, has been remarkably successful. Many trade barriers between the member states have been eliminated or reduced. Intrazonal trade, though still not large, almost tripled between 1957 and the early 1960s. For the first time businessmen of the republics began to think in regional rather than national terms, and they have become convinced that CACOM is an instrument for fighting competition from the outside.

The nine-member Latin American Free Trade association (LAFTA), made up of Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru and Uruguay, went into effect in June 1961. As of the mid-1960s LAFTA was not nearly as sophisticated as CACOM, but it had many strong supporters and prospects for a successful future. The states comprising LAFTA contain 80% of Latin America's population and produce more than 70% of its output. LAFTA has succeeded in bringing about an increase of trade between the republics and in encouraging the private sectors. Many problems confront it, but none more serious than the need to increase its share of world trade, since foreign exchange is vital to the continued development of the republics.

Foreign Investment.—The disastrous experiences of the depression and the conduct of nationalistic governments in the late 1930s made foreign investors most reluctant, after World War II, to send capital to Latin America in the form of portfolio investments. On the other hand, there has been since the war a relatively heavy flow of private capital into the area as a result of direct investments by foreign enterprises. Between 1945 and 1950 private capital went primarily into petroleum, but since 1950 investors have shown increased interest in manufactures and the extraction of minerals other than petroleum.

Latin-American governments in general have welcomed foreign investors since World War II but have insisted that since foreign investors will not put their capital into the development of those sectors basic to long-range growth, such as power and transportation, aid in these areas must come from international lending agencies. Between 1948 and the mid-1960s the International Bank for Reconstruction and Development (IBRD) made loans totaling about $2,000,000,000 in the Latin-American republics.

Various agencies of the U.S. government have also been active in assisting the republics to develop their human and natural resources. The Export-Import Bank of Washington is the oldest of such agencies. From 1934 through 1966 it authorized credits to the republics in excess of $5,600,000,000. After many years of agitation by the Latin-American republics, the U.S. government in 1959 approved an Inter-American Development bank. This agency was originally capitalized at $1,000,000,000, of which $450,000,000 was contributed by the U.S. The bank approved its first loan in 1961. Loans and grants made to the republics by the U.S. Agency for International Development (AID) totaled $3,010,000,000 by the end of 1965. Between 1946 and 1965 the United States made economic grants to the republics in the total sum of $2,709,900,000 and economic loans in the total sum of $6,715,400,000. Military aid (grants and loans) totaled $925,200,000 in the same period. Brazil received by far the most aid, with grants totaling $637,700,000 and loans totaling $2,150,700,000; on a per capita basis Chile ranked first.

Urbanization.—After World War II, three factors combined to produce a major urbanization movement: industrial and commercial expansion, a population explosion that was annually adding 2.8% to the total number of inhabitants, and the advantages afforded by the cities. In 1925 Latin America's population was 33% urban; in 1960 it was 45% urban and the percentage was increasing rapidly. Uruguay, with over 65% of its people living in cities in 1960, was the most urbanized of the republics, but nearly all the republics showed a pronounced trend toward urban concentration. During the decade after World War II Colombia's urban population increased 58%, Venezuela's 57%, Panama's 54% and Mexico's 50%. Almost everywhere the tendency was for the largest cities to grow faster than the smaller ones. The population of São Paulo, Braz., increased from 2,017,025 in 1950 to more than 3,100,000 in 1960, and that of Caracas, Venez., more than doubled during the same period.

Centralization of Power.—One of the profound effects of state intervention in the social and economic fields has been the general strengthening of the already strong central government at the expense of the states and municipalities. In 1960 only Brazil and Argentina showed any tendency to move in the other direction. In several of the smaller nations the state as a separate entity does not exist at all and the municipality thus serves as the only buffer between the central government and the individual. In many cases, notably Colombia, the states and municipalities have been largely stripped of their power to tax and are consequently dependent upon subsidies from the central authority. In 1950 it was estimated that, on the average, cities other than state capitals in Brazil raised by direct taxation only ten cents (U.S.) per inhabitant for education, hygiene, transportation and other services.

The Presidency.—Historically, the tendency in Latin America has been toward the concentration of power in the executive branch of government, a tendency that was not ordinarily deterred by any theoretical balance of power or by federalism. The strengthening of the central governments at the expense of the states and municipalities in most instances has encouraged the trend toward a strong president. Since World War II the legislative branches have not

in general exercised their constitutional prerogatives, and the legislatures have been little more than rubber stamps. However, Brazil, Chile, Costa Rica and Uruguay are important exceptions to the general rule. The chief executive, also, generally participates in, if he does not actually make, judicial appointments, and thus is able to exercise considerable influence over the judiciary. Moreover, programs of social legislation, which have tended to place social interests above the rights of individuals as private citizens, have been more closely linked with administrative law than with private civil law. This innovation gives the executive branch power to regulate the rights of individuals by administrative acts and thus to reduce the power of the regular courts.

The Electorate.—Elected presidents, as of the 1960s, could claim to speak for a larger share of the population than ever before, because the expansion of the electorate has been a major political phenomenon of the postwar era. In a drive for general enfranchisement, property requirements have been removed in most instances; age and literacy requirements have been reduced, and in some cases discontinued; and women have been granted the right to vote. These measures have been highly successful in broadening popular participation in politics. In Brazil the number of eligible voters multiplied ten times between 1930 and 1960, reaching about 18,000,000 in the latter year. In Chile the number of registered voters quadrupled between 1937 and 1958, and again increased by 30% to 2,900,000 for the election of 1964. In Mexico the number of votes cast in the presidential election of 1964 was more than three times as great as in 1940. Voters in Bolivia cast 970,635 ballots in the presidential election of 1960 compared with only 126,000 in 1951. In Venezuela 40% of persons of all ages voted in the presidential election of 1963.

Political Parties.—Personalism and the political influence that the family traditionally exercised have given the erroneous impression that organized political parties are either nonexistent or are of recent origin in the Latin-America area. It is true that in several of the republics major and even dominant parties date from World War II. But it is also true that by the mid-19th century two relatively homogeneous party traditions had emerged, represented by the Liberals and the Conservatives. The Liberal and Conservative parties of Colombia and Chile all date from before 1850. In the late 19th century nationalist parties arose with programs for national development. The still active Socialist party of Argentina had elected national congressmen before World War I. Parties with middle-class leaders and depending upon the electoral support of labour groups were active in Argentina, Chile and Uruguay before 1920. These older parties usually were organized from the top down and consequently lacked local spontaneity. More recently organized parties have shown this same weakness.

Since World War II all types of party systems have been used. In the mid-1960s a single party held an effective monopoly on public power in Mexico, Paraguay, Nicaragua and Cuba. Uruguay and Colombia had effective two-party systems. Multiparty arrangements existed in Argentina, Bolivia, Brazil, Chile, Costa Rica, Guatemala, Panama, Peru and Venezuela. In Brazil and Chile it has been usual for at least ten parties to send representatives to the national congress.

Most of the existing parties are pragmatic. They are more interested in commanding votes than minds and make no major ideological demands upon their membership. The Argentine Radical party and the Chilean Radical party, both of which have at times enjoyed considerable electoral success, are representatives of pragmatic parties. There have been many ideological parties but they have not been notably successful in winning popular support. Of them, the Communist organizations (the name varies from country to country) have shown great ability to survive under many circumstances, and in 1959 the Cuban organization gained control of that nation under Fidel Castro (see *Communism*, below). The Socialist party of Argentina has been too doctrinaire to win widespread popular support. Since World War II the Church-oriented Christian Democratic parties have increased their influence significantly. In 1964 a Christian Democrat, Eduardo Frei Montalva won the presidency of Chile. COPEI, the Christian Democratic party of Venezuela, also gained considerable strength, and the party was increasing its influence in Costa Rica, Guatemala and Ecuador. Although the parties differed somewhat in the various countries, their general aim was to provide an effective alternative to Communism as an ideology and as a movement that would foster modernization and prosperity. Nationalist parties typically have been narrowly based and have appealed to a small sector of society.

Quasi-Fascist parties—Peronista in Argentina, Integralista in Brazil, Nacista in Chile and Sinarquista in Mexico—have had large followings at times. The agrarian-populistic Aprista parties, the chief prototype of which is Alianza Popular Revolucionaria Americana (Apra) of Peru, have indigenous roots. The Apristas seek far-reaching social and economic reform and the integration of the lower classes into the political process. Acción Democrática, since World War II the predominant civilian party in Venezuela, is often considered to be an Aprista party. After 1959 a number of parties based on ideologies similar to that of Castro made their appearance, notably in Brazil and Venezuela.

The Roman Catholic Church.—The Roman Catholic Church exerts a profound influence over the people of Latin America, 93% of whom consider themselves Catholic. The Church has used its influence to prevent the legalization of divorce in 11 of the 20 republics. The Church, as of 1960, was subsidized by the state in nine of the countries and legally participated in politics in Costa Rica, Panama, the Dominican Republic, Peru, Chile and Uruguay. It directed more than 300 publications with a combined circulation of 4,500,000. It ran at least 10 universities and 8,000 elementary schools and high schools (*colegios*) with a total enrollment of approximately 2,000,000. In addition, religious instruction was included in the public-school curricula in Guatemala and Brazil. In 1956 Bolivia authorized the nation's first Roman Catholic teachers college.

As indicated in the section dealing with the 19th century, the Church's influence did not prevent it from coming under persistent and often violent attacks from anticlericals. After World War II, however, there was a notable lessening of tension, and in the mid-1960s there was no major anti-Church movement anywhere in Latin America, except in Cuba.

Three developments since World War I appear to have contributed significantly to the change. (1) National governments became stronger. This allowed them to be somewhat more tolerant of the opposition and also reduced the opportunities for the Church on its own account, or in conjunction with foreign elements, to create political stability. (2) The middle class became politically powerful at the expense of the old allies of the Church. In the light of this development the Church re-examined the ideology of constitutional democracy that such groups advocated. By 1960 its stated position was that any privileges that might accrue through co-operation with dictators in the Latin-American area would soon be more than offset by hatred against the Church. In giving practical application to this new position, the Church, between 1955 and 1959, co-operated with liberal democratic groups in the overthrow of the Argentine dictator, Juan Perón, the Colombian military chief, Gustavo Rojas Pinilla, and the Venezuelan tyrant, Marcos Pérez Jiménez. In 1961 the Church went into open opposition against Castro in Cuba. (3) The Communists established their ability to create ideological confusion in the minds of the members of both the lower classes and the intellectual middle class. This development was of great concern to the Church, whose first reaction, apparently, was to combat Communism by closer supervision. In pursuit of this policy six members of the Latin-American hierarchy were raised to the rank of cardinal in 1946, and three more were added in 1953. But, since the mid-1950s, the Church has chosen to combat Communism by emphasizing social and economic reform, including, at least in Colombia and Venezuela, land reform.

Education.—It may be stated categorically that the schools have been the stepchildren of the social and economic planners. Since World War II, literacy rates have risen slowly in some republics, not at all in others and in Chile they may actually have

declined. The average public-school elementary teacher, except in Uruguay, Argentina, Costa Rica and Chile, was poorly educated, inadequately paid and lacking in status.

The public neglect of schools accounts in large part for the fact that developments which might be expected eventually to produce basic changes in educational thinking have been slow in appearing, and the direction that some of them will finally take is not yet clear. To the extent that educational trends, or what appeared to be trends, were discernible in the mid-1960s they generally reflected the social and economic thinking that has been popularized since 1920. A reaction against the traditional scholastic system in education, dating from the early decades of the century, had continued. Under the impact of expanding commerce, industry and public affairs, education had ceased to be a luxury and had become a necessity. Having become a necessity, education had been made increasingly a public responsibility. This, in turn, had tended to place a greater emphasis upon the social function of the school and also to provide greater educational opportunities for girls from working-class homes. It had also resulted in considerably greater stress on vocational education and on-the-job training in technical skills.

Except at the university level, where public institutions generally were superior, private schools continued to be preferred by those families who could afford to send their children to them. Quite often public officials who proclaimed public education to be the salvation of their countries sent their own offspring to private schools. This situation had in it seeds of public strife. Many children of the present leadership group are receiving orthodox training in private schools while their contemporaries and future political opponents in public schools are being instructed by teachers who have shown a tendency to accept radical solutions to social and economic problems.

As has been the case historically, educational opportunities at every level were, in the mid-1960s, far greater in the urban centres than in the rural areas. Despite this, no major city in Latin America possessed classrooms for as much as 70% of its school-age population. Meanwhile, the advantages afforded in the cities served to attract the best young minds from the farms and villages and once in the cities the youths showed little inclination to return to the backward areas from which they came. What education was available in the rural districts was often determined in the capital cities and might have little relevance to the needs of the students. The final and perhaps most obvious tendency was for educational planning, administration and financing to come under the control of the central governments, as had many other social and economic activities.

Summary.—From the above presentation certain broad generalizations may be drawn regarding Latin America in the mid-1960s. Despite the rash of military coups that unseated constitutionally elected governments in Argentina, Peru, Guatemala, Ecuador, the Dominican Republic, Honduras, Bolivia and Brazil, it was evident that the long-range trend in Latin America was toward more government by law and by the people. Appreciable progress had been made toward institutionalizing the electoral process. Issue-oriented political parties had grown in strength. These trends were in part counterbalanced by more demagoguery directed to persons whose minds were ruled by their immediate needs; the concentration of power in the central government at the expense of the states and municipalities; and the general failure to make inroads on the extended powers of the executive branch of government, a situation conducive to the continuance of dictatorship in the republics.

In the social-religious area the problems of the underprivileged had been given recognition; the worker had been given some cause to have self-respect and to feel that he was a part of the nation; people of colour had penetrated the privileged classes without producing significant social clashes; and the Roman Catholic Church had found it easier than formerly to live at peace with the political leadership. However, little had been done to create a responsible labour movement; education had failed to keep pace with progress in certain other areas; and a large part of the lower classes continued to live marginal existences.

In the economic area, industry and commerce had reduced somewhat the dependence upon foreign private capital. But industrial expansion had often been at the expense of agriculture; factories had failed to absorb all those entering the labour market; industry had not measurably improved the living levels of the working groups, and increased industrialization, far from making for self-sufficiency, had, by increasing the need for raw materials, fuels and capital goods, tied the republics ever closer to the world trading community. (J. J. J.)

IX. ORGANIZED LABOUR

Organized labour in Latin America has been deeply influenced by the economic, social and political milieu in which it has developed. However, influences coming from outside the area partially explain the wide extent of trade unionism and the complexity of Latin-American labour and social legislation, in what is still one of the economically underdeveloped regions of the world.

Although the history and present status of the labour movement vary considerably from one Latin-American country to another, organized labour possesses certain general characteristics throughout the area. It is highly political in nature; it is subject to a wide degree of government control; and it has tended to follow a general pattern insofar as structure and organization are concerned.

The highly political nature of the Latin-American labour movement is explained by several factors. First, in many countries it was established by immigrant workers who brought radical political ideas with them to their new fatherlands; in others the impetus for establishing unions first came from radical-minded politicians of the middle class and intelligentsia. The second factor leading to the politicalization of Latin-American labour was the weak position of the unions in their early years. This led them to look for both political and financial support from outside elements. They needed the aid of sympathetic politicians to protect them from retaliation from employers and hostile government officials and to obtain the passage of laws that would permit the legal organization of unions and the improvement of the situation of the workers. At the same time, the poverty of the workers and their inexperience with paying regular dues made it necessary for unions to seek financial help from outside to pay for headquarters, full-time officials and other needs.

For their part, many politicians realized the political potential of the labour movement. It could not only supply votes in countries where governments are changed by elections, but could also be of key importance through the strike weapon or even the bearing of arms in countries in which regimes generally change by more violent methods.

There are few unions in Latin America that are not controlled by or associated with one or another political group. Before World War I anarchosyndicalism tended to be the dominant political influence, although the Socialists and other groups also played a role. Since World War I, the Socialists, Communists and various indigenous national revolutionary parties have been the principal groups having hegemony in the labour movement. In recent years Christian Democratic influence has been growing steadily.

Government Controls.—One effect of the politicalization of labour has been the weaving of a considerable web of government controls over the unions. Even those politicians most sympathetic with labour have realized that control of the unions by a rival party would constitute a potential danger to themselves. They have therefore sought to establish a wide degree of control over the potentially revolutionary workers' groups. Governmental controls have varied greatly from country to country, but certain types are almost universal. In order to be able legally to deal with employers and governmental bodies, unions must receive governmental recognition. Frequently, in order to obtain such recognition, the unions must adopt a structure prescribed by law and must permit the government to fix their jurisdiction. Once legally recognized, most Latin-American unions are subject to more or less strict government controls over elections, finances and collective bargaining activities. Frequently, elections are not valid unless certified by the appropriate ministry of labour official.

Some governments have allocated to themselves the right to veto the election of union officials.

Most Latin-American unions are forbidden to spend their money on certain types of activities such as political campaigns and money-making enterprises. Most unions must submit to the ministry of labour an accounting of how they have spent their funds, and, in some countries, must submit in advance a detailed budget. Most governments reserve the right to veto any expenditures deemed to be against the law. In most cases, Latin-American labour laws provide for extensive government control over collective bargaining. Unions and employers must submit to government conciliation and mediation. Frequently, particular groups of workers (such as government employees, workers in public utilities and agricultural labourers) are forbidden to strike, and thus are forced to submit to compulsory arbitration. The process of submitting organized labour to governmental control has been most extensive in countries controlled by dictatorship. Thus in the Dominican Republic under Trujillo, Venezuela under Pérez Jiménez and Cuba under Batista and Castro, the labour movement became little more than an arm of the government.

Organizational Structure.—The organizational pattern of the Latin-American labour movement has tended to follow a common process of evolution, largely resulting from the economic milieu in which the unions operate. When industrialization is in its infancy and there are only a handful of establishments in any one field, groups of unions in a given town tend to join in establishing a city central labour body. These local bodies join to form national labour confederations. With the intensification of industrialization, the local central labour groups become less important, and workers in a given industry—textile, shoe, metallurgy, etc.—form national unions, which become the basis for national labour confederations.

Historical Background.—The first workers' organizations to appear in Latin America were generally mutual benefit societies, formed to provide their members with aid during sickness and in old age, and to care for families of deceased members. Perhaps the first of these was the Typographers' union of Buenos Aires, established in the 1850s. In the 1860s and 1870s there were numerous mutual benefit societies in Mexico.

During the last two decades of the 19th century, organizations more nearly resembling trade unions appeared in several Latin-American countries. "Societies of resistance" were established among miners and craftsmen in Chile and among a variety of workers in Argentina, Uruguay and Brazil. In some cases, the old mutual benefit groups were converted into resistance societies, or the newer organizations arose with their aid. In most cases the resistance societies were under anarchosyndicalist influence. The extreme individualism of anarchosyndicalist philosophy seemed to be particularly congenial to the small craftsmen who made up most of the membership of the resistance groups.

During the decade and a half before World War I both resistance societies and mutual benefit groups appeared in Mexico, Ecuador, Bolivia and other Latin-American countries. Labour relations generally were marked by violence during this period, both because of bitter resistance by employers and government officials to the spread of the labour movement, and because of the belief of the anarchosyndicalists in direct action. There were particularly violent strikes among the dock workers and nitrate miners of Chile, textile workers and miners in Mexico and numerous groups of workers in Argentina. There were half a dozen nationwide general strikes in Argentina during this period.

World War I stimulated the industrialization of Latin America, and, with it, the growth of trade unionism. Although the 1920s brought certain setbacks to the labour movement, they marked the vast extension of the influence of the unions in Mexico. With the great depression, which again gave great impetus to industrialization and saw an increase in the social and political transformation of the Latin-American countries, trade unionism grew apace. The general desire for social peace during World War II allowed the unions to make further gains, more or less pacifically. By the end of the war, most organizable workers—those in transportation, public utilities and manufacturing—were in unions.

The spread of dictatorships in the late 1940s and early 1950s was catastrophic for the labour movements of several nations. However, with the reversal of this trend, the unions again grew rapidly in the more democratic atmosphere that succeeded the overthrow of dictatorial regimes in Peru, Colombia and Venezuela.

Hemispheric Labour Groups.—From the early years of the labour movement in Latin America, attempts have been made to bring together all the organized workers of the area. The first effort was an anarchosyndicalist union conference in Buenos Aires in 1907, which established a loose confederation.

At the end of World War I the American Federation of Labor (A.F. of L.) and the Confederación Regional Obrera Mexicana sponsored the Pan American Federation of Labor (P.A.F.L.). It included a scattering of labour groups in countries around the Caribbean, and held several congresses, the last in 1927. However, after Samuel Gompers' death in 1924, the A.F. of L. lost most of its interest in the P.A.F.L. After 1927 the P.A.F.L. was little more than a paper organization.

Several attempts were made to establish rivals to the P.A.F.L. One was a conference in Mexico in 1926 that brought together leaders of important organizations in several countries. However, no permanent group resulted.

More successful was the Communist-sponsored conference that met in Montevideo, Uruguay, in 1929, and established the Confederación Sindical Latinoamericana (C.S.L.A.). The Latin-American Communists, in conformity with the Comintern's "third period" line of establishing dual unions under Communist control, had set up such groups in most of the Latin-American nations and all of these joined the C.S.L.A. It continued until 1935 when the Latin-American Communists followed the new popular-front line of the Comintern calling for merging Communist union groups into non-Communist central labour organizations in each country.

In 1938 the new Confederación de Trabajadores de México sponsored the formation of the Confederación de Trabajadores de la América Latina (C.T.A.L.). Although the C.T.A.L. began as a genuine united front of virtually all Latin-American national labour groups of all political colours, it came completely under Communist control during World War II. After 1944, 7 of the 11 members of the C.T.A.L. executive were avowed members of their national Communist parties.

A general revolt against Communist domination of Latin-American labour and a return of interest by the A.F. of L. in hemispheric labour matters resulted in the formation in Jan. 1948 of a new group, including both Latin-American and North American unions, the Confederación Interamericana de Trabajadores (C.I.T.). In 1951, after the formation of the International Confederation of Free Trade Unions (I.C.F.T.U.), the C.I.T. was reorganized as the Organización Regional Interamericana de Trabajadores of the I.C.F.T.U., and became known by its Spanish initials as the O.R.I.T. It was the dominant group during most of the 1950s.

During the 1950s, the chief rivals of the O.R.I.T. were those unions under control of the Peronistas. On invitation of the Argentine Confederación General del Trabajo, these formed the A.T.L.A.S., with affiliates in Mexico, Nicaragua, Panama, Costa Rica, Colombia and Venezuela. It collapsed with Perón's overthrow in 1955.

The advent of the Castro regime provoked another attempt to organize a rival to the O.R.I.T. On Castro's insistence, the Confederación de Trabajadores de Cuba withdrew from O.R.I.T. and launched the idea of forming a new "revolutionary" labour confederation in Latin America without participation of U.S. unions. The idea was strongly supported by Communist unionists throughout the hemisphere. However, the Confederación de Trabajadores Venezolandos, the Bolivian labour movement and the Peronistas in Argentina, all of which at first supported the idea, finally refused to support it and instead became increasingly friendly to the O.R.I.T. As a result of the Communists' inability to recruit non-Communist elements, the new Central Unica de Trabajadores de America Latina (C.U.T.A.L.), finally established in a conference in Brazil in Sept. 1963, was little more than a renewal of the old C.T.A.L., which had been declared extinct

the previous year.

Probably more significant as a challenge to O.R.I.T. than the C.U.T.A.L. was the Catholic labour confederation, the Confederación Latino Americana de Sindicalistas Cristianos. Although it was established in 1955 as the result of an attempt by the International Federation of Christian Trade Unions to expand its influence to the western hemisphere, it did not begin to grow significantly until the early 1960s. Amply financed by European Catholic union groups, it was by that time carrying on a violent propaganda and organization campaign against the O.R.I.T. and its various national affiliates.

By the mid-1960s the great majority of the industrial, transportation and public utilities workers of Latin America were unionized. Increasingly, national industrial unions were superseding local federations of labour as the key organizations of national labour movements. More and more unions were acquiring the checkoff of union dues, and thus gaining greater financial independence. The labour movement had acquired an important role in the economic, social and political life of the majority of the Latin-American countries.

X. COMMUNISM

The Communists have been active in Latin America since shortly after the Russian revolution. From the beginning they have constituted an integral part of the international Communist movement. Although until the advent of the Castro regime in Cuba no Latin-American Communist party had succeeded in gaining control of its nation's government, the Communists constituted by the 1960s an element of considerable importance in the political life of several nations, and there were Communist parties in all Latin-American republics.

The Latin-American Communists have faithfully followed the twists and turns of the Communist or third international (Comintern) line from their early days. During the period preceding the death of Lenin in 1924, the international was principally concerned with establishing its character as a highly disciplined, tightly knit international party, dedicated to violent overthrow of capitalist regimes and the establishment of the "dictatorship of the proletariat." The Latin-American Communists, like their confreres elsewhere, were busy shedding the vestiges of the democratic Socialist and anarchist past of their parties' founders.

The late 1920s were overshadowed by the struggle between Stalin and his various opponents. The Latin-American parties, too, were wracked with factional squabbles, which melded into the over-all struggle within the international. The Latin-American parties, like those elsewhere, emerged from this period as monolithic organizations in which no dissent was permitted.

Between 1928 and 1935 the Communists passed through their "third period," marked by extreme sectarianism and dual unionism. The Latin-American Communists faithfully followed these policies. They violently attacked everyone else on the left in Latin-American politics as "social fascists" and established their own sectarian labour movements in every country in which they were organized. Subsequently, in the succeeding popular front period, the Latin-American Communists followed the international's lead and made overtures to the democratic leftist groups they had denounced shortly before. Still in conformity with the international's policy in the late 1930s, the popular fronts the Latin-American Communists sought to establish included not only the democratic left, but men and parties reaching far to the right and including such dictators as former Pres. Carlos Ibáñez del Campo of Chile, Pres. Oscar R. Benavides of Peru and Col. Fulgencio Batista of Cuba.

During World War II the Latin-American Communists, like the international generally, first supported the Soviet Union's collaboration with the Nazis and attacked the war as imperialist. After the U.S.S.R. itself was invaded they became the most extreme partisans of the Allied cause.

Finally, after World War II, the attitudes and policies of the Latin-American Communists were indistinguishable from those of Communists in other parts of the world. As with Communist parties elsewhere, their principal efforts were devoted to trying to arouse antagonism toward the United States and to discrediting any local political leaders inclined to be friendly with the U.S.

Over the whole period of existence of Communist parties in Latin America, they have shared the two basic objectives characteristic of Communist parties throughout the world: to support the policies of the Soviet Union and to establish a dictatorship of their own party within their nation.

That the Latin-American Communist parties have been aided by and subject to the control of the international Communist apparatus has been demonstrated frequently. Communist parties throughout the area have long been noted for the large amounts of money and the staffs of paid bureaucrats at their disposal. Usually these have indicated resources far beyond anything available to them from within the individual Latin-American country.

Several instances of international interference in the internal affairs of the Latin-American Communist parties could be cited. In the late 1920s the South American bureau of the Comintern deposed the leadership of the Chilean party without consulting the rank and file of that party's membership. In 1940 Comintern representatives deposed the leadership of the Mexican party without consulting its membership. In the early 1950s, two rival Communist groups in Guatemala were merged as the result of instructions received by their leaders during visits behind the "iron curtain."

The appeal made by various Latin-American Communist parties has varied from time to time. They have always sought support from the urban workers on a class basis, picturing themselves as the chosen spokesmen of that class. They have appealed to the social conscience of intellectuals, and more recently have made an intensive appeal to this same group on the grounds of nationalism, and particularly anti-United States sentiment. In the last few years they have begun extensive efforts among the poverty-stricken peasantry of several Latin-American countries. In dictator-ridden countries, they have appeared as opponents of the tyrants, and have spoken much about democracy—though in the late 1940s and early 1950s the Communist parties of Peru, Venezuela, Argentina and Cuba split into two groups, one backing the dictator and the other opposing him.

Historical Background.—The Russian revolution of 1917 had a considerable attraction for the radical movements then existing in Latin America. The Socialist parties of Chile and Uruguay joined the Communist international and changed their name to Partido Comunista. A group of dissident Socialists, who had formed the Partido Socialista Internacionalista some years before, became the Partido Comunista de Argentina. A group of younger anarchosyndicalist labour leaders in Brazil broke with their confreres, who quickly became disillusioned in the Soviet experiment, and formed the Partido Comunista do Brasil in 1922.

In Mexico, early chosen by the Comintern as its Latin-American headquarters, an assorted group of expatriate United States citizens and Mexicans formed the Partido Comunista de México, after a comedy of errors type of rivalry among various contenders for the official endorsement of the Comintern. Leading figures in the Comintern, including the Russian Mikhail Borodin, the Japanese Sen Katayama and the Indian M. N. Roy, served as official midwives at its birth.

Most other Communist parties were founded considerably later than those in Argentina, Brazil, Chile and Mexico. That of Honduras, for example, was established in the middle 1950s.

During the third period, the Communist parties of Latin America remained relatively small sects in most cases. Those like the Chilean party, which had started out with considerable support, declined during this period. It was not until the advent of the popular front period that the Latin-American Communist parties began to gain ground. They won considerable influence in the labour movements of Mexico, Colombia, Venezuela, Peru, Chile, Argentina, Uruguay, Brazil and Cuba. They formed part of the popular front that won the 1938 election in Chile, and of the so-called Democratic Socialist coalition that successfully supported Colonel Batista in Cuba's 1940 election.

During the first part of World War II the virtually pro-Nazi position of the Latin-American Communists alienated them in most countries from the democratic allies whom they had courted dur-

ing the 1930s. However, this period did not last long enough to do them irreparable damage, and they were able to pick up once again their popular frontism once the Soviet Union had been invaded. During the latter part of the war, they won the tolerance, if not support, not only of left-wing democratic groups but of the governments, dictatorial as well as democratic, of several Latin-American nations, because of their opposition to strikes and other movements that interfered with production for the Allies.

The high point of Communist influence in Latin America was reached during and immediately after World War II. The Communist parties of Ecuador and Cuba had ministers in the governments of presidents Velasco Ibarra in 1944 and Batista from 1942 to 1944. The Chilean Communists supported Gabriel González Videla in the 1946 election and were rewarded with three posts in his first cabinet. However, President González requested the resignation of his Communist ministers in April 1947, and later in the year he sponsored the so-called law for the preservation of democracy, which outlawed the Communist party in Chile.

During World War II the Communists gained the general leadership of the Latin-American labour movement. With the help of Vicente Lombardo Toledano, president of the Confederación de Trabajadores de la América Latina, the Communists took complete control of this organization, which at the time represented on a hemispheric basis most of the Latin-American trade union movement. In many individual countries as well the Communists were able to make large gains in the labour movement during World War II.

Generally, the Communists lost ground after the war. There was widespread revulsion against them as a result of their close identification with the Soviet Union. Then when the "cold war" began, most Latin Americans chose the anti-Soviet side. As a result, the Communists lost much of the popularity acquired during World War II. In a number of countries they were persecuted by the government, which served to hamper their ability to appeal to the general population.

The principal gains made by the Communists during the first ten years after the war were in Brazil and Guatemala. As Pres. Getúlio Vargas eased his dictatorship in Brazil, he permitted the Communists extensive freedom both in the general political field and in the trade unions. In return, the Communists supported his ambition to remain in the presidency until he was forcibly overthrown by the army in Oct. 1945. As a result of this arrangement with Vargas, the Brazilian Communists experienced spectacular growth during 1945, which continued for about a year after the overthrow of the president. The party increased from a handful of members early in 1945 to an estimated 150,000 early in 1947. When the party was declared illegal and was forced to function partially underground, it lost much of what it had gained during the 1945–47 period. However, the 60,000 members remaining in the late 1950s were a hard-core, well-trained and severely disciplined group. During the administration of Pres. João Goulart (1961–64) they were one of the principal bulwarks of his regime. His overthrow by the military on April 1, 1964, was a severe setback for the Communists.

In Guatemala, the Communists were able to capitalize on the revolution that began in 1944. Because of the failure of a democratic revolutionary party to develop as spokesman for the forces unleashed in 1944 and to distinguish clearly between itself and the Communists, the latter were able to drape the mantle of the revolution about themselves and claim to be its most loyal supporters. They were a step from absolute control of the government when Pres. Jacobo Arbenz Guzmán was overthrown in 1954. Arbenz Guzmán's fall cut short the Communists' activities for a while, though they had begun a comeback by the end of the 1950s.

In the early 1960s two important events affected the course of Communism in Latin America. First was the establishment of a Communist regime in Cuba. Although Fidel Castro's 26th of July movement was not originally Communist, pro-Communist elements won control of it and of the Cuban government by gaining Castro's support late in 1959. Members and leaders of the old-line Communist party were then incorporated into the Castro regime. In May 1961 Castro declared his regime to be "socialist"; on July 26, 1961, he announced that his followers and the old-line Communists were merging to form the only legal party in the island. In December of the same year, Castro proclaimed himself to be a Communist. Although all friction between Castroites and old-line Communists was by no means eliminated, Cuba had become the first Communist-dominated country in the Americas.

The second major event in Latin-American Communism was the extension to it of the schism caused by the Soviet-Chinese dispute over Communist ideology. The first split along these lines took place in Brazil in 1961; subsequently schisms between pro-Soviet and pro-Chinese elements took place in the Communist parties of Chile, Peru, Ecuador and Mexico, and similar developments were threatened in the parties in Venezuela, Colombia and elsewhere.

Summary and Conclusion.—Although the Communists in the mid-1960s were a major party in only a few countries and controlled only one Latin-American government, they were a potential force of considerable importance in all the nations. They sought power mainly by appealing to the social and economic grievances of the lower classes and the nationalist anti-U.S. sentiment widespread in Latin America. Thus, the future of the Latin-American Communists tended to depend largely on the ability of democratic groups to raise standards of living and overcome social injustices, and upon the ability of the United States to evolve policies to blunt the sharpness of Latin America's anti-U.S. sentiment. (R. J. A.)

XI. LATIN AMERICA IN INTERNATIONAL ORGANIZATIONS

Latin America's role in modern international organizations has been a prominent one. Traditionally, jurists, scholars and statesmen from this region have had a view of world society which has strongly disposed them to collaborate in the establishment and development of such organizations, as attested by their joining the United States in the creation of a regional system, beginning in 1889. (*See* PAN-AMERICAN CONFERENCES.)

Fifteen Latin-American states were charter members of the League of Nations (*q.v.*), and the others joined later. In the 1920s the Latin Americans tended primarily to regard the League as a counterbalance to their powerful northern neighbour, especially after the United States failed to join the organization. They made repeated efforts, unsuccessfully, to have the League formulate an official interpretation of the Monroe Doctrine that would restrict the discretion of the United States in its intrahemispheric relationships. The League was consistently reluctant to become involved in these relationships, however, in the face of the disapproval of the United States.

On only two occasions did the League directly concern itself with inter-American problems. From 1932 to 1935 the Chaco war between Bolivia and Paraguay was on its agenda. The League's efforts to resolve this conflict were on the whole unsuccessful, in large measure as a result of a lack of co-ordination with the inter-American system. In the case of a boundary dispute between Peru and Colombia from 1932 to 1934, the League was considerably more effective. A cease fire was established, and a final settlement proposed by the League was then accepted by both sides.

Latin-American statesmen were prominent in the affairs of the League. Two of them served as presidents of the assembly and three as presidents of the council. Three Latin-American states were customarily members of the council. Seven Latin-American jurists served as judges of the Permanent Court of International Justice.

In the 1930s Latin-American interest in the League declined markedly, due largely to two factors. One was the increasing preoccupation of the League with strictly European affairs as well as its inability to check the drift to war. The other was the marked change in relations between the United States and Latin America. In the early and middle 1920s, the United States continued to follow a policy of intervention, but in 1928 Pres.-elect Herbert Hoover undertook a good-will visit to Latin America. Shortly thereafter he advanced a reinterpretation of the Monroe Doctrine which suggested a repudiation of intervention. He also withdrew

the marines from Nicaragua and Haiti. Pres. Franklin Roosevelt continued this same policy, which he described as that of the good neighbour. Following an explicit renunciation by the United States at Montevideo in 1933 of the right of unilateral intervention, together with a significant increase in cultural interchange and technical assistance, the structure of the inter-American system was steadily strengthened during the 1930s. At the same time, Latin-American membership and interest in the League steadily declined.

With the onset of World War II, Latin-American objectives definitely shifted to a regional perspective, as these states made a concerted effort to remain clear of the conflict. Regional machinery was devised for this purpose at meetings of the American foreign ministers at Panama in 1939 and Havana in 1940. (*See* PAN-AMERICAN CONFERENCES.) Following this, however, the involvement of the United States in the war in Dec. 1941 brought about another major change. By the end of March 1945, every Latin-American state had declared war on the Axis and thus established a right to participate in organizing the new international system that was to come after the war.

Prior to the United Nations Conference on International Organization at San Francisco in 1945, at which the charter was drafted, the Latin-American states met with the United States at Chapultepec, Mex., to clarify their position on the relationship of their regional system to the new organization. Their concern now was to protect the integrity of the former against encroachment by the latter. Out of this concern came the famous art. 51 of the charter, guaranteeing the right of individual and collective self-defense until the United Nations can take effective action against armed aggression. It was designed to permit action by the regional system should the United Nations be unable to act because of the veto or for other reasons. The treaty of reciprocal assistance, signed at Rio de Janeiro in 1947, was the first treaty to be brought into existence under art. 51.

Otherwise, the Latin Americans were not very influential in shaping the charter. Their efforts to increase the role of the smaller states within the organization were generally unavailing. They did contribute to strengthening and clarifying the position of the general assembly and toward gaining at least formal recognition of the importance of international law. As a sequel to both the Chapultepec and San Francisco conferences, the ninth international conference of American states, held at Bogotá, Colombia, in 1948, greatly strengthened the structure of the regional system through the adoption of the charter of the Organization of American States. (*See* AMERICAN STATES, ORGANIZATION OF.)

Latin-American influence in decision-making during the early years of the United Nations was considerably greater than it had been in the shaping of the charter. Until 1955, the 20 Latin-American votes constituted one-third or more of the general assembly's voting strength and were thus a potential collective veto on any substantive decision of which they disapproved. Actually, they rarely voted as a bloc. Mindful, nevertheless, of the advantages to be gained from their united strength, they customarily caucused before voting in an effort to achieve the broadest possible consensus. With the expansion in UN membership after 1955, an expansion which the Latin Americans strongly supported, their relative influence steadily diminished but still remained significant.

The Latin-American nations were principally interested in three areas of action within the United Nations: the maintenance of international peace and security, the extension of self-government or independence, and economic development. In the first of these areas, their record was consistent in supporting western-sponsored proposals, including the historic Security council resolutions dealing with Korea in 1950. (Colombia thereafter provided an infantry battalion and a frigate to the United Nations command.) They were the only bloc to vote against both the Soviet intervention in Hungary and the Anglo-French-Israeli invasion of Suez. Brazilian and Colombian units were included in the United Nations emergency force established in the middle east as a sequel to the Suez crisis. To help achieve greater international security through arms control, a number of Latin-American states in 1963 established an important United Nations precedent by proposing measures to make possible the denuclearization of Latin America.

In the second area, influenced by recollections of their own history, they usually backed the anti-colonialist position and favoured concessions to the pressures generated by nationalism among the nonself-governing peoples. This policy was occasionally modified, however, by considerations relating to the cold war. During the Congo crisis, they opposed the proposals of the Soviet Union and strongly supported the action taken by the secretary-general.

The question of economic development was the issue that most significantly concerned the Latin Americans in United Nations debates. They identified themselves with the underdeveloped countries and, perhaps more than any other group of states, provided strong and persistent leadership in working for United Nations programs dealing with this problem. They played a prominent role in bringing about the United Nations Conference on Trade and Development at Geneva, Switz., in 1964.

Another of the principal objectives of the Latin Americans within the United Nations has been the strengthening of the influence of international law. They played a very prominent part in the formulation of the Universal Declaration of Human Rights.

The Latin Americans have held many offices of responsibility in the United Nations. They customarily occupy two seats on the Security council, four on the Economic and Social council, two on the Trusteeship council, and four on the International Court of Justice. Every fourth year a Latin American customarily serves as president of general assembly.

In addition to membership in the United Nations and their own regional Organization of American States, nearly all the Latin-American states belong to the principal specialized agencies and functional organizations within the United Nations system.

See also references under "Latin America" in the Index.

(J. A. Ho.)

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LATIN-AMERICAN LITERATURE: *see* IBERO-AMERICAN LITERATURE.

LATIN-AMERICAN MUSIC. Folk and Popular Music.—The greater part of Latin-American folk music resides in two great culture areas: the Antillean-Brazilian zone, whose influence reaches from the Caribbean to just south of Rio de Janeiro, Braz., and the Andean zone, set mainly within the territory of the old Inca empire, from southern Colombia to central Chile and across to western Bolivia and northwest Argentina. In the Antillean-Brazilian complex, the most characteristic music is part European, part African. In the Andean complex, the music is made up of varying mixtures of European and Indian—mainly Quechua—elements. The two complexes interacted upon each other to some extent, especially in their later developments. In both zones, the mass of folk music is not only ethnically hybrid but also derives from two different social sources, the one of relatively recent urban influence, the other of earlier, more rural influence. Between these sources there is constant interaction, and the student of Latin-American music often finds it hard to say with certainty: "This is specifically Negro (or Indian) and this is entirely white; this is utterly urban and this is exclusively rural."

Indian Origins.—Already in pre-Columbian times the musics of Central and South America were varied and stratified. The high culture of the Aztec, Maya and Inca civilizations was very different from the primitive culture of the interior. The Aztecs maintained music schools with an *ometochtli* or priestly director of performances, a *tlapizcatzin* (maker and teacher of instruments) and a *cuicapicque* (composer and teacher of songs). For all that, it seems, the music of the old Central American civilizations was in too weak a condition to resist the music of the Spanish conquerors and it crumbled till only a few vestiges remained, notably among the Indians of the Mexican northwest. With Indian music weak and African music scanty (in the absence of large numbers of Negro slaves), folk song in the territory of the former Aztec em-

pire has for some centuries been predominantly European. In the territory of the former Inca empire, on the other hand, a fund of vigorous well-formed native melody was able to combine with Spanish song to make an attractive hybrid music of remarkable durability.

The Andean Complex.—Probably the Andean songs that most clearly kept their Indian character are the *bahualas,* with tritonic melodies based on an octave scale of three notes, usually *do fa la* (*do*). Originally they were sung as free recitative, but the adoption of the Spanish octosyllabic verse line imposed a regular shape. The texts are among the gravest and most profound of any in South America, and the *bahualas* have been called "the blues of the Andes." Like the U.S. "country" blues, they are the property of the lowest social classes though also esteemed by city intellectuals with a fancy for folk song. These three-note songs are limited mainly to the eastern slopes of the central Andes, roughly from Oruro, Bol., to Catamarca, Arg.

A far greater area of diffusion is enjoyed by the pentatonic melodies that abound in a wide band stretching from Ecuador, through Peru and western Bolivia to northwest Argentina. These melodies, almost exclusively binary in rhythm, are much used for a variety of attractive types of dance and song with Spanish, hybrid or Indian names such as *carnavalito, huachi-torito, huaino,* etc. The greater part of the tunes used by the large Indian and mixed populations of the central Andes are of this type.

Another powerful kind of music, of later origin and owing more to European and less to Indian influence, exists in the western part of South America. Much of this music evolved in colonial times, with bimodal scales of heptatonic character. The commonest rhythms are 6/8 and 3/8, and the harmony of two voices in parallel thirds is typical. Unlike the tritonic and pentatonic melodies, the tunes of this category (called "colonial ternary" by the Argentine folklorist Carlos Vega) were by no means exclusive to the lower classes. On the contrary, many of them originated in the ballrooms of the Pacific cities and spread only gradually to the countryside, where they underwent characteristic alteration. To this category belong such types as the *zamacueca* (called the *cueca* in Chile and the *zamba* in Argentina), the *chacarera,* the *gato* and the *vidala.* In rural districts the melody in this kind of music was chiefly entrusted to the human voice, especially in duets in parallel thirds. Among instruments, the harp, the *quena* (Indian flute) and more rarely the fiddle were used for melody, supported by a monotonous rhythm from guitars, *charangos* (small guitars made partly of the carapace of the armadillo) and the European bass drum or the small flat *caja* drum.

During the 19th century, following the wars of independence and the consequent broadening of cultural horizons in many South American states, the flow of popular and folk music from the central Andes met another musical current, of more modern European influence, sweeping up from Buenos Aires, Arg., and Santiago de Chile, that had the effect of liberating the rather limited tonal, rhythmic and harmonic system of "colonial ternary" music. *Quena* and harp (except in Paraguay) retreated to the remoter villages before the advance of the guitar, which now became the dominant instrument for melody as well as for rhythm. The use of the drum likewise declined, and accordion and bandonion became increasingly common, especially in villages within reach of town influence. Most of the Argentine, Chilean and Paraguayan music heard from popular stage performers in Europe and the United States belongs to this later stage of development.

The Antillean-Brazilian Complex.—In Europe and the United States, Latin-American music of the Atlantic seaboard is more familiar than that of the Pacific coast and the Andes, chiefly because of the international success of such dances as the ballroom versions of the Cuban *rumba* and the Brazilian *samba.* In this area, the give-and-take between town and country musics has been so widely effected that what scholars call "authentic" folk music is hard to find. The music is mainly compounded of west European and west African elements. Negro slaves on the plantations of Cuba, Trinidad, Venezuela, Brazil, etc., were in close contact with the whites, and their vigorous music mingled with that of their Hispanic masters from early times; this is testified by such songs as the celebrated "Son de Má Teodora," notated in Havana, Cuba, in 1598. Nevertheless this mulatto music, nowadays regarded as typical of eastern Latin America, had to wait long for proper recognition. In the colonial countries, African musical ways were despised by white intellectuals, and the first publicized music was that derived from European models—the ballads, lyrical songs and courtly dances; later came such popular productions as the waltz, polka, mazurka and quadrille, which were given a certain Latin-American spice but showed little of Africa in form, rhythm or accompaniment.

During colonial times, African musical usages were mainly confined to the slave barracks and the urban slums. By the beginning of the 19th century, however, Negro musicians were establishing themselves in the small orchestras of the towns, playing a dance music repertory that varied from Iberian or creole folk tunes and old courtly pieces to more recent bourgeois romantic compositions. Gradually, during the 19th century, African instruments—rhythm sticks, gourd rattles and various drums—were added to the flutes, clarinets, fiddles and cellos of these orchestras. But it was only after the proclamation of Brazilian independence in 1882 and the liberation of Cuba in 1898 that the Negro musician came fully into his own in this vast zone where the folk music is much coloured by the popular productions of Havana and Rio de Janeiro.

Lower-class Negroes throughout the area had managed to preserve certain African traditions almost intact, particularly in the music attached to the African-style religions that are known under various local names such as Voodoo, Vodun, *shango, candomble* and *macumba* in Haiti, Cuba, Brazil and elsewhere. This more-or-less purely African music was declining in the mid-20th century, and the working population was left with a folk music that was becoming either Negro diluted with European or vice versa. Influences from old Europe still flourished, notably in certain *corridos* and *romances* (topical and lyrical ballads), in lyrical songs such as the *polos* of eastern Venezuela, and in song dramas such as the celebrated *Nau Catarineta* of Brazil, but the most characteristic music is an interracial, even international, hybrid.

Humble professional minstrelsy is still a feature of rural life, especially in northeastern Brazil where the ballad singer, often a blind man, may be heard intoning in public his accounts of chivalry or banditry or, rather curiously, the exploits of remarkable animals such as the brave ox that fights for its freedom and is killed as a rebel. An urban example of the minstrel is provided by the calypso singers of Trinidad who specialize in the composition and performance of narrative songs relating to passing events, local or otherwise. Generally the music of the Antillean-Brazilian area has been dominated by dance melody, and even the purely diversionary lyrical songs tend to move in one or other characteristic dance rhythm, frequently syncopated and often of admirable variety and subtlety.

Throughout the area, the guitar is paramount, either in its conventional form, or smaller and with fewer strings, such as the *tres* of Cuba, the *cuatro* of Venezuela and the *cavaquinho* of Brazil. The Indian flute (*quena*) is not heard in the folk and popular music of the Atlantic coast, but the array of percussion instruments is far vaster than on the Pacific side. All kinds of drums, entirely wooden or with membrane, played by hand or sticks, are encountered, along with stamping tubes, rhythm sticks (*claves*), scrapers (*reco-recos*), gourd rattles with seeds or pellets inside (*maracas*) or outside (*cabaças*), and tube rattles consisting of cylinders containing pellets (*chocalhos, ganzas*). With the vogue for Antillean-Brazilian popular music, many of these ancient primitive percussion instruments became familiar in the ballrooms of Europe and the United States during the first half of the 20th century.

(A. L. Ll.)

Sacred and Secular Music.—A decree of 1574 granted the Jesuits, who had settled in Brazil, control of the Indians, and the early Jesuits taught the musical natives to sing, make and play musical instruments, and to compose. Also in the 16th century the Spanish composer Fernando Franco (d. 1585) was active in Guatemala and was later *maestro de capilla* in Mexico City. He wrote magnificats and other religious works, some of which, on texts in the Nahuatl language, were written for use by missionaries.

During the 17th and 18th centuries, the church was still the centre of music, but after the Jesuits were expelled (1759 and 1767) the trend was toward secular music. One of the earliest composers of secular music was a Brazilian mulatto, Father José Mauricio Nunes García (1767–1830), a fine organist, who produced choral and instrumental works besides a grand opera, *Le due Gemelle* (1821). In Mexico, José Mariano Elízaga (1786–1842) founded a philharmonic society in 1825, and in 1827 Manuel García introduced opera. In 1868 a Mexican opera, *Ildegonda*, by Melesio Morales (1838–1908) was produced in Florence, Italy. By 1850 opera and ballet were established in Buenos Aires, where the first Teatro Colón was inaugurated in 1857. The Teatro Municipal in Santiago, Chile, was opened on the same date. The opera *O Guarani* (La Scala, Milan, Italy, 1870) brought fame to Carlos Gomes (1846–96) of Brazil, where no less than seven provincial conservatories were functioning before 1900. Cuba's earliest composer of symphonic music, Antonio Raffelín (1796–1882), had works performed in Paris, where his compatriot, Ignacio Cervantes (1847–1905), was a brilliant conservatoire pupil. Alberto Williams (1862–1952) of Argentina was a disciple of César Franck.

In the 20th century most of the capitals and large provincial cities established symphony orchestras.

Representative Latin-American composers include Juan José Castro (1895–), Argentina; Heitor Villa-Lobos (1887–1959), Brazil; Pedro Humberto Allende (1885–) and Juan Orrego Salas (1919–), Chile; Guillermo Espinosa (1905–), Colombia; Julio Fonseca (1895–), Costa Rica; Amadeo Roldán (1900–39), Cuba; Carlos Chavez (1899–), Mexico; Roque Cordero (1917–), Panama; Teodoro Valcarcel (1900–43), Peru; Eduardo Fabini (1883–1950), Uruguay; and Juan Vicente Lecuna (1899–), Venezuela. (NN. F.)

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LATINI, BRUNETTO (*c.* 1220–1294), Florentine scholar regarded by his contemporaries as a man of great learning who cared not for the soul, sinned in unnatural vice and scoffed at the things of God and the church, was a member of the Guelph party and a leading figure in the political life of Florence. After the defeat of the Guelphs at Montaperti (1260), he went into exile in France but returned to Tuscany in 1266 and held public office for about 20 years from 1267, becoming famous as a master of rhetoric. Between 1262 and 1266 he wrote a prose encyclopaedia in French, *Li Livres dou Trésor* (Lat. *Thesaurus;* 13th-century translation by Bono Giamboni under the title *Tesoro*), and an abridged version in Italian verse called the *Tesoretto*. He was a friend of the young Dante (*Inferno* xv, 30–124); but although he helped to mold Dante's thought, the idea that he was a tutor or schoolmaster is a poetical exaggeration.

BIBLIOGRAPHY.—For biography *see* the critical edition of *Li Livres dou Trésor* by F. J. Carmody (1948). *See* further the edition of the *Tesoro* by L. Gaiter (1878). On the *Tesoretto*, see B. Wiese, article in *Zeitschrift für romanische Philologie*, vol. vii, pp. 236–389 (1883). For Latini's association with Dante, *see* the translation by Dorothy L. Sayers, *The Divine Comedy*, i, *Hell* (1949). (S. J. C.)

LATIN LANGUAGE. To write the history of a language is to trace the changes which it underwent in form, with special reference to time and place, from its earliest records, and indeed before, to its latest. A spoken language is constantly in a state of change, never fixed; it is dynamic, not static. Strictly speaking, languages do not "live" or "die" or have "family" relationships; such terms are purely metaphorical. Thus the Romance languages (*q.v.*), said to be descended from Latin, really represent Latin in its changed form in various localities at various dates down to the present. In the same way, Latin itself is a changed form, a developed dialect, of an earlier tongue, a so-called parent language, which is commonly known as Indo-European (*q.v.*), since most of its members in the old world are located mainly either in India or Europe. If Latin is said to be related to these other members, all that is meant by the phrase is that it possesses in common with them not by borrowing but by inheritance, *i.e.*, by direct derivation from the Indo-European, a fund of words (its vocabulary), certain types of word formation and inflection (morphology) and certain modes of expression (syntax). The Indo-European tongue itself must by no means be thought of as primitive or original. Even in its predialectal state, before the distribution of Indo-European dialects from a common centre, it was a highly developed speech, with an agelong evolution behind it.

Naturally and inevitably Latin had diverged considerably from this predialectal tongue by the time (*c.* 600 B.C.) from which the oldest extant records of it, inscriptions, date. Destined to survive over 1,000 years more as a distinct though constantly changing language, but itself split, as the Indo-European had been, into separate dialects long before the close of its career, it had acquired, by the end of the 1st century B.C., a norm which, by standards not really arbitrary, is judged classical and which, in prose style, especially, but also in verse, reflects and is reflected by that grave, restrained and stately character of the Roman people who first spoke it and whose empire made it a world language.

Prehistory.—Latin was at first the language of only the Latins or people of Latium, that is the Romans themselves and their immediate neighbours. Precisely whence, at what date and by what route this tongue was brought to the banks of the Tiber is not known, although it may be conjectured that it came from somewhere in Europe, across the Alps and Apennines, and certainly before the Etruscan invasion of Italy by sea in the 8th century B.C. More exact definition cannot be given. Spoken contemporaneously with it, in Italy, about the 5th century B.C., were other more or less closely related Indo-European languages and dialects, from the very Latinlike Sicel, known now only from Sicily, to Ligurian, linguistically as well as geographically intermediate between Italic and Celtic, in the northwest; an Illyrian group of dialects (Messapic, Picene, Raetic and perhaps the so-called old Sabellic) on the Adriatic coast; and, finally, the Italic dialects proper—Oscan, Umbrian and the minor dialects. There were also the less nearly related, but still Indo-European Celtic, brought in by the invading Gauls, and Greek of Magna Graecia. Lastly there was Etruscan (*q.v.*), spoken north of the Tiber and, for a time, in Campania. Etruscan was not Indo-European; but it was the only non-Indo-European tongue in ancient Italy, before the coming of Hannibal's Carthaginian troops, of which there is any record. Outside Italy, the Italic group of dialects (including Latin itself and its closest congeners like Faliscan) is most nearly linked to Celtic and next to Greek and Germanic, but the historical implications of their similarities are clear only in the case of Celtic and Italic (*see* CELTIC LANGUAGES; ITALIC DIALECTS). In this case, striking phenomena, among them the subdivision of Celtic into two main branches, Goedelic and Brythonic, strictly parallel to the subdivision of Italic into Latin-Faliscan and Osco-Umbrian, make it certain that the linguistic ancestors of the Celtic- and Italic-speaking peoples lived for a long period in close community. Inside Italy itself, Latin was early subjected to considerable influence from the non-Indo-European Etruscan and from its nearest Italic neighbour, Sabine. Greek influence became important only later, and Celtic influence was never great, being limited to a few elements borrowed by the Latin vocabulary, *e.g.*, *petorritum*, "four-wheeler"; *gaesum*, "spear." Not only individual names like *Casca, Sulla*, but characteristic features of the Roman name system, and formative suffixes used in name formation, have been compared with the Etruscan; there are also a number of borrowed words (*e.g., histrio*, "actor"; *persona*, "mask"; and even the stem of the verb *am-are*, "love"); the substitution of breathed for voiced sounds, *e.g.*, in *sporta* (Gr. σπυρίδα, accusative singular, "basket"), *catamitus* (Gr. Γανυμήδης, "Ganymede") and other words; the aspiration in names like *Gracchus, Cethegus* (and perhaps in the *chommoda* for *commoda* of Arrius in Catullus); loss or weakening of syllables, as in Lat. *Pollux* (from Gr. Πολυδεύκης), consequent upon a shift of accent to the initial syllable of the word; that mode

of accentuation itself; and the names of the three old tribes said to have constituted the early Roman people—Ramnes, Tities, Luceres—even the very name of Rome, *Roma,* where the existence of an Etruscan quarter, *vicus Tuscus,* is well known. Finally, reason has been shown for rejecting the older view, which derived the Latin alphabet directly from the Greek, in favour of an origin at least partly Etruscan.

From the Sabines were taken a number of forms showing *f* medially, as *rufus,* "red haired" (contrast *ruber,* "red," with pure Lat. *b*); or *f* initially, *e.g., fordicidia,* "sacrifice of unborn calves" (pure Lat. *h,* as in *hordicalia*), *filum,* "thread," beside Lat. *ni-hil,* "nothing"—literally "not a thread"; and *l* for pure Lat. *d,* as in *lacrima,* "tear." It has also been plausibly held that the peculiar hodgepodge of six or eight different means of forming nonpresent or noncontinuous tenses, which in Latin were fused together into a single perfect tense, and also the shaping of forms in *-r* in the passive voice were the work of a large Sabine element in the population of Rome, which some have identified with the patrician class. Finally, if not from Sabine itself, from some one of the Italic dialects outside the Latinian group, were imported words with *p* or *b* for pure Lat. *qu* (*c*) or *u* (*g*), as *Pompilius, lupus,* "wolf"; *popina,* "cookshop"; *bos,* "ox." Thus does the evidence of language confirm the historical tradition of Sabine and Etruscan kings in Rome.

Latin in the Historical Period.—Certain differences in sounds (*e.g., losna,* Lat. *luna,* "moon"; *nefrones,* Lat. *nebrundines,* "testes"), in usage (*e.g., tammodo,* properly "just as," in the sense of "on the spot," "straightway"), in word forms (*e.g., magistreis* for nominative plural *magistri;* or the dual form *Cestio,* "the two Cestiuses") and in vocabulary (*e.g., tongitio,* "idea," Lat. *notio*) are clearly marked in early rustic Latin as spoken at Praeneste, about 20 mi. from Rome. Besides such local peculiarities of dialectal Latin, account must be taken of distinctions of date. Subsequent to the development of an elaborate literature, for the most part after Greek models, further account should be taken of: (1) differences which may be called social, though they are not merely as between educated and uneducated usage, but also between the stylized language of literary forms and the popular spoken language of everyday life; and (2) differences, at least in expression and style, between prose and poetry, or between the language of oratory and that of philosophy, science, law or correspondence. Slangy Latin, for example, is occasionally to be recognized in the letters of some of Cicero's friends. Naturally the popular language (vulgar Latin) appears, not only in the artless inscriptions of plain folk, but from time to time in the literature too, as in the plays of Plautus, and later in the *Satyricon* of Petronius. In the end it was spoken Latin which won and which was the true basis of the Romance languages. In Romance, it is again important to discriminate with regard to date and locality. The language of Spain, for example, was superimposed upon a different linguistic substratum from, say, that of Rumania; it was planted there by speakers of quite different stock, and that 300 years earlier. Such considerations help to explain the divergent development of the Romance languages from a common spoken Latin. The oldest documents of what can no longer be called Latin do not, it is true, go back beyond the 9th century; but it is certain that, as regularly happens, the development of the written had lagged far behind that of the spoken tongue. The artificiality of the Latin of writers later than the 5th century is self-evident. Indeed the very conditions—central government, stability and security of life, ease of intercommunication and the rest—which had ensured the spread and maintenance of a common language were already seriously impaired and destined soon to fail. As an official language for correspondence and ritual, Latin had been retained by the Roman Catholic Church; and it remained the language of instruction throughout western Europe for many centuries. But in both cases it was divorced from the living tongues developing around it. Suggestions to revive Latin as an international auxiliary language for learned use seem hardly likely to result in actual practice, although it has been so used among classical scholars.

The sources of knowledge of the history of Latin are: mainly the language itself as recorded in inscriptions and in the literature; the testimony of ancient grammarians and glossographers; and the light shed by comparison with related languages and dialects and by the history of the Romance languages themselves. Chronologically six periods may be distinguished, beginning with:

1. *Preliterary Latin* (to *c.* 250 B.C.). The oldest document is a presentation inscription on a brooch found, not at Rome itself, but at Praeneste, so that perhaps it would be better counted dialectal. It runs *Manios med fhefhaked Numasioi,* "Manius made me for Numerius," and is not later than *c.* 600 B.C. The differences between this and the classical Latin (*Manius me fecit Numerio*) are striking. Next in date are two 5th-century inscriptions, from the Roman Forum and Tivoli (*Tibur*), respectively, the latter discovered in 1926; neither is perfectly understood, the former being so much mutilated as to defy all attempt at restoration and interpretation. But it shows among others the following interesting forms which are certain: *recei* (*regi*), "for the king"; *sakros* (*sacer*), "holy"; *iouxmenta* (*iumenta*), "beasts of burden"; *diouestod* (*iusto*), "lawfully"; and the Tibur inscription contains *mitat* third person singular, present subjunctive (*mittat*), a spelling which had long been known from the Quirinal vase inscription (4th century), a curse beginning with the words *iouesat deiuos qoi med mitat,* "whoso sends me adjures the gods . . ." The epitaphs of the Scipios, the laws of the Twelve Tables, the Saliar and Arval hymns, and the commemorative inscription of Gaius Duilius—these were nearly all more or less restored in a later age—are the more important surviving documents of this period.

2. The period of *archaic Latin* (from *c.* 250 to *c.* 90 B.C.) is represented not only by numerous inscriptions of all kinds but also by considerable literary remains (of Livius Andronicus, Naevius, Plautus, Ennius, the elder Cato, Terence, Pacuvius, Accius and Lucilius). The written still generally reflected the spoken language with fidelity, which is the reason why certain idioms of old Latin, judged by the standards of the classical language to be incorrect, reappeared in late Latin and Romance; *e.g.,* the use of the present instead of the future tense in an if-clause, such as *si venis, te videbo,* "if you come, I shall see you" (in classical Latin, *si venies,* "if you [shall] come"), like Fr. *si tu viens, je te verrai,* although Italian has the literary idiom. *se tu verrai* (future), *io te vedrò.* Similarly, the versification of Plautus is intelligible only if it is recognized that the diction of his plays was in accord with popular usage (*e.g.,* note the loss of final *-s* and *-m,* as in Romance, or the scansion of *ille* as a monosyllable; *cf.* Fr. and It. *il*). Orthography was not yet standardized (thus consonants really pronounced double, or prolonged, were commonly written single, as in *habuise* for *-isse*—at least in inscriptions—the manuscripts of Plautus have had their spelling continually modernized, like texts of Shakespeare). Old verbal and nominal forms still, though precariously, held their own (*e.g.,* the future perfect in *-[s]so* and perfect subjunctive in *-[s]sim,* the passive infinitive in *-ier,* the ablative singular in *-d,* the dissyllabic genitive singular of *a*-stems in *-āī,* and, in a few words, the genitive plural of *o*-stems in *-um* instead of *-orum*). Finally, Greek words imported during the period were, as a rule, completely Latinized in form and sound; no attempt was made to preserve rigorously their native shape. There was already in process of development a national prose style, not very well represented, however, by Cato's treatise on agriculture. Its most characteristic features show that Latin prose had its springs in oratory.

3. In the *classical period,* roughly contemporary with the Golden Age of Latin literature, *c.* 90 B.C. to A.D. 14, some notable poets were Lucretius, who was old fashioned in language as well as in style, Catullus representing the new school, and Virgil and Horace with their finished style and highly elaborated language; and in prose there were the archaizing Sallust, the simple and direct Caesar and the polished Cicero. Inscriptions of this period are reckoned in thousands from Rome alone. The cleft between the popular and the literary language can be shown to have become wide by the end of the republic. Steadily increasing Greek influence is marked, though in syntax its extent has certainly been exaggerated by commentators and grammarians. But viewed as

a whole, in respect of vocabulary, accent, sounds, forms and syntax, the Latin language had, by the last century B.C., developed all the characteristics which may be regarded as typical of it: of these the salient features are indicated below.

4. *Silver Latin: from Tiberius to Trajan* (A.D. 14 to 117). Although in earlier ages they often were not Roman, Latin authors were now seldom even Italian by birth. Of Livy it was said by a contemporary that marks of his Paduan origin were discernible in his language, and modern criticism has succeeded in identifying some of them. But into the language of later writers provincialisms and vulgarisms crept in increasing numbers and frequency. Ovid's diction is at times distinctly artificial. Characteristic, too, is the straining aftereffect which reveals itself in writers like Tacitus, trained as rhetoricians, and which was responsible for many a queerly turned sentence; archaisms and Grecisms are both needlessly frequent; and prose was invaded by expressions and style hitherto considered proper to verse. Seneca, Lucan, Martial, Quintilian—all Spaniards—the elder and the younger Pliny and Juvenal are the other outstanding writers of this period.

5. Archaism was so pronounced in the succeeding age (A.D. 117 to *c.* 180, Gellius, Fronto, Apuleius) that it may even be called an *archaizing period*. But it was accompanied by daring innovation, especially in the creation of new forms and in the admission of popular ones.

6. To the *period of decadence* which followed belong the Christian writers, among them the famous Africans, Tertullian, Cyprian, Arnobius and Augustine. The classical standard was gradually and unconsciously being lost. The written Latin of learned ecclesiastics of still later date—Gregory of Tours (6th century) may be taken as a fair sample—was an artificial survival, full of corruptions and remote from the living dialects into which the spoken Latin of the empire was developing wherever it had really taken root, that is, except in Dacia and Illyricum, mainly in the west.

The Developed Language.—The more striking features which distinguish Latin may now be briefly noted. Latin is one of the Indo-European group known as the centum languages, which may be broadly designated western and are characterized by the preservation of *k* sounds (Lat. *centum*, "hundred," but Sans. *šatam*) and the more or less complete labialization of *q* sounds (Lat. *quis*, "who"; Oscan *pis*, but Sans. *ka-s*). Latin has considerably modified the inherited system of accentuation and the original vowel sounds by extruding or weakening them in final and (if unaccented) medial syllables and by generally substituting simple sounds for diphthongs (*see* below, *Accent*, for examples). The Indo-European consonants which in Sanskrit become mainly voiced aspirates (*bh, dh, gh*) and which are represented in Latin in most cases by spirant (*f, h*) or stopped sounds (*b, d, g*), *e.g.*, corresponding to Lat. *fero*, "carry," *fumus*, "smoke," *formus*, "warm," are in Sanskrit *bharati, dhuma-s, gharma-s;* and similarly Lat. *haurio*, "drain," is in Sanskrit *ghasati*, "consumes"; Lat. *tibi*, "to thee," Sans. *tubhy-am;* Lat. *iubeo*, "bid," Sans. *yodhayati*, "stirs to battle"; Lat. *medius*, "middle," Sans. *madhya-s;* Lat. *in-dulgere*, "be complaisant" (literally "go a long way"), Sans. *dirgha-s*, "long"; Lat. *muger*, "false at play," Sans. *mogha-s*, "vain." Latin also changed *-s-* standing between vowels into *-r-*, a change which can be dated to *c.* 450–350 B.C., *e.g.*, *Furius* from an older *Fusios*, cited by the grammarians. Exceptions, when not phonetically explicable (as in *causa*, older *caussa*, "a case at law") are due to borrowing, *e.g.*, *carbasus*, "linen," which was probably taken from Sabine. In the sphere of declension Latin preserved almost intact six of the original eight cases, the functions of the other two being absorbed by the six that were kept. It tended to fuse stems in *-i-* and stems ending in a consonant (*e.g.*, *-es* came to be the termination of the nominative and accusative plural in both classes). In conjugation, among other innovations, it developed a new set of forms in *-b-* (*e.g.*, *amabam*, "I loved," *amabo*, "I shall love") for the imperfect and future tenses, and in *-r* for the passive voice. It amalgamated the old perfect and aorist tenses and the old subjunctive and optative moods. Finally, in syntax, the development of the elaborate and somewhat rigid principles which govern the sequence of tenses and the forms of indirect quotation is perhaps the most noteworthy feature.

Pronunciation of Latin in Italy in the classical period has been determined with approximate accuracy by the application of strict philological and linguistic methods; *e.g.*, in the last century B.C. the Romans never pronounced C like an English *s*, but always like *k* and G not as *j* but as *g* (in *get*), I and V, as consonants, were sounded like English *y* and *w*, respectively (not *j* and *v*), S was always as *-ss* in *hiss*, and the vowels had roughly much the same sounds as in modern Italian.

Accent.—In predialectal Indo-European the position of the chief accent of a word (or word group) was not limited either by the quantities or the number of the syllables. But in an early stage of the development of Latin the Indo-European accent, which in character had been predominantly *musical*, at least in the final period of the Indo-European, gave way to a system of accentuation by which the initial syllable of a word was uttered with more force. Later the Latin accent remained a weak *stress* accent, though before the classical period it had come to be restricted to the last three syllables of a word. The precise position was determined by quantity, the penultimate being accented if long (*e.g.*, *amāre*), the antepenultimate if the penultimate was short (*e.g.*, *amábĭmus*). The chief difference between this and a somewhat earlier system of accentuation, which prevailed as late as the days of Plautus, is that in words in which the three syllables before the last were all short, the *fourth* syllable from the end was accented (*e.g.*, *fácilĭus*). A few typical examples of the changes dependent upon these conditions of accent may serve to indicate their importance (the position of the accent, where indicated, is that not of classical but of pre-Plautine Latin).

Syncope of short medial and final unaccented vowels, *e.g.*, in *árdēre*, "to be parched," but *aridus*, "dry, parched" (unsyncopated), *mens*, "mind," from an older **méntis* (*denotes a form which is not recorded, but which can be proved to have existed); syncope with vocalization of a neighbouring consonant; *e.g.*, *amicio*, "throw around," from **am-iacio* (the *y* sound of the initial *i* in *iacio*, "throw," has become the vowel *i* at the same time that the *-a-* was lost), *sákros*, "holy," became *sacer* (*-ros* first passed into *-rs*, in which *r* is vocalic, like a French final *-re*, and this successively into *-ers*, *-err* and *-er*).

Weakening of short medial vowels in unaccented syllables; *e.g.*, *óbsideo*, "beset," but *sĕdeo*, "sit"; *éfficio*, "complete," but *făcio*, "do, make"—contrast (before two consonants) *éffectus*, "completed," or (before *r*) *péperi*, "have borne," but *părio*, "bring forth"; *ílico*, "on the spot," beside *lŏcus*, "place"—contrast (after *i*) *pietas*, "sense of duty," but old Lat. **pīŏs* (classical *pius*), "dutiful," or (before two consonants) *vénustus*, "charming," but old Lat. *Venos* "(the goddess) love"; *capitis*, genitive singular, "head," but *caput*, neuter singular; weakening of diphthongs in unaccented syllables, *e.g.*, *cecīdi*, "have slain," but *caedo* (older *caid-*), "slay," *éxclūdo*, "shut out," but *claudo*, "shut." Dependent upon stress accent, too, is the regular shortening of a long syllable when preceded by a short syllable and also immediately either preceded or followed by the accent; thus *bene*, "well" (older *-ē*), but, *e.g.*, *honestē*, in which the second syllable is long.

Changes of sound, in addition to those already mentioned, include the following:

1. Vowels and diphthongs. When *e* was followed by *l* it became *o* (except before *e, i*, or a second *l*), hence *volo*, "wish," *volebam, volam*, but *velim, vellem, velle; -e* before *nc, ng* and *gn* (pronounced *ngn*) became *i, e.g., septingenti*, "seven hundred," but *septem*, "seven"; and *-ei* became *ī, e.g., dīco*, "say" (older, *deico*). Similarly *ai* became *ae, e.g., aedes*, "temple" (older, *ai-*), but in rustic Latin a long open *e*, as in *ēdus* for *haedus*, "goat." Successively *oi* became *oe* and *ū, e.g., ūnus* (older, *oi-*); *eu* became first *ou* and then *ū, e.g., iūmentum*, "beast of burden," old Lat. plural *iouxmenta* (*see* above), but in Greek ζεύγ-νυ-μι "yoke." With this *ou* original *ou* also became *ū, e.g., lūcus*, "grove," lit. "a clearing," in old Latin *loucom* (accusative singular), except in rustic Latin, in which both *ou* and *au* (ordinarily preserved in polite Latin) gave *ō, e.g., lōsna*, "moon" at Praeneste (*see* above), cognate with *lux*, "light," *lucus*, "grove," and *ōrum*, "gold" (hence It. *oro*, Fr. *or*) but polite *aurum*.

2. Consonants. After about A.D. 50, *b* between vowels became a sound like English *v* (*cf.* It. *avere*, Fr. *avoir* from Lat. *habere*, "have"). About the same time Lat. *v* (pronounced like Eng. *w*) passed into the same sound (*cf.* It. *voce*, Fr. *voix* from Lat. *vōcem*, "word," "voice"). The corresponding change of consonantal *i* (= Eng. *y*) into a *j* sound (*cf.* It. *giusto*, Fr. *juste* from Lat. *iustum*, "legal," "fair") took place about 400 years later. Consonantal *i* and consonantal *u* inherited from the Indo-European were lost at a very early date, the former between any two vowels, the latter between two like vowels of which the first was accented: thus in *torreo*, "scorch," the ending was originally *-ēio;* the genitive singular *divitis* (nominative *dives*) became, with the loss of *u* and contraction, *dītis*. Where for any reason *i* occurs in the developed language between vowels it really stands for *-iy-* in pronunciation; *e.g.*, in *eius*, pronounced *ei-y-us*. From the group *du* (*u* being consonantal) at the beginning of a word arose *b-:* thus we have *bis*, "twice," from **dwis*, beside *duo*, "two." In popular Latin a single breathed consonant (*p, t, k*) seems regularly to have been doubled in the middle of a word when preceded by a long vowel, and the vowel shortened at the same time—but not in the literary language. Hence arose a number of doublets; *e.g.*, in the popular language *cuppa*, "cask" (Fr. *coupe*), beside *cūpa* (Fr. *cuve*) in the literary language. On the other hand, *-ss-* became *-s-* in the first century B.C. after a long vowel or diphthong; *e.g.*, *cāsum*, supine of *cado*, "fall," from *cāssum*, older **cad-tum* (Indo-Eur. *t* + *t*, *d* + *t*, *dh* + *t* regularly becoming *-ss-* except before *r*), and *-ll-* became *l* after a long vowel when *i* stood in the following syllable: thus the plural of *mīlle*, "thousand," is *mīlia*. Assimilation of neighbouring unlike consonants, characteristic of all languages, is prevalent in Latin: *āctus*, "driven," from **ag-tos* (*cf. ag-o*); *ferre*, "carry," from **fer-se* (*cf. es-se*). Before *d, m, n, l* and *v, -s-* was always lost and the preceding vowel lengthened; *e.g.*, *prīmus*, "first," for **pris-mos* (*cf. pris-cus*, "ancient").

Vocabulary is in the main inherited directly from the Indo-European, but there are numerous borrowed words from other tongues; moreover, the popular speech retained the power freely to form compounds much longer than the written language. Some of these are half comic, as the *vaniloquidorus*, "generous in talk," of Plautus (there the element *-doro-* is also Greek). Prepositional compounds, however, in which the true force of the preposition was not felt, so that the compound, *e.g.*, in *con-, de-, in-*, gained merely in emphasis, were common in the spoken tongue throughout its history. Many suffixes remained or became productive, and new words were constantly being built up on old patterns from existing stems.

Numerals reflect an Indo-European system of reckoning that was mainly decimal. Only the first three of cardinal numerals up to 100 were declined; the decades, however, were originally neuter plurals, and the hundreds and thousands (except *centum* and *mille*) were regularly declined. Even where originally nouns the numerals have almost all become adjectival.

Noun and Verb Forms have certain peculiarities noted above; others include the almost complete loss of the dual number, the employment of a termination *-i* in the genitive singular of the first (*-ae* from *-āī*) and second declensions (peculiar to Italic and Celtic in the *o*-stems), the adoption (as in Greek) of pronominal terminations in the nominative plural of the same two declensions, the extension of *-ti-* abstract nouns by an *-ōn-* suffix (*e.g.*, *ratio*, "thought"), the wider development of the *dies*-type of declension, and the loss of the *u* declension of adjectives. In verbs may be noted the disuse of the augment in the past tenses (Gr. ἔ-θη-κ-α, "I put," but Lat. *fē-c-i*, "I did"), and the growth of new forms for the future perfect and pluperfect tenses and for the imperfect subjunctive. Even the syntactical categories of the future perfect and imperfect subjunctive were new.

Syntax.—Further features of special interest are the running together of the true ablative, the instrumental, and (for the most part) the locative of the Indo-European into a single ablative case, and sharp definition in the use of all the cases; the development of constructions by which the subjunctive was regularly used in dependent questions and in clauses of definition, purpose and result; and the peculiarly Latin idiom of the gerundive.

See also references under "Latin Language" in the Index.

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LATIN LITERATURE is the product of the Roman republic and the Roman empire. When Rome fell Latin remained the literary language of the western medieval world until it was superseded by the romance languages it had generated and by other modern languages. After the Renaissance the writing of Latin was increasingly confined to the narrow limits of certain ecclesiastical and academic publications. This article, which is designed to be supplemented by the accounts of individual authors to be found under their names, devotes most space to ancient Latin literature. It is divided as follows:

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I. ANCIENT

Latin literature began as translation from the Greek, a fact which largely conditioned its development. The Greeks themselves had always valued originality of treatment above originality of invention. Latin literature was even more traditional,

in its use both of former writers as sources or models and of stock motifs or arguments (*loci communes*). It is nevertheless one of the great literatures of the world. Roman writers learned to turn tradition to good account, absorbing or transfiguring borrowed elements as well as exploiting literary associations evoked in the mind of educated readers. Some did this to a degree amounting to originality, and eventually some often dispensed with models altogether. Further, whereas the Greeks excelled in abstraction, the Romans had an unusually concrete vision, illuminating Greek precepts or generalizations with vivid illustration, as Lucretius did in his *De rerum natura,* Virgil in his *Georgics,* Horace in his *Ars poetica,* Cicero in his *De officiis;* and they had a lively wit (*Itali sales*), exemplified in their particular medium of satire, in Plautine comedy, in Cicero's letters, in the lighter poems of Catullus and Horace and above all in Ovid. But even such faculties hardly confer greatness: that was the gift of the Latin language.

Latin is exceptionally capable on the one hand of sonorous dignity, and on the other of the most economical neatness. Roman authors learned to exploit both qualities admirably. Latin has become accepted as an ideal language both for ceremony or liturgy and for "lapidary" inscription. The authors of the Golden Age enhanced these qualities, both in prose and verse, by judicious use of the artistic discoveries made by Greek rhetoricians, aided by a flexibility of word order surpassing even that of Greek. They were, in fact, more distinguished on the whole as artists than as thinkers; but the best of them knew that art and native wit must go together. The Romans, as their portraiture also shows, were intensely interested in human individuality. They talked about others and themselves. Their genius, correspondingly, was moral, and by extension, political. Their noblest ideal was *humanitas,* a blend of culture and kindliness—"civilization" as the word is used today of individuals. It is these qualities, together with wit, that inspire most of what is good in Latin literature, for Lucretius is exceptional in his passion for truth.

A. General Trends

1. Preliterary Period.—Little need here be said of the preliterary period. There was Hellenistic influence from the south, Etrusco-Hellenic from the north. There was improvised Atellan farce, originating in Campania, with stock characters in masks (*cf.* the *Commedia dell'arte; q.v.*). But most stage words in Latin are of Etruscan origin, and Livy traced quasi-dramatic *satura* (medley) to Etruscans. Cato and Varro said that in former times the praises of heroes were sung after feasts, to the flute (perhaps an Etruscan custom) or unaccompanied. Here some scholars are skeptical. If they existed, these *carmina convivalia* would be *chansons de geste,* not unlike those Thomas Macaulay imagined in his *Lays of Ancient Rome,* lying behind some of the legends that came down to Livy in prose annals. Cicero hankered after them; so did the Augustans. There were also the rude Fescennine verses (*q.v.*), improvised at harvest festivals and weddings, and liturgical formulas, prescriptions and dirges, whose scanty remains show a taste for alliteration, assonance and rudimentary "periodic." The nearest approach to written literature must have been in public and private records and in recorded speeches such as those of Appius Claudius (fl. *c.* 300 B.C.), which, with his collection of maxims, were extant in Cicero's day.

2. Early Writers.—The event which fertilized the soil of Rome for literature was the capture in 272 B.C. of the Spartan colony of Tarentum. There was an influx of Greek slaves, some of whom were put to tutoring young Roman nobles. Among them was Livius Andronicus, subsequently freed, and with him Latin literature begins. In 240 B.C., to celebrate the victory over Carthage of troops who had now tasted Greek life in Magna Graecia and Sicily, he was commissioned to compose for the *Ludi Romani* genuine drama (probably one tragedy and perhaps also one comedy) adapted from the Greek. His success established a tradition of performing such plays, and at other festivals too, alongside the cruder native entertainments, which gradually receded. He also made a translation of the *Odyssey* which must have been an eye-opener to the Romans, and which was still read in schools in Horace's day. So Latin literature was to be based on Greek: but it had been born of the patriotic upsurge created by the Punic Wars.

For his plays Livius adapted the Greek metres to suit the Latin tongue; but for his Odyssey he retained the traditional Italian measure, the Saturnian metre, as did Naevius (d. *c.* 200) for his epic on the First Punic War. The verse falls into two parts, often of six and seven syllables respectively. It may have been largely a matter of syllable counting: certainly the extant specimens cannot be consistently scanned according to either quantity or accent. These two were features of Latin of which even the unlettered were conscious. In the classical period the quantity of the penultimate syllable determined the position of word accent, but the nature of that accent is disputed. Roman critics spoke of it in terminology borrowed from the Greeks, whose accent was one of pitch; yet the Latin language shows marked symptoms such as normally betoken stress accent. Those who maintain that it was a pitch or "tonic" accent belittle or deny its effect on literature. It seems likely, however, that pitch and stress are in any case to some degree inseparable. Plautus, the leading poet of comedy (*c.* 254–184), seems to have compromised to some extent, seeking to make the unfamiliar metre easier for his largely unlettered audience to feel by contriving that accent should as far as possible coincide with metrical pulse (ictus "beat," or "expectation of beat"). (*See* further Prosody, Classical.)

Ennius (239–169) boldly adopted and latinized the Greek hexameter for his epic *Annales.* He tended, far more than the Greeks, to end it with a disyllable or trisyllable, and this again would help the unfamiliar listener, since it meant that, by the law of the penultimate, accent would coincide with ictus in the salient last two feet. But he also showed a marked preference for the penthemimeral caesura, which tended to make conflict between accent and ictus predominate in the first four feet. This produced a harmonious disharmony, a struggle ending in resolution, and some scholars think that Ennius was feeling after this recognized aesthetic effect, which became more apparent when his tendencies crystallized into rules in the 1st century B.C. (Cicero, Catullus, Virgil). It is unfortunate that two of Rome's most original geniuses, Ennius and Lucilius, should have come to the hexameter before its ultimate refinement; otherwise they might have left work which ages artistically more fastidious would have taken care to preserve. As it is, there are only tantalizing fragments. Ennius' range was remarkable: he acquainted Rome with whatever was interesting the Hellenistic world. Though a half-Greek from Calabria, he became intensely Roman and the acknowledged father of Latin literature.

The Greek character thus imposed on literature made it more a preserve of the educated elite. Ennius, discovered by the elder Cato, was taken up by M. Fulvius Nobilior and the Scipios, his nephew Pacuvius by Aemilius Paulus, the scholar-tragedian Accius by Junius Brutus. Now emerge coteries such as were to play an important part at Rome, notably the "flock" of Scipio the younger (185/4–129). This contained the statesman-orator Gaius Laelius, the Greek Stoic philosopher Panaetius and the Greek historian Polybius, Lucilius and the African-born slave of genius, Terence. Greek influence was increased by the arrival in 167 B.C., after the battle of Pydna, of the library of Perseus of Macedonia, by the accidentally prolonged residence of the scholar Crates (*q.v.; c.* 170 B.C.), and by the celebrated embassy of the three Athenian philosophers—Carneades, Critolaus (*qq.v.*) and Diogenes of Babylon—in 155. Attempts of senatorial conservatives, led by Cato the censor, to stem the influx were unavailing. Greek had become a second language to educated Romans. The Roman historians of the day followed Fabius Pictor and wrote in Greek. Greek declamation now became the crown of education. However, early in the 1st century B.C. Latin declamation established itself; and the rewards offered by the republic to successful speakers were so great that censorial opposition could not check it. Part of the training was in the art of the rhetorical "period." As a consequence writing as well as speaking became polished.

Aelius Stilo (*c.* 100 B.C.), Rome's first important philologist, surmised that, if the Muses spoke Latin, it would be the Latin of

Plautus; and Crassus in Cicero's *De oratore* says that his mother-in-law, Laelia, spoke Latin so beautifully that one imagined that was how Plautus spoke. Plautus is one of the chief sources for colloquial Latin. But Ennius, following Livius, sought to heighten epic and tragic diction by using archaisms; and from his time onward, with few exceptions, such as the short poems (*nugae*) of Catullus, Lucilius' and Horace's satires and Petronius' *Satyricon*, the language of literature (as distinct from handbooks such as Vitruvius' on architecture), as also its rhythms, became more and more divorced from that of the people, with consequent division of audiences into "high-brow" and "low-brow," until reaction came in the 2nd century A.D. In Cicero's letters the degree of colloquialism varies greatly, depending on his familiarity with the recipient or on the seriousness of the subject.

3. Golden Age, 80 B.C.–A.D. 17.—The first period of the Golden Age of Latin literature, from 80 to 42 B.C., is justly called the Ciceronian. It produced not a few writers of distinction, most of them also men of action, among whom Julius Caesar stands out. The most prolific was Varro, "most learned of the Romans." But it was Cicero, statesman, orator, poet, critic, philosopher, who developed the Latin language to express abstract and complicated thought with clarity and also wedded it to the Isocratean "period," artfully constructed and permeated with quantitative rhythm, especially in the cadences. Subsequent prose style was either a reaction against, or a return to, his. It was mostly his that triumphed, notably at the Renaissance. As a poet he may have been uninspired, but he should not be underrated as a versifier. The several hundred hexameters which survive show a great technical advance on any known predecessors. He also edited that lonely masterpiece the *De rerum natura*, left unfinished on the untimely death of Lucretius. Like Lucretius, he admired Ennius and the old Roman poetry and, though apparently interested in Hellenistic work, spoke ironically of its extreme champions, the *Neoteroi* ("newer poets").

After the destruction of Carthage and Corinth in 146 B.C. prosperity and external security had allowed the cultivation of *otium* ("leisure"), living for oneself, and hence literature of self-expression and literature for entertainment. The *Neoteroi* had precursors at Rome *c.* 100 B.C., Laevius with his light *Erotopaegnia*, Q. Lutatius Catulus' circle with their Alexandrianizing epigrams in Greek (Archias, Antipater of Sidon) and in Latin (Catulus, Licinus, Aedituus). But the new school was essentially non-Roman; it centred on the Milanese poet-teacher P. Valerius Cato; and its adherents, all save perhaps G. Licinius Macer Calvus, came from northern Italy, from regions incompletely enfranchised, if at all. None is known at first hand save Catullus of Verona. They reacted against the grandiose, the Ennian tradition of "gravity," consciously emulating the Callimacheans of 3rd-century Alexandria, with poems meticulously refined and sometimes complicated by recondite learning. They introduced into Latin literature before its Augustan maturity the mentality of "art for art's sake" usually associated with decadent stages of literature. Their "aesthetic" attitude passed to the elegists of the next generation. Two transitional figures were also the first Latin authors from southern Gaul, P. Terentius Varro Atacinus and G. Cornelius Gallus. Virgil, born near Mantua and schooled at Cremona and Milan, grew up in the same *ambience*. His choice of Theocritus' pastoral idyll as his first model marks him not only as a man of taste, but as a Neoteric before he entered the circle of the future Augustus. His highly developed artistic conscience and his vein of romanticism probably owed something to this movement.

The *Eclogues* are largely "art for art's sake." They aim at recapturing Theocritus' cadences and at creating beauties of sound to match the beauties of the idyllic life of shepherds, depicted in a fanciful landscape which is inextricably blended of Theocritus' Sicily and Cos, Pan's Arcady, and the poet's own Mantuan and south Italian surroundings. Epicurean, escapist poems; yet they are shot through with topical allusions sometimes puzzling to the modern reader, and in the fourth, the *Pollio*, the future bard of Rome steps out of the frame. This poem probably celebrates the conclusion of the treaty of Brundisium in 40 B.C., negotiated for Antony by G. Asinius Pollio, himself a poet associated with the *Neoteroi*, for Caesar Octavian by Gaius Maecenas. Virgil was now drawn, with his friend L. Varius Rufus, into the circle being formed by Maecenas. These poets had already belonged to an Epicurean "garden" near Naples centring on Siro and Philodemus. In 38 B.C. they introduced to their patron another promising young poet, Horace, and by the final victory of Octavian in 30 B.C. the circle had been consolidated. They aspired to endow Rome with equivalents for the classic Greeks, Virgil for Theocritus, Hesiod and Homer, Horace for Archilochus and Alcaeus, Propertius for Callimachus, and so forth.

The classical notion was that a writer should not try to say new things so much as to say old things better. But inevitably the more dynamic minds broke through and created works unmistakably their own. These "Augustans" also, at some cost to spontaneity, introduced to poetry the art of the rhetorical "period." The effect can be seen by comparing the hexameter poetry of Lucretius and Catullus with that of Virgil. Virgil has no straggling sentences, and avoids monotony by varying the position of his pauses in the line and by subtle use of synaloepha. The rhetorical figures of thought and speech were mastered until they became instinctive. Alliteration and onomatopoeic suggestion, overdone by the Ennians and therefore eschewed by the *Neoteroi*, were now used effectively with due discretion. This studied perfection of form characterizes the odes of Horace, while elegy too became more polished.

The decade of Augustanism's first impetus, 29–19 B.C., is one of the most illustrious in all literary history. It saw the publication of Virgil's *Georgics* in 29, and the composition of the whole *Aeneid* by his death in 19; Horace's *Odes* books i–iii (23) and *Epistles* book i (20); in elegy, books i–iii of Propertius, also of Maecenas' circle, and books i–ii of Tibullus, with others from the circle of M. Valerius Messalla Corvinus and doubtless the first recitations by a still younger member of his circle, Ovid. Livy began his monumental work about 28/27 B.C. and Pollio was engaged on his important but lost history of recent events.

Maecenas' circle was not a propaganda bureau. True, he seems to have suggested occasionally that some public theme was ripe for celebration; witness the ingenious poems of graceful refusal. But the tone of these indicates that refusing was easy, and that he was as much friend as patron. Poetic promise was the qualification for entry; Propertius when admitted was simply a youth with an anti-Caesarian background who had made a hit with passionate love elegies. He and Horace proved antipathetic, and after Virgil's death the circle fades out. Would-be poets now abounded, such as Horace's protégés who occur in the *Epistles* and Ovid's friends whom he remembers wistfully in exile; also Manilius, whom no one mentions at all. Poems were recited in literary circles (and, on Pollio's initiative, in public), hence the importance attached to euphony, smoothness and artistic structure. They thus became known piecemeal, and might be improved by friendly suggestions. When finally they were assembled in books, great care was taken over arrangement, which was artistic or significant (but not chronological).

4. Prose After Cicero.—Meanwhile in prose the Ciceronian climax had been followed by a reaction, led by Sallust. In 43 B.C. he began to publish a series of historical works in a style which, eschewing the rhythmic copiousness of Cicero, was terse and epigrammatic (and studded with archaisms). The establishment of the principate indirectly favoured the spread of such a style; for eloquence, deprived of political influence, migrated from the forum to the schools. In their atmosphere it was cleverness and point that counted, not rolling periods to sway the emotions of a crowd. Thus developed the epigrammatic style of the younger Seneca (*c.* 4 B.C.–A.D. 65) and ultimately, in an extreme form, of Tacitus (*c.* 56–*c.* 120). Spreading to verse, it conditioned the witty couplets of Ovid, the tragedies of Seneca and the declamatory satire of Juvenal (fl. early 2nd century). Though Livy stood out, Ciceronianism only found a real champion again in Quintilian (*Institutio Oratoria*, *c.* A.D. 95).

5. Silver Age, A.D. 17–133.—After the first flush of enthusiasm for Augustus as deliverer from the nightmare of civil war, and for Augustan ideals of national regeneration, literature under

the empire paid the price of political paternalism, as contemporaries were aware. Without freedom it was subtly sterilized; and Ovid was but the first of many writers actually suppressed (or inhibited by fear). Only Tacitus and Juvenal, writing under tolerant emperors, turned emotions pent up under Domitian's terror into the driving force of great literature. Late Augustans like Livy already sensed that Rome had passed its summit. Yet the title of Silver Age (A.D. 17–133) is not undeserved by a literary century which produced, in addition to Tacitus and Juvenal, the elder Seneca, his versatile, representative, influential son of the same name, his nephew Lucan, Pliny and his nephew of the same name, Petronius, Statius and Martial, not to mention lesser lights such as Manilius (Augustan-Tiberian), Persius, Valerius Flaccus, Silius Italicus and Suetonius. It is noteworthy that of these the two Senecas, Lucan, Martial, Quintilian and possibly Valerius were all Spaniards, as were two technical writers of repute who wrote under the early emperors, the geographer Pomponius Mela and the agriculturalist Columella.

6. Later Writers.—The inevitable decentralization of the empire under the philhellene Hadrian and the Antonines weakened the dynamic forces of recent literature—Roman pride and senatorial-Stoic passion for liberty. Romans began again to write in Greek as well as Latin. The "new sophistic" movement in Greece affected Rome and the "novel poets" (Florus, etc.), imitators of the old Neoterics. An effete culture devoted itself to grammar, metric and philology, to archaism and preciosity. Thus pagan literature began to wither even before the barbarian incursions of the next century disrupted society. One must wait 250 years after Juvenal for poets worth mentioning in Ausonius of Bordeaux (*c.* 310–*c.* 393) and especially Claudianus (fl. *c.* 400), last of the true classics. Save that, at some time between, someone composed the *Pervigilium Veneris* ("Vigil of Venus"), reminiscent of Catullus yet in its May-day freshness and occasional vulgarisms of speech a harbinger of the middle ages. Though its 93 trochaic septenarii are quantitative, they show a more than random tendency to make accent and ictus coincide. Accent, in fact, was now beginning to oust quantity, and from the 3rd century purely accentual verse begins to be written alongside the quantitative.

Ausonius, though in the pagan literary tradition, was a Christian and contemporary with a truly original Christian poet, the Spaniard Prudentius (b. 348). In fact from the 2nd century A.D. onward Christian literature overlaps pagan, and generally surpasses it.

In prose these centuries have somewhat more to boast, though the greatest work by a Roman was written in Greek, the *Meditations* of the emperor Marcus Aurelius. His tutor in Latin, the African Fronto, self-consciously cultivated the fashionable style (*elocutio novella*) by going back to preclassical authors and blending archaisms with the common speech of his day. This style is seen to best advantage in another African, Apuleius (b. *c.* 125). But it was mainly an era of stocktaking, which produced those literary museums the *Attic Nights* of Aulus Gellius (b. *c.* 130) at one end and the *Saturnalia* of Macrobius (fl. *c.* 400) at the other. Already a vastly important stocktaking in law had been accomplished in the 2nd century A.D. by Gaius and Papinian. The 4th century, in the breathing space between the barbarian invasions, was the great age of the grammarians and commentators (*see* CLASSICAL SCHOLARSHIP). But in prose literature some of the most interesting work is again Christian, the dialogue *Octavius* by Minucius Felix and the fiery apologetics of the African Tertullian from about A.D. 200, and later the massive works of Lactantius, Ambrose and Augustine. Their worthiest opponent was Q. Aurelius Symmachus (*c.* 340–402).

B. The Genres

The Romans had a perhaps excessive sense of the integrity of genres, and of the metre or style appropriate to each, based on tradition often going back to a recognized *inventor*. To mingle them required considerable independence.

1. Comedy.—Roman comedy was based on the New Comedy in vogue in Greece, whose classic representative was Menander (342/341–292/291). But whereas to the Greeks this was essentially imitation of life, to the Romans it was escape to a world of fantasy and literary convention (*see* COMEDY; DRAMA). Livius' successor, Naevius, who developed this "drama in Greek cloak" (*fabula palliata*), may have been the first to introduce recitative and song, which increased its unreality. But being a freeborn and spirited man, he slipped in details of Roman life (presaging Plautus) and outspoken criticisms of powerful men such as the Metelli. His imprisonment warned comedy off topical references, but the Roman audience became remarkably alert in applying ancient lines to modern characters and situations, and demonstrating their feelings by appropriate clamour.

Plautus, unlike his predecessors, specialized, writing only comedy, *palliata* enlivened by *vis comica*—high spirits and *Itali sales*, oaths and linguistic play and somewhat "slapstick" humour—by music and by skilful adaptation of rhythm to subject matter. His *cantica* occupy so large a part that his plays must be thought of almost as comic opera. Part of the fun consisted in the sudden intrusion of Roman things into this conventional Greek world. "The Plautine in Plautus" consists in pervasive qualities rather than supposed innovations of plot or technique. His stage was a temporary wooden erection, curtainless, low, broad and probably long, and the makeshift semicircular auditorium was primitive indeed. But he is the father of modern comedy, and of many comic elements in nondramatic forms. Nevertheless, and despite the praises of scholars, he is not a favourite Latin author. The reason may be that an age hungry for novelty finds the stereotyped situations, characters and setting of New Comedy pall (*cf.* Ovid's *Heroides*). (Is *The Comedy of Errors*, based on Plautus' *Menaechmi*, a favourite Shakespearean play?) Where a Plautine play appeals, it is likely to be for some untypical feature—the romantic setting of the *Rudens* or the burlesque treatment of the gods in the *Amphitryo*. But one must always remember that one is judging a libretto without the music.

As Roman culture became hellenized, its drama became more, not less, dependent. Caecilius kept closer than Plautus to his originals, and did not blend plots, a practice dating from Naevius which Terence had to defend. Terence's comedy is very different from Plautus'. Singing has almost disappeared; recitative is less prominent. He was, in Caesar's phrase, "half a Menander." From Menander he learned to appreciate and exhibit refinements of psychology, and to construct ingenious plots; but he lacked *vis comica*, being uninterested in raising laughs from the crowd. His pride was refined language—"Latinity"—avoiding vulgarity, obscurity, oaths or slang. His characters were less differentiated in speech than those of Plautus: their discourse has the elegant charm of Jane Austen's dialogue. He was naturally a favourite of Horace, who slighted Plautus' metre and wit alike. The society he portrays was more sensitive; lovers tend to be loyal, and sons obedient. Plautus breathes *Romanitas* and "Italian vinegar," Terence the quality (first realized perhaps in the Scipionic circle) of *humanitas*. His historical significance has doubtless been enhanced by the loss of nearly all Menander. As it is, he so universalized Latin comedy in language and character that he could suggest himself as a model even to the 10th-century nun Hrosvitha.

After Terence *palliata* was rarely written, though often revived (especially Plautus'). The Ciceronian was the great age of acting (*e.g.*, Roscius), and in 55 Pompey at last gave Rome a permanent theatre. But there was also, perhaps even in Naevius, *fabula togata* (*i.e.*, in Italian dress and setting). This now came into vogue. Its framework was that of New Comedy, but it represented Roman society. Women were more respected, slaves less uppish. The chief composer was L. Afranius (b. *c.* 150). Under Sulla, Atellan farce was also revived, now with libretto and professional actors, as an afterpiece to tragedy (*cf.* Greek satyric drama; but at Rome tragedies were performed singly, not in groups). This in turn yielded in popularity under Caesar to the verse mime (*q.v.*) of Greek origin (for example, written by D. Laberius and Syrus Publilius), realistic (actresses; no masks), often obscene, but abounding also in quotable and even edifying apothegms. And finally, when the lively gesticulation of mime gave rise to the dumb-show of the *pantomimus* with choral accompaniment, and when exotic spectacles had become the rage,

Roman comedy faded out. It had always had to struggle against less demanding attractions: at the first performance of Terence's *Hecyra* the audience had deserted to rope dancers and boxers, at the second to gladiators.

2. Tragedy.—Livius introduced Greek tragedy to Latin (*fabula crepidata,* "buskined") as well as comedy (*see* DRAMA). He was followed by Naevius and (more notably) Ennius, who, like the Hellenistic Greeks, loved Euripides for his pathos, his melodrama, and the rationalistic tendencies he shared. Pacuvius, probably a greater tragedian, liked Sophocles, and heightened tragic diction even more than Ennius. His successor, Accius, equally admired by Cicero, was more rhetorical and decorated in style, impetuous and violent (*atrox*) in spirit. The fragments of these poets betoken grandeur in "the high Roman fashion" dear to Cicero and Varro, but have also a ruggedness sometimes amounting to gaucherie. They did not always deal in Greek mythology: occasionally, from Naevius onward, they exploited Roman legend, or even recent history, in *fabula praetexta,* especially when the deeds of a patron or his ancestors could so be celebrated.

The Roman chorus, unlike the Greek, performed on the stage, the orchestra being usurped by senatorial seats. It was thus inextricably involved in the action; but its *cantica* derived from *embolima* (the interludes of later Greek drama), their metres being much more restricted than those of classical Greek tragedy.

Classical tragedy ceased being composed after Accius, as comedy after Terence, though its plays were constantly revived (Aesopus, its greatest actor, gave Cicero hints). It was a somewhat upper-class institution, but attempts were made to popularize it by lavish production ("600" mules in Accius' *Clytemnestra*). Writing plays, once a function of slaves and freedmen, became a pastime of aristocratic dilettanti. Quintus Cicero composed or translated four in three days. Such writers had probably no thought of production, though Varius' famous *Thyestes* was reputedly performed at Octavian's triumphal games in 29 B.C., and Horace implies that Pollio's tragedies were destined for the stage. Ovid, whose *Medea* was greatly admired, expressly denies having written for the theatre. Drama was now for reading.

The nine extant tragedies of the younger Seneca were clearly not written for public performance. They are melodramas of horror and violence, mythological but all too applicable to contemporary experience. They exhibit faults latent or incipient in Euripides: sensational realism and rhetorical cleverness. But compare the Medeas of the two poets and the differences stand out. The rhetorically trained Seneca strains after point, in season and out. Characterization is crude, and Stoic moralizing obtrusive. The iambic verse is competent but facile. The choral metres are made gratuitously monotonous by unrelieved repetition of short verse forms. Where Seneca copies Horatian metres, his inferiority is patent; what he changes he deforms. Yet he was the great model for 16th and early 17th century tragedy, especially in France. Shakespeare's *Richard III* smacks of him, as do the ghost scenes in *Julius Caesar, Hamlet* and *Macbeth*. Ignorance of Greek tragedy at that time no doubt gave Seneca his chance and his stature; but the fact remains that even J. C. Scaliger preferred him to Euripides. He suited the spirit of the age.

The *Octavia,* implausibly handed down as Seneca's, is the only surviving *praetexta.* It deals with Nero's enormities (introducing Seneca himself to protest against them): a possible subject for tragedy, but spoiled by tiresome artificiality and misplaced erudition.

Stage performances under the empire were variety shows, at most including favourite scenes from old plays or short scenes newly composed. Nero fancied himself as the blind Oedipus, etc., and apparently composed the words himself. There are references to playwrights, but these were probably literary dilettanti.

3. Epic and Epyllion.—Livius' pioneering *Odyssey* was, to judge from the fragments, primitive; so was the *Bellum Punicum* of Naevius, important for Virgil because it began with the legendary origins of Carthage in Phoenicia and Rome in Troy. But Ennius' *Annales* soon followed. In a sense this compound of legendary origins and history was a *Romaid* analogous to the Hellenistic *Ephesiaca, Milesiaca,* etc. But it was in Latin, in a transplanted metre, and by a poet who had a quality rare among Romans, imagination. Not a few of the flashes in the *Aeneid* were kindled by him. And he had a realization, remarkable so early in a half-Greek from Calabria, of the emergent greatness of Rome. In form his work must have been an ill-balanced chronicle. Thus he almost ignored the First Punic War in consideration of Naevius, and he became more detailed as he progressively added books about his own times. But his great merit shines out even from the fragments, nobility of ethos matched with nobility of language, the *magnanimitas* that made him so much better at tragedy than comedy. On receptive spirits such as Cicero, Lucretius and Virgil his influence was profound. For a century and a half he was unapproached in epic. Verse-chronicles of wars were composed, one of them, a *Bellum Sequanicum* on Caesar's campaign of 58, written by Varro Atacinus, who also composed a Latin *Argonautica* after Apollonius.

Little is known of the "strong epic" for which Virgil's friend Varius was renowned. (Did his *De morte* use epic narrative of contemporary events to reinforce Epicurean doctrine on death?) But Virgil's *Aeneid* was certainly something new. Recent history would have been too particularized a theme—less philosophic, in Aristotle's phrase. Instead Virgil developed Naevius' version of Aeneas' pilgrimage from Troy to found Rome. The poem is only superficially an Odyssey of travel (with an Apollonian interlude of love) followed by an Iliad of conquest. It is not an allegory either. Aeneas does not represent Augustus, for instance, nor Dido Cleopatra. But it is a symbolic epic of deep contemporary relevance. The hero is Rome. Any attempt to appreciate the poem as a personal epic of Aeneas invites disappointment. He is the archetypal Roman, and the subject is his conversion from an individualistic Homeric leader to the dedicated servant of Rome's destiny. He learns what he must do from a succession of ever-clearer prophetic promises. His fault was ever to have lingered at Carthage. The command to leave Dido shakes him ruthlessly out of the last great temptation to seek individual happiness. But it is only the vision, seen when he visits Hades, of Rome's future greatness, that kindles obedient acceptance into imaginative enthusiasm. It was such a sacrifice of the individual that the Augustan ideal demanded. The second half of the poem represents the fusing in the crucible of war of Trojans, with the softer graces of civilization, and Italians, with the cruder virtues of manliness. The tempering of Roman culture, with its concomitant luxury, by Italian (*e.g.,* Sabine) hardiness was another part of the Augustan ideal. So was a revival of interest in ancient customs and religious observances, which Virgil, "a great lover of antiquity," could here appropriately indulge. There is however some justification for the feeling that Virgil, perhaps too full of Apollonius' and Euripides' Medea, by returning to Carthage to dwell on the suffering and suicide of Dido, made the sacrifice of individualism seem unacceptable on such terms, at least for modern readers, separated by centuries of chivalry from stoical Augustans to whom Rome was everything. The verse throughout is superbly varied, musical, apt and rhetorical in the best sense; and there are many flashes of imagination and of moral sublimity.

Thenceforth epics in Virgilian or Ovidian hexameters, both on legendary and on historical (even contemporary) subjects, proliferated. Only those extant can be mentioned here. Statius' *Thebais* (and inchoate *Achilleis*), preferred by Hadrian to Homer and famous in the middle ages (largely perhaps through the poet's spurious prestige as a reputed Christian), are justly unread today. So is Valerius Flaccus' incomplete *Argonautica,* mentioned only by Quintilian. (Is William Morris' *Life and Death of Jason,* a superior counterpart, read today?) As Callimachus had realized long before, such poems were an anachronism, and Virgil had shown what could take their place. The young Lucan had a more interesting idea. Caesar and Pompey were already legendary figures (*cf.* Thomas Hardy's *Dynasts*), and their struggle would be more convincing without divine interference (which Petronius however considered indispensable in epic). It was a struggle of universal significance, tragic because each side had partial justification. But unfortunately Lucan did not appreciate the significance, nor deduce it from his source: books of Livy now lost (which however

prompted his championship of Pompey, courageous under a less tolerant emperor than Augustus). His unfinished work is a series of episodes treated in a highly rhetorical, Senecan strain. One can at least appreciate its deft and muscular use of Latin, its intellectual force and Tacitean brilliance of epigram. Silius too chose a frequent Livian theme, the struggle between Hannibal and Rome. More conventional in every way, he reintroduced the Olympian machinery. He likewise was unclear about the issues involved, nor could he depict character. Most fatal of all, he was no poet.

To replace grand epic Callimachus in 3rd-century Alexandria had inaugurated, with his *Hecale,* the short, carefully composed hexameter narrative with fresh and realistic detail which is called epyllion. The Neoterics wrote one each: Cinna's *Zmyrna* was famous for taking him nine years. The only independent epyllia that survive are the *Ciris* in the Virgilian appendix (author unknown) and Catullus lxiv. The *Hecale* had started a convention of insetting an independent story. Catullus inset the story of Ariadne on Naxos into that of the marriage of Peleus and Thetis. His poem has a monotonous beauty, and is given significance by the closing lament that the gods no longer visit men: "The world is too much with us." But the story of Aristaeus at the end of Virgil's *Georgics,* with that of Orpheus and Eurydice inset, the last flower of the poet's early neotericism, shows what heights epyllion could attain.

Ovid's *Metamorphoses* is a nexus of some 50 epyllia with shorter episodes. Others had described metamorphoses in verse, arranged legends chronologically or linked them plausibly together; but by doing all three at once Ovid created a convincing imaginative world with a magical logic of its own. His continuous poem, meandering from the creation of the world to the apotheosis of Julius Caesar, is a great baroque conception, executed in swift and clear hexameters, in which interest is sustained by variety of mood and genre, after the manner of Callimachus. Its frequent irony and humour should not be missed through any misconception that it is an attempt at homogeneous epic.

4. Didactic Poetry.—Ennius essayed didactic poetry in his *Epicharmus,* in trochaic tetrameters, a work on the nature of the physical universe based on the 5th-century Sicilian whose name it bears. Lucretius' masterpiece of flashing genius and poetic art was its first noteworthy successor. What drives the *De rerum natura,* one may feel, is Lucretius' anxiety to rid himself as well as his reader of fear of death and the supernatural, to block up every chink through which doubt might creep in. He is not an original thinker, but one who has attained an imaginative conception of the effect of Epicurus' atomism, and is obsessed by its application to everything in and around him. His poem is truly didactic, and he himself conceives of the poetry as honey smeared round what would otherwise be a bitter cup. Certainly some of the finest poetry is in the prologues and excursuses, but the grandeur of the total vision is missed if the detailed and impassioned argument is shirked.

The appearance of this poem must have profoundly affected Virgil, age about 16. It may even have swept him into his temporary phase of Epicureanism, seemingly so foreign to his nature. But his poetic reaction was delayed for some 17 years; and the *Georgics,* though deeply influenced as poetry by Lucretius, whom they single out for envious praise, are not truly didactic: they are pseudodidactic. Virgil wrote for literary readers like himself, country-bred though he was, selecting whatever would contribute picturesque detail to his impressionistic picture of rural life. If his precepts are generally sound, it is because he had reliable authorities available; *e.g.,* Varro. The *Georgics* are, in effect, the first descriptive poem in literature. They portray the recently united land of Italy. They teach that the idle Golden Age of the *Eclogues* is a mirage: relentless work creates "the glory of the divine countryside." Work was introduced by a paternal Jupiter to sharpen men's wits. The compensation is the infinite variety of civilized life. Part of book i only is based on Hesiod; but the poem is Hesiodic throughout in its glorification of work, while the pervading sense of divine providence recalls the Greek Stoic poet Aratus. Insofar as it had a political intention (and Maecenas was in some sense behind it), it encouraged revival of agriculture by small-holding farmers in fields neglected or devastated in the civil wars, the old Italian virtues that went with agriculture, and the idea of Rome, regenerated by them and led by the young Octavian, extending its works over Italy and its civilizing *iura* over the world.

Ovid's *Ars amatoria* is comedy or satire in the burlesque guise of didactic, which enhances its outrageousness, an amusing commentary on the psychology of love; so is his *Remedia amoris.* The *Fasti,* broken off halfway by his exile, was didactic in popularizing the new calendar of festivals; but its main object was clearly to entertain by retailing incidental stories. It is clear, then, that true didactic poetry was being undermined. Its last full-scale monument is Manilius' *Astronomica,* a genuine attempt to commend and expound astrology, competent as verse and forceful as Latin, but neither a trustworthy guide for ancient believers nor palatable literature for modern readers.

5. Satire.—*Satura* meant a hodgepodge, a medley. The word was applied to variety performances (flute-playing, song and dance) introduced, according to Livy, by Etruscans in 364 B.C. Literary satire (*q.v.*) begins with Ennius, and reflects his multiplicity of interests in its range of subject and metre. But it was Lucilius who established the genre. After experimenting in trochaic and iambic metres he settled on dactylic hexameters, thus making them its recognized vehicle. A tendency to break into dialogue may be a vestige of a dramatic element in nonliterary satura. Being an egoist of ebullient nature, pungent wit and strong opinions, he used this medium for self-expression, fearlessly criticizing public as well as private conduct; and it was his temperament that made satire "satirical." He owed much to the Cynic-Stoic "diatribes," etc.—racy sermons in prose or verse—of Greeks such as Bion the Borysthenite (*c.* 325–*c.* 255); but in extant Hellenistic literature what most presages him is the fragments of Callimachus' *Iambi.* His successors were Horace, Persius and Juvenal. But there was also "Menippean" satire, mingling prose and verse, which descended from the Greek prototype of Menippus of Gadara, a contemporary of Bion much admired by Lucian. This was introduced to Rome by the scholar Varro.

Horace undertook satire professedly because it was a genre still awaiting improvement: Lucilius, a great original genius, had been a hasty writer and an uncouth versifier. *Satires* i, 1–3 are essays in the Lucilian manner, and even the autobiographical "journey to Brundisium" (i, 5) borrows motifs from a Lucilian journey piece. But Horace's nature was to laugh, not to flay, and his incidental butts were either insignificant or dead. He was also too individual not to break free; and he came to appreciate (ii, 1) that the real point about Lucilius was not his denunciations but his self-revelation. This encouraged him to talk about himself, notably in i, 6, ii, 6 and the *Epistles.* In *Satires* ii, besides reinstating frequent dialogue, he develops in parts the satire of moral diatribe, which presages Juvenal. But he is still his amusing, lively self, still composing *sermo* ("talk"); whereas his successor Persius, the earnest young Stoic, blended Lucilius, Horace, diatribe and mime into serious and sometimes telling sermons in verse, obscure, convoluted, and affected by the new influence of the declamation schools. The great declaimer was Juvenal, who fixed the idea of satire for posterity. Gone was the personal approach of Lucilius and Horace: little is known of his life, not even approximate dates. His denunciations should not be taken too seriously as representative evidence. Anger, bottled up under Domitian, may have become a self-indulgent habit of mind. And his dictum that "if nature refuses, indignation makes verse" encourages one's suspicion that he cultivated it for this purpose. Essentially he was writing for effect. But his epigrammatic power makes him stimulating in the same way as Tacitus, and at his best he is brilliant and memorable.

Varro's vast *Saturae Menippeae,* partly moral and political, were also an encyclopaedist's bid to make entertainment of his erudition; their loss is regrettable. The elder Seneca's *Apocolocyntosis* belongs to this branch as being a medley of prose and verse, but its pitiless skit on the deification of Claudius is satire in the Lucilian sense. The *Satyricon* of Petronius is also Menip-

pean inasmuch as it contains varied digressions and occasional verse; but essentially it comes under fiction.

With Lucilian satire may be classed the fables of Augustus' freedman Phaedrus, nearly a hundred surviving from several hundreds. Phaedrus aspired to be the Roman Aesop, using beast fables agglomerated round Aesop's name together with Hellenistic collections of stories and jokes, diatribes and his own observation. Beast fables occur in Ennius, Lucilius and Horace; but what makes these terse little iambic poems qualify as satire is the fact that Phaedrus could not resist indulging in contemporary social and political allusions, which provoked reprisals from Sejanus. But mostly his verses are genial criticisms of life in general.

6. Iambic, Lyric and Epigram.—The short poems of Catullus were called by himself *nugae* ("trifles"). They vary remarkably in mood and intention; and he scouts the laws of the genres, for instance using iambic metre associated with invective not only for his devastating abuse of Caesar and Pompey (29, 52) but for his tender homecoming to Sirmio (31). By no means all are trifles; some of these poems strike modern readers at least as superlative lyrics. Catullus and his friends set a fashion—witness the *Catalepton* in the Virgilian appendix (only 5 and 8 are generally accepted as Virgilian) and Maecenas' fragments. The galliambi of Catullus' arresting, exotic *Attis,* suggested by some Hellenistic work, occur also in Varro's *Saturae Menippeae* and in Maecenas.

Horace was a pioneer, and knew it. He too, in his *Epodes,* broke through the law of the genres, using iambic verse to express devotion to Maecenas (*Epodes* 1), though in general he adopted with the metre the offensive posture of Archilochus. But, as in the contemporary *Satires,* his primary aim was to create literature, whereas his models had been venting their feelings, and often he is simply joking (*Epodes* 3, 17). There are several poems in this collection with no Archilochian element, and the serious bard of the state poems was intermittently active from the first (16, 7, 9). After the battle of Actium he turned to Alcaeus for inspiration, and adapted the Alcaic, Sapphic and Asclepiad metres, strengthening them by the regularization of long syllables and disciplining them by the regularization of caesuras in certain positions—in fact romanizing them. The resultant verse forms compensated for loss of fluent spontaneity, some with elegance, some with monumental dignity. Horace claimed immortality as the introducer of early Greek lyric to Latin, though his motifs are often Hellenistic when not contemporary. The *Odes* affect to be for singing to the lyre. Probably this was a mere convention (save for the *Carmen saeculare*), though this is disputed. They nearly all have an addressee, who may affect their tenor. They rarely show the passion nowadays associated with lyric; but they have Pindaric grandeur sometimes, or Alcaic intensity, or deep Simonidean melancholy, as well as Sapphic grace, or Anacreontic lightness or Callimachean wit, each assimilated into something peculiarly Horatian. As meditated works of art they are well-nigh perfect, and they are inimitable as they are untranslatable—witness Statius' attempts at Alcaics and Sapphics in his *Silvae,* a collection of 32 occasional poems (mostly in hexameters) otherwise not without merit.

Martial went back to Catullus for his metres, and for his often obscene wit. He fixed the notion of epigram for posterity by making point its characteristic. Rhetorical training encouraged this. He could be charming and gentle as well as witty, but he was no Catullus; in fact he seems rather paltry-spirited, a flatterer. Not a high proportion of his 1,561 epigrams gives keen pleasure; but they are readable in selection, and incidentally provide valuable information for the social history of his times; for life, not literary tradition, he pointedly insisted, was the stuff of literature.

7. Elegy.—The elegiac couplet reached Ciceronian times with its hexameter regularized, but its pentameter still uncouth, stumbling with elisions and ending with words of indiscriminate length, so that conflict of accent and ictus often predominated throughout (*see* ELEGY). As such it suited the spontaneous self-expression of Catullus, whose temperament broke tradition, filling elegiac epigram no less than Hellenistic lyric forms with outbursts of personal emotion. One of his intensest poems about Lesbia in this metre (76) extends to 26 lines; another (68) is a long poem of involved design in which his love is incidentally compared with that of Laodamia for Protesilaus. These two poems make him the inventor of "subjective" love elegy dealing with the poet's own passion (apparently unknown in Greek). Gallus, with his four lost books on Lycoris, established the genre, and Tibullus and Propertius developed it. Propertius in book i shows a marked tendency to end pentameters with a disyllable, thus securing a two to one preponderance of coincidence between ictus and accent in the latter half; and in books ii–iv, perhaps following Tibullus' lead, he made this practically a rule. Couplets were consequently marked off from each other more clearly; they became "closed" (like English heroic couplets, which they directly influenced). The rugged elisions of Catullus had also disappeared.

Propertius' first book is still Catullan, in that it seems genuinely inspired by passion for Cynthia (with mythological parallels freely introduced as Catullus introduced Laodamia). As to Tibullus' Delia and Nemesis one can be less sure; and already in book ii Propertius also is beginning to write love elegy as a form with its own commonplaces and conventions, often borrowed from other forms. The nature of the debt to Callimachus and Philetas acknowledged in book iii remains obscure, but seems a matter of manner rather than content. Tibullus' elegy is constructed of sections of placid couplets with subtle transitions. These two poets established the convention of the "soft poet," valiant only in the campaigns of love, but winning, through them and the Muses, triumph and immortality comparable with the warrior's. Tibullus may genuinely have been frail in physique; and Propertius was certainly at first impervious to the Augustan ideals then taking shape, glorying in his abject slavery to love and his naughtiness (*nequitia*), though later he became acclimatized to the Augustanism of Maecenas' circle.

Tibullus, a lover of peace, country life and old religious customs, has charm and grace, and a thin vein of humour. Propertius too can be charming, but he is far more. He often writes impetuously, straining language and associative sequence, to the despair of scribes and editors, with passion or irony or sombre imagination. The 20th century is more at home with his obscure, tangential manner than was the 19th, which was also apt to underrate his poetic power through disapproval of his moral attitudes. He can betray bad taste in overdoing mythological parallels as also in sensitivity; but he is a true and exciting poet. Heartfelt love animates the six short elegies in the Tibullan appendix (iv, 7–12) of Messalla's ward Sulpicia, whose passion for Cerinthus is also the subject of iv, 2–6, by Tibullus himself. (Delightful too is the *Copa* in the Virgilian appendix, an elegiac mime reminiscent of Theocritus in which a Syrian dancer details to the tired wayfarer the pseudopastoral attractions of her roadside garden tavern.)

Ovid, nurtured in the easier world established by the *pax Augusta,* had a different aim: not to unburden his soul nor to move the reader's, but to entertain. In the *Amores* he is "the poet of his own *nequitia,*" outrageous and amusing in the role adopted from Propertius, his Corinna being probably a fiction. Elegy became his characteristic medium. He carried the couplet of his predecessors to its logical extreme (*cf.* Edmund Waller and the English heroic couplet), characterized by parallelism, regular flow and ebb and a neatness that pointed his wit. He had no successor worthy of the name, though there is much elegiac verse in Martial and the *Anthologia Latina* (*see* ANTHOLOGY), and Ausonius and Claudianus long after wrote a few of their best poems in this metre.

8. Rhetoric and Education.—Speaking in the forum and law courts was the essence of a public career at Rome, and hence of educational practice. There were always men naturally eloquent, but it was only after the middle of the 2nd century that the Greek art of rhetoric really began to affect Roman speaking. The *Rhetorica ad Herennium* (86–82 B.C.) formerly attributed to Cicero is a comprehensive presentation of current Greek theory in Latin guise. The dominant style at this time was the "Asiatic," —emotional, rhythmical, ornate (*e.g.,* Hortensius, 114–50 B.C.). Cicero, Asiatic at first, early learned while at Rhodes (78 B.C.) to

tone down his style. Criticized later by the "Atticist" revivers of plain style (*e.g.*, Calvus, Brutus), he replied by commending Demosthenes as a model instead of their Lysias, and rightly insisting that style should vary with subject. But in public speaking he held that crowds were swayed less by argument than emotion, which demanded the grand manner; and to modern as to Atticist taste he seems sometimes to err on the side of copiousness when it is inappropriate. He was however the acknowledged master speaker from the condemnation of Verres (70 B.C.) until his death (43 B.C.). He expounded the history of Roman oratory in the *Brutus* and his own principles and practice in the *Orator* (both 46 B.C.).

The establishment of monarchy robbed eloquence of its public importance, but force of habit retained rhetoric as the crown of education. Insofar as this taught boys to marshal material clearly and logically and to express themselves cogently, it performed the function of the modern essay; but, insofar as the temptations of applause made it strained and affected, it did harm. Its operation can be studied in the specimens quoted by the elder Seneca, and its effects, good and bad, in the style of his son.

In the *De oratore* (55 B.C.), essentially an *apologia pro vita sua* in dialogue form, Cicero had pleaded (through Crassus) that an orator's training should be not merely in the technique of speaking, but in all liberal arts. Education without rhetoric was inconceivable; but what Cicero was proposing was to graft on to it a complete Isocratean system of higher education, something Rome had wholly lacked. Quintilian in his *Institutio oratoria* went back to Cicero for inspiration as well as style. Much of it is conventional schoolroom stuff, but the first and last books in particular show admirable common sense and humanity. Quintilian's work greatly influenced Renaissance education. But how regrettable that he flattered Domitian, persecutor of philosophy!

9. History.—Q. Fabius Pictor wrote his pioneering history of Rome during the Second Punic War, using pontifical and family annals. A nationalistic historian seeking to make Roman ways and outlook intelligible to critical Greeks, he wrote in Greek. His immediate successors followed suit. Latin historical writing began with Cato's *Origines*. Unlike the annalists, the great self-made man pointedly made the Italian people, not individual Roman leaders or families, the hero. After him there were as many historiasters as poetasters, who probably deserved Cicero's disdain. Velleius Paterculus, though later (Tiberian), is perhaps a fair specimen surviving. The first great exception is Caesar's *Commentarii,* a political apologia in the guise of unvarnished narrative. The style is good because appropriate: dignified, terse and clear. Absence of rhetoric would especially strike Roman readers, suggesting sincerity and detachment, an impression Caesar enhanced by speaking of himself in the third person. These works are more interesting as documents in a historical context than as literature, but a panorama rewards a complete perusal of the *De bello Gallico*.

Sallust took Thucydides as his model. He interprets, using speeches, and ascribes motives. In his extant monographs *Catilina* and *Jugurtha* at least, he transcended the annalistic method, using history to emphasize the decadence of the dominant caste. He was, one may suppose, both more readable and more scientific than his predecessors. The revolution in style he inaugurated has already been mentioned, and it is this that gives him importance in an account of Latin literature. For historians he is likely to remain a controversial figure. Did he write the extant invective against Cicero and the two political letters to Caesar, not to mention the lost didactic poem *Empedoclea* mentioned by Cicero? Though a Caesarian, he at least affected a Thucydidean detachment, and though a millionaire he sternly rebuked the luxury and degeneracy of the dying republic. Indeed Sallust, Livy and Tacitus were all moralists. So was Varro, whose lost *Antiquitates* were a mine of unprocessed historical and religious lore.

Livy began his 40-years' task as Augustus became princeps, and though "a Pompeian" he made with good will his massive contribution to the Augustan revival. He consummates the annalistic tradition. If in historical method he falls short of modern standards, he has the literary virtues of a historian. He could visualize and vividly describe past events, and interpret the participants' views in plausible, eloquent speeches. He inherited from Cicero his literary conception of history, his copiousness and his principle of accommodating style to subject. Indeed he is perhaps the greatest of Latin stylists. His earlier books, more akin to Ennius than to Polybius, where his imagination has freer play, are the most readable nowadays. In the later, long tracts have a certain sameness, and the more historical the times become, the more disturbed one is by his uncritical methods and his patriotic bias. Having today more reliable historians of antiquity, one judges his work mainly as literature. His stories of Camillus or of Hannibal crossing the Alps are immortal; but he can no longer be called a favourite author with classical readers, who can share but vicariously the enthusiasm of an Augustan for an immense prose epic of Rome, which survives moreover only as an imposing ruin.

Tacitus, on the other hand, stands higher today than in antiquity. Though his anti-imperial bias in attributing motives is plain, his facts can rarely be impugned, and his evocation of the terrors of tyranny is unforgettable. He is read for his penetrating studies of character, his dramatic scenes, his ironical epigrams and his abrupt surprises. Variety is everything. Instead of the "calmly and equably drawn-out style" which Cicero approved in a historian and Livy exemplified, he showed an extreme development of the Sallustian style, shunning the graces of the period, coloured with archaic and poetic words, careful to avoid the commonplace. Perhaps the nearest analogy in English is in Thomas Carlyle.

Suetonian biography apart, historiography now degenerated into handbooks and epitomes made by men conscious of being mere gleaners, until one comes to Ammianus Marcellinus (b. *c.* 330). He was a tolerant polytheist, refreshingly detached, rather ornate in style, but capable of vivid narrative and description, who continued Tacitus' account from Domitian's death to A.D. 378. More than half dealt with his own times, and this portion (covering 353–378) fortunately survives.

10. Biography and Letters.—The endemic Roman interest in human beings was demanding before the end of the republic a literature to satisfy it. The idea of comparing Romans with foreigners, perhaps originating in Varro's *Imagines,* was taken up by Nepos, friend of Cicero and Catullus. Of his encyclopaedic *De viris illustribus* all that survive are 24 hack pieces about worthies long dead and one of real merit about another of his friends, Atticus. The very fact that Atticus himself and Tiro decided to publish Cicero's letters unsifted to the number of nearly 1,000 is the best evidence of public interest in people. Unwittingly they constitute the only heart-searching Latin autobiography before Augustine's *Confessiones*. Admiration of these fascinating letters, thrown off without thought of publication by an uninhibited and witty genius near the heart of public affairs, gave rise to letter writing as a literary genre. The younger Pliny's, anticipating publication, convey a possibly rose-tinted picture of civilized life in the sunshine following the death of Domitian. All are well written. Some have charm, and others value for the social historian. But they are nothing to his spontaneous correspondence with Trajan, one of the most interesting documents in Latin. Here are revealed the day to day problems (such as those posed by the behaviour of Christians), of a conscientious governor of Bithynia, with the decisions and advice elicited from a wise and patient emperor. The letters of Fronto to Marcus Aurelius are also real, if rather self-conscious owing to the correspondents' difference in status; but he was more interested in rhetoric than is the 20th-century world. The letter as a verse form, beginning with striking examples by Catullus (65; 68A), was established by Horace. Some of his *Epistles* i are real letters, though others approximate to "talks."

Suetonius' lives of the Caesars and of poets, etc., contain much valuable and intriguing information, especially since, as Hadrian's private secretary, he had access to the imperial archives. But his method was to cite, in categories, whatever he found, favourable or hostile, and to leave this raw material to the judgment of the reader, who should be warned that it was customary to slander opponents with reckless and inventive malice. The *His-*

toria Augusta, covering the emperors from 117 to 284, is a collection of lives in the Suetonian tradition, degenerate, but not utterly so until after Caracalla. By contrast, Tacitus' *Agricola* is an admiring, but not necessarily overcoloured, biographical study.

Some of the most valuable autobiography was incidental, like Cicero's account of his oratorical career in the *Brutus,* or Lucilius' spontaneous self-revelation in his satires. Horace's largely autobiographical *Epistles* i is significantly sealed with a miniature self-portrait. Ovid in exile, afraid of fading from Rome's memory, gave an invaluable account of his life in *Tristia* iv, 10. It should be emphasized, on the other hand, that poetry so full of traditional motifs as the Latin cannot be combed so confidently for autobiographical evidence as modern poetry.

11. Philosophy and Learning.—The practical Roman mind produced no original philosopher, for Lucretius is an expositor of Epicurus and Seneca a meditator of eloquent, sometimes poignantly topical, philosophical tracts (many of which might come from a Christian writer). The only name that demands consideration is Cicero's. He was trained at Athens in the eclectic New Academy, and insofar as one can deduce his own views from works mainly in dialogue form, eclectic he remained, seeking (like Horace) a philosophy to fit his own constitution rather than a logical system valid for all. He used the dialogue form avowedly in order to make people think for themselves instead of following authority, and in this his spirit is genuinely philosophical. But essentially he was a philosophic journalist, composing, to console himself when in political doldrums, works which became one means by which Greek thought, predigested and so made more easily assimilable, was absorbed into early Christian thinking, and the great means by which it was propagated in western Europe at the revival of learning. The *De officiis* is a treatise on ethics, after Panaetius, written for his son. The dialogues follow, not the Platonic or dialectic pattern, in which truth is progressively sought, but the Aristotelian (no specimen extant), in which speakers expounded already formed opinions at greater length. This suited Cicero's oratorical bent, and facilitated his use of sources; but the idea that they are merely copies of Greek works is an exaggeration due to a casual remark of his own referring to them as *apographa* (*see* CICERO, MARCUS TULLIUS).

Nor were the Romans any more original in science. Instead they produced encyclopaedists such as Varro, and Celsus (Tiberian), whose style, and the chance that the only part surviving is on medicine, earned him the title of "Cicero of the medical." Pliny's *Natural History* is a fascinating rag bag, especially valuable for art history, though it shows to what extent Hellenistic achievement in science had become confused or lost. Abruptly stated information is interspersed with rhetorically elaborated passages, but it hardly qualifies as literature. No more does jurisprudence, though in itself one of the greatest of Roman achievements; nor the numerous technical treatises; nor philological and grammatical works, such as Varro's partly extant *De lingua Latina* or Q. Remmius Palaemon's comprehensive treatise (1st century A.D.) and the other lost sources of the well-known 4th and 5th century compilers.

12. Literary Criticism.—Of the kind of criticism which hits off an author in a few words the Romans had salient examples in Cicero's *Brutus,* a masterly survey of near 200 Roman orators, and in the 10th book of Quintilian's *Institutio oratoria,* which characterized neatly but sometimes at second hand the Greek and Roman writers beneficial to the would-be orator. They also inherited from the Peripatetics an interest in stylistic art prominent in Cicero's *Orator* and in Quintilian's 8th and 10th books: modern critics who are impatient of this interest are likely to be out of tune with much of Latin literature. But Cicero's casual remarks show a shrewd appreciation of the literary issues of his day. He stresses the importance of a well-stocked mind and of native wit against mere handbook technique. By Horace's day, however, it had become more timely to insist on the equal importance of art. Some of Horace's best criticism is in the *Satires* (i, 4 and 10; ii, 1), in the epistle to Florus (ii, 2) and in the epistle to Augustus (ii, 1), an outspoken vindication of the Augustans against prejudiced archaists. But it was his epistle to the Pisones (later called *Ars poetica*) that was to prove so influential in the century following Boileau. Ostensibly this is *sermo:* but it is also a cunningly devised treatise based on the Hellenistic critic Neoptolemus of Parium (3rd century B.C.). It supports, among acceptable if somewhat trite theses, the dubious one that poetry is necessarily best when it mingles the useful (particularly moral) with the pleasing. The devotion of so large a proportion to drama suggests that he had his eye more on Neoptolemus' Peripatetic (?) precepts than on his own practice, though his lively illustrations and comments make the work enjoyable as "talk." The Romans were better at discussing literary trends than fundamental principles. There is much good sense about this in Quintilian, and Tacitus' *Dialogus* is an acute discussion of the decline of oratory. But most people would admit that Rome produced no work of literary criticism to set beside Aristotle's *Poetics* or even the treatise *On the Sublime* attributed to Longinus.

13. Fiction.—Republican and early imperial Rome knew no Latin fiction beyond such stuff as the Milesian tales of Aristides, as translated with enhanced salacity by L. Cornelius Sisenna (119–67 B.C.). But two considerable works survive from imperial times. Of the *Satyricon* attributed to Petronius there are extracts from books xv and xvi. It was apparently a rambling picaresque novel, with Milesian tales such as "The Widow of Ephesus," literary discussions, etc., inset. The disreputable characters have varied adventures and talk lively colloquial Latin. The satirical description of the vulgar parvenu Trimalchio's banquet is justly famous. Apuleius' *Metamorphoses* (*The Golden Ass*) is extant complete. The hero Lucius has accidentally been changed into an ass. After strange and exciting adventures he is restored to human shape by Isis. Amid much ribaldry runs a characteristic mystical-hermetic strain; many passages, notably the story of Cupid and Psyche, have a beauty which culminates in the apparition of Isis and the initiation of the hero, now assimilated to the author, into her mysteries. (L. P. W.)

II. MEDIEVAL AND RENAISSANCE

1. The Beginnings.—There is no break in continuity between classical and medieval Latin literature. The literary language had always been, to some extent, divorced from the language of everyday intercourse and from that of the unlettered classes. Its permanent home was in the schools of grammar and rhetoric, but a new element was introduced by what has been called Christian Latin, the Latin of the growing Christian communities in the west, including the Roman province of Africa. The language was enriched by a new and varied vocabulary which was conditioned by specifically Christian needs. The Old Latin versions of the Bible as well as the idioms of the vulgar speech exercised an influence here. A group of 3rd- and 4th-century African writers, Tertullian, Minucius Felix, Cyprian, Arnobius and Lactantius, were the creators of Christian Latin literature. They had received their education in the schools, but the influence of "Christian Latin" as well as of the spoken Latin is manifested in varying degrees in their writings.

Commodianus, in all probability an African, wrote poems for the unlearned, which show a departure from classical prosody, with a use of acrostics. The peace of the church, begun under Constantine, brought Christianity and Christian literature into the full light of day. The problem, which had already become a real one, of the attitude to be taken by educated Christians toward secular literary culture, was discussed by Augustine in his *De doctrina christiana,* where the former teacher of rhetoric gave a qualified sanction to the acceptance by Christians of the methods of the schools, while pointing out that the "lowly style" of the Scriptures contained a rhetoric of its own that appealed more directly to the heart. The same problem had tormented Jerome, who could not cast off what he had absorbed in the schools, but in the Vulgate (his translation of the Bible), which was to exercise a profound influence throughout the middle ages, he produced a masterpiece of Christian Latin. Augustine himself, like his spiritual master Ambrose, employed all the devices of rhetoric, but at the same time was often content to use a simpler style. But the rhetorical tradition was still powerful, especially in the

host of poets, who versified, for educated audiences, scriptural and other religious themes in epic style. Such were Juvencus, a Spaniard who made a Virgilian epic of the gospel story; Sedulius, an Italian, whose *Carmen paschale* relates miracles of the Old and New Testaments; a number of Gallic poets, of whom Avitus of Vienne, author of *De spiritalis historiae gestis,* is perhaps the ablest; Arator, an Italian who made an epic of the Acts of the Apostles, and Dracontius, whose *Satisfactio* is a witness to the persistence of the rhetorical tradition in Vandal Africa. The influence of the same tradition is seen in the work of two more original and important poets, Prudentius, a Spaniard, who, in his *Cathemerinon* and his *Peristephanon,* is the creator of the Christian ode, and, in his *Psychomachia,* of the Christian allegory; and Paulinus of Nola, who was a pupil of the famous Ausonius, but broke away from his master's influence and retired to Nola in Campania to devote his talents to Christian themes. Christian history in the west was represented by Rufinus, Sulpicius Severus and Orosius, whose works were widely read and used in the middle ages. Two pagan writers of the 5th century, Macrobius and Capella, the one by his *Saturnalia* and his commentary on Cicero's *Somnium Scipionis,* and the other by his *De nuptiis philologiae et Mercurii,* an allegorical introduction to the seven arts, exercised for centuries a great influence in the schools.

Hymns.—The most original and one of the most important literary creations of the 4th century was the Latin Christian hymn. Hilary of Poitiers, better known for his theological writings, composed hymns which had no lasting success. Ambrose used the simple iambic dimeter, with four-line stanzas, and his compositions formed the core of later hymnals, becoming the model for subsequent hymns, even when quantity had given way in this same metre to rhythms and rhyme. Rhyme was a familiar ornament of rhetorical prose, and its application to verse was of immense importance, since its use spread from the Latin into the vernacular poetry of Europe (*see* HYMN).

2. The 6th and 7th Centuries.—To the 6th century and to the period of Ostrogothic rule in Italy belong Boethius and Cassiodorus. The former, not merely in his celebrated *De consolatione philosophiae* but also in his translations from Aristotle and Porphyry and in his own logical and theological works, had a profound influence on the literature and philosophy of the middle ages. Cassiodorus, whose *Institutiones* laid down a programme of study which was followed for centuries, embracing Christian and the necessary secular learning, founded a monastery at Vivarium, where manuscripts were copied and whence this practice spread to other monasteries and especially to those that followed the Benedictine rule. Ennodius, rhetorician and bishop, and Maximian, a friend of Boethius, display in their verse the still persistent secularism of the Italian schools.

The Lombard invasions had disastrous results for Italian culture, but Gregory the Great, whose writings reflect at once his genius and the decay of learning, by sending Augustine to convert the English brought a new people into the orbit of Latin culture.

Under the Merovingian Franks in the 6th century conditions were unfavourable to learning. Gregory, bishop of Tours, wrote his valuable *Historia Francorum* in a style which shows the influence of vulgar Latin. The only poet of note is Venantius Fortunatus, trained in Italian schools and later bishop of Poitiers. He is the author of a number of occasional poems, but his fame rests on his two hymns, *Vexilla regis* and *Pange lingua gloriosa proelium certaminis,* composed for the reception of a relic of the cross.

In Spain, as in Italy, there was a continuous tradition of culture from imperial times. Isidore, bishop of Seville, compiled his *Etymologiae,* an encyclopaedia which handed on to the middle ages in convenient form the whole corpus of knowledge in the 7th century.

Ireland and England.—Ireland, whose evangelization St. Patrick had completed in the 5th century, had a monastically centred church, to whose religious houses, according to Bede, Anglo-Saxons resorted for the study of the Scriptures. There is little evidence in Irish Latin literature of any serious study of the classics, or, indeed, of any real knowledge of Greek. Irish Latin poetry, as in Columba's *Altus prosator* or in the hymns of the Bangor Antiphonary (7th century), is in rhythmical verse, with a fondness for rhyme, often of two syllables, though Columban uses classical measures. This love of rhyme is seen in the *Lorica,* ascribed to Gildas, and in various Anglo-Saxon poets. It is to Irish-British circles that one must assign the strange *Hisperica famina* (6th century), in a kind of rhymed prose with a mixture of words from glossaries, including Hebraisms and Graecisms, along with words of no known origin.

Latin literature in England begins in the 7th century with Aldhelm, bishop of Sherborne, whose prose and verse show the mingled influences of the Irish tradition and of the new current of learning brought from Rome to Canterbury by Archbishop Theodore and his companion Hadrian. Bede, whose ecclesiastical history is a source of the first order, is the most conspicuous representative of this revival. His scheme of studies, based on the seven arts, was carried over to the school of York from which Alcuin went to be master of the palace school at Aachen and the most prominent figure in the Carolingian revival of learning.

3. The Carolingian Revival.—Irish and Italian scholars came to the court of Charlemagne, and from Spain came Theodulph, later bishop of Orléans, a considerable poet and scholar. Nearly all the scholars of the court circle composed verses after classical models, though Paulinus of Aquileia was more at home in rhythmical verse, which was also cultivated in northern Italy and in monastic centres, such as St. Gall. History is represented by Einhard's life of Charlemagne, modeled on Suetonius, and Paulus Diaconus' *Historia Langobardorum,* a history of his own people. Alcuin composed school books as well as theological treatises and poetry. The great age of the Carolingian monasteries extends to the 9th century. Their most important achievement was the copying of manuscripts which preserved so many Latin authors. Lupus of Ferrières stands out as a humanist with an excellent Latin style, while the Irishman Johannes Scotus Erigena is an impressive and original thinker. Rabanus Maurus, teacher and encyclopaedist, presided over the school of Fulda and had as his pupil Walafrid Strabo, an accomplished versifier, and Gottschalk, a pioneer in rhyme and an attractive poet.

4. The 10th and 11th Centuries.—Among the numerous writers of the 10th and 11th centuries, theologians, chroniclers, hagiographers and poets, there are a few of outstanding importance. In France there are Odo, the great abbot of Cluny, poet as well as theologian, and Berengar of Tours. In Italy Liudprand, bishop of Cremona, diplomat, humanist and poet, wrote also a lively prose. From the north of Italy come a number of rhythmical poems, such as *O admirabile Veneris idolum* and *O Roma nobilis.* Cardinal Peter Damian was the master of an elaborate prose style and a poet who used rhythmical measures with impressive skill. Monte Cassino was a centre of learning, where manuscripts were copied and scholars trained, among them poets such as Guaiferius and Alphanus, archbishop of Salerno, who used classical measures with skill and wrote prose as well.

In Germany, Widukind of Corvey wrote a history of the Saxons, and the Irishman Marianus Scotus composed a universal chronicle, which was used by later historians. Three "epic" poems deserve mention, the famous *Waltharius,* by a monk of St. Gall, the anonymous *Ecbasis captivi,* a beast epic, and the *Ruodlieb,* also anonymous. The talented nun Hrosvitha of Gandersheim wrote lively plays in prose, as well as poems in Leonine verse. These are a few among many German poets of this time.

5. The 12th Century.—The age of monasteries was followed by that of the cathedral schools, the precursors of the universities. Under Gerbert, later Pope Silvester II, at Reims and Fulbert at Chartres a wider range of studies was established, with a more intelligent devotion to the "authors" and, in Chartres at any rate, in the 12th century, with the appearance of "Platonizing" influences, of which a remarkable monument is Bernard Silvestris' *De mundi universitate,* a mixture of prose and verse. Alain of Lille (Alanus de Insulis), theologian and poet, author of the *Anticlaudianus* and the *De planctu naturae,* was similarly a Platonist, though with Aristotelian elements in his thought. The cathedral schools produced famous poets in Hildebert of Tours,

Marbod of Rennes and Balderich of Bourgueil. Gautier de Châtillon and Joseph of Exeter wrote elaborate epics, the former on Alexander and the latter on the Trojan war. John of Salisbury, the most famous medieval humanist, represents all that was best in the 12th-century renaissance; he owed as much to his masters at Chartres as to Peter Abelard and other teachers at Paris. In England he was a member of the Canterbury circle with which Walter Map and Nigel de Longchamps had been connected. The former is known by his *De nugis curialium,* a mixture of gossip and folklore and satire, and the latter by his *Speculum stultorum,* an amusing satire in elegiacs. The writings of Giraldus Cambrensis have a quality which is all their own.

The *Historia regum Britanniae* by Geoffrey of Monmouth had an unprecedented success in a century which took a great interest in romantic tales, as well as in the stories presented in poetical form under the title of *comoediae.* The study of classical satirists and moralists is a mark of this century, when the *Ethics* of Aristotle had not yet been discovered. At the same time, there was an immense growth of historical writing, centred largely in the monasteries and prompted not merely by the widening of the intellectual outlook but also by great events and movements, such as the crusades, which called for record, often in imitation of the style of ancient historians. Among these writers may be singled out Sigebert of Gembloux, Guibert of Nogent, Orderic Vitalis, William of Malmesbury, Suger of St. Denis, Otto of Freising, William of Tyre, Saxo Grammaticus and, later, Matthew Paris.

6. The Sequence.—The most original poetical creation of the Latin middle ages was the sequence, sung between epistle and the gospel at the Mass. Beginning as a piece of poetical prose, it had as its most famous exponent, though not its inventor, the 9th-century Notker Balbulus of St. Gall. By the 12th century, it had developed into an elaborate rhymed and rhythmical composition, reaching its perfection in the sequences of Adam of St. Victor, in which masculine and feminine rhymes of two syllables are used with great effect.

7. Lyric.—The history of the Latin lyric is closely connected with developments in music. The Cambridge Songs, an 11th-century collection, made, it would seem, in the Rhineland, has secular pieces in early sequence form as well as love lyrics in simple rhythmical measures. As skill in the use of rhyme developed, the lyric assumed a variety of forms. The late 12th and the 13th centuries are its flowering time. The various collections, such as that of Benediktbeuern (*Carmina Burana; see* GOLIARD), contain religious, moralistic and satirical pieces along with erotic poems, all of which were composed to be sung to cultivated audiences in monastic, cathedral and similar learned circles. The authors of most of these poems are unknown, but Gautier de Châtillon covers the whole range of this lyric verse. With Hugh Primas of Orléans, a master of invective, may be mentioned the famous "Archpoet" and Peter of Blois, another accomplished poet as well as a man of letters. Philip the chancellor of Paris excelled in religious as well as in satirical verse.

Poetry was regarded as a branch of rhetoric, and its principles were laid down in versified *artes poeticae,* the most famous of which by Geoffrey of Vinsauf was known to Chaucer.

8. Religious Literature.—From the late 11th century onward, apart from purely theological and philosophical writings with which this article is not concerned, and apart from the vast output of hagiography, of which Jacobus de Voragine's *Legenda aurea* is the most famous example, there was a growing stream of devotional and religious writing. Anselm of Canterbury put his *Monologion, Proslogion* and *Cur deus homo* into literary form, and in addition, his prayers gave a great impulse to the movement of personal devotion, which Bernard of Clairvaux, a religious genius of the first order, transmitted to the Franciscans. William of St. Thierry and Aelred of Rievaulx belong to the same devotional movement. The meditations of Guigo, prior of the Grande Chartreuse, are unparalleled in medieval Latin literature. Hugh of St. Victor and Richard of St. Victor represent a conservative theology, with a humanistic background, and, in the case of Richard, a mystical emphasis. Devotional literature culminates in England in Richard Rolle of Hampole and, on the continent of Europe, in Thomas à Kempis. It is largely cast in the form of prayer and meditation, though Franciscan literature contains as well the various accounts, official and unofficial, of Francis and his followers. In poetry, Franciscan meditation reaches its height in the anonymous *Stabat mater* and in the *Dies irae* which is probably to be ascribed to Thomas of Celano. John of Howden and John Pecham, the latter a Franciscan who became archbishop of Canterbury, are among the greatest devotional poets of the middle ages.

9. Renaissance.—The term "Renaissance Latin" is associated in 14th-century Italy with Dante and then with Petrarch and Boccaccio, though mention should also be made of Albertino Mussato, Coluccio Salutati, Leonardo Bruni and Aeneas Silvius Piccolomini (Pope Pius II). In verse there was a return to classical models and to classical elegance. In prose, Latin was still a necessary medium for the abundant literature, humanistic, historical, scientific, philosophical and religious, which was one of the marks of the new age. This international literature is so vast that it is possible here to mention only a few names (*see* further RENAISSANCE).

In Italy there were three main centres of learning and literature in the 15th and 16th centuries, Florence, Rome and Naples. Poggio, Marsilio Ficino, Giovanni Pico della Mirandola, Politian and Francesco Landini belong to the Florentine circle. In Rome were Pietro Bembo, Giovanni Cotta, Marco Vida and many others. At the court of Naples Giovanni Pontano was pre-eminent; other famous poets and scholars were Jacopo Sannazzaro, Antonio Beccadelli (Panormita), Lorenzo Valla, Andrea Navagero and Girolamo Fracastoro. Michele Marullo, of Greek origin, is found in all three centres of learning. His love lyrics, poems of exile and pagan *hymni naturales* can still be read with pleasure. The renowned Battista Spagnoli (Mantovano), general of the Carmelite order, was a prodigious composer of verse, whose eclogues were widely read. In the Renaissance centuries the pastoral was a favourite genre. There were sacred eclogues and profane eclogues, Sannazaro alone showing originality in his *Piscatoriae,* where fisher folk took the place of shepherds. Germany and the Low Countries made a large contribution in prose and verse to Latin literature in the 15th and 16th centuries. Nicolas of Cusa and the great Erasmus owed their early education to the Brethren of the Common Life, who laid much emphasis on the study of the classics. The German abbot Johannes Trithemius was a historian and scholar with an immense range of interests and knowledge. Conradus Celtis is conspicuous as a German humanist and poet, while Petrus Lotichius wrote elegant elegiacs. The *Basia* of Johannes Secundus, who was of Dutch origin, have been much admired.

Spanish humanism is best seen in Juan Vivès, while in England Thomas More is the outstanding literary figure. Polydore Virgil, an Italian, in writing his *Historia Anglica,* brought the new methods of historiography into England, though Tito Livio Frulovisi, poet and historian, had lived in England and had written a life of Henry V which influenced later English writers. Among many Latin poets mention should be made of George Buchanan and John Barclay, both Scots. The strong English tradition of the composition of classical verse in the schools is shown in the Latin poems of distinguished 17th-century poets such as John Milton, Henry Vaughan, Richard Crashaw and Abraham Cowley. In the 18th century Vincent Bourne had many admirers.

In France, where, as in England, the Renaissance came late, some members of the Pléiade (*q.v.*) wrote Latin verse, among them J. A. de Baif and Rémy Belleau. The foundation in 1530 of the Collège Royal by Francis I was an event of importance for learning and Latin poetry, though the triumph of the vernacular was assured after Joachim du Bellay's famous manifesto (1549). But Latin poems continued to be written, and the hymns of the brothers Santeuil and of Charles Coffin, composed in classical measures, were taken into liturgical use (17th and 18th centuries).

Until the early 18th century, Latin was recognized as the best medium for historical, antiquarian and scientific work if it were to reach a European audience. Hence Ficino and Pico della

Mirandola, Erasmus and More, and later, Francis Bacon, Hugo Grotius, Descartes, Spinoza and Newton used what was still an international language.

See also references under "Latin Literature" in the Index.

(F. J. E. R.)

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LATIN RIGHTS (JUS LATII, LATIUM), a term used in the later Roman republic and the empire to denote a status of individuals and communities, probably derived ultimately from the relation of the early Latin communities to Rome and perhaps directly from that of the Latin colonies. By the Cassian treaty of 493 B.C. the communities of the Latin league were bound to Rome by a perpetual alliance in which both parties would share equally the booty taken in a common war and would judge disputes in the town where the agreement was made and according to its law. These relations continued, extended also to the Hernici (486), involving the rights of *commercium* (contract) and *conubium* (intermarriage), even after the Latin revolt (340) and the dissolution of the Latin league (338). Most of the old Latin towns were then incorporated into the body of Roman citizens, and the "Latin name" (*nomen latinum*), apart from the remaining old Latin towns, began to consist mainly of the Latin colonies, many of whose citizens had been recruited from Roman citizens. These colonies were autonomous communities, composed of settlers drawn from Latin towns and from Rome, subject to Rome in foreign policy, through which Rome occupied many of the strong points of Italy as it expanded. As Latins they formed an intermediate group between the Roman citizens and the Italian allies. It is probable that the old Latins had *jus migrationis,* the right to attain Roman citizenship by moving to Rome and being registered there, but it may have arisen, as P. Fraccaro suggests, from the relation of Rome to Romans who had accepted Latin status when they settled in Latin colonies. In 187 this right was limited at the request of the colonies, which were becoming depopulated, and later disappeared altogether. Two further rights were granted, apparently before 123: the right of appeal against a magistrate with *imperium,* a grant probably due to abuse of the *imperium* by certain Roman commanders; and the right of magistrates and their families in Latin colonies to receive Roman citizenship. Whether this right was given to compensate for the loss of the right to move to Rome or as a way of attaching the leading families more closely to Rome remains uncertain. If the latter, it was successful, for the Latin colonies remained loyal in the Social War (or "war of the allies").

The incorporation of many of the old Latin communities in the Roman citizen body in 338 began the process which dissociated Latin right from the territory of Latium and the Latins. It was advanced by the expansion of Latin colonies, and by the grant of Latinity to the children of Roman soldiers and native women in the colony of Carteia in Spain (170). It was completed with the grant of Roman citizenship to Italy in 89 and the grant of Latin right under the *lex Pompeia* that year, not to colonists, but to residents of Transpadane Gaul. These fictive Latins adopted the municipal pattern, the language and the law of Latins, while their demand for Roman citizenship quickly became a political issue in Rome, and was granted in 49 by Caesar. Latin right as *municipia* or as fictitious colonies was granted by Caesar and Augustus to many native communities in the western provinces, and the process went on until Vespasian gave it to all the organized communities of Spain. Later emperors extended it freely in these and in the northern provinces. The status became in practice an intermediate step in the advancement of native communities to Roman citizenship; effective as leading elements, the magistrates and their families immediately attained it. Under Hadrian appeared the *Latium maius,* a right the grant of which allowed all the council members (*decuriones*) to attain Roman citizenship, a measure which may indicate the need to make the decurionate more desirable. But the right itself was wanted; otherwise towns would not have sent embassies to petition for it. The edict of Caracalla (A.D. 212), which granted Roman citizenship to all but *dediticii* (surrendered barbarians and freed slaves of bad character), reduced the distinction between Latin and Roman status to a mere formality, but the titles continued for a time. *Latini Juniani* were a special class created by the *Lex Junia* (*c.* 17 B.C.), which defined the status of slaves who had been informally manumitted. Slaves who were freed without meeting the conditions of the *Lex Aelia Sentia* (A.D. 4) regarding age of slave or of manumitter became *Latini Juniani.* They might, however, obtain full citizenship by raising a family or by performing some other service to the state.

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LATINUS, in Roman legend, king of the aborigines in Latium and eponymous hero of the Latin race. In Hesiod's *Theogony* he is the son of Odysseus and Circe and ruler of the Tyrsenians; in Virgil, the son of Faunus and the nymph Marica, a national genealogy being substituted for the Hesiodic, a piece of Roman reshaping of the story. Latinus was a shadowy personality, in-

vented to explain the origin of Rome and its relations with Latium.

According to Virgil's *Aeneid,* Aeneas, on landing at the mouth of the Tiber, was welcomed by Latinus, the peaceful ruler whose seat of government was Laurentum, and ultimately married his daughter Lavinia.

LATITUDE AND LONGITUDE, by means of which the position or location of any place on the earth's surface can be determined and described.

Latitude is a measurement on a globe, or map, of location north or south of the equator. It is measured from the equator to both poles in degrees and fractions thereof; 1 degree (°) equals 60 minutes (′) and 1 minute equals 60 seconds (″); for example, 30° 15′ 20″ north latitude. From the equator to either pole is 90° ($\frac{1}{4}$ the circumference of the earth), thus the greatest possible latitudes are 90° N. and 90° S. As aids to show different latitudinal positions, equidistant circles are plotted and drawn parallel to the equator and to one another. These circles are known as parallels, or parallels of latitude, and they may be drawn in any convenient number on a given globe or map.

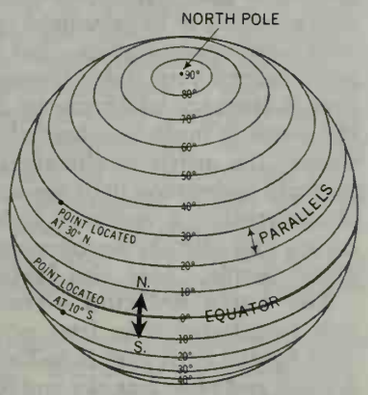

FIG. 1.—PERSPECTIVE OF THE GLOBE WITH PARALLELS OF LATITUDE

Technically there are different kinds of latitude—geographical, astronomical, geocentric—but there are only minor differences among these. In most common references geographical latitude, the kind used in mapping, is implied. Geographical latitude is the measurement of the length of arc along a north-south line, called a meridian, between the equator and the given point, as 30° N. ($\frac{1}{3}$ the distance from the equator to the north pole) or 10° S. ($\frac{1}{9}$ the distance from the equator to the south pole). Different methods are used to determine geographical latitude, as by taking angle-sights on certain polar stars or by measuring the angle of the noon sun above the horizon by means of the sextant (*q.v.*). The length of a degree of arc of latitude is approximately 69 mi., varying, because of the nonuniform curvature of the earth's surface, from 68.704 mi. at the equator to 69.407 mi. at the poles.

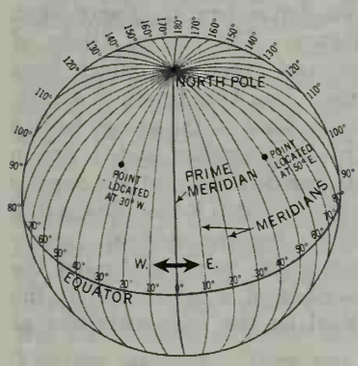

FIG. 2.—PERSPECTIVE OF THE GLOBE WITH MERIDIANS OF LONGITUDE

Longitude is a measurement of location east or west of the prime meridian, the specially designated zero meridian that passes through Greenwich, Eng. Like latitude, longitude is measured in degrees and fractions thereof; for example, 30° 30′ 15″ east longitude. More technically, longitude is the amount of arc created by drawing a line from the centre of the earth to the intersection of the equator and the prime meridian and another line from the centre of the earth to any point elsewhere on the equator. Longitude is measured both 180° east and 180° west of the prime meridian, the two together making the full 360° of the earth's circumference. As aids to locate longitudinal positions, meridians are plotted and drawn directly from pole to pole, where meridians meet. The number of miles per degree of longitude at the equator is about 69.17 statute miles (of 5,280 ft. each), and at the poles 0. (For the relationship between longitude and time, *see* TIME, STANDARD.)

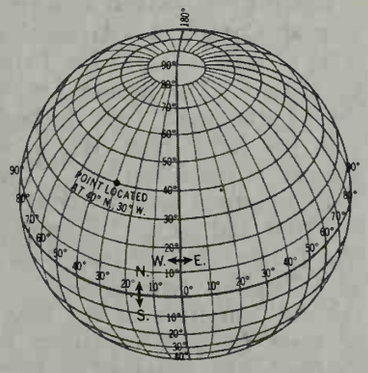

FIG. 3.—PERSPECTIVE OF THE GLOBE WITH GRID FORMED BY PARALLELS AND MERIDIANS

The combination of meridians and parallels establishes a framework or grid by means of which exact positions can be determined in reference to the prime meridian and the equator; for example, a point described as 40° N., 30° W. is located on the 40th parallel north of the equator and on the 30th meridian west of the prime meridian.

See also MAP: *Map Projections: Basic Concepts.*

(R. M. GL.)

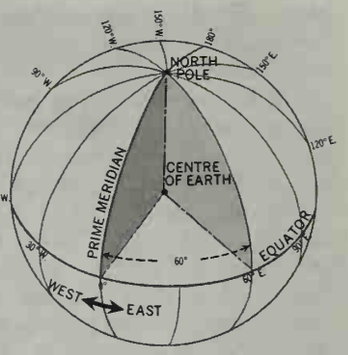

FIG. 4.—VIEW OF EARTH GLOBE WITH CUTOUT SECTION INDICATING 60° OF EAST LONGITUDE (NOTE EQUATOR, PRIME MERIDIAN AND EARTH'S CENTRE)

LATIUM (modern LAZIO), an area in west central Italy, originally limited to the territory around the Alban hills, but extending by *c.* 500 B.C. south of the Tiber river as far as the promontory of Monte Circeo. It was bounded on the northwest by Etruria, on the southeast by Campania, on the east by Samnium and on the northeast by the territory of the Sabini, Aequi and Marsi. The modern *regione* of Lazio (*q.v.;* capital Rome) extends farther to include the entire coastal plain between the Fiora river in the north and the Garigliano river in the south, and is bounded by the Apennines on the east.

The history of Latium is inseparable from the destiny of Rome, beginning in the middle of the 8th century B.C., on the Alban hills. But Rome, which became the city par excellence, eclipsed the towns that surrounded it, and this has slightly obscured the fact that primitive Rome had its roots in a civilization which was common to all the peoples of Latium. Modern research gradually brings to light this initial community of Latin civilization and shows how the first centuries of Roman history cannot be understood apart from the history of the whole of the Latin plain and of the Alban hills. The present article aims to single out the originality of the Latin peoples and thereby throw light on the first centuries of the life of Rome itself.

The Country.—The geological features of Latium are described elsewhere (*see* ITALY: *Physical Geography*); the essential characteristics of this small sector of central Italy must be outlined here, however, since they can help to explain certain aspects of the Latin temperament. Latium is the plain of the lower Tiber valley, the earth of which is made up of volcanic tufa, covered by a thin layer of humus. Agricultural work has to be constant and intensive in such a region. The climate is dry, the watercourses (the Tiber and its tributaries) are Mediterranean in behaviour. Irrigation is necessary everywhere. It is therefore not surprising that the Latins were a peasant people, tenacious and attached to the land. The crest of this land of plains is formed by the mass of the Alban hills, which dominate the Campagna of Rome. Its extinct volcanoes are covered with vegetation, enclosing great lakes and containing a large number of fresh-water springs. These natural amenities attracted men from early times.

Latium has a long coast line, but being flat and without indentations the coast does not favour the establishment of ports or give scope for maritime pursuits. The mountains grouped around Latium are crossed by several natural routes which separate them and permit communication with the surrounding regions. This is where the great Roman roads of the historical era originated, which became the Via Aurelia, the Via Cassia and the Via Flaminia leading to Tuscany and Emilia in the north; the Via Salaria and the Via Valeria toward the east and the Adriatic sea; and the Via Latina and the Via Appia toward the south and Campania. Latium is, as it were, a crossroads in a country sharply divided into compartments by natural features, and this was a precious advantage.

The Latin People.—Although varied documentary and archaeological evidence exists for the Latins in the historical period, the study of them is more difficult during the obscure centuries of their proto-history, the period in which the Latin people was formed and began to be an ethnic whole with lasting character-

istics. For the study of this period it is necessary to depend on the sciences auxiliary to history, such as linguistics, epigraphy and archaeology.

The Latins were sprung from those Indo-European tribes which, during the 2nd millennium B.C., came to settle in the Italian peninsula and acquired, during the historical epoch, certain distinct though related features. Out of the pattern formed by the peoples of primitive Italy, a few outstanding elements may be mentioned: the Veneti in the northeast, the Umbrians, the Latins, the Oscans and the Samnites in the centre, and the Sicels in Sicily. The study of their language makes it possible to establish with some nicety relations between one people and another, and to some extent fix the order in which they came to Italy. The Latins appear to have formed part of a first wave of invaders with the Veneti and the Sicels, the Oscans and the Umbrians of a second wave. Latin, Venetic and Sicel speech reveal an archaism which is not found in the same degree elsewhere. The Latins, together with their neighbours the Falisci, also speaking Latin, thus represent a portion of those tribes, now called proto-Latins, who came from the north at an early period and settled in various parts of the peninsula. The Latins retained their ethnic individuality and their archaic speech, which shows that this small people possessed, from its origin, a singular organizing power and cohesion.

From the initial centuries of the 1st millennium B.C., the Latins as a people had an overt existence. The Latins originally established themselves on the mass of the Alban hills, which was isolated and easy to defend. In the beginning they may have been called Latii, whence later came the names Latinienses and Latini. The last form of the name passed into common usage. The Latins dominated and controlled the surrounding plain, but neighbouring tribes, settled on the spurs of the Apennines, barred their way to the east and the south: the Sabini, Aequi, Marsi, Hernici, Volsci and Aurunci. On the wooded heights of the Alban hills the Latin tribes were to develop a special culture. The essential features of their language and religion are discussed below; many of these features are shared by Rome itself.

The Latin Language.—The Latin language appeared for the first time in epigraphic documents, of which the oldest, an inscription engraved on a gold fibula from Praeneste, dates back to *c.* 600 B.C. At some time in the 7th century the Latins borrowed their alphabet from their powerful neighbours north of the Tiber, the Etruscans. The Etruscan alphabet had itself been previously borrowed from the Greeks. For a long time it was thought, and some scholars still assert, that the Latin alphabet was derived directly from the Greek alphabet and that the Latins had received it from one of the Hellenic colonies in the south, perhaps from Cumae. But modern research has established beyond doubt the Etruscan source of the Latin alphabet. The positions of the unvoiced and the voiced gutturals, C and G, are sufficient proof of this. Etruscan had no voiced consonants, and so the Etruscans gave a silent value to the third letter of the Greek alphabet, the gamma, which became the C of the Latin alphabet. The Latins, not having any letter to denote the voiced guttural which they habitually used in their speech, were compelled in the 3rd century B.C. to create a new letter, the G, which took the seventh place in their alphabet. Thus the positions of C and G in the various Romance languages are explained. The Latins could not have borrowed their alphabet from the Etruscans after the end of the 7th century B.C. because the Praeneste fibula dates from about 600 B.C.

This alphabet, which is of Greek type but which came via Etruria, has served to note down the Latin language which is known from the Roman epigraphic and literary texts. In fact, Roman Latin supplanted fairly rapidly the dialects which were spoken in the various regions of Latium. At the same time, the peculiarities of the Latin of Falerii (Faliscan) and of the Latin of Praeneste are known. The inscription on the Praeneste fibula runs thus: *Manios med fhefhaked Numasioi,* a form which in classical Latin would read *Manius me fecit Numerio,* "Manius made me [the fibula] for Numerius." The details of the text are explained as a whole by their early date, but the reduplication *fhefhaked* is a form peculiar to Praeneste.

As a general rule the Latin language has an archaic character and has rural traits: it is a language of peasants, in short. From very early times, important terms of civilization were borrowed from the Greek, such as *machina* ("invention," "machine"); *poena* ("fine," "punishment"). In the same way the vocabulary received several terms of Etruscan origin, such as *persona* ("mask" or "character"), *histrio* ("actor") and *subulo* ("flute player"). All this is what might be expected of a small, rural people, naturally tending to be influenced by the languages spoken by peoples with a higher civilization. But in the main the Latin vocabulary has remained very stable throughout its history. Latin is, moreover, a language which can be defined as synthetic; the order of the words is much less fixed than it is in English syntax for instance; the article is absent; the sense of a phrase cannot be properly understood until one arrives at the end. These linguistic characteristics, a stubborn archaism and a synthetic structure, accord well with the temperament of this hardy, patient and disciplined people. (*See* also ITALIC DIALECTS; LATIN LANGUAGE.)

The Latin Religion.—The religion of the Latin tribes can only be inferred from later evidence concerning it. Their gods were for the most part Indo-European; the first among them was Jupiter, god of a clear sky and lightning. The goddess Diana also was a divinity of light. Although the Latins were split up into 31 smaller peoples, according to the elder Pliny (*Natural History,* iii, 69), they were all conscious of their common origin and destiny. Their holy places were situated on the Alban hills. On the Monte Cavo (Mons Latiaris) was the central sanctuary of Jupiter, and that of Diana was on the shore of the picturesque Lake Nemi. The first appears to have been more directly dependent on Alba Longa (*q.v.*), the second on Aricia (*q.v.*). There were, no doubt, grades in their pre-eminence. The cult of Diana of Nemi involved certain very archaic and cruel rites which have prompted a vast amount of literature. The king-priest of Diana, who was called the *rex nemorensis,* the king of the grove, had to be killed in certain circumstances by his successor, and it was in this way that a succession of ritual murders ensured the service of the goddess of the Latin forests. When Rome dominated Latium, it assumed the responsibility for the cult of Jupiter Latiaris, and every year, on Monte Cavo, were celebrated the Feriae Latinae, marked by the sacrifice of a white heifer, the meat of which was shared as a ritual by the representatives of the Latin cities.

The religion of Rome, a Latin city, owed much to the relations it had with the neighbouring sister towns, such as Lavinium and Tusculum. Lavinium (*q.v.*) was founded, according to legend, by Aeneas, and its name is derived from Lavinia, Aeneas' wife. It occupies an important position in the history of the foundation of Rome. The feasts held in Lavinium preserved into the historic era those ancient Latin cults whose continuance was assured by the presence of Rome in the place of their origin. Roman praetors, consuls and dictators went every year to Lavinium to make sacrifice to Vesta and the Penates when they assumed their duties and at the end of their appointments. Castor and Pollux, the Dioscuri, patron heroes of equestrian youth, received constant worship at Tusculum before a temple was built to Castor, in 485–484 B.C. in the forum of Rome.

Latin Civilization and the History of Latium Until the Roman Conquest.—Archaeology makes it possible to assess the level of civilization of the Latin people in the first centuries of its history. The Bronze Age left only slight traces in Latium. On the other hand, from the beginning of the 1st millennium B.C., with the Early Iron Age, a reasonably flourishing culture developed in the Alban hills. The Latin tribes which settled there were influenced both by the civilization of the Iron Age of southern Italy and by the Villanovan civilization of southern Etruria. The Latins cremated their dead and deposited their ashes in urns of Villanovan type as well as in hut-shaped urns which were faithful imitations of the huts of the living. The decoration of these funerary containers is of a simple geometrical type, similar to that engraved on bronze objects found in these tombs, such as razors, spindles, weapons and brooches. The material used for the tombs in the Alban hills resembles the material found

in contemporary tombs in Rome, but is occasionally rougher and coarser in appearance.

In approximately 600 B.C., when the Etruscans occupied Latium and settled in Rome, the bridgehead between Etruria and Campania, the influence of Etruscan civilization and art made itself felt as much in the Latin towns as in Rome itself. But Rome soon became a large city, similar to the powerful cities of southern Etruria, and it took precedence over its neighbours. It is in the light of this fundamental fact that the ancient tradition regarding the reign of the Tarquins in Rome should be understood. Rome dominated Latium as long as the Etruscans stayed there. According to the annalistic tradition it was a specifically Roman rising that drove the Etruscans from Rome in 509. In fact it was a coalition of Latins and Greeks which led to the Etruscans' withdrawal from Latium in 475 B.C. The Etruscan cavalry was still in their ranks when the Roman troops were confronted by the Latins at the beginning of the 5th century (499 and 496 are the alternative dates given in the annalistic tradition) at the battle of Lake Regillus.

After the departure of the Etruscans the fortunes of Latium changed; it became impoverished. Rome lost its pre-eminence over the neighbouring cities and took a long time to recover it. Throughout the 5th century the Latin league imposed its policy on Rome. Every year the delegates of the Latin cities elected a dictator who commanded a federal army which included Roman troops. In this league Tusculum seemed to exercise the leadership Rome had held in the Etruscan period. The territory of Rome did not extend beyond the sixth mile from the city.

The life of the mass of the Latin people was threatened by the proximity of turbulent peoples, the Volsci who dwelt in Antium, and the Aequi who ruled Praeneste and Tibur. The legendary story of Coriolanus shows how, in the early 5th century B.C., Rome began, still timidly, to extend its territory toward the south, by fighting on the side of Ardea and Aricia against the Volsci. It was at the end of the 5th century that Roman colonies were established in the Monti Lepini. In the 4th century B.C. Rome began to take precedence among the sister cities of Latium, weakened by their dissensions. In 358 B.C., however, Rome and the Latin confederacy concluded a treaty of alliance on a basis of equality. They nominated in turn the dictator of the league. But the strength of Rome grew, and it established two tribes in Volscian territory. Then war broke out between Rome and the Latins, a war which lasted from 340 to 337. It meant the defeat of the Latins and the dissolution of their league. The Latin cities were given political statutes which limited or abolished their autonomy. Henceforth Roman hegemony in Latium was an accomplished fact and the life of the Latin country was soon modeled on that of the city.

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LA TOUR, GEORGES DE (1593–1652), French painter, who was well known in his own time but then forgotten until well into the 20th century, was born in the vicinity of Lunéville, Lorraine (now in Meurthe-et-Moselle), on March 19, 1593, and died there on Jan. 30, 1652. Little is known about his life, but there is no doubt about an artistic relationship between the artist and his contemporaries from Lorraine, Jean le Clerc and Jacques Bellange. Few paintings by his hand are known, and it is strange to note that replicas exist of almost every one of his authentic works. Most of his paintings represent candlelight scenes, although there are also a few surprisingly bright daylight pictures. Only two of la Tour's works are dated (1645 and 1650), and at times it is difficult to arrive at the correct interpretation of his subjects. His expression in form and colour is most individual and original, and he aims at a simplification of form which frequently gives his pictures a deceptively modern appearance. His realist style is not entirely without some mannerist traits, yet his work

WIDE WORLD

"THE FORTUNE TELLER" BY GEORGES DE LA TOUR. IN THE METROPOLITAN MUSEUM OF ART, NEW YORK

as a whole is marked by an almost classical calm.

Among la Tour's most impressive night scenes are "The Prisoner" (Épinal), "The Newborn Child" (Rennes), "St. Joseph in the Carpenter's Shop" (Paris) and "St. Sebastian and St. Irene" (Berlin). Among his most important daylight compositions are "The Hurdy-Gurdy Player" (Nantes museum), "The Sharper" (P. Landry, Paris) and "The Fortune Teller" (Metropolitan museum, New York city).

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(V. BL.)

LA TOUR, MAURICE QUENTIN DE (1704–1788), French pastelist whose animated and sharply characterized portraits made him one of the most successful portraitists of the age of enlightenment, was born at St. Quentin on Sept. 5, 1704. Early in his youth he went to Paris where he entered the studio of the Flemish painter Jacques Spoëde. He then went to Reims, Cambrai (1724) and England (*c.* 1725), returning to Paris to resume his studies *c.* 1727. In 1737 La Tour exhibited the first of that splendid series of 150 portraits which formed the glory of the Salon for the succeeding 37 years. Among his subjects were Rousseau, Voltaire, Louis XV and Mme de Pompadour, of whom he did a life-size portrait. In 1746 he was received into the Academy, and in 1751 was promoted to councilor. La Tour was made portraitist to the king in 1750. In 1766 he visited Holland. La Tour retired at the age of 80 to St. Quentin where he died on Feb. 17, 1788.

LA TOUR D'AUVERGNE, a French noble family remarkable for its controversial self-advancement. With its seat at La Tour in western Auvergne, it was descended from Bertrand de La Tour (fl. 1190), whose son Bernard was knighted by Raymond VII of Toulouse in 1244. With this Bernard's great-grandsons, Bernard and Bertrand, the house was divided between the senior line of La Tour and the junior line of Olliergues (in eastern Auvergne). The last-named Bernard's great-grandson Bertrand in 1389 married Marie, heiress of the countships of Auvergne and Boulogne; but his grandson Bertrand exchanged Boulogne for Lauraguais (a countship in western Languedoc) in 1478. The senior male line died out in 1501 with Bertrand's son Jean, through whose second daughter Madeleine the inheritance passed to Catherine de Médicis.

The line of La Tour d'Olliergues had meanwhile inherited the viscounty of Turenne by marriage (1444); but its real greatness began in 1591, when Henri I de La Tour, vicomte de Turenne, 8th in descent from Bertrand, seigneur d'Olliergues, married Charlotte de La Marck (d. 1594). She left him her titles to Bouillon and to the so-called principality of Sedan. His sons

by a later marriage were Frédéric Maurice, duc de Bouillon, and the great Henri, vicomte de Turenne. The duc, in compensation for Sedan, obtained not only the French duchies of Château-Thierry and Albret in 1651 but also the countship of Auvergne, the barony of La Tour and court rank as "foreign princes" for his house. The name La Tour d'Auvergne was then exploited to imply not merely an origin in Auvergne but lordship over Auvergne; and the family sought to prove itself descended from a certain Acfred, count of Auvergne and duke of Aquitaine in the 10th century. The genealogist Étienne Baluze accepted as proof of this claim documents allegedly extracted from a cartulary of the abbey of St. Julien at Brioude; but in 1704 the immediate sponsor of these documents, Jean Pierre de Bar, was convicted (rightly or wrongly) of forgery.

The last duc de Bouillon of the direct line of Olliergues died in 1802; but the house survived till 1896 in the comtes d'Apchier (descended from Antoine Raymond, seigneur de Murat, a brother of Henri I de La Tour's great-grandfather), who came to rank as princes de La Tour d'Auvergne because they were named as eventual heirs by wills of the ducs de Bouillon of 1769 and 1791. Finally, despite lawsuits, the house of La Tour de Lauraguais (with lands in Lauraguais but not the countship) obtained in 1829 authorization to call itself La Tour d'Auvergne-Lauraguais; it had a dubious claim that its ancestor, Bernard, seigneur de Juges or de Juses (fl. 1367), was a grandson of the Bernard knighted in 1244. (J. G. R.-S.)

LA TRAPPE, NOTRE DAME DE, a Cistercian monastery located near Soligny, Normandy, 80 mi. W. of Paris, in the *département* of Orne and the diocese of Séez. Founded as a Benedictine house in 1122, it was united with the Cistercian order in 1148. For several centuries, during which it survived the Black Death and the Hundred Years' War, its history was that of a fervent Cistercian abbey. But in the 16th century it fell prey to the system of the commendatory abbot (*see* COMMENDATION) and by the middle of the 17th was in ruins. Things changed, however, when Armand Jean le Bouthillier de Rancé (*q.v.*) became commendatory abbot. In 1664 Rancé instituted a reform which revived the abbey and led to the establishment of a group of fervent monasteries. La Trappe was closed by the French Revolution but opened again after the fall of Napoleon. Expelled in 1880, the Trappists soon returned and have weathered two world wars; in the Cistercian order the monastery now ranks second after Cîteaux. The spirit of La Trappe is that of the modern revival of strict Cistercianism, which is strong in the English-speaking world, particularly in the United States. *See* also CISTERCIANS: *Trappists*.

See Thomas Merton, *The Waters of Siloe* (1949). (E. A. R.)

LATREILLE, PIERRE ANDRÉ (1762–1833), French priest and naturalist noteworthy for studies in insect classification, was born at Brive-la-Gaillarde (Corrèze), on Nov. 20, 1762. In 1778 he entered the Collège Lemoine at Paris, and on his ordination in 1786 retired to Brive, where he devoted his leisure to the study of entomology. In 1788 he returned to Paris, but during the Revolution was imprisoned at Bordeaux. Latreille's *Précis des caractères génériques des insectes, disposés dans un ordre naturel,* which appeared at Brive in 1796, led to his being entrusted with the arranging of the entomological collection at the recently organized Muséum d'Histoire Naturelle (Jardin des Plantes). He died in Paris on Feb. 6, 1833.

Latreille's other works include *Histoire naturelle générale et particulière des crustacés et insectes,* 14 vol. (1802–05); *Genera crustaceorum et insectorum, secundum ordinem naturalem in familias disposita,* 4 vol. (1806–07); *Considérations générales sur l'ordre naturel des animaux composant les classes des crustacés, des arachnides, et des insectes* (1810); *Familles naturelles du règne animal, exposées succinctement et dans un ordre analytique* (1825); *Cours d'entomologie,* vol. i (1831).

LA TRÉMOÏLLE, one of the French noble families that came to rank as "foreign princes" under the *ancien régime.* The name is taken from that of a village in Poitou (the modern La Trimouille in the Vienne *département*). A Pierre de La Trémoïlle is recorded as early as *c.* 1040, but the first ancestor from whom the family's descent can be certified is HUMBERT (fl. early 13th century). GUY (d. 1397), 6th in descent from Humbert, was appointed standard-bearer of France, went with John the Fearless, duke of Burgundy, on the crusade to Hungary, was captured by the Turks in the battle of Nicopolis (1396) and died of his wounds in Rhodes. His son GEORGES DE LA TRÉMOÏLLE (*c.* 1382–1446) became chamberlain to John the Fearless in 1407, accompanied him to Paris in 1413, transferred his loyalty to the French court and, in 1416, married Jeanne d'Auvergne-Boulogne (widow of Jean de France duc de Berry), whom he treated so harshly that she died *c.* 1423. With the help of the constable de Richemont (*see* ARTHUR III, of Brittany), he procured the drowning of King Charles VII's favourite Pierre de Giac in Feb. 1427, married Giac's widow (Catherine de L'Isle-Bouchard) in July and took Giac's place in the king's counsel, where he obstructed the influence of Joan of Arc. The constable, disgusted with him, took him prisoner in 1433 and made him leave the government. As Charles VII failed to protect him, Georges joined the revolt of the Praguerie in 1440.

Georges de La Trémoïlle's son LOUIS I (*c.* 1431–1483) brought the so-called principality of Talmond and the viscounty of Thouars into the family by marriage. His son LOUIS II (1460–1525) won a reputation for blameless chivalry comparable to Bayard's: he defeated the French rebel princes at St. Aubin-du-Cormier (1488) and served gloriously in the Italian campaigns till his death in the battle of Pavia. As his son CHARLES, prince de Talmond (1485–1515), had been killed at Marignano, Louis was succeeded by his grandson FRANÇOIS (1502–42), who in 1521 had married Anne de Laval, granddaughter of Frederick of Aragon, the deposed king of Naples (*see* LAVAL). Their son LOUIS III (1522–77) was created duc de Thouars, with hereditary succession to females in default of males, in 1563. His youngest brother CLAUDE (d. 1566), sieur de Noirmoutier, was the great-grandfather of the first duc de Noirmoutier, LOUIS DE LA TRÉMOÏLLE (1612–66), whose daughter ANNE MARIE was the famous princesse des Ursins (*q.v.*).

Louis III's son CLAUDE (1566–1604)—whose sister CHARLOTTE (1568–1629) married Henry I de Condé (*see* CONDÉ, PRINCES DE)—became a Huguenot in 1586 and served Henry IV of France in the war against the Holy League. The duchy of Thouars was then made a peerage, with succession to males only (1595); and the style of duc de La Trémoïlle soon came to be given to the succeeding peers. Claude's son by his marriage to William the Silent's daughter Charlotte of Orange-Nassau was HENRY (1598–1674), who in 1605 succeeded to his great-grandmother's Laval inheritance and, after his conversion to Catholicism (1628), was encouraged to claim princely rank as heir to the crown of Naples. His son HENRY CHARLES (1620–72) thus styled himself prince de Tarente (*i.e.,* Taranto), as the Neapolitan crown princes did; and the claim to Naples was put forward, ineffectively, at international peace congresses. Though Henry Charles had spent his youth fighting for the Dutch or for the great Condé in the Fronde, he finally secured from Louis XIV recognition of the whole family's right to rank as "foreign princes" at the French court. His father had already renounced the peerage in his favour.

The later ducs, in direct succession, were CHARLES BELGIQUE HOLLANDE (1655–1709), so christened because the Dutch estates-general were his godparents; CHARLES LOUIS BRETAGNE (1685–1719); CHARLES ARMAND (1708–41); JEAN BRETAGNE CHARLES GODEFROY (1737–92); CHARLES BRETAGNE MARIE JOSEPH (1764–1839), who fought for the royalists, with his brother ANTOINE PHILIPPE, prince de Talmond (1765–94) in the Wars of the Vendée, tried to secure the succession to Bouillon (*q.v.*) by right of his grandmother Marie Hortense de La Tour d'Auvergne, Charles Armand's wife, and was received into the reconstituted peerage of the Restoration in 1819; CHARLES LOUIS (1838–1911), the chief historian of the family; LOUIS CHARLES MARIE (1863–1921); and LOUIS JEAN MARIE (1910–33), whose accidental death in a fire brought the duchy-peerage of La Trémoïlle (1595) to an end, though the nonpeerage duchy of Thouars (1563) passed to his eldest sister CHARLOTTE, married since 1910 to Prince Henri de Ligne.

LATROBE, BENJAMIN HENRY (1764–1820), U.S. architect and engineer, one of a number of notable men who left their mark on the design of the U.S. Capitol, was born on May 1, 1764, at Fulneck near Leeds, Eng. He was educated in Germany, returning to England in 1786. In 1796 he emigrated to Virginia, where his first commission was a penitentiary at Richmond; in 1799 he designed the Bank of Pennsylvania in Philadelphia (with the first stone vault and the first Greek Revival detail in the U.S.) and the Philadelphia waterworks. In 1803 President Jefferson made him surveyor of the public buildings in Washington, and he took over the supervision of the uncompleted Capitol, begun by William Thornton and Stephen Hallet. After the Capitol was burned by the British in 1814, he was recalled to Washington to rebuild it, designing a new chamber for the house of representatives which in 1864 became Statuary hall. Many of Latrobe's buildings disappeared, but even if engravings of them were not available, the neoclassical Roman Catholic cathedral in Baltimore, Md., would suffice to establish him as the first U.S. architect of international stature. He also did much to place the profession of architect on a new footing. He died in New Orleans on Sept. 3, 1820.

See T. F. Hamlin, *Benjamin Henry Latrobe* (1955). (Ms. W.)

LATTEN, a mixed metal like brass, composed of copper and zinc, generally made in thin sheets, and used especially for monumental brasses and effigies. A fine example is in the screen of Henry VII's tomb in Westminster abbey. There are three forms of latten: (1) black latten, unpolished and rolled; (2) shaven latten, of extreme thinness; and (3) roll latten, of the thickness either of black or shaven latten, but with both sides polished.

LATTER-DAY SAINTS, CHURCH OF JESUS CHRIST OF, commonly miscalled the Mormon Church, does not claim to be a new religion, but regards itself as a "restoration" of the one and only gospel of the Lord Jesus Christ: God's plan of "eternal life, which God . . . promised before the world began" (Tit. i, 2). Territorially the church holds a world-wide jurisdiction; it is a "universal" church. In the United States, where it is most intensively organized, the headquarters are in Salt Lake City, Utah. It is divided into stakes (a stake being similar to a diocese) and wards (similar to parishes), with missions and mission branches where membership is less concentrated. Members number about 2,000,000.

DOCTRINES AND POLITY

While there is but one gospel, there have been many "dispensations" of it, by reason of men from time to time falling away or apostatizing from the order of things God has revealed to them. Ultimately, however, according to Latter-day Saint belief, there is to be a final or last dispensation of this one and only "everlasting gospel," known as the "dispensation of the fulness of times" (Eph. i, 10), in which all things pertaining to the redemption of the earth and the salvation of man will be gathered together in one, both in heaven and in earth. The appearance of God the Father and his Son Jesus Christ to Joseph Smith, the translation of the Book of Mormon and the organization of the Church of Jesus Christ of Latter-day Saints was, in the Latter-day Saints' belief, the beginning of this promised "dispensation of the fulness of times."

Sources of Doctrine.—The Church of Jesus Christ of Latter-day Saints recognizes two sources of doctrine: the written word of God—the scriptures; and direct revelation from God.

The books accepted as scriptures are: (1) the Bible, both the Old and the New Testaments; (2) the Book of Mormon, an abridged record of certain ancient American prophets and peoples, translated by Joseph Smith (*q.v.*), "by the gift and power of God"; (3) *Doctrine and Covenants,* a collection of revelations given chiefly through Joseph Smith; (4) the *Pearl of Great Price,* containing principally revelations given to Moses and re-revealed to Smith and writings of Abraham translated by Smith from ancient records.

The church believes, however, in continuous revelation: by direct communication from God (as to Moses; Ex. xxxiii, 11); by visitation of angels (as to Zechariah; Luke i, 11–20); and by impressions upon the mind of man by the Spirit of God (as suggested in Ezek. xi, 5). Revelation in any of these ways is the supreme source of knowledge. ("Surely the Lord God does nothing, without revealing his secret to his servants the prophets" [Amos iii, 7].)

It is the doctrine of the church that its members have the right to divine guidance through revelation and inspiration for their individual lives (as also have all officers of the church in their respective callings and offices) but not for the guidance of the whole church or for the domination of others. There is but one man on the earth at a time in the dispensation of the fullness of times who may receive revelation for the guidance of the entire church, and he is the president of the church, who holds "the keys" of the priesthood and is accepted as a prophet, seer and revelator. His official word, when speaking in the name of the Lord, is received by the church as God's word.

Some Distinguishing Doctrines.—Some distinguishing doctrines, principles and practices of the church are:

1. Belief in the apostasy of the postapostolic church during the centuries following the Saviour's death, with resulting loss of authority; and a restoration of the authority of the priesthood and the "keys of the Kingdom" to the prophet Joseph Smith and some of his associates by direct revelation and the visitation of heavenly beings.

2. Marriages performed in the temples by one having authority "to bind on earth and in Heaven," which marriages do not terminate at death but continue for time and eternity.

3. Temples wherein baptism and other essential ordinances are performed, vicariously, by the living, for those who have died without an adequate opportunity to accept the gospel when they were on earth.

4. Tithing; also a practical welfare program for those in need, with emphasis on work as the cure for want.

5. Belief that happiness is the normal expectancy of life—"men are, that they might have joy" (Book of Mormon, II Nephi ii, 25).

6. A program of recreation and cultural activity and opportunity for all ages.

7. No professional clergy; opportunities and responsibilities for service for everyone, with provision for every worthy male member over the age of 12 to be ordained to the priesthood.

8. Baptism only for those who have reached "accountability" (eight years of age and over). Infants and young children are saved in their innocence by the atonement of Jesus the Christ, "for to such belongs the kingdom of God" (Mark x, 14).

9. A law of health (the "word of wisdom") that counsels against the use of tobacco, alcoholic beverages, tea and coffee, and emphasizes the use of grains, wholesome herbs and fruits for the benefit and health of man.

10. Emphasis on education, as the search for truth: "The glory of God is intelligence, or, in other words, light and truth" (*Doctrine and Covenants* xciii, 36); "It is impossible for a man to be saved in ignorance" (*Doctrine and Covenants* cxxxi, 6).

11. Belief in the God-given freedom of man (free agency). "God will force no man to heaven." ("Teach them correct principles, and let them govern themselves"; Joseph Smith.)

12. Space, time, matter and the universe in Mormon theology are limitless by nature. Matter in its elemental state is eternal and while subject to change can neither be created nor annihilated (*Doctrine and Covenants,* sec. 93).

God.—In its doctrine of God, the Church of Jesus Christ of Latter-day Saints accepts Jesus the Christ literally as the only begotten Son of God in the flesh and as one of three members of the Godhead. It accepts God the Father as a real and personal God in whose image men were made and of whom Jesus was in "the express image" (or bore "the very stamp of his nature"; Heb. i, 1–3) in personality and in form, and in intellectual and spiritual powers, having the attributes of the Father. The third member of the Godhead, the Holy Ghost, is a personage of spirit. These three, the Trinity of Father, Son and Holy Ghost, are accepted as being one in purpose and principle, but being a plurality of personages, separate in physical fact, as recorded in various scriptural accounts.

Man.—It is the declared purpose of God "to bring to pass the immortality and eternal life of man" (*Pearl of Great Price:* Moses i, 39). Essential to this is the ultimate inseparable union of spirit and body, constituting "the soul of man" (*Doctrine and Covenants* lxxxviii, 15–16). Man was "in the beginning" with God (*Doctrine and Covenants* xciii, 23), and has gone through an infinite premortal period of progression. Having kept his "first estate" (or "own position"; Jude 6) he was permitted by the Father to be born into the earth and to receive a mortal body. Following his death and his resurrection man will receive an immortal body—all of which is necessary to his eternal progress in a life that is limitless and everlasting. There is universal "salvation"; that is, all men will be resurrected through the atonement of Jesus Christ. "For as in Adam all die, so also in Christ shall all be made alive. But each in his own order" (I Cor. xv, 22–23).

The Gospel.—The gospel of Jesus Christ is the means of attaining all that God has planned and prepared for his children. And by keeping the commandments, living the law and complying with the prescribed principles and ordinances of the Kingdom of God, the Latter-day Saint believes that man may reach the highest blessings of heaven (in the "celestial" kingdom or glory, of which Paul speaks in I Cor. xv, 40–42), which blessings include eternal progress and everlasting life with his loved ones.

Organization and Government.—The Church of Jesus Christ of Latter-day Saints was organized by Joseph Smith at Fayette, Seneca county, N.Y., on April 6, 1830. Associated with Smith, who was designated a "Seer, a Translator, a Prophet, an Apostle of Jesus Christ, an Elder of the Church through the will of God the Father and the Grace of your Lord Jesus Christ" (*Doctrine and Covenants,* sec. 21), were Oliver Cowdery, Hyrum Smith, Peter Whitmer, Jr., Samuel H. Smith and David Whitmer. It is not to be inferred that the church became fully organized at this early date. On the contrary, the process of organization was a gradual one and new features were added only as occasion demanded. Thus it was not until March 18, 1833, that the First Presidency as now constituted was organized; the First High council, on Feb. 17, 1834; and the First Quorum of the Twelve Apostles, on Feb. 14, 1835. To supplement the work of the priesthood, there came into existence the Sunday school, the Women's Relief society, the Young Men's and Young Women's Mutual Improvement associations, the Primary association for children under 12 years of age and a church school and seminary system giving religious training simultaneously with state secular education.

The organization of the Mormon Church arises out of the priesthood, regarded as the power delegated from God to man through which man is authorized to act in the name of Deity. The higher or Melchizedek priesthood, which deals primarily with spiritual affairs, was bestowed upon the prophet Joseph Smith and Oliver Cowdery directly by the apostles Peter, James and John, resurrected beings; and the lower or Aaronic priesthood, which concerns itself with temporal matters, by the forerunner of Christ, the prophet John the Baptist. These ordinations are extremely important in the eyes of the Latter-day Saints, who in consequence of them challenge the authority of all other denominations to officiate in the name of Deity, maintaining that non-Mormon representatives did not have conferred upon them the proper authority to do so. It is the assertion of this principle of divine commissionship that accounts largely for the persecution of the early adherents of the Mormon faith.

HISTORY

Founding.—In western New York, at a time of intense religious revival in the year 1820, Joseph Smith, then a boy of 14, declared that he retired to the woods near the family farm one spring morning and sought the Lord in prayer to ask "which of all the sects was right," that he "might know which to join," and that in answer to his prayer "two Personages, whose brightness and glory defy all description," appeared to him, one of whom "spake . . . and said, pointing to the other, 'This is My Beloved Son. Hear Him!'" A detailed account of the circumstances and of the words that were uttered was printed in Joseph Smith's own widely published story. In Sept. 1823, 3½ years after this appearance of the Father and the Son, Smith testified that a heavenly messenger, a resurrected being, appeared to him in response to prayer and gave his name as Moroni, an ancient American prophet, and revealed the existence of a record engraved upon gold plates hidden in a hill between Palmyra and Manchester, N.Y., not far from the Smith home, which hill was anciently called Cumorah. This record contained an account, both sacred and secular, of the prophets and people who were the ancestors of some of the American Indians and who came from a colony of Israelite origin and lived in the western hemisphere (both North and South America) principally from about 600 B.C. to about A.D. 420.

The Book of Mormon.—Four years later, on Sept. 22, 1827, these plates were delivered into Smith's hands, and with them instruments called "interpreters" (*Urim* and *Thummim*), by which he translated the "reformed Egyptian" characters found upon the plates and gave to the world the Book of Mormon—so-called because Mormon, one of the later prophets of this 1,000-year period, had made an abridgment of many of the previous plates. Moroni, the resurrected being or "angel" who delivered the plates to Joseph Smith, had been the last mortal custodian of the plates before he concealed them in the hill Cumorah about 14 centuries previously.

The Book of Mormon was first published at Palmyra, N.Y., early in 1830, in an edition of 5,000 copies financed by Martin Harris. Since then it has passed through many editions and has been translated and published in many languages. In the preface to the Book of Mormon there appears the testimony of three witnesses, Oliver Cowdery, David Whitmer and Martin Harris. "We have seen the plates . . . we have seen the engravings which are upon the plates . . . and we also know that they have been translated by the gift and power of God, for his voice hath declared it unto us." Eight additional witnesses, whose solemn words are prefaced to the Book of Mormon, also testified to seeing and "hefting" the plates. Soon after publication of the book, according to Smith, the plates were taken away by the angel Moroni.

The Latter-day Saints regard the Bible as "the stick" of Judah and the Book of Mormon as "the stick" of Joseph, referred to in Ezek. xxxvii, 16–19.

Early Church Communities.—With the initial organization of the church completed, the prophet Joseph Smith dispatched missionaries to preach to the Indians or Lamanites as the Mormons called them. The missionaries were successful and many converts were made, which prompted the prophet to remove the headquarters of the church from unfriendly New York (where several lawsuits had been brought against Smith) to Kirtland, O. There many difficulties were encountered. The United Order founded by the prophet proved impracticable and bred dissatisfaction. Heavy debts were incurred through unwise speculation. A temple was erected and consecrated in 1836 (the first in the church) at a cost of $40,000. Then came the panic of 1837, and because of it the Kirtland bank, a Mormon institution, after being charged with violating the state law against unchartered banks, was forced to close its doors. These difficulties produced internal dissension, and many apostatized. Some non-Mormon historians claim that at this time also the "Danites" were organized as a secret para-military organization; whether or not this body existed, many crimes and outrages were attributed to them. Under these circumstances, it was thought wise to move westward where the undeveloped country on the frontier might offer opportunities for the members of the church to retrieve their fortunes. The site selected for the new headquarters was Jackson county, Mo., where a group of Mormons had already settled seven years earlier.

At first the Mormons were kindly received by the Missourians, who looked upon them as a "set of harmless fanatics, very susceptible of being molded into good and honest citizens" (Josiah Gregg, *Commerce of the Prairies;* 1844). However, friction soon developed. Many of the people of Jackson county were southerners and regarded Missouri as the crucial outpost of slavery,

which had to be defended at all costs. They were disposed, therefore, to regard the Mormon immigrants with suspicion and classified them as objectionable New England abolitionists. Furthermore, they feared being dispossessed of their lands and were fearful that the newcomers might gain political control of the county.

Active manifestations of hostility were first reported in the spring of 1832 with the stoning of Mormon houses at night. These continued unabated until July 20, 1833, when 400 or 500 citizens assembled at Independence "to take some means to rid themselves of their fanatical neighbors" (E. D. Howe, *Mormonism Unveiled;* 1834). A committee was appointed to draft an address to the public, setting forth their grievances and recommending some program of action. The address stated that a little more than two years previously

> some two or three of these people made their appearance in Missouri; that they now numbered upwards of 1,200; that each successive autumn and spring poured forth a new swarm of them into the country as if the places from which they came were flooding Missouri with the very dregs of their composition; that they were little above the condition of the blacks in regard to property and education; and that in addition to other causes of scandal and offense, they exercised a corrupting influence over the slaves (Charles Mackay, *The Mormons;* 1856).

The address, commonly referred to as the Jackson County Manifesto, concluded with the recommendation that the Mormons be expelled forthwith from the county by force of arms if necessary.

Mob action was renewed when the Mormons on the advice of Gov. Daniel Dunklin repudiated an earlier agreement to leave the county. Instead, as the governor advised, they decided as a last resort to throw themselves upon the mercy of the courts for legal protection of their rights. No sooner was this action made known than the whole county rose in arms and declared war on the Mormons, who thereupon fled northward into Clay, Daviess and Caldwell counties. But the story of the Mormon refugees in their new home was merely a repetition of the Jackson county experiences. On Oct. 30, 1838—three days after Gov. Lilburn W. Boggs's order that "the Mormons must be treated as enemies and must be exterminated or driven from the state, if necessary, for the public good"—17 Mormons were killed and many others including women and children were severely wounded at Haun's Mill. Soon thereafter, after repeated violations, hope was abandoned and 15,000 refugees fled from Missouri. "The struggle was now over," wrote Parley P. Pratt in his autobiography (1874), "our liberties were gone, our homes to be deserted and possessed by a lawless banditti."

Nauvoo.—The midwinter exodus of the Mormons from Missouri (1838–39) led to the founding of the city of Nauvoo (*q.v.*) on the east bank of the Mississippi river, in Hancock county, Ill. There, beginning with swampy river land, they built in a short time the largest city in Illinois, with a population of about 20,000. A temple was built and a university projected, the Nauvoo legion (of which Smith was commander) was organized as a part of the state militia, and the city received a liberal charter from the Illinois legislature, since both political parties hoped to secure Mormon support for the presidential election of 1840.

Converts began coming to Nauvoo from Great Britain, where Brigham Young had been sent with a majority of the Council of the Twelve Apostles to enlarge the work already begun there. (Orson Hyde also proceeded to Palestine, which land, on Oct. 24, 1841, he dedicated "for the gathering of the Jews.") The other missionaries, penetrating to all parts of the United Kingdom (1840–41), converted about 5,000 persons and established a shipping agency to carry forward the "gathering of Israel to the Land of Zion," the first company migrating from Europe under these auspices in June 1840. With increasing church population, the political question again became an issue, with the Latter-day Saints holding the balance of power between the Whigs and the Democrats in Illinois and being alternately courted by both parties. While this possession of the balance of power at elections appeared momentarily advantageous to the Mormons, in the end it proved disastrous; it alienated all parties, since none could rely upon their allegiance. Then, too, much jealousy was aroused through the granting of an extremely liberal charter to Nauvoo. Gov. Thomas Ford declared that through it

> it was proposed to reestablish for the Mormons a government within a government, a legislature with powers to pass ordinances at war with the laws of the state; courts to execute them with but little dependence upon the constitutional judiciary; and a military force at their command, to be governed by its by-laws and ordinances and subject to no state authority but that of the governor. . . . The great law of the separation of the powers was wholly disregarded. The mayor [Joseph Smith] was at once the executive power, the judiciary, and part of the legislature.

At this point a serious apostasy occurred in Nauvoo, and William and Wilson Law, with others who had withdrawn from the church, organized a paper called the *Nauvoo Expositor,* which advocated among other things the repeal of the Nauvoo charter and, in its first and only issue (June 7, 1844), accused Joseph Smith of practising polygamy and of entertaining political ambitions. Joseph Smith, as mayor with the municipal council, retaliated by condemning the *Expositor* as a nuisance and ordering its abatement. The order was carried out by the city marshal and police, who forthwith destroyed the press. This rash act proved to have been unwise, since the convincing charge could now be raised that the Mormons in defiantly curtailing the freedom of the press were dangerously hostile to American liberties. Threats of mob violence followed, and the prophet, as lieutenant general of the Nauvoo legion, in order to protect the city, called out the troops. For this he was charged with treason and with others, including his brother Hyrum, was incarcerated in Carthage jail under pledge of protection by Governor Ford. This pledge was not kept. On the afternoon of June 27, 1844, a mob of armed men with blackened faces assaulted the jail and murdered Joseph and Hyrum Smith. John Taylor was severely wounded in the melee, but Willard Richards, their fellow prisoner, escaped unhurt.

The Question of Succession.—With Joseph Smith gone, Sidney Rigdon (1793–1876) claimed the right to succeed to the leadership of the church by virtue of his having been Joseph Smith's counselor in the First Presidency. But Smith had said, "Where I am not, there is no First Presidency over the Twelve." His death had dissolved the First Presidency and placed the government of the church in the hands of the Council of the Twelve Apostles, with Brigham Young (*q.v.*) as senior member. This point of church law, overwhelmingly sustained by the people, disposed of Rigdon's claim and settled the question as to who should preside over the church. Later several divergent sects arose, the most important of which was the Reorganized Church of Jesus Christ of Latter Day Saints (*q.v.*), which claim succession in the presidency from father to son. (Note also the claims of the Strangites of Beaver Island, Wis. *See* STRANG, JAMES JESSE.) The majority, however, followed Brigham Young and his fellow apostles.

The Migration to Utah.—The Mormons had no intention of leaving Missouri or Illinois for a far-western home; it was their intention to build their Zion in the former state. Only the exigencies of the situation compelled them to migrate westward again. After the death of Joseph and Hyrum Smith, increased mob violence about Nauvoo led to an agreement on Sept. 24, 1845, between Mormon leaders and state and county representatives of Illinois for the prompt evacuation of Nauvoo. Two weeks earlier (Sept. 5) the authorities of the church had resolved that a company of 1,500 men be selected to go to the valley of the Great Salt lake. The final decision with regard to the location of the new homeland was determined upon almost two years before the first pioneer band had crossed the desert wilderness westward to Utah. There was nothing inviting or attractive about the designated site. Indeed, the Great Salt lake valley was selected because of its very unattractiveness, with the hope, therefore, that it would not be coveted by others. The founding of Utah was distinctly the result of a religious appeal, and in migrating there the Mormon pioneers had a twofold purpose: to escape persecution and to establish a commonwealth where they could worship their God in their own way.

The vanguard of the Mormon pioneers crossed the Mississippi river on ice on Feb. 4, 1846. On the same day Elder Samuel Brannan, in charge of the eastern group, sailed from New York on the ship "Brooklyn" with a company of 238, arriving at Yerba

Buena (San Francisco) on July 31, 1846. During the first week 400 teams and 1,350 Mormon refugees from Illinois crossed to the Iowa shore. Throughout the ensuing year, 15,000 Mormons, 3,000 wagons and 30,000 head of cattle reached the encampments on the banks of the Missouri river. There was much suffering during the trek across Iowa, and particularly during the winter of 1846–47, when hundreds became victims of cholera and black canker, contracted in the malaria-infested Missouri bottoms. Temporary camps were founded at Sugar Creek, Garden Grove and Mount Pisgah and permanent headquarters at Winter Quarters (now Florence, Neb.) on the western bank of the Missouri river. It was at Mount Pisgah that the Mormon battalion, a contingent of servicemen in the Mexican War, was recruited; joining the force under Col. Stephen W. Kearny, they took part in the march to California in the winter of 1846–47. Due largely to this call, and to the emaciated condition of the Mormons in general, all plans of reaching the Great Basin that season were postponed.

During the long winter months at Winter Quarters (1846–47), however, Brigham Young made careful plans for the exodus in the spring. The initial company included 143 men, 3 women, 2 children, 73 wagons, 93 horses, 52 mules, 66 oxen and 19 cows. At Ft. Laramie 17 members of the Crow and Terkhill families of Mississippi Mormons were recruited, and at the Green river crossing six members of the Mormon battalion were added, so that there were numbered in the pioneer train some 171 souls. On July 21 Orson Pratt and Erastus Snow entered the valley, and a day later (July 22) a select party of nine led by Orson Pratt and George A. Smith conducted a reconnaissance and selected a site for encampment. On that same day (July 22) Willard Richards, on the advice of Brigham Young, led 60 wagons and approximately 110 pioneers into the valley. Two days later (July 24) Brigham Young, who had been ill with mountain fever, led the remaining 60 pioneers and their 18 wagons into the valley. By Jan. 1, 1848, more than 1,600 immigrants had arrived in the valley. It is estimated that before the railroad came in 1869, about 80,000 Mormon pioneers traveled the 1,100-mi. distance from Winter Quarters to Salt Lake City, some in covered wagons drawn by mules and oxen, some pushing their possessions in handcarts and some walking.

The Mormon trail extended along the north banks of the Platte and North Platte rivers to Ft. Laramie. Thence it followed northwestward along the Sweetwater to South pass. From this point, it diverted southwestward across Green river to Ft. Bridger on Blacks fork. From this post it followed the Reed-Donner trail, by way of Hastings cutoff, to Great Salt lake valley. (*See* also Oregon Trail.)

Upon their arrival in Utah, the Mormon Church leaders at once planned the exploration of its various valleys with a view to expansion and colonization, for it was realized that the Salt lake valley was too limited in resources to meet the needs of about 70,000 additional colonists. The result was that within a decade nearly 100 settlements had been founded, stretching from Bear river on the north to the Santa Clara on the south, a distance of 450 mi. In addition several outposts or outer cordon settlements were established at such places as Ft. Bridger, Ft. Supply, Las Vegas, Tubac, Ft. Lemhi, Elk Mountain mission, Genoa, Yerba Buena (San Francisco) and San Bernardino. These were all strategic sites selected to control important routes to and from the basin area, to facilitate Mormon emigration, to pacify hostile Indian tribes that threatened the lines of communication with distant commercial markets and to provide localities from which the gospel might be spread.

Despite the obstacles common to the desert area of the Great Basin—sudden changes of temperatures, scarcity of timber, early frosts, insect pests, lack of markets, transportation difficulties and the necessity for irrigation—the colonists made steady progress in the task of farming the desert during the first decade of Utah history. Between 1850 and 1860 the population grew from 11,000 to 40,000 and farm area increased from 16,333 to 77,219 improved acres. Occasional droughts and periodic plagues of crickets were the greatest threats. However, scientific methods of irrigation, in which practice the Mormons were pioneers, overcame these obstacles. In general, relations with the Indians were friendly, thanks to the policy of Brigham Young, who asserted that "it is better to feed the Indians than to fight them." Only three major wars occurred before 1870: the Utah Indian War (1849–50), the Walker War (1853–54) and the Black Hawk War (1865–68).

Political Relations With the Federal Government.—Because economic wants were of greater importance than political or civic matters, the pioneers postponed the establishment of civil government until the foundation of a settlement had been laid permanently. Until 1849 they operated under an organization known as a "theo-democracy," a pure theocracy, the only example of such in the history of the United States except for the short-lived New Haven experiment (1638–44). This organization represented a complete fusion of church and state and the utilization of only one set of institutions, those of the church, for both ecclesiastical and civic affairs. In March 1849, however, the Mormons established a provisional state government and petitioned congress for admission to the union as the state of Deseret. This action was deemed necessary because of the large influx of gentile (that is, non-Mormon) population, prompted by two important events: the discovery of gold in California in Jan. 1848; and the transfer of the southwest territory—Utah, California and New Mexico—from Mexico to the United States. The petition for statehood failed, however, and instead the area was organized as a territory, under the name of Utah, Sept. 9, 1850. Under territorial tutelage, for 46 years the residents of Utah had to submit to the rule of many unsympathetic federal officials, who could not be expected, as nonmembers of the established faith, to appreciate or understand Mormon peculiarities and eccentricities.

During the 1850s frequent altercations occurred between Gov. Brigham Young and federal officials. The latter bitterly criticized what they termed the domination of "priestly government" and charged the Mormons with treason. Associate Justice William W. Drummond, for example, filed affidavits with Jeremiah Black, U.S. attorney general, claiming that the records of the territorial supreme court had been destroyed and that this action had been approved by Brigham Young. This serious charge later was proved to be unfounded, but no official investigation was made at the time. President Buchanan accepted Drummond's report, as well as similar charges filed by the mail contractor W. M. F. Magraw and the Indian agent Thomas S. Twiss, as prima-facie evidence that the Mormons were in rebellion against the United States; clashes between Mormons and gentile residents and California immigrants passing through Utah—of which the worst was the so-called Mountain Meadows massacre (*q.v.*)—contributed to federal mistrust. The sequel was inevitable: an army must be dispatched to Utah. Albert Sidney Johnston was placed in command of the troops, and the newly appointed governor, Alfred Cumming, and Judge D. R. Eckles accompanied the train. Due to adverse weather conditions and effective guerrilla tactics by Lot Smith and others, the army was compelled to winter at Camp Scott, near Ft. Bridger. In the following spring, Governor Cumming and Col. Thomas L. Kane entered Utah and effected a compromise: Johnston's army would be allowed to enter Utah without opposition provided encampment was not made within 60 mi. of Salt Lake City. The governor found the court records in question to be in order and reported that a general "move south," whereby 30,000 inhabitants were leaving their homes pending the threatened federal invasion, was in progress. E. W. Tullidge wrote:

> This was the very backbone of Brigham's triumph. There is no denying the wisdom and importance of this move. For whatever the motive of Brigham Young, whether to attract the public gaze or not, or perhaps a sincere but desperate move of resistance—which appears doubtful, this more than anything else turned the tide of public opinion in favor of the Saints (*History of Salt Lake City;* Salt Lake City, 1886).

The whole military episode soon became known as "Buchanan's blunder" and did much to ruin his fortunes politically. An official investigation of the "rebellion" was conducted by a peace commission, a pardon was extended by President Buchanan, and the Johnston army episode was resolved.

Brigham Young's Leadership.—The history of the church during the 30 years that Brigham Young presided over it was to a large extent the history of the settling and development of the intermountain west during the same period of time. He and his people—many thousands of them emigrants from the old world—spread their colonizing activities over Utah and parts of Idaho, Nevada, Colorado, Arizona, California and New Mexico. Brigham Young built temples, tabernacles and theatres, founded schools, organized a newspaper and was at the head of the great mercantile, industrial and educational movements in this area. He also extended the missionary system of the church into many countries. After his death in 1877 he was succeeded by John Taylor, the senior apostle in the Council of the Twelve.

Struggle Over Polygamy.—Taylor's administration was marked by prosecution against plural marriage, under the laws enacted by congress against it. This form of marriage is said to have been practised by Joseph Smith and others in Illinois and had been perpetuated by the founders of Utah, as a matter of religious principle. Congress passed a law in 1862 (Anti-Bigamy act) prohibiting polygamy, supplementing it 20 years later by the Edmunds law, still later by the Edmunds-Tucker law. Under these statutes a vigorous prosecution was carried on in Utah, Idaho and Arizona, wherever polygamists were found. Men and women were fined and imprisoned, certain Mormon leaders were driven into exile and a great deal of suffering was inflicted. These laws were questioned because it was thought that they constituted an infringement upon religious liberty as guaranteed by the constitution.

In 1890, however, after the U.S. supreme court had reaffirmed the constitutionality of the antipolygamy laws, Wilford Woodruff, who was then president of the church, issued a manifesto, which read in part:

> To Whom It May Concern: Inasmuch as laws have been enacted by Congress forbidding plural marriages, which laws have been pronounced constitutional by the court of last resort, I hereby declare my intention to submit to those laws, and to use my influence with the members of the Church over which I preside, to have them do likewise.

The general conference of the church in Oct. 1890 sustained the manifesto and thus withdrew sanction from the further solemnization of plural marriages.

Following the manifesto a change of feeling ensued, in Utah and elsewhere, and in Jan. 1896 the territory of Utah was admitted into the union as the 45th state. (*See* also UTAH.)

Later History.—Wilford Woodruff's successors, each of whom was the senior member of the Council of the Twelve Apostles at the time of his selection, were: Lorenzo Snow (1898–1901); Joseph F. Smith (1901–18), son of Patriarch Hyrum Smith; Heber J. Grant (1918–45), the first Utah-born president; George Albert Smith (1945–51); and David O. McKay (1951–). The church's approximately 2,000,000 members are organized in about 400 stakes, 76 missions and 5,600 wards and independent branches. There are 12,000 full-time missionaries in the field. Missionaries, usually young men, give about two years of their time and pay their own expenses. It is estimated that the Mormon Church expends annually about $10,500,000 for missions and missionary work, $10,000,000 for church schools and $3,000,000 for the construction and maintenance of temples.

Temples are situated at Salt Lake City, Logan, Manti and St. George, Utah; Cardston, Alta., Can.; Mesa, Ariz.; Idaho Falls, Ida.; Los Angeles and Oakland, Calif.; Bern, Switz.; on the island of Oahu, Hawaii; near London, Eng.; and at Hamilton, N.Z.

See also references under "Latter-day Saints, Church of Jesus Christ of" in the Index.

BIBLIOGRAPHY.—No impartial and critical history of the Church of Jesus Christ of Latter-day Saints yet exists. Extensive bibliographies are found in the New York Public library, Bancroft library (Berkeley, Calif.), Brigham Young university and the Latter-day Saints church historian's office (Salt Lake City). The two most important manuscript collections of Mormon history are the *History of Brigham Young* (1844–77) and the comprehensive *Journal History of the Church*. The former is a contemporary record compiled by successive official secretaries and historians of the church, written in the first person as though from the pen of Brigham Young; and the latter, a compilation of transcripts from original documents, compiled by years (1850–1959). *The Journals of Discourses*, 26 vol. (1854–86), contain the addresses of the general authorities. Three comprehensive histories published by the church at Salt Lake City are the *History of the Church of Jesus Christ of Latter-day Saints* by Joseph Smith, ed. by B. H. Roberts (1902–12); B. H. Roberts, *Comprehensive History of the Church of Jesus Christ of Latter-day Saints*, 6 vol. (1930); and Orson F. Whitney, *History of Utah*, 3 vol. (1892–1904).

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(R. SM.; R. L. E.; L. H. CR.)

LATTER DAY SAINTS, REORGANIZED CHURCH OF JESUS CHRIST OF, claims to be the legal continuation of the church founded by Joseph Smith (*q.v.*) at Fayette, Seneca county, N.Y., in 1830. World headquarters is in Independence, Mo., and the church's members number about 200,000 in 1,200 congregations. The Reorganized church does not accept the appellation "Mormon" because of the association with polygamy.

History.—After Joseph Smith's death in 1844 the church that he founded broke into factions following various leaders. Rejecting the leadership of Brigham Young, who led the majority group to Utah (*see* LATTER-DAY SAINTS, CHURCH OF JESUS CHRIST OF), a number of the members, holding that the son of the founder had been designated his successor, reorganized under the original name, the Church of Jesus Christ of Latter Day Saints, at Beloit, Wis., in 1852. The word reorganized was added to the title in 1869. Joseph Smith III accepted the leadership of this body in 1860 and was elected president. He was succeeded by his sons Frederick Madison Smith (1915–46), Israel A. Smith (1946–58) and W. Wallace Smith (1958–).

Belief.—The Reorganized church rejects the doctrine of polygamy and denies that it was taught and practised by Joseph Smith. It further claims that polygamy was introduced by Brigham Young and his associates and that the alleged revelation on polygamy, made public in 1852 by Young in Utah and attributed to Joseph Smith, was not in harmony with the original tenets of the church or with the teachings and practices of Joseph Smith, the prophet and founder of the original church. It denies that Joseph Smith had more wives than one and accepts the testimony of Emma Hale Smith that she was the only wife of Joseph Smith. It claims to follow the teachings of the original church of 1830 as organized by its founder. Its system of belief is based upon the teachings of the Bible, the Book of Mormon and a third book, the *Doctrine and Covenants*, which contains revelations received by the prophets of the Latter Day Saints and accepted by the vote of the general conference.

The Reorganized church believes in (1) God the Father, Christ the Only Begotten Son of the Father, and the Holy Ghost; (2) the doctrines of faith in God, repentance from sin, baptism by immersion, laying on of hands and resurrection of the dead; (3) graded reward or punishment in the hereafter according to conduct in this life; (4) the continuity of divine revelation and the open canon of scripture; (5) the restoration of Christ's church on the New Testament pattern; (6) the doctrine of stewardship in personal and economic life; (7) the gathering together at Independence, Mo., designated Zion by the prophet Joseph Smith in

1831, as a place of preparation and demonstration of the Christian way of life; (8) the return of Christ and the millennial reign.

Organization.—The ecclesiastical organization is contained within the framework of two priesthoods, the Melchizedek or higher and the Aaronic or lesser. The officials in the higher priesthood are: the president and his two counselors; the Council of Twelve Apostles; high priests, bishops, patriarchs, seventies and elders. In the lesser or Aaronic priesthood are priests, teachers and deacons. The judiciary is composed of a series of ecclesiastical courts before which members may be called for violation of the church law. There are three types of courts: the elders', the bishop's and the court of final appeal, known as the Standing High council, composed of 12 high priests with a member of the first presidency presiding.

Local congregations are grouped for administrative purposes into two forms of area organizations, districts and stakes. The district organization ties the individual congregations of an area into a closely knit fellowship presided over by officers elected at district conferences. The stake organization consists of a number of congregations administered by a central authority, the stake presidency, stake bishopric and stake high council. Business of the stake is conducted in conferences at which all members of the stake have a right to vote.

World Conferences.—International conferences are held biennially at Independence, where the publishing interests as well as the world headquarters of the church are located. The World conference is the supreme legislative body of the church, and all general administrative officers including those of the first presidency must receive its endorsement. The presiding bishop, who is in charge of the exchequer of the church, presents his financial report to the conference for endorsement and for appropriations. Missions are sponsored in various parts of the world.

The church conducts Graceland college, an accredited, four-year college with about 1,000 students in Lamoni, Ia.; the School of the Restoration, a ministerial and leadership seminary; a hospital; and a home for the aged, the last three in Independence.

(JN. B.; C. A. D.)

LATTICELEAF PLANT, the common name for *Aponogeton fenestralis,* an aquatic monocotyledonous plant belonging to the small family Aponogetonaceae and a native of the Malagasy Republic (Madagascar). The plant has a singular appearance from the structure of the leaves, which are oblong in shape, from 6 to 18 in. long and from 2 to 4 in. broad: they spread horizontally beneath the surface of the water, and are reduced to little more than a latticelike network of veins. The tuberous roots are edible. The plant is grown in cultivation as a house or greenhouse aquatic, as is also the closely allied Cape pondweed or water hawthorne (*A. distachyus*) of South Africa.

LATTICE THEORY discusses in precise mathematical language the relation of different parts of the same whole to each other. The fundamental concept is that one part x may *include* (or contain) another part y, written $x \geqq y$. A lattice, defined in more detail below, is a partially ordered set any two of whose elements have a least upper bound (l.u.b.) and a greatest lower bound (g.l.b.). (*See* SET THEORY [THEORY OF AGGREGATES].) As a branch of set theory it forms a fundamental part of higher algebra, geometry and mathematical logic.

Properties of Inclusion.—Mathematically, the relation of inclusion is characterized by the *reflexive* law, which states that $x \geqq x$ for all x; the *transitive* law, which states that if $x \geqq y$ and $y \geqq z$, then $x \geqq z$; and the *antisymmetric* law, which states that if $x \geqq y$ and $y \geqq x$, then $x = y$.

The inclusion relation is fundamental in the study of the subclasses of a class (aggregate). It also corresponds directly to implication in logic (*see* LOGIC). Thus the reflexive law of logic states that any statement p implies itself; the transitive law, that if p implies q and q implies r, then p implies r; the antisymmetric law, that if p implies q and q implies p, then p and q are logically equivalent.

There are many other relations which have the formal properties of inclusion. Thus the relation $x \geqq y$ of ordinary inequality between real numbers is reflexive, symmetric and transitive. Again, with the non-negative integers, if we define $x \geqq y$ to mean $x = ny$ for some non-negative integer (that x is a *multiple* of y), the same three laws are satisfied. Thus if x is a multiple of y and y a multiple of z, then x is a multiple of z.

Lattices.—By a *lattice* is meant in general any abstract system L of elements $x, y, z, \ldots$, having a reflexive, transitive, and antisymmetric relation which satisfies the following lattice condition. *For any two elements x and y of L there is a least element including both x and y, denoted by $x \cup y$, and a greatest element included in both x and y, denoted by $x \cap y$.* The four preceding examples satisfy the lattice condition. In the case of the subsets of an aggregate, $x \cup y$ is the sum of x and y, and $x \cap y$ is the set of elements common to x and y. In logic, $p \cap q$ is the statement "p and q"; $p \cup q$ means "p or q" (or both); with real numbers, $x \cup y$ is simply the greater and $x \cap y$ the lesser of x and y. In the example of the integers, $x \cup y$ is the least common multiple and $x \cap y$ the greatest common divisor of x and y.

The two lattice operations just defined are always *commutative* and *associative*, so that $x \cup y = y \cup x$, $x \cap y = y \cap x$, $x \cup (y \cup z) = (x \cup y) \cup z$, and $x \cap (y \cap z) = (x \cap y) \cap z$ for all, x, y, z. They are also *idempotent*, so that $x \cup x = x \cap x = x$, and satisfy the law of *contraction*, $x \cap (x \cup y) = x \cup (x \cap y) = x$ for all, x, y. Conversely, we may define a lattice as an algebraic system with two commutative, associative, idempotent and contractive operations. The inclusion relation may be defined in terms of either lattice operation, since $x \geqq y$ is equivalent to $x \cup y = x$ and to $x \cap y = y$.

Distributive Law.—In the four examples previously discussed, the *distributive* law also holds: $x \cap (y \cup z) = (x \cap y) \cup (x \cap z)$. Hence in these examples, if we call $x \cup y$ the *sum* of x and y, and $x \cap y$ the *product* of x and y, the five fundamental laws of arithmetic hold (*see* NUMBER); hence so do all their consequences.

However, neither cancellation law of arithmetic holds. If $x > y$, then $x \cup y = x \cup x$ and $x \cap y = y \cap y$. There is no operation of exponentiation either; hence the analogy is incomplete.

Moreover it should be emphasized that the distributive law does not hold in many important lattices. For example, it does not hold in the lattice consisting of the points, lines and planes of ordinary space, together with the empty set O and all space. In this lattice, $x \cap y$ is the intersection of x and y; $x \cup y$ is the line through x and y if x and y are points, the plane through x and y if x is a point and y a line, or if x and y are parallel or intersecting lines, and all space if x and y are skew lines.

An even more interesting example consists of the points, lines and planes of projective space (*see* PROJECTIVE GEOMETRY). In this example, though the distributive law is not valid in general, it holds when $x \geqq z$. That is, we have the *modular* law,

(1) $$\text{if } x \geqq z, \text{ then } x \cap (y \cup z) = (x \cap y) \cup z.$$

Duality.—The concept of a lattice has an important "duality" property. If we define $y \leqq x$ to mean $x \geqq y$ (by "conversion") it is evident that the relation $\leqq$ is reflexive, transitive and antisymmetric since $\geqq$ is. Furthermore, if we replace $\geqq$ by $\leqq$, we simply interchange $\cup$ and $\cap$ in the statement of the lattice condition, without altering as a whole the definition of lattices. Thus the concept of a lattice is *self-dual* under the duality between greater and less (container and contained).

This observation makes it evident why the two lattice operations satisfy the same laws. In fact, though it is not obvious, even the distributive law is equivalent to its dual, which is $x \cup (y \cap z) = (x \cup y) \cap (x \cup z)$. It is interesting that the arithmetic analogue $x + yz = (x + y)(x + z)$ of this law is false.

The modular law is also self-dual, as can easily be seen if one interchanges the variables z and x in (1).

Universal and Null Elements.—Many lattices have a *universal* element I and a dual *null* element O, defined by

(2) $$\text{I} \geqq x \geqq \text{O} \text{ for all } x.$$

Thus the empty set is O and the whole aggregate I in the lattice of subsets of any aggregate.

Similarly, zero is a common multiple and one a common divisor in the lattice of the integers under divisibility.

From (2), one easily proves $\text{O} \cap x = \text{O}$, $\text{O} \cup x = x$, $\text{I} \cap x = x$, and

$I \cup x = I$, for all x. The first three laws are analogues of the laws $0x = 0$, $0 + x = x$, and $1x = x$ of arithmetic (*see* NUMBER); the arithmetic analogue $1 + x = 1$ of the fourth law being false.

Complements.—If we define the *complement* x' of a subset x of an aggregate I to consist of the elements *not* in x, then we easily verify

$$(3) \qquad x \cap x' = 0, \; x \cup x' = I.$$

In any lattice with O and I, we say that x and x' are *complementary* if they satisfy (3).

There are many lattices with O and I in which most elements do not have complements. However, any two skew lines of ordinary or projective space are complementary, and any proposition p is complementary to its denial, not-p; hence complements always exist in projective geometry and the algebra of logic.

One element may have many "complements" in ordinary or projective geometry; but a subset of an aggregate can have only one complement. This follows formally from the distributive law. By this law, if x' and x'' are both complements of x, then

$$x' = x' \cup 0 = x' \cup (x \cap x'') = (x' \cup x) \cap (x' \cup x'') = I \cap (x' \cup x'')$$
$$= (x \cup x'') \cap (x' \cup x'') = (x \cap x') \cup x'' = 0 \cup x'' = x''.$$

If the distributive law holds, we can also prove by direct calculations that

$$(4) \qquad (x')' = x, \quad (x \cup y)' = x' \cap y', \quad (x \cap y)' = x' \cup y'.$$

Applications.—Mathematical logic begins with the study of *Boolean algebra*, that is, of lattices with complements in which the distributive law and the above laws (1) through (4) hold (*see* LOGIC; MATHEMATICS, FOUNDATIONS OF). The same is true of point-set theory (*see* POINT SET); in fact, it may be shown that every finite Boolean algebra represents the subsets of some aggregate. Again, projective geometry can be defined as the study of lattices satisfying (2) and (3), in which O and I are the only elements having unique complements, and every chain is finite. The theory of the structure of groups (*q.v.*) can also be shown to follow from the remark that the invariant subgroups of any group form a lattice satisfying (3). A similar statement is valid as regards the structure of other algebraic systems.

There are many other applications; in general, lattice theory plays the same role in the study of structure and order that group theory does in the study of operations and symmetry.

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LATTRE DE TASSIGNY, JEAN DE (1889–1952), French army officer, posthumous marshal of France, was born at Mouilleron-en-Pareds (Vendée) on Feb. 2, 1889. Commissioned from St. Cyr in 1911, he fought in World War I, then in French Morocco from 1921 to 1926. In World War II he was 5th army chief of staff until May 1940, when he took the 14th infantry division into battle. Sentenced to ten years' imprisonment for resisting the German invasion of the free zone on Nov. 11, 1942, he escaped, reached north Africa in Oct. 1943 and took command of the French 1st army. He landed at St. Tropez on Aug. 16, 1944, advanced along the Rhône and took his army across the Rhine into Germany and Austria. On May 8, 1945, in Berlin, De Lattre signed for France the German act of capitulation. Subsequently he became army inspector general, then commander of the Western European Union ground forces. Sent to Indochina in Dec. 1950, he brought the Vietminh offensive to a halt and undertook to organize a Vietnamese national army. Illness forced his return to Paris, where he died on Jan. 11, 1952. De Lattre published *Histoire de la Première Armée* (1949; Eng. trans., *The History of the French First Army*, 1952). (M. V.)

LATVIA (Lettish LATVIJA, Russian LATVIYA, officially LATVIYSKAYA SOVETSKAYA SOTSIALISTICHESKAYA RESPUBLIKA), the central of the three Baltic republics of the U.S.S.R. It is 24,595 sq.mi. in area, with a population (1959) of 2,093,458 and a density of population of 88 persons per square mile. The capital is Riga (*q.v.*).

The western limit of Latvia is its 100-mile coast line in the Baltic sea, while in the northwest the shallow Gulf of Riga penetrates about 100 miles southeastward. In the northeast it borders Estonia, in the east the Russian Soviet Federated Socialist Republic, in the southeast the Belorussian Soviet Socialist Republic and in the south Lithuania.

Physical Geography.—Latvia consists almost entirely of Devonian rocks, but most of the surface is covered to a considerable depth with glacial deposits, which in places where former large terminal moraines occur form uplands several hundred feet above the surrounding country. The coastal lowlands of the Baltic and the Gulf of Riga, bounded by coastal dunes in places, are below 300 ft., and the lowland south of Riga continues as far as the Lithuanian boundary in the valleys of the Western Dvina (Daugava), and the Lielupe (Aa), separating the Kurzeme (Courland or Kurland) upland from the larger upland areas of the eastern third of the republic. The highest point, in the Vidzeme (Livonian) upland, is a little over 1,000 ft. There are many small lakes, particularly in and around the eastern uplands which include the scenic district known as Livonian Switzerland (*q.v.*).

Climate.—Latvia has a maritime location and, in spite of its relatively high latitude (56°–58° N.), its winters are not excessively cold, though summers are not hot. The mean January temperature in Riga is −4° C. (25° F.); the temperature on the Baltic coast is slightly higher, −3° C. (27° F.) at Liepaja; but inland temperatures are lower; *e.g.*, −6° C. (21° F.) at Daugavpils. The Gulf of Riga remains frozen for several months, but the Baltic coast remains ice free most years. Snow cover lasts from November to April. Mean July temperatures are 17° C. (63° F.) at Riga and Liepaja and 17.5° C. (64° F.) at Daugavpils. Mean annual precipitation exceeds 30 in. in the Vidzeme upland, is 25 to 30 in. over most of Latvia, but less than 25 in. in the lowland southwest of Riga. Riga itself receives 24.4 in., Jelgava (Mitau) only 22 in.

Vegetation and Animal Life.—Latvia falls within the zone of mixed coniferous and deciduous forest, but only one-third of the total area is forested, and marshes occupy about 10%. Three-quarters of the forest is coniferous, chiefly pine, which occupies half of all the forest, and also fir; the principal deciduous species are the birch, aspen and alder, but oak and maple also occur. The most heavily wooded districts are the Kurzeme uplands and the lowlands to the north, and the Vidzeme uplands in the east. Soils are mainly podsolized but those in the lowland south of Riga are lacking in lime. Sandy soils are frequent, occurring particularly along the coast.

Wild animal life is less abundant than formerly and although wild boars, red deer, roe deer, elks and wolves are to be found in the wooded areas, the smaller species of mammal including hares, squirrels, badgers and lynxes are more common. Grouse and ducks are among the most widely found wild birds. Fish include salmon, trout and pike, as well as cod, plaice and sprat off the coast. (J. P. Co.)

The People.—The modern Latvians or Letts, who call themselves Latviesi, belong to the Baltic group of nations which include also the Lithuanians and the Prussians (germanized between the 13th and 18th centuries). The ancestors of the present-day Latvians were the Latgals (or Latgallians) who, around the 9th century, inhabited the northeastern part of the country, on the right bank of the Daugava (Dvina) river. To the north and along the coast of the Gulf of Riga they were in contact with the Livs, a Finno-Ugrian tribe, who became absorbed by the Latgals. In the centre of the present-day Latvia, on the left bank of the Daugava, lived two other Latvian tribes, the Selens and, more to the west, the Semigallians (or Zemgals). South of the Gulf of Riga and on the Baltic coast dwelled the Kurs (Cours or Curonians), who were also Livs, absorbed by the Latvians. The individuality of the Kurs is more pronounced anthropologically than linguistically. Their dialect differs very little from the Latvian language. The formation of the modern Latvian nation from the peripheral tribes of Eastern Balts is a result of the rule of the Teutonic Order.

The majority of the inhabitants of Latvia (56.2%) belonged in 1938 to the Latvian Lutheran Church; and there were minorities

(ABOVE) SOVFOTO; (BELOW AND RIGHT) NOVOSTI PRESS AGENCY

(Above) Wide sandy beaches and dunes are typical of the Baltic seacoast of Latvia. (Below) Flowers are brought to the modern monument commemorating the poet and dramatist Rainis. (Right) In Riga, the Doma or Cathedral of St. Mary, founded in the 13th century, is now used as a museum and concert hall

of Roman Catholics (24.5%), Greek Orthodox (8.9%), Russian Old Believers (5.5%) and Jews (4.8%). *See* also BALTS; BALTIC LANGUAGES; COURLAND; LATVIAN LITERATURE; LETTISH (LATVIAN) LANGUAGE. (J. Cz.)

Population.—According to the 1959 census only 62% of the population of Latvia were Latvians; Russians made up 26.6% and were predominantly urban dwellers; there were also smaller numbers of Belorussians (2.9%), Poles (2.9%), Jews (1.7%), Lithuanians and Ukrainians. A high proportion of the total population was urban, 1,173,976 persons or 56% of the total (*cf.* U.S.S.R. in 1959, 48%; Latvia in 1939 only 35%), and an appreciable part of this was in Riga, which had 604,700 inhabitants in 1959, compared with 393,211 in 1939. The only other towns with more than 50,000 inhabitants are the port of Liepaja (71,464) and the inland centre of Daugavpils (formerly Dvinsk, 65,459) on the Western Dvina. Other important centres are the port of Ventspils and the inland town of Jelgava. (J. P. Co.)

History.—The prehistory of the group of peoples to which the Latvians belong is covered in the article BALTS. The first historically documented connection between the Balts and the civilization of the Mediterranean world was based on the ancient amber trade: according to Tacitus, the Aestii (predecessors of the Old Prussians) developed an important trade with the Roman empire. This trade, for which the Germanic tribes occupying the intermediate territory served as middlemen, reached its peak in the first two centuries A.D. and was maintained, precariously, when the restless migrations of the Germanic tribes began. What isolated the Balts from direct contact with the Mediterranean world was the large expansion of the Slavs over central and eastern Europe. Trade routes then shifted farther to the east or to the west, and the eastern Baltic countries had to rely on their Scandinavian neighbours for trade and cultural relations.

The Varangian or Viking expansion southeastward to the steppes north of the Black sea was along the Daugava (Western Dvina) and Dnieper rivers and so passed across the Latvian lands. During the 10th and 11th centuries these lands were subject to a double pressure: from the east there was the Russian penetration; from the west came the Swedish push toward the shores of Courland (*q.v.*).

German Rule in the Middle Ages.—During the crusading period German or, more precisely, Saxon overseas expansion reached the eastern shores of the Baltic. As the people occupying the coast of Latvia were the Livs, the German invaders called the country Livland, a name rendered in Latin as Livonia (*q.v.*). In the mid-12th century German merchants from Lübeck and Bremen were visiting the estuary of the Daugava; and these visits were followed by the arrival of German missionaries. Meinhard, a monk from Holstein, landed there in 1180 and was named bishop of Üxküll (Ikškile) in 1186. Berthold of Hanover, who succeeded Meinhard as bishop in 1196, was killed in 1198 because he used force against the "treacherous Livs" resisting baptism. Then the third bishop, Albert of Buxhoevden, with Pope Innocent III's permission, founded the Order of the Knights of the Sword in 1202. Before they merged in 1237 with the Knights of the Teutonic Order (*q.v.*), the Knights of the Sword had conquered all the Latvian tribal kingdoms. The history of the country as written by the Germans is thus a product of the conqueror's biased pen.

After the conquest the Germans formed a so-called Livonian confederation, which lasted for more than three centuries. This feudalistic organization was not a happy one, its three components—the Teutonic Order, the archbishop of Riga and the free city of Riga—being in constant dispute with each other. Moreover, the vulnerability of land frontiers involved the confederation in frequent foreign wars: the network of German strongholds testifies to the lack of security no less eloquently than the earlier system of castle mounds built by the Latvians. The Latvians, however, benefited from Riga's joining the Hanseatic league (*q.v.*) in 1282, as the league's trade brought prosperity. In general, however, the situation of the Latvians under German rule was that of any subject nation. The indigenous nobility was extinguished, apart from a few of its members who changed their allegiance; and the rural population was forced to pay tithes and taxes to their German conquerors and to provide the so-called statute labour.

The rise of Lithuania in the 14th century and the union of the Lithuanian and Polish crowns (1386) created a power that could wage long and devastating wars with the fast-growing Muscovite state in the east; but these wars were partly fought out on Livonian soil, so that the Latvian people's sufferings increased. As the fortunes of the Teutonic Order declined, the knights exploited their subjects more and more ruthlessly, and by the 16th

century the Latvian peasants were reduced to virtual slavery as the chattels of their landlords.

The Poles, the Swedes and the Encroachment of Russia.—In 1561 the Latvian territory was partitioned: Courland, south of the Daugava, became an autonomous duchy under the suzerainty of the Polish crown; and Livonia north of the river was incorporated into Poland under the name Inflanty. Riga was likewise incorporated into Poland in 1581, but was taken by the Swedish king Gustavus II Adolphus in 1621; Vidzeme, that is to say the greater part of Livonia north of the Daugava, was ceded to Sweden by the truce of Altmark (1629), though Latgale, the southeastern area, remained under Polish rule. Swedish possession of Vidzeme was confirmed by the Swedish-Polish peace of Oliva (1660).

The rulers of Muscovy had so far failed to reach the Baltic shores of the Latvian country, though Ivan III and Ivan IV had tried to do so. The Russian tsar Alexis renewed the attempt without success in his wars against Sweden and Poland (1653–67). Finally, however, Peter the Great managed to "break the window" to the Baltic sea: in the course of the Great Northern War he took Riga from the Swedes in 1710; and at the end of the war he secured Vidzeme from Sweden under the peace of Nystad (1721). Latgale was annexed by the Russians at the first partition of Poland (1772), Courland at the third (1795). By the end of the 18th century, therefore, the whole Latvian nation was subject to Russia.

The Russian Domination.—In the period immediately following the Napoleonic Wars the Russian emperor Alexander I was induced to grant personal freedom to the peasants of Courland in 1817 and to those of Vidzeme in 1819. This was remarkable insofar as it preceded the abolition of serfdom in Russia by more than 40 years; but it did not imply any right of the peasant to buy the land that his ancestors had tilled for centuries, so that the Latvian peasant's freedom was compared by wits to that of a bird. Consequently there was unrest in the Latvian lands until the emancipation of the serfs throughout the Russian empire (1861) brought the right to buy land in ownership from the state and from the landlords, who were still mostly German. The Baltic German historians estimated the total value of land to be redeemed in the Latvian area at more than 100,000,000 gold rubles and calculated that approximately 80% of this sum would be paid up by 1900.

In step with the growing economic strength of the local peasantry came a revival of national feeling. This movement was led by idealistic, strong-willed men who soon saw how difficult and dangerous it would be to steer a course between the German aristocracy and merchant groups on the one side and the Russian administration on the other. During those years of intermittent hope and despair the idea of political self-rule was conceived; and moreover, in order to meet the rapidly increasing intellectual demands of the people, educational establishments and other national institutions were required. The idea of an independent Latvian state was openly put forward during the Russian Revolution of 1905. This revolution, evoked as it was simultaneously by social and by national groups, bore further witness to the strength of the Latvian reaction to economic and political German and Russian pressure. Nine years later World War I broke out.

Independence.—After the Russian Revolution of March 1917 the Latvian National Political conference, convened at Riga, asked in July for complete political autonomy. On Sept. 3, however, the German army took Riga. After the Bolshevik coup of Nov. 1917 in Petrograd (Leningrad), a Latvian assembly was convened at Valka (Valga) and proclaimed itself the Latvian national council. By the treaty of Brest-Litovsk (*q.v.*) in March 1918, the Soviet government ceded the Baltic countries to Germany; and in April a German-controlled *Landesrat* ("local assembly") was set up in Riga with the intention of forming a Baltic grand duchy comprising Latvia and Estonia, whose hereditary ruler would be the king of Prussia.

On Nov. 18, 1918, after the collapse of Germany, the Latvian national council, assembled in Riga, proclaimed the independence of Latvia. Janis Cakste and Karlis Ulmanis (*q.v.*) were elected president of the republic and prime minister, respectively. The Soviet government, having declared the treaty of Brest-Litovsk null and void, established at Valmiera (Wolmar) a Latvian Communist "government" headed by Peteris Stucka. As the Red army took Riga on Jan. 3, 1919, the Ulmanis government moved to Liepaja, where it was protected by one British cruiser and six destroyers. Gen. Rüdiger von der Goltz (*q.v.*) arrived at Liepaja on Feb. 3 with orders from the German high command to repulse the Reds and to rebuild a sort of German-controlled *Baltikum;* and, on May 22, his forces took Riga. Pushing northward, they were stopped near Cesis by the Estonian army under Gen. Johan Laidoner (*q.v.*), which included 2,000 Latvians. In the battle of June 19–22 the Germans were defeated and had to abandon Riga, to which the Ulmanis government returned in July.

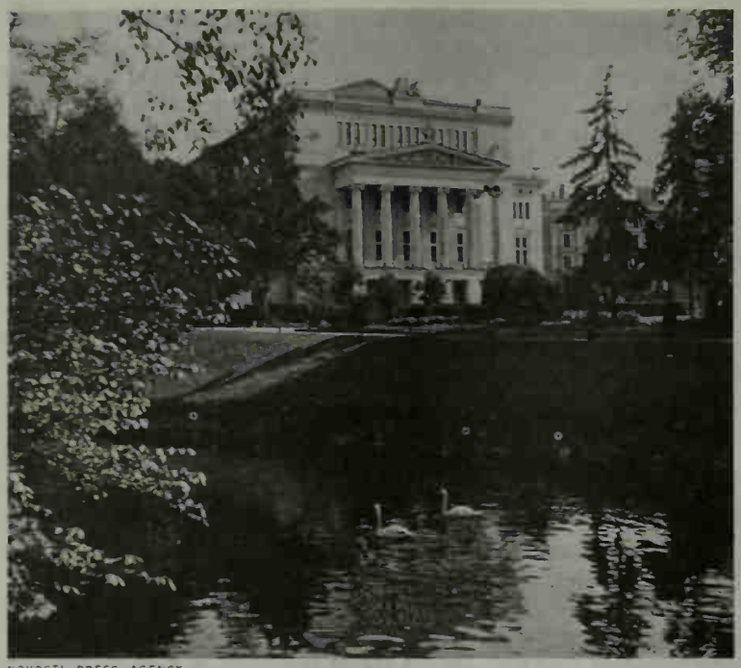
In June 1919 the Allied supreme council in Paris appointed Gen. Sir Hubert de la Poer Gough head of the Allied military mission to the Baltic countries. He ordered General von der Goltz to retreat with his force to East Prussia, but the Germans then presented themselves as "White" Russians eager to fight the Communists. An adventurer, Col. Bermondt (Berman)-Avalov, emerged as the new commander in chief. On Oct. 8 he occupied the suburbs of Riga south of the river. By Nov. 10, however, the Latvians, helped by the artillery of four British and four French destroyers, had defeated the Germans, who eventually did retreat to East Prussia. Only Latgale remained in Red hands; but this province was cleared by 33,000 Latvians under Gen. Janis Balodis (*q.v.*), 20,000 Poles under Gen. Edward Smigly-Rydz and 6,000 volunteers of the *Landeswehr* ("territorial force"), which from July 1919 was under the command of the British colonel H. R. Alexander (later Earl Alexander of Tunis).

A Latvian constituent assembly, elected in April 1920, met in Riga on May 1; and on Aug. 11 a Latvian-Soviet peace treaty was signed in Riga, the Soviet government renouncing all claims to Latvia. The Latvian constitution of Feb. 15, 1922, provided for a republic with a president and a unicameral parliament, or *saeima,* of 100 members elected for three years.

The multiplicity of parties in the *saeima* (22 in 1922 and 24 in 1931) made it impossible to form a stable government; and in 1934 Ulmanis, prime minister for the fourth time since 1918, proposed a constitutional reform. This was angrily opposed by the Social Democrats, the Communists and the national minorities. The German minority became nazified, and Ulmanis had to suppress the Latvian branch of the *Baltischer Bruderschaft* ("Baltic brotherhood"), whose program was the incorporation of the Baltic states into the third *Reich;* but a Latvian Fascist organization called *Perkonkrust* (Thundercross) developed a fierce propaganda. On May 15, 1934, Ulmanis and Balodis issued a decree declaring a state of siege. The *saeima* and all the political parties were dissolved. On April 11, 1936, on the expiry of the second term of office of Pres. Alberts Kviesis, Ulmanis succeeded him. The country's economic position improved considerably.

The Soviet Occupation.—When World War II started in Sept. 1939, the fate of Latvia had been already decided in the secret protocol of the so-called German-Soviet nonaggression treaty of Aug. 23. In October Latvia had to sign a dictated treaty of mutual assistance by which the U.S.S.R. obtained military, naval and air bases on Latvian territory. On June 16, 1940, Latvia was invaded by the Red army, while A. Y. Vyshinski arrived in Riga to sovietize the country. On June 20 the formation of a new government headed by August Kirchensteins was announced; on July 14–15 a mockery of an election was staged; on July 21 Ulmanis and Balodis were arrested; on the same day the new *saeima* voted for the incorporation of Latvia into the U.S.S.R.; and on Aug. 5 the U.S.S.R. accepted this incorporation. In the first year of Soviet occupation about 35,000 Latvians, especially the intelligentsia, were deported to Russia.

After the German attack on the U.S.S.R., from July 1941 to Oct. 1944, Latvia was a province of a larger Ostland, in which Estonia, Lithuania and Belorussia were also included. After the reconquest of Latvia by the Soviet army the Soviet regime was restored with Kirchensteins as chairman of the presidium of the supreme soviet and Vilis Lacis as chairman of the council of ministers. About 65,000 Latvians fled to Germany and to Sweden



NOVOSTI PRESS AGENCY

LATVIAN STATE OPERA AND BALLET THEATRE, RIGA

before the arrival of the Soviet forces, while during 1945–46 about 105,000 were deported to Russia. The extreme northeast section of Latvia with its predominant Russian population was ceded to Pskov *oblast* of the Russian S.F.S.R. in 1945. In March 1949, when collective farming was forcibly introduced, the third mass deportation took place, when about 70,000 Latvians were sent to northern Russia and Siberia. In 1952 Kirchensteins was succeeded by Karlis Ozolins, who was dismissed in Nov. 1959 as the leader of the "Nationalist Communist" faction which opposed Russian influence in Latvia. He was succeeded by Janis Kalnberzins, first secretary of the Latvian Communist party from 1940. At the same time Arvids Pelse was appointed the party's first secretary, while Janis Peive succeeded Lacis as premier. In 1961 Kalnberzins, the last influential Stalinist in the Latvian party, was dropped from his chairmanship of the presidium of the supreme soviet. In 1961 the Latvian party had 76,642 full members and 6,407 candidates. About two-thirds of the deputies, elected to the Latvian supreme soviet in 1963, are Communists. Many of the voters were relatively young people who were born in Russia.

The incorporation of Latvia into the Soviet Union has not been recognized by the U.S., and western countries as a whole have not accorded *de jure* recognition. (A. Sp.; K. Sm.)

Administration.—Unlike the larger Soviet republics Latvia is not divided into *oblasts* but directly into 32 *raions*. The supreme soviet, elected in 1959, consists of 200 deputies.

In the early 1960s there were more than 1,600 primary, secondary and continuation schools with about 300,000 pupils. Places of higher education at Riga include the Latvian State university (founded 1919), an academy of sciences (1946), an agricultural academy, a pedagogical institute and a state conservatory of music.

The Economy.—Because of industrial developments after 1945, agriculture is declining in relative importance. Nevertheless, it is still one of the principal activities of Latvia. Livestock products account for 70% of collective farm incomes. The sown area is 3,600,000 ac., or 23% of the total area. Cereals account for 1,280,000 ac., or 36% of the total sown area, fodder crops 1,760,000 ac. or 49%, and potatoes 380,000 ac. or 10%. Flax occupies about 80,000 ac. and is the principal industrial raw material grown. Rye and barley are the chief cereals cultivated, and wheat accounts for only 10% of the cereal acreage. Perennial grasses make up more than two-thirds of the land under fodder crops. In the early 1960s the republic had more than 900,000 cattle, 1,000,000 pigs and about 500,000 sheep. Of the cattle, over 60% were cows, evidence of the emphasis on dairying in this region (*cf.* less than 50% cows in the U.S.S.R. as a whole). The wider use of lime and the draining of marshes offer opportunities for increasing agricultural production. The fish catch of 140,000 tons is landed all along the coast. Cod, herring and sardines are important, and fish is canned at Liepaja.

Although lacking a sound energy base, Latvia has attracted many industries since 1945. Peat (1,800,000 tons in 1960) is the chief local source of energy and is used to generate electricity. Hydroelectric power is limited. Power stations on the Western Dvina at Kegums and near Krustpils are the major producers, and other sources of energy have to be brought in from elsewhere. A natural gas pipeline was, in the 1960s, constructed from Dashava in the western Ukraine to Riga. Latvia has no important minerals apart from certain building materials. Timber and flax are its two principal industrial raw materials. In spite of these drawbacks, glass, cement (more than 450,000 tons), mineral fertilizers (320,000 tons) and limited quantities of steel (90,000 tons), but no pig iron, are produced. Most highly developed, however, is the manufacture of engineering products, textiles and paper. The principal items of the engineering industry are ships, rolling stock (especially for electrified railways), electrical equipment and lathes. Linen, woolen and cotton yarn and cloth are all made, and Latvia accounts for about 2% of the Soviet total of linen and woolen cloth, but less than 1% of the cotton cloth, most of which, however, is of high grade. Riga (*q.v.*) is by far the most important industrial centre in the republic, with almost 75% of the value of all production. Its industries include engineering, textiles and clothing, food, wood and chemicals. Jelgava is a textile centre and Daugavpils has engineering, and the ports handle timber and food products. Liepaja also has the only steelworks of the republic. There are several paper mills in smaller towns. The Rigas Jurmula resort area and Livonian Switzerland attract considerable tourist trade.

The railways provide the chief means of transport. With 1,940 mi. of route, Latvia is one of the best-provided republics in the U.S.S.R. considering its small size, but almost all the lines are single track and some are narrow gauge. Many of the lines were built originally to provide outlets to ports from European Russia. There are 15,600 mi. of road, of which 2,920 mi. are surfaced. The Western Dvina (*see* Dvina, Western) is used for navigation, although shallows and small rapids hinder movement and freezing for four months further reduces its usefulness. Liepaja and Ventspils are of considerable value to the U.S.S.R. since they are ice-free ports and unlike Riga can be used all the year. Nevertheless Riga is the principal port of Latvia as navigation can be maintained with the help of icebreakers. *See* also references under "Latvia" in the Index. (J. P. Co.)

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LATVIAN LANGUAGE: *see* Lettish (Latvian) Language.

LATVIAN LITERATURE. Latvian folk poetry is of great age and includes a wealth of folk songs (*dainas*). K. Barons published (1900–15) 35,789 folk songs and 182,000 variants; P. Šmits increased their number to 60,000 with some 100,000 variants. In the mid-1960s there were about 900,000 unpublished basic songs and variants recorded in the Institute of Latvian Folklore in Riga. The loss of political independence in the 13th century prevented a natural evolution of literature out of folk poetry, and much of Latvian literature is an attempt to re-establish this connection. Written literature comes late, fostered by German clergymen. The first known book is the *Catechismus Catholicorum* (1585). The 17th century produced some outstanding religious writing by C. Fuereccerus, who introduced certain metrical conventions into Latvian written poetry; by G. Mancelius, a master of prose; by J. Reiters, himself a Latvian, who translated religious texts; and by E. Glück, the translator of the Bible (1685–89).

Secular literature begins in the 18th century with G. F. Stender. In the middle of the 19th century, in the period of the "national awakening," Latvians themselves assumed the leadership in the literary field. J. Alunāns's book of verse, *Dziesmiņas* (1856), marks the beginning of the modern Latvian lyric. Folk poetry increasingly became the source of literary inspiration, as in the lyrics of Auseklis (M. Krogzems), and in A. Pumpurs's epic poem *Lāčplēsis* ("Bearslayer," 1888), the hero of which is the symbol of the Latvian fighter for freedom. The first great novel, *Mērnieku laiki* (1879), by the brothers R. and M. Kaudzītes, gives a realistic account of Latvian peasant life. The "national awakening" was further developed by the poet Rainis (*q.v.*; J. Pliekšāns, 1865–1929), whose principle was "old songs to new tunes"—the "old songs" being the imagery of folk poetry and the "new tunes" the problems of modern life. The themes of his plays were often taken from legends (as was *Lāčplēsis*) or from the motifs of folk songs. The most profound of his plays, *Jāzeps un viņa brāļi* (Eng. trans., *Sons of Jacob,* 1924), has a biblical theme. The most striking volume of his lyrics is *Gals un sākums*. His wife, Aspazija (Elza Rozenberga [1868–1943]), a champion of women's rights, showed a stormy temperament in her lyrics and plays.

In the 1890s Latvian literature gave voice to diverse and often contradictory literary trends which had taken other European nations decades to develop. The "new movement" demanded realism and a literature dealing with social problems. In direct opposition, J. Poruks (1871–1911) introduced the ideas of the New Romanticism, but the underlying note of his work is a typically Latvian desire for ethical clarity. R. Blaumanis (1863–1908) wrote realistic plays and short stories of peasant life. In the following decade a group of poets, the "Decadents" or "Symbolists," propounded art for art's sake. Their greatest emotional experience was the revolution of 1905 when the Latvians tried to break away from imperialistic Russian and local German tutelage. Lyricism then began to become predominant. In the verse and in the fairy tales of the great poet Kārlis Skalbe (1879–1945) the ethical world of folk poetry is reborn. Skalbe looks for beauty in small things and for virtues in humble folk.

It was out of this literary polyphony that a generation of authors arose to dominate the scene on Latvia's becoming independent in 1918. J. Akuraters (1876–1937) pictured in his prose romantic heroes, aristocratic prototypes with aesthetic ideals in the spirit of Nietzsche; more often he portrayed himself. His lyrics are powerful in expression but improvised in style. A. Upītis (1877–), inspired by French and Russian naturalism, condemned in his novels the middle classes and intelligentsia and idealized the heroes of the working class, but did not succeed in portraying a lifelike ideal soviet man. E. Virza (E. Lieknis, 1883–1940), inspired by French poetry, created lyrics in strict classical forms. His prose poem *Straumēni* (1933, numerous translations) is a song in praise of the patriarchal farmstead. Lyrical emotionalism is disciplined in J. Jaunsudrabiņš (1877–1962), whose best novel is the trilogy *Aija, Atbalss, Ziema.* Experience in World War I provided themes for many literary works, as K. Štrāls's novel *Karš* (2 parts, 1922–27), Anna Brigadere's *Kvēlošā lokā* (1922) and A. Grīns's *Dvēselu putenis* (1932–34). The short stories of J. Ezerinš (1891–1924) are in the French manner and evoke the postwar atmosphere of his time; those of K. Zariņš (1887–) are simple and ascetic in style. J. Veselis (1896–1962) tried to harmonize the spirit of his age with the world of Latvian folk poetry in his novels and modern legends.

But Latvians no less than writers in other literatures found it difficult to achieve a unified view of the world in the 20th century and so turned, as others did, to psychological detail. The short stories of M. Bendrupe (1910–) show a certain Freudian influence. E. Ādamsons (1907–46), who learned much from English literature, depicted the neuroses of modern man; Anšlavs Eglītis (1906–) delighted in caricaturing and in intensifying one particular human quality at a time; and M. Zīverts (1903–), the best modern Latvian dramatist, evolved a particular kind of long, one-act play culminating in "the great monologue," as in his historical tragedy *Vara* (1944). As an exponent of the modern lyric, J. Medenis (1903–61) tried to evolve new metres from those of the folk songs. On the other hand V. Strēlerte (1912–) wrote her lyrics in strict forms, whereas Z. Lazda (Z. Šreibere, 1902–57) and Andrejs Eglītis (1912–) showed the influence of the folk song in the style of their verse. A. Čaks (A. Čadarainis, 1902–50), influenced by V. V. Mayakovski and his contemporaries, created a new tradition in Latvian lyrics, describing in free verse and with exaggerated poetical images the atmosphere of the suburbs. His outstanding work is a ballad-cycle *Mūžības skārtie* ("Marked by Eternity," 1938) describing the Latvian fusiliers of World War I and its revolutionary aftermath. After World War II a great number of authors migrated to the west, to contribute a focus of Latvian literature outside the country's territorial boundaries. In exile a new generation of poets arose who followed along the path opened up by Čaks and introduced existentialist ideas and surrealist methods in their lyrics: V. Sniķere, O. Stumbrs, G. Salinš, L. Tauns. In the 1960s some of the authors in Latvia, in resisting the uniformity of socialist realism, tried to follow this new tradition developed by Latvian poets in the west.

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LAUBE, HEINRICH RUDOLF CONSTANZ (1806–1884), German writer, a member of the radical Young German movement (*see* GERMAN LITERATURE), from which he was later a renegade, was born at Sprottau, Silesia, on Sept. 18, 1806. After studying theology at Halle and Breslau (1826–29) he turned to dramatic criticism and journalism. The Leipzig *Zeitung für die elegante Welt* which he edited in 1833–34 became the mouthpiece for Young Germany and in May 1834 he was expelled from Saxony. In July he was arrested in Berlin and imprisoned for eight months and then temporarily released; but in spite of his efforts to appease the authorities he was again imprisoned for the same earlier offenses, this time for 18 months (1837–39), though now in the pleasant Pückler castle in Muskau on the Neisse. He became a member of the Frankfurt assembly, of which he wrote a history, but his greatest work was as artistic director of the Vienna Hofburg theatre (1849–67), which under his direction reached a high-water mark; he greatly enlarged the repertoire and personally produced every play. He subsequently directed the Leipzig Stadttheater (1869–70) and the Vienna Stadttheater (1872–80). He gives an interesting account of his work in *Das Burgtheater* (1868), *Das norddeutsche Theater* (1872) and *Das Wiener Stadttheater* (1875). He died at Vienna on Aug. 1, 1884.

Laube's many plays, among them *Die Karlsschüler,* on the young Schiller (1847), and *Graf Essex* (1856), are marked by great technical resource. His early novel *Das junge Europe* (three parts, 1833–37) mirrors his development from revolutionary reformer to resigned bourgeois.

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LAUCHHAMMER, a town of Germany which after partition of the nation following World War II was located in the Cottbus *Bezirk* (district) of the German Democratic Republic. Pop. (1964) 28,002. The town lies just west of the Berlin-Dresden highway about 170 km. (106 mi.) S of Berlin. Opencast lignite workings nearby supply briquetting plants, a power station and a plant (opened 1951–52) from which metallurgical coke is made from lignite. The Lauchhammer ironworks, founded in 1725, is one of the chief heavy industrial enterprises in the republic.

LAUD, WILLIAM (1573–1645), English archbishop whose policy was one of the main causes of the Puritan revolution in the 17th century, was born at Reading on Oct. 7, 1573, the only son of William Laud, a clothier. He was educated at Reading free school, matriculated at St. John's college, Oxford, in 1589, gained a scholarship in 1590, a fellowship in 1593, and graduated B.A. in 1594, proceeding to D.D. in 1608. In 1601 he took orders, in 1603 becoming chaplain to Charles Blount, earl of Devonshire,

whom he married to Penelope, the divorced wife of Lord Rich, which he afterward bitterly repented.

Laud early took up a position of antagonism to the Calvinistic party in the church, and in 1604 was reproved by the authorities for maintaining in his thesis for the degree of bachelor of divinity "that there could be no true church without diocesan bishops," and again in 1606 for advocating "popish" opinions in a sermon at St. Mary's, Oxford. Laud in 1607 was made vicar of Stanford in Northamptonshire, and in 1608 became chaplain to Bishop Richard Neile, who in 1610 presented him to the living of Cuxton, Kent, when he resigned his fellowship. In 1611, in spite of the influence of Archbishop George Abbot and Lord Chancellor Ellesmere, Laud was made president of St. John's, and in 1614 obtained the prebend of Buckden, in 1615 the archdeaconry of Huntingdon and in 1616 the deanery of Gloucester. In 1617 he went with the king to Scotland, and aroused hostility by wearing the surplice. In 1621 he became bishop of St. David's, when he resigned the presidency of St. John's.

BY COURTESY OF THE ARCHBISHOP OF CANTERBURY, COURTAULD INSTITUTE OF ART PHOTOGRAPH

ARCHBISHOP LAUD BY SIR ANTHONY VAN DYCK, 1633, DETAIL. IN LAMBETH PALACE, LONDON

In May 1622 Laud, by the king's orders, took part in a controversy with John Percy (Fisher), a Jesuit, to prevent the conversion of the countess of Buckingham to Romanism. He acknowledged the Roman church as a true church and a branch of the Catholic body, but attacked the claim to the pope's infallibility; and with regard to the English church he denied that all its 39 articles were fundamental. The foundation of belief was the Bible, and, when dispute on matters of faith rose, "a lawful and free council, determining according to Scripture, is the best judge on earth." A close intimacy between Laud and Buckingham, the son of the countess, now began, and proved the chief instrument of Laud's advancement. On the accession of Charles, Laud's activities were allowed free scope. A list of the clergy was prepared by him for the king, in which each name was labeled with an O or a P, distinguishing the orthodox to be promoted from the Puritans to be suppressed. Laud defended Richard Montague, whose pamphlet against Calvinism had angered parliament. He supported the king's prerogative throughout the conflict with the parliament, preached in favour of it before Charles's second parliament in 1626 and assisted in Buckingham's defense. In 1626 he was nominated bishop of Bath and Wells, and in July 1628 bishop of London. On April 12, 1630, he was elected chancellor of Oxford university after a bitter contest.

At Oxford Laud carried out many useful reforms, including the codification of the statutes, the statute by which public examinations were rendered obligatory for university degrees, and the ordinance for the election of proctors, the revival of the college system and of moral and religious discipline and order, and of academic dress. He founded a readership in Arabic, procured in 1636 the royal charter to print all kinds of books and obtained for the Bodleian library more than 1,300 manuscripts, adding a new wing to the building to contain his gifts. His rule at Oxford was marked by a great increase in the number of students. In his own college he erected the new buildings, and was its second founder. Of his chancellorship he himself wrote a history, and the Laudian tradition long remained the great standard of order and good government in the university. Elsewhere he showed his liberality and his zeal for reform. He was an active visitor of Eton and Winchester, and endowed the grammar school at Reading, where he was himself educated. In London he procured funds for the restoration of the dilapidated cathedral of St. Paul's.

As a judge he showed a tyrannical spirit both in the star chamber and high commission court, threatening John Felton, the assassin of Buckingham, with the rack, and showing special activity in procuring a cruel sentence in the former court against Alexander Leighton in June 1630 for a diatribe against episcopacy. His power was greatly increased after his return from Scotland, whither he had accompanied the king, by his promotion to the archbishopric of Canterbury in Aug. 1633. "As for the state indeed," he wrote to Thomas Wentworth (the earl of Strafford) on this occasion, "I am for *Thorough*." In 1636 the privy council decided in his favour his claim of jurisdiction as visitor over both universities. Soon afterward he was placed on the commission of the treasury and on the committee of the privy council for foreign affairs. He was all-powerful in both church and state. He proceeded to impose by authority the religious ceremonies and usages to which he attached so much importance. He wished to enforce a decent and uniform order in services because he felt that "outward worship" was a witness to the true "inward worship of the heart." He tried to get repaired the fabric of churches, much neglected since the Reformation. The communion table was now to replace the pulpit as the chief feature in the church. The Puritan lecturers were suppressed. He showed great hostility to the Puritan sabbath, and supported the reissue of the *Book of Sports*, especially odious to that party. Wherever he could he insisted on the use of the Prayer Book among Englishmen abroad and aliens in England. In 1637 he took part in the sentence of the star chamber on William Prynne, John Bastwick and Henry Burton, and in the same year in the prosecution of Bishop John Williams. He urged Strafford in Ireland to carry out the same reforms and severities.

He was now to extend his ecclesiastical system to Scotland. The new prayer book and canons were drawn up by the Scottish bishops with his assistance. Presbyterian Scots hated them as an attack not only on the national religion but on the national independence, signed the national league and covenant in 1638, raised an army, and defied Charles I and Laud. Laud continued to support Strafford's and the king's arbitrary measures to the last. Though at first opposed to the sitting of convocation, after the dissolution of parliament in 1640, as an independent body, on account of the opposition it would arouse, he yet caused to be passed in it the new canons which both enforced his ecclesiastical system and asserted the king's divine right, resistance to his power entailing "damnation." Laud's infatuated policy could go no further, and the et cetera oath, according to which whole classes of men were to be forced to swear perpetual allegiance to the "government of this church by archbishops, bishops, deans and archdeacons, etc.," was long remembered and derided. He was attacked and reviled as the chief author of the troubles on all sides. In October he was ordered by Charles to suspend the et cetera oath. The same month, when the high commission court was sacked by the mob, he was unable to persuade the star chamber to punish the offenders.

On Dec. 18, 1640, he was impeached by the Long parliament and on March 1 imprisoned in the Tower. On May 12, at Strafford's request, the archbishop appeared at the window of his cell to give Strafford his blessing on his way to execution; Laud fainted as Strafford passed by. On May 31, 1643, Prynne received orders from the parliament to search his papers, and published a mutilated edition of his diary. The articles of impeachment were sent up to the lords in October, the trial begining on March 12, 1644, but, the attempt to bring his conduct under a charge of high treason proving hopeless, an attainder was substituted and sent up to the lords on Nov. 22. In these proceedings there was no semblance of respect for law or justice, the lords yielding (Jan. 4, 1645) to the menaces of the commons. Laud now tendered the king's pardon, which had been granted to him in April 1643. This was rejected, and it was with some difficulty that his petition to be executed with the ax, instead of undergoing the ordinary brutal punishment for high treason, was granted. He died on Jan. 10 on Tower hill, asserting his innocence of any offense known to the law, repudiating the charge of "popery," and declaring that he had always lived in the protestant Church of England.

Laud never married. He is described by Thomas Fuller as "low of stature, little in bulk, cheerful in countenance (wherein gravity and quickness were all compounded), of a sharp and piercing eye,

clear judgment and (abating the influence of age) firm memory." His personality, because of the sharp religious antagonisms with which his name is inevitably associated, has rarely been judged with impartiality. His severities were the result of a narrow mind and not of a vindictive spirit, and their number has certainly been exaggerated. His career was distinguished by uprightness, by piety, by a devotion to duty, by courage and consistency. In particular it is clear that the charge of partiality for Rome is unfounded, but he was unfortunate in that unscrupulous enemies could misrepresent his measures as popish.

Laud's complete failure to appreciate the strength of Puritanism is the principal proof of his total lack of true statesmanship. The hostility to "innovations in religion," characteristic of the Arminian conception of church and episcopacy *jure divino* and diametrically opposed to Puritan Presbyterianism, may have been a stronger cause of the Civil War than even the violation of constitutional liberties; and to Laud, therefore, more than to Strafford, to Buckingham or even perhaps to Charles himself, may be especially due the responsibility for the catastrophe. He held fast to the great idea of the catholicity of the English church, to that conception of it which regards it as a branch of the whole Christian church, and emphasizes its historical continuity and identity from the time of the apostles, but here again his policy was at fault. His despotic administration not only excited and exaggerated the tendencies to separatism and independency which finally prevailed but alienated churchmen from communion with their church and from their country. The emigration to Massachusetts from 1629 onward was composed not only of Separatists but also of Episcopalians. Thus what Laud grasped with one hand he destroyed with the other.

Spiritual influence, in Laud's opinion, was not enough for the church. The church as the guide of the nation in duty and godliness, even extending its activity into state affairs as a mediator and a moderator, was not sufficient. Its power had to be material and visible, embodied in great places of secular administration and enthroned in high offices of state. Thus the church, descending into the political arena, became identified with the doctrines of one political party in the state—doctrines odious to the majority of the nation—and at the same time became associated with acts of violence and injustice. Equally disastrous to the state was the identification of the king's administration with one party in the church, and that with the party in a minority not only in the nation but even among the clergy themselves.

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LAUDANUM, originally the name given by Paracelsus to a famous medical preparation of his own, composed of gold, pearls, etc., but containing opium as its chief ingredient. The term is now only used for the alcoholic tincture of opium (*q.v.*).

LAUDER, SIR HARRY (MACLENNAN) (1870–1950), British music-hall comedian, who excited enthusiasm throughout the English-speaking world as singer and composer of simplehearted Scottish songs, was born at Portobello, Edinburgh, on Aug. 4, 1870. While a child labourer in a flax mill he won singing competitions but worked in a coal mine for ten years before joining a concert party that took him to Belfast, Birkenhead and other places which claim to have seen his professional debut. The first songs that he wrote and sang were Irish or English, but when he came to London, to Gatti's music hall, in May 1900, he was wearing the kilt. Later he wore trousers for his character studies only, such as "Saftest of the Family" and "It's Nice to Get Up in the Morning." During his week's engagement at Gatti's a gap occurred, through illness, in the program at the Tivoli, and he stepped into it with "Lass o' Tobermory," an immediate success. Until then his songs had all been comic. With "I Love a Lassie" he struck the homely poetic note that gave charm to "When I Get Back Again to Bonnie Scotland" and "Roamin' in the Gloamin'." His range extended from the bibulous "Just a Wee Deoch and Doris" to the hortatory "End of the Road." With a large repertoire of his own songs (some verses partly by other persons) he toured America, South Africa and Australia, and during World War I he sang to troops in France. He gave many concerts for war charities and was knighted in 1919. On tour in 1935 he still acted the amorous exuberance of youth. He published four books of reminiscences and acted in several films. He died at Strathaven, Lanarkshire, on Feb. 26, 1950. (M. W. D.)

LAUDERDALE, JOHN MAITLAND, DUKE OF (1616–1682), a member of Charles II's Cabal, wielded viceregal powers over Scotland for many years. He was the eldest surviving son of John Maitland, 2nd Lord Maitland of Thirlestane, created earl of Lauderdale in 1624, and was born at Lethington on May 24, 1616. By 1641 he had emerged as an active Presbyterian and was soon employed in negotiations with the rebellious parliamentary party in England. After entering the St. Andrew assembly as a lay elder in July 1643, he was sent to England in August as one of the commissioners for signing the Solemn League and Covenant, and went again in November to attend the Westminster assembly. Thereafter he was fully involved in English affairs and, becoming a member of the Committee of Both Kingdoms in Feb. 1644, tried to mediate with Charles I for a Presbyterian settlement during negotiations at Uxbridge in Jan. 1645. He continued to work for accommodation up to the surrender of Charles I by the Scots in 1647; beyond this date he worked entirely in the king's cause. His objective remained the establishment of Presbyterianism and the greater employment of Scots in public affairs. He secured these concessions from Charles in the Engagement of Dec. 1647: in return the king was promised military assistance. Maitland, earl of Lauderdale since his father's death in 1645, now co-operated with the duke of Hamilton and English royalists in mounting the ill-fated invasion of England in 1648. After the defeat at Preston he turned to negotiations with the prince of Wales and by 1650 was deep in the confidence of the new king. He accompanied Charles II on the next invasion of England but was taken prisoner at the battle of Worcester in 1651. He was confined in the Tower of London, Portland castle and other prisons and was not released until March 1660.

Lauderdale was in time to do something to assist the Restoration and was able to accompany the fleet to Breda. There he reestablished close ties with Charles and, against fierce competition, secured the coveted post of secretary for Scottish affairs; henceforth he was "never from the king's ear nor council." Lauderdale seems to have shown few scruples in abjuring his Presbyterian oaths and did nothing to obstruct the restoration of episcopacy in Scotland, nor the trial and execution of the duke of Argyll. But he was himself the object of determined attacks which made his position precarious. He showed considerable dexterity in outmaneuvering his personal enemies and by late 1663 had emerged as the most powerful of Scottish ministers. The fall of the earl of Clarendon in 1667 strengthened his position in England and enabled him to emerge on an equal footing with other members of the Cabal. In 1669 his dominance was formally embodied in his appointment as lord high commissioner to the Scots parliament.

Soon after his second marriage (in 1672 to Lady Dysart) he was created duke of Lauderdale and marquess of March in the Scottish peerage, and made a knight of the garter. In the English peerage he became earl of Guilford and Baron Petersham in 1674, an elevation which coincided with the beginning of attacks on him by the house of commons. His Scottish administration had become increasingly marked by the harsh repression of dissenters and an arrogant disregard for civil liberties which gave cause for alarm among the English opposition. His removal from office was demanded in a succession of addresses. Lauderdale, however, survived unscathed to conduct the most ferocious of his repressive measures in 1677, when he employed a small army of undisciplined Highlanders to harry the western counties of Scotland where resistance to his rule was strongest. On June 22, 1679, the covenanters were finally crushed at Bothwell bridge. Lauderdale's subsequent decline was the consequence of ill-health rather

than disfavour. He resigned his Scottish responsibilities in 1680 and was removed from the rest of his offices in 1682, dying shortly after in August at Tunbridge Wells.

He left an execrated name among his own countrymen. More objective critics, such as Clarendon, were willing to admit his genuine ability, and Bishop Burnet, who had denounced him before the house of commons, acknowledged his learning in Latin, Greek and Hebrew literature. He had an extraordinary memory, but these gifts were put to the service of a violent and ruthless ambition. His rough manner and coarse language were a matter for comment, and his morals shamed even that tolerant age. But despite his boorishness he remained a boon companion of the king.

He had only one child, a daughter, Mary, by his first wife who was the co-heir of the earl of Home. Consequently at his death his dukedom became extinct and his earldom in the Scottish peerage passed to his brother Charles. (H. G. Ro.)

LAUDON (LOUDON), **ERNST GIDEON,** FREIHERR VON (1717–1790), Austrian field marshal under Maria Theresa and her two successors, was born at Tootzen, Livonia, on Feb. 2, 1717, the son of a Swedish officer of Scottish extraction. One of the many soldiers of fortune of good family who thrived in Europe in the 18th century, he entered the Russian army as a cadet in 1732 and saw field service in 1734–35 and 1738–39. In 1741 he resigned and offered his services to Frederick the Great, but when his offer was declined, he joined Franz von der Trenck's corps of light horse in Vienna as a captain. He became a colonel at the outbreak of the Seven Years' War and a major general of cavalry in 1757. In 1758 he forced Frederick to raise the siege of Olmütz and defeated him at Kunersdorf (1759) and Landeshut (1760). Made commander in chief in Bohemia, Moravia and Silesia, he was defeated by Frederick at Liegnitz (Aug. 15, 1760), but maintained that this was due to lack of support from the two commanders of the main Austrian forces, Daun and Lacy. His capture by a surprise attack of the fortress of Schweidnitz (1761) was the last Austrian success in the war.

After being commander in chief in Bohemia and Moravia from 1769 to 1772 he settled at Hadersdorf, near Vienna, in 1776 and was made a field marshal. Recalled from retirement, he commanded an army in the War of the Bavarian Succession (1778–79), was not very successful. Recalled again for the Turkish War after Lacy's failure, he captured Belgrade in 1789. The emperor Leopold II made him commander in chief of the Austrian armed forces; but he died on July 14, 1790, at Neu-Titschein (Moravia) and was buried at Hadersdorf. (C. N. B.)

LAUDS is the second of the offices of the canonical hours in the Roman breviary, the morning prayer, so called from Ps. cxlviii–cl—each beginning *Laudate*, "Praise ye"—which form part of the service. *See* BREVIARY; HOURS, CANONICAL.

LAUE, MAX THEODOR FELIX VON (1879–1960), German physicist, recipient of the 1914 Nobel prize in physics for his work on the diffraction of X-rays in crystals, was born Oct. 9, 1879, at Pfaffendorf, near Coblenz. He attended the universities of Strasbourg, Göttingen and Munich and became an assistant in the University of Berlin and later in Munich, being subsequently called to the University of Zürich as professor (1912). From there he went to the University of Frankfurt (1914), finally proceeding to the University of Berlin (1919) as a director of the Institute for Theoretical Physics, where he became emeritus professor in 1943. In 1951 Laue became director of the Max Planck institute for research in physical chemistry in Berlin. He died in Berlin on April 23, 1960.

Laue specialized in theoretical physics and was a champion of Albert Einstein's theory of relativity. He also devoted his attention to the quantum theory, to the Compton effect (alteration of the frequency of Röntgen rays), to the Einstein-Bohr equation and the disintegration of atoms. Besides his work for various scientific publications, he also had many articles published in the daily press. He was the first to suggest the use of a crystal to act as a grating for the diffraction of X-rays, showing that if a beam of X-rays passed through a crystal, diffraction would take place and a pattern would be formed on a photographic plate placed at right angles to the direction of the rays. This was verified experimentally in 1912 by W. Friedrich and P. Knipping, working under the direction of Laue, and was the starting point of much subsequent work on X-rays and crystal structure.

Laue's published works include: *Das Relativitätsprinzip* (1911); *Die Relativitätstheorie* (1911); *Röntgenstrahleninterferenzen* (1941); *Geschichte der Physik* (1946; Eng. trans., 1950); and *Theorie der Supraleitung* (1947; Eng. trans., 1952).

See also his autobiography in H. Hartmann, *Schöpfer des neuen Weltbildes* (1952).

LAUENBURG, a former duchy of northern Germany, whose territory, bounded on the north by Lübeck, on the east by the ecclesiastical principality of Ratzeburg and by Mecklenburg-Schwerin, on the south by Brunswick-Lüneburg (Hanover) and on the west by Hamburg and by part of Holstein, comprised the towns of Ratzeburg and Lauenburg. In 1946 its territory was included in the *Land* Schleswig-Holstein.

As Saxon colonists displaced the Slavs on the right bank of the Elbe river, the country that later became Lauenburg was in the 12th century A.D. incorporated in the possessions of Henry the Lion, duke of Saxony, who established a countship of Ratzeburg and also restored the bishopric of Ratzeburg (originally founded in the 1060s). On the partition of Henry's duchy (1180), the countship was included in the lesser duchy of Saxony given to the Ascanian Bernhard of Anhalt (d. 1212), who in 1182 built Lauenburg. Lost to Valdemar II of Denmark in 1203 but recovered by Bernhard's son Albert I of Saxony in 1227, Lauenburg was on Albert's death (1260) made into the separate duchy of Saxe-Lauenburg for his elder son John (d. 1285). Hadeln, on the left bank of the Elbe estuary, was also attached to the duchy of Saxe-Lauenburg. Partitioned between John's grandsons in the 14th century, Saxe-Lauenburg was reunited in 1401 under the duke Eric IV (d. 1412). His great-grandson Magnus I (d. 1543) introduced the Reformation to the territory. When the Ascanian line of dukes died out with Julius Francis in 1689, nine claimants to the succession came forward, the most important being George William, the Welf duke of Brunswick-Lüneburg-Celle (relying on a treaty of 1369), and John George III, the Wettin elector of Saxony (relying on a treaty of 1507). George William established his claim in 1702; and the rights of his nephew George Louis, elector of Hanover and, as George I, king of England, were recognized by the Holy Roman emperor Charles VI in 1728. Thenceforward Lauenburg shared the fortunes of Hanover till the congress of Vienna (1815). It then passed (apart from Hadeln) to the kingdom of Prussia, which promptly granted it to Denmark in exchange for the previously Swedish part of Pomerania. Occupied by Hanoverian troops in 1848 during the Prusso-Danish War and administered by the German confederation till 1851, Lauenburg was declared an integral part of Denmark in 1853 but was ceded to Austria and Prussia jointly after the last war in 1864 about the Schleswig-Holstein question (*q.v.*). By the convention of Gastein (Aug. 1865) Austria sold its rights to Prussia for 2,500,000 thalers; and in Sept. 1865 William I of Prussia assumed the ducal title. Lauenburg, however, retained its separate constitution till 1876, when it was made a "circle" (*Kreis*) of the Prussian province of Schleswig-Holstein, with Ratzeburg as its capital. Bismarck, who had received extensive lands in Lauenburg in 1871, was created duke in 1890 but never used the title. From 1918 Lauenburg ceased to be a duchy.

LAUGHTER: *see* EMOTION.

LAUNCESTON, chief city of northern Tasmania, Austr., is situated where the North and South Esk rivers meet to form the Tamar, a navigable tidal estuary which winds 40 mi. to Bass strait. It was founded in 1806. Pop. (1966) 60,453 (urban area). The setting is attractive and the dramatic Cataract gorge of the South Esk cuts through the town quite close to the shopping centre; there are well-planned parks. An equable climate (average monthly temperature range 18°–7° C [65°–45° F]; annual rainfall 28.6 in.) is a further attraction. There are a teachers' training college and a museum, while the daily *Examiner* (founded 1842) retains some of the quality of a remarkable era in the young settlement's economic and social history.

Although smaller than Hobart, Launceston has a brisker quality

and perhaps even more of the constituents of a true city. It forms the hub of the transport systems of the north and is the crucial link between Tasmania and the mainland. There is busy traffic by both air and sea, shipping being handled both at Launceston and at wharves farther along the estuary. Chief exports are agricultural produce, wool, timber, textiles, and aluminum from the plant at Bell bay.

Hydroelectric power is available and woolen mills, railway engineering, brewing, flour mills and potteries have long maintained industrial activity; other industries include board mills.

(O. M. R.)

LAUNDERING, HOME: *see* HOME EQUIPMENT.

LA UNION, Philippine province on the northwest coast of Luzon. Area 576 sq.mi.; pop. (1960) 293,330, an increase of 55,990 over 1948. The province consists of a narrow coastal plain backed by rugged mountains. The annual 100-in. rainfall is concentrated between June and October. Rice, both lowland and upland varieties, is the major food crop and tobacco is the leading cash crop. San Fernando, the provincial capital, has tobacco warehouses and rice mills. It is the province's leading town and the northern terminus of the Manila railroad. (R. E. HE.)

LA UNIÓN, a department and city in eastern El Salvador. The area of the department is 957 sq.mi., and the population (1961) was 148,108, of which 76% was rural. The department is especially important in livestock industries, ranking high in hogs, cattle, poultry and the production of cheese. Sesame and cotton are the other leading products. The Inter-American highway crosses the north-central part of the department into Honduras.

The departmental capital, La Unión (pop. [1961] 11,432), on the Gulf of Fonseca, is a port that handles about half of El Salvador's foreign commerce. It is the terminus of the International Railways of Central America, which traverses El Salvador and Guatemala, giving La Unión connections with Puerto Barrios, a Guatemalan port on the Caribbean sea. La Unión is 116 mi. E.S.E. of San Salvador, with which it is connected by railway and modern highway. Concrete and steel piers at Cutuco and the deep spacious harbour enable steamers to unload and load at docks, the only port of El Salvador where this is possible. Seven miles south of the city the massive volcano Conchagua rises to 4,101 ft. above sea level. (C. F. J.)

LAURA (LAVRA), originally a special kind of Christian monastic community first founded in Palestine by St. Saba (5th century). Laura is a Greek word meaning "lane" which gave its name to a community of anchorites sleeping in separate cells originally along a small street or lane but eating and praying together and living in obedience to an abbot. Later the name laura came to be applied to certain important cenobitic monasteries, such as the Great Laura on Mt. Athos, the Holy Laura in the Peloponnese and the Pecherskaya Laura in Kiev. *See* also MONASTERY.

LAURACEAE, the laurel family of aromatic evergreen trees and shrubs, best-known members of which include laurel, cinnamon, cassia, camphor and the avocado (*qq.v.*). There are 45 genera and about 1,100 species, nearly all tropical and subtropical and especially numerous in southeastern Asia and in Brazil. The leaves are leathery and evergreen; the tissues contain oil cavities; the flowers are without petals, the parts usually arranged in threes; the stamens are characteristic, opening by two to four uplifted valves; the fruit is a drupe. In North America the family is represented by several trees and shrubs, found chiefly in the southern United States; *e.g.*, sassafras, Oregon myrtle (*qq.v.*) and spicebush.

LAURANA, FRANCESCO DA (*c.* 1430–?1502), sculptor and medalist, especially distinguished for his portrait busts of women, was born in Vrana (near Zara) on the Dalmatian coast. His early career is obscure, and he is first documented in 1453, when he was being paid by Alfonso of Aragon for work on a triumphal arch in Naples. Disputes over the succession following Alfonso's death in 1458 probably prompted Laurana's departure for France, where he is recorded between 1461 and 1466 at the court of René, duke of Anjou, rival claimant to the throne of Naples. By 1468, however, he was in Sicily, and he seems to have spent the remainder of his life in Sicily, Naples, and the south of France. He died in France some time before March 12, 1502. Laurana's documented works include a series of medals executed for René, statues of the Madonna and bas-reliefs in Italy and Sicily, and tombs and architectural sculpture in the south of France. His portraits (Louvre; National Gallery, Washington; Frick collection, New York) have been variously identified as being of members of the Aragon and Sforza families; they are characterized by serene, detached dignity and reserve. Laurana created an ideal image of aristocratic elegance by reducing individual details to a minimum and concentrating on the essential geometry of forms harmoniously balanced, clearly and precisely carved. In its seriousness and gravity of impression, as well as in its simplification of forms, Laurana's work may be compared to that of Piero della Francesca, whom he may have known in Urbino, since his relative the architect Luciano da Laurana was active there.

BIBLIOGRAPHY.—Monographs by F. Burger and W. Rolfs (both 1907); J. Pope-Hennessy, *Italian Renaissance Sculpture* (1958); R. W. Kennedy, *Four Portrait Busts by Francesco Laurana* (1962).

LAUREL, JOSÉ PACIANO (1891–1959), president of the Philippines during the Japanese occupation from 1943 to 1945, was born March 9, 1891, in southern Luzon. He was educated primarily in the Philippines and the United States, receiving an LL.B. degree from the University of the Philippines in 1915 and a D.C.L. from Yale university in 1920. In 1922, as a cabinet official, he was the central figure in the political controversy between Gen. Leonard Wood, the governor general, and the Philippine nationalist leader. Manuel Quezon y Molina. In 1925 Laurel was elected to the Philippine senate and in 1936 he was appointed associate justice of the supreme court.

Because of his outspoken criticism of Americans, Laurel was favoured by the Japanese as their puppet president during the occupation of the islands in World War II. In accepting office under the Japanese, Laurel insisted that he acted only from patriotic motives. He felt vindicated when, as the Nacionalista party's nominee for the presidency of the Republic of the Philippines in 1949, he was narrowly defeated by the incumbent president, Elpidio Quirino, nominee of the Liberal party, in what Laurel claimed to be a rigged election.

Laurel was elected to the senate in 1951 and helped to persuade Ramón Magsaysay, then secretary of defense, to desert the Liberals and join the Nacionalistas. When Magsaysay became president, Laurel headed an economic mission that negotiated an agreement in 1955 to improve economic relations with the United States. He retired from public life in 1957 and devoted his time to law, banking and the promotion of economic nationalism. He died in Manila on Nov. 6, 1959. (C. A. B.)

LAUREL, a city of southeastern Mississippi, U.S., and the seat of Jones county, is 27 mi. N.N.E. of Hattiesburg. Founded in 1882 when two lumbermen established a sawmill in the largest virgin yellow-pine forest in the United States, Laurel was incorporated in 1890 and grew rapidly. By 1920 it had become the world's largest shipper of yellow-pine timber, but soon the forests were depleted and Laurel faced economic collapse. It was then that William Mason, an associate of Thomas Edison, discovered uses for the waste products of the lumber industry. From these wastes Mason developed a hardboard, Masonite, which is produced in Laurel. Other industries include the refining of petroleum from nearby oil fields and the production of machinery and naval stores. Laurel is served by excellent highway, air and rail facilities. The Lauren Rogers library and museum has the largest woven basket collection in the world.

For comparative population figures *see* table in MISSISSIPPI: *Population.* (E. H. Hs.)

LAUREL, the popular name given to a number of evergreen shrubs or small trees of widely different families. The true laurel of history is probably the bay or sweet bay laurel of gardeners (*Laurus nobilis*), held to be the *Daphne* of the ancients, a member of the family Lauraceae (*q.v.*) to which also belong sassafras, cinnamon and avocado. The name is applied commonly to certain members of the rose family (Rosaceae; *q.v.*), as cherry laurel or laurel cherry, and to many other plants that resemble the true laurel.

True Laurel.—The bay laurel is a large evergreen shrub, sometimes reaching a height of 60 ft., but rarely assuming a truly tree-like character. The leaves, smaller than those of other laurels, possess an aromatic and slightly bitter flavour for which they are used in cooking (*see* BAY LEAF). The small yellowish-green flowers are produced in axillary clusters, are male or female, and consist of a simple four-leaved perianth, which encloses nine stamens in the male, the anthers of which dehisce by valves that lift upward as in the common barberry. The fruit consists of a succulent berry surrounded by the persistent base of the perianth. The bay or sweet laurel is a native of Italy, Greece and north Africa, and is abundantly grown in the British Isles as an evergreen shrub, as it endures most winters. The date of its introduction is unknown, but must have been previous to 1562, as it is mentioned in William Turner's *Herbal* published in that year. It was carried to North America by the early colonists, and is much cultivated in the warmer parts of the United States, often as a sheared tub plant for formal effects.

JOHN H. GERARD

BAY LAUREL (LAURUS NOBILIS)

Among the Greeks the laurel was sacred to Apollo, especially in connection with Tempe, in whose laurel groves the god himself obtained purification from the blood of the Python. This legend was dramatically represented at the Pythian festival once in eight years—a boy fleeing from Delphi to Tempe, and after a time being led back with song, crowned and adorned with laurel. The victors in the Pythian games were crowned with the laurels of Apollo, and the laurel became the symbol of triumph in Greece and later in Rome also. As Apollo was known as the god of poets, the *Laurea Apollinaris* naturally belonged to poetic merit. The various prerogatives of the laurel among the ancients are collected by Pliny in his *Natural History*. It was a sign of truce, like the olive branch; letters announcing victory, and the arms of the victorious soldiery were adorned with it; it was thought that lightning could not strike it, and Tiberius always wore a laurel wreath during thunderstorms. From its association with the divine power of purification and protection, it was often set before the doors of Greek houses, and among the Romans it was the guardian of the gates of the Caesars.

J. E. DOWNWARD

COMMON CHERRY LAUREL (PRUNUS LAUROCERASUS)

Laurel Cherries.—The laurel cherries are often grouped with the plums and cherries in the genus *Prunus*, but are sometimes given separate generic rank as *Laurocerasus*. The common cherry laurel or English laurel (*Prunus laurocerasus*), up to 20 ft. tall, is a native of the woody and subalpine regions of the Caucasus, of the mountains of northern Iran, of northwestern Asia Minor and of the Crimea. It was received into Europe in 1576, and flowered for the first time in 1583. John Ray in 1688 relates that it was first brought from Trabzond to Constantinople, then to Italy, France, Germany and England. John Parkinson in his *Paradisi* records it as growing in a garden at Highgate in 1629; and in the 1633 edition of John Gerard's *Herball* it is recorded that the plant "is now got into many of our choice English gardens, where it is well respected for the beauty of the leaues and their lasting or continuall greenness."

The leaves of this plant are rather large, broadly lance shaped and leathery, the margin being somewhat toothed. They are remarkable for their poisonous properties, giving off the odour of bitter almonds when bruised and yielding oil of bitter almonds and hydrocyanic (prussic) acid in distillation.

The following varieties of the common cherry laurel are in cultivation: the Caucasian (*Prunus laurocerasus caucasica*), which is hardier and bears very rich, dark-green glossy foliage; the Colchican (var. *colchica*), which is a dwarf-spreading bush with narrow, sharply toothed pale-green leaves; and var. *zabeliana*, the hardiest of the cherry laurels. Several other varieties also occur. Two other laurel cherries, both taller than the preceding, are the American cherry laurel (*P. caroliniana*), called also wild orange or mock orange, and the Portugal laurel (*P. lusitanica*), a native of Portugal and Madeira, introduced about 1648 into England, where it was cultivated in the Oxford Botanic gardens.

Other Laurels.—The spurge laurel (*Daphne laureola*), of the mezereon family (Thymelaeaceae; *q.v.*), is a small evergreen shrub, with alternate somewhat lanceolate leaves with entire margins. The greenish-yellow flowers are produced in early spring and form drooping clusters at the base of the leaves, followed by a berry, green at first, but finally black.

The name laurel is applied to several North American shrubs or trees, usually with a qualifying term. The best known are the mountain laurel (*q.v.; Kalmia latifolia*), the sheep laurel (*K. angustifolia*), the great laurel (*Rhododendron maximum; see* RHODODENDRON), swamp laurel (*Magnolia virginiana; see* MAGNOLIA) and the California laurel (*Umbellularia californica*), which is often called Oregon myrtle (*q.v.*), and yields a valuable wood used in cabinetmaking.

In Australia and New Zealand are found the Tasmanian laurels (certain species of *Anopterus*) and other trees called laurel (*Sebesten, Cryptocarya, Pittosporum* species). Many Central and South American trees of the Lauraceae are called laurel, as Indian laurel (*Persea indica*) and species of *Nectandra, Ocotea, Phoebe, Licaria, Terminalia* and others. (N. TR.; X.)

LAURENS, HENRY (1724–1792), U.S. statesman of the Revolutionary War era, was born in Charleston, S.C., on Feb. 24 (new style; March 6, old style), 1724, of Huguenot ancestry. He became a clerk in a countinghouse in London, and later engaged in trade and planting at Charleston until 1771, when he retired. He spent the next three years traveling in Europe and in superintending the education of his sons in England. Convinced that a peaceful settlement of the dispute between England and the American colonies was impracticable, he returned to Charleston at the close of 1774. He was made president of the South Carolina council of safety, and in 1776 vice-president of the state. He was sent as a delegate to the continental congress at Philadelphia, Pa., and served as its president from Nov. 1777 until Dec. 1778. In Aug. 1780 he started on a mission to negotiate on behalf of congress a loan of $10,000,000 in Holland; but he was captured off Newfoundland and imprisoned in the Tower of London. His papers were found to contain a sketch of a treaty between the United States and Holland. This discovery led to war between Great Britain and the United Provinces. On Dec. 31, 1781, he was released on parole, and was finally exchanged for General Lord Cornwallis.

In June 1782 Laurens was appointed one of the American commissioners for negotiating peace with Great Britain, but he did not reach Paris until Nov. 28, 1782, only two days before the preliminaries of peace were signed by himself, John Adams, Benjamin Franklin and John Jay. Because of failing health he did not remain for the signing of the definitive treaty. He died at Mepkin plantation near Charleston on Dec. 8, 1792.

His son, JOHN LAURENS (1754–1782), American revolutionary officer, was born at Charleston, S.C., on Oct. 28, 1754. He was educated in England, and on his return to America in 1777 joined Washington's staff; he was entrusted with the delicate duties of a confidential secretary, which he performed with much tact and

skill. He was present in all Washington's battles, from Brandywine to Yorktown. After the capture of Charleston by the English in 1780 he was selected by Washington as a special envoy to appeal to the king of France for supplies for the relief of the American armies. The more active co-operation of the French fleets with the land forces in Virginia, which was one result of his mission, brought about the defeat of Cornwallis at Yorktown. Laurens rejoined the army, and at Yorktown was at the head of an American storming party that captured an advanced redoubt. He was designated with the vicomte de Noailles to arrange the terms of the surrender, which virtually ended the war. In a skirmish on Aug. 27, 1782, on the Combahee river, before peace was formally concluded, Laurens was killed.

See D. D. Wallace, *Life of Henry Laurens* (1915). (D. D. W.)

LAURENT, AUGUSTE (1807–1853), French chemist whose greatest contribution to chemistry was his clarification of the obscure ideas concerning equivalent, atomic and molecular weights, was born at La Folie, Haute-Marne, on Nov. 14, 1807. He spent most of his life in poverty. He was first a mining engineer and then *préparateur* at the Central School of Arts and Manufactures in Paris. He occupied various industrial positions and was appointed professor of chemistry at Bordeaux in 1838, a post he held until 1846. He was warder of the mint at Paris from 1848 until his death on April 23, 1853.

Laurent assisted in bringing to light Avogadro's hypothesis, which played a great part in the accurate fixing of atomic weights. In conjunction with C. F. Gerhardt (*q.v.*) he helped develop the systematic classification of organic compounds. His famous *Méthode de chimie* appeared a year after his death.

For biographical details *see* E. Grinaux, *Revue scientifique* (1926); E. Riegel, *Journal of Chemical Education* (1926); essay by M. Bloch in G. Bugge (ed.), *Buch der grossen Chemiker* (1929–30).

LAURESTINUS, the popular name of a common evergreen garden shrub known botanically as *Viburnum tinus,* with rather dark-green ovate leaves in pairs and flat-topped clusters (corymbs) of white flowers, which are rose-coloured before expansion and appear very early in the year. The fruit, a one-seeded, fleshy drupe, is blackish. In milder parts of the United States it is grown in gardens as an ornamental plant and for low hedges, especially in California; in the north it is often cultivated as a pot plant. It is a native of the Mediterranean region and was in cultivation in Britain at the end of the 16th century. *See* also VIBURNUM.

LAURIA (LORIA or LURIA), **RUGGIERO DI** (1250–1305), admiral of Aragon and Sicily, was the most prominent figure in the naval war which arose directly from the Sicilian Vespers. From 1262 he was brought up at the Aragonese court. In 1283, following the submission of Sicily to Peter III of Aragon, he was made admiral and defeated, off Malta, a French fleet in the service of Charles of Anjou. In 1284 he defeated the Angevin fleet in the Bay of Naples, taking prisoner the heir to the kingdom, Charles of Salerno. In 1285 he fought on the coast of Catalonia one of the most brilliant campaigns in all naval history. The French king Philip III had invaded Catalonia with a large army, which relied almost wholly for its stores on the cooperation of its allies stationed in squadrons along the coast. Lauria, recalled from Palermo by Peter III, fell on the central squadron of the French fleet near the Hormigas; the Catalan and Sicilian squadrons gained a complete victory. This campaign, which was followed by destructive attacks on the French coast, saved Catalonia from the invaders and completely ruined the French naval power for the time being.

When Peter III's third son (*see* FREDERICK III of Sicily) accepted the Sicilian crown in 1296 in defiance of both the Angevins and his elder brother James II of Aragon, Lauria at first entered his service, but concern for his large estates in Valencia soon obliged him to change sides and adhere to James II. As admiral of Aragon, Lauria inflicted defeats on the Sicilian fleet in 1299 and 1300. He retired to Aragon after peace had been signed (1302) between Frederick and the Angevins, and died at Valencia in 1305.

LAURIER, SIR WILFRID (1841–1919), first French-Canadian premier of Canada, was born on Nov. 20, 1841, at St. Lin, Quebec, of French Roman Catholic parents. He attended the local parish school and spent two years in public school in New

NATIONAL FILM BOARD OF CANADA

SIR WILFRID LAURIER

Glasgow where he learned English and also respect for English-speaking Protestants. He graduated from L'Assomption college and studied law at McGill university. He practised law briefly in Montreal, but because of ill-health moved to Arthabaska where he opened a law office and edited *Le Défricheur.*

From the beginning he was associated with the *Parti Rouge,* which espoused republicanism and anticlericalism. In Montreal he was promiment in L'Institut Canadien, which was criticized and later condemned by the Roman Catholic authorities for its nonsectarian debates and for its library containing books on the *Index Librorum Prohibitorum;* in Arthabaska, *Le Défricheur* was banned for its criticism of the clergy.

Laurier was elected to the Quebec legislature in 1871 where his first speech attracted attention by its graceful delivery, logical structure and felicitous phrases. He entered the dominion house of commons in 1874 and quickly achieved prominence. He was appointed minister of inland revenue in 1877 and was defeated in the by-election which followed, but found a seat in the constituency of Quebec East which he represented until his death.

He became the acknowledged leader of the French-Canadian Liberals during the long period of opposition after 1878. The Liberals in Quebec were still tainted with *Rouge* anticlericalism and remained a minority party. Laurier had moderated his views, and his political philosophy, cogently expressed in a speech delivered in 1877, recognized the right of the clergy to persuade but not to coerce voters. His moderating influence led to increasing support for the Liberal party in federal and provincial elections. By 1896 Laurier had quietly effected a coalition with the moderate Conservatives, and by this means established Liberal supremacy in Quebec. Federal politics in these years were dominated by Sir John A. Macdonald's Conservative policy of protective tariffs and the construction of the Canadian Pacific railway. Laurier as lieutenant of the Liberal leader Edward Blake was critical of both policies but was not prominent in the debates.

He became a national figure after the execution of Louis Riel in 1885. English Protestants had demanded the execution and French Canadians, who believed he had died a martyr to racial prejudice, were roused to fierce nationalist agitation in Quebec. In this atmosphere Laurier charged the government with administrative responsibility for the rebellion without condoning Riel's actions; his speech gained him the respect of English Canadians and also established his reputation as an orator in English. When Blake resigned he selected Laurier as his successor. Laurier was the first French Canadian to lead a federal party in Canada, and this as a member of the minority group at a time of strife between French and English elements in the Liberal party.

He showed unexpected capacity for leadership. He modified the Liberal policy of unrestricted reciprocity with the United States to the less controversial policy of tariff for revenue only after the general election of 1891. Another serious division in Canada was threatened when the Manitoba government abolished denominational schools. The Conservative government temporized and finally decided to restore separate schools, but Laurier managed to keep the Liberal party united on a policy of compromise which acknowledged provincial control of education but guaranteed Roman Catholic teachers within the public school system for most Roman Catholic students. The Liberals won the election of 1896, obtaining a large majority even in Quebec where the Roman Catholic bishops had campaigned against them.

Laurier was prime minister of Canada from 1896 to 1911. The Liberal party relied on a "solid Quebec" and scattered support from the Maritime provinces, rural Ontario and the west; Laurier's policies dominated the administration. His aim was to dissipate

friction by compromises which conceded the cultural identity of French Canada within the framework of a federal state. His understanding of the aspirations of both English and French Canadians was perceptive and his compromises won easier acceptance because he had earned the confidence and affection of men from both groups.

The most difficult problem was the definition of Canada's relations with Great Britain. English-Canadian loyalty to the empire conflicted with French-Canadian fear of British domination. Laurier's compromise was an undefined autonomy. He steadily resisted the pressure from Great Britain for any form of imperial federation which would limit this autonomy. When the South African War broke out in 1899 he was opposed to Canadian participation. English Canadians, however, insisted on support for Great Britain, and Laurier finally agreed to equip Canadian volunteers and transport them to South Africa where they fought as members of the British army. Laurier insisted that the decision to participate in British wars must rest with Canada. He rejected the idea of an imperial customs union although he did amend the Canadian tariff to grant a preference to imperial imports. English Canadians favoured a direct contribution to the British navy during the naval armaments race with Germany but French Canadians opposed this as a commitment to support Great Britain in time of war. Laurier proposed a Canadian navy which would defend the Canadian coasts but could participate in a war only on the orders of the Canadian government. Even this was too militant for many French Canadians, and Liberal support in Quebec declined in the election of 1911. Laurier's imperial policy was essentially negative: refusing to commit Canada to support imperial policies and rejecting any schemes of imperial federation, but at the same time rejecting the alternative of independence. He recognized the conflict between Canadian nationalism and imperial loyalties. His compromises helped to establish the Commonwealth of Nations.

The most successful achievement of Laurier's administration was the settlement of the Canadian west. External factors favoured the government, for wheat prices were rising, transportation costs were declining, foreign capital was available and the U.S. west was settled. The government took advantage of the situation: a vigorous recruiting campaign in the United States and Europe attracted immigrants and a carefully administered policy of free homesteads brought vast areas on the prairies into production. Western settlement produced wheat, which became Canada's major export, and also stimulated lumbering, mining and manufacturing industries in other parts of Canada. The optimism of the period had some unfortunate results. Laurier agreed to subsidize the private construction of two more transcontinental railways, both of which were financial failures and were later taken over and operated by the federal government. Prosperity was a factor in the three successful elections after 1896 and also in the defeat of 1911. In that year the Laurier government had negotiated with the United States an agreement establishing reciprocal free trade in natural products. This had been the ambition of all previous Canadian governments but in 1911 Canadians were already prosperous. Reciprocity no longer seemed necessary and it was successfully denounced in Ontario as the prelude to political separation from Great Britain. The combination of imperial sentiment in Ontario and, in Quebec, anti-imperial sentiment based on the naval issue, led to Laurier's defeat.

Laurier continued as leader of the opposition and became involved in the most serious crisis of his career. Canada went to war beside Great Britain in 1914 and Laurier gave his full support to the war measures of the Borden government, going on recruiting campaigns between sessions. French-Canadian enlistments, however, were on a smaller scale than those of the rest of Canada, and Borden decided necessary reinforcements could be obtained only by conscription. Laurier was strongly opposed and refused to enter a coalition government to introduce the measure. He proposed a referendum to make conscription more palatable to the minority. The Liberal party split on the issue and in the bitter election of 1917 only a few English-speaking Liberals were elected. After the conscription bill was passed, Laurier counseled obedience to the law, and when the war ended he began the reconstruction of the party by welcoming back those Liberals who had supported conscription. His successor, William Lyon Mackenzie King, completed the task of reuniting the party after Laurier's death in Ottawa on Feb. 17, 1919.

Laurier was one of Canada's greatest statesmen. He ended direct political intervention by the religious hierarchy in Quebec by his moderate but firm insistence on political liberalism. He fostered the co-operation of the English and French elements in Canada by his successful compromises and in the process preserved and strengthened Canadian autonomy within the empire. His personal charm and dignity won the respect of Canadians in both groups and even during the conscription crisis he was able to moderate the animosity and to facilitate postwar co-operation.

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(H. B. NE.)

LAURIUM (Gr. LAVRION), a town in Greece (pop. [1961] 6,553) famous for the silver mines of the district. It is located in Attica *nomos* (department), 42 km. (26 mi.) S.E. of Athens. The mines were probably opened up in the 6th century B.C., but were at first not very productive. In 483 a new and richer vein was struck and Themistocles persuaded the Athenians to devote this sudden access of unexpected wealth to the construction of a large fleet, which made possible the defeat of the Persians at Salamis in 480. The Laurium mines continued to be intensively worked through the 5th century until the occupation by the Spartans of Decelea (413), which led to their temporary abandonment. During the early 4th century production remained low, as Xenophon emphasized in his treatise on the *Revenues,* but after 350 there was a sharp recovery and Demosthenes' private speeches show that great fortunes were again being made. By the Roman period the mines were virtually exhausted, but they have been worked again in modern times for lead, manganese and cadmium. In classical times the mines were state owned, leased for a fixed sum with a percentage of the product, and operated mainly by slaves. The ancient shafts and galleries for extracting the metal may still be seen. After World War II a camp was established at Laurium for refugees from eastern European countries.

(R. ME.)

LAUSANNE, capital of the canton of Vaud, Switz., is located on the northern shore of the Lake of Geneva, 61 km. (38 mi.) N.E. of Geneva. Pop. (1960) 126,328. The town is built on the slopes which rise from the lake to the hillocks of the Jorat range. Its altitude varies from 1,240 ft. at Ouchy to 2,122 ft. at the Signal de Lausanne, the highest point. Two streams, the Flon and the Louve, which formerly flowed through the centre of the town, have been filled in, leaving numerous depressions; as a result the city is built on many levels, connected by streets or bridges.

The main districts of Lausanne are St. François, the business and commercial centre; La Palud, containing the city hall; La Cité, the administrative centre of the canton; La Gare, in the lower part of the town; and Ouchy, the port of Lausanne, where many of the largest hotels are located. Among historic buildings are the cathedral of Notre Dame, now Protestant, a beautiful specimen of the primitive Gothic style, which was consecrated in 1275 by Pope Gregory X in the presence of the emperor Rudolf of Habsburg; and the church of St. François, erected during the same period but partly rebuilt at the end of the 14th century. The Donjon de l'Ancien Evêché, now housing the Musée du Vieux-Lausanne, is the only vestige of the manorial residences of the bishops in the 13th century. The Château St. Maire (1397), the former bishop's castle, is now the seat of the cantonal government. Of the ramparts which surrounded the town during the middle ages, only the Tour de l'Ale remains. Some buildings in the Rue de Bourg retain their 17th- and 18th-century façades. Of more recent construction are the Palais de Rumine (1903), the principal building of the university which also houses the cantonal museums; and the federal court of justice (1927), seat of the supreme court of Switzerland.

Lausanne is especially well known as an educational and cultural centre. The university was founded in 1537 and was known until 1890 as the Academy. At first only theology was taught, but the university expanded to include faculties of Protestant theology, literature, law, medicine and political and social sciences, as well as schools of engineering and architecture and of modern French. In addition to its regular student body, the university annually attracts more than 1,000 summer students from all over the world. Among the town's museums are the Musée Cantonal des Beaux-Arts; the Roman museum, built near the site of the ancient Gallo-Roman town; and the Olympic museum in the Parc Mon Repos. The headquarters of the International Olympic committee are located in Lausanne.

The birthplace of Benjamin Constant, A. R. Vinet, Juste Olivier and the philosopher Charles Secrétan, Lausanne has played an important role in the history of literature. Many famous writers, including Voltaire, Rousseau, Victor Hugo, Dickens and Edward Gibbon resided there. Shelley and Byron lived at Ouchy in 1816, and the hotel where Byron wrote "The Prisoner of Chillon" still exists.

Lausanne is a junction for railway lines from Geneva, Fribourg and Bern, the Simplon tunnel and Vallorbe (for Paris). The opening of the Simplon tunnel in 1906 greatly increased the town's commercial importance, placing it on the great international highway from Paris to Milan. Principal industries include precision instruments, metal- and leatherwork, printing, clothing and food processing. Lausanne is a tourist and convention centre, and the many hotels have about 950,000 overnight stays annually.

The original town, the ancient Lausonium or Lausonna, was on the shore of the lake southwest of the present city. During the invasion by the Alamanni in the 4th century, the inhabitants took refuge in the hills above, building a settlement on the site of the present Cité. In 590 Bishop Marius of Aventicum established his diocese there. This settlement eventually joined with the Burgundian settlement of Bourg across the Flon and with a colony around the church of St. Laurent to the west. The bishops gradually obtained great temporal powers, becoming princes of the empire in the 12th century. Their power was retained until 1536 when Lausanne, with the rest of the Pays de Vaud, was conquered by the Bernese, who introduced the Reformation. The Bernese occupation lasted until 1798. In 1803 the canton of Vaud was formed as part of the Helvetic republic, Lausanne becoming its capital. Two important international treaties were signed at Lausanne: between Italy and Turkey in 1912 and between the Allies and Turkey in 1923. (J. Hi.)

LAUSANNE, CONFERENCES OF. Under this heading two international conferences are discussed: that of 1922–23 which led to the peace treaty with Turkey after World War I, and that of 1932 which put an end to the problem of German reparations resulting from World War I.

Peace With Turkey.—In April 1920, at the conference of San Remo (*q.v.*), a peace treaty between the Allies and Turkey was drawn up, and the representatives of the Ottoman government of Constantinople (Istanbul) were compelled, at Sèvres, near Paris, to sign it on Aug. 10, 1920. But it was a stillborn affair because the real government of Turkey, which sat at Ankara, repudiated the treaty of Sèvres. In Sept. 1922 the Greco-Turkish war in Anatolia ended in disaster for the Greeks. On Sept. 23, 1922, the principal Allied powers invited the Ankara government to a peace conference. The invitation was accepted, but the Ankara government proposed a preliminary armistice conference, which met at Mudania, on the Sea of Marmara, on Oct. 3 and resulted in the signature of an armistice convention on the 11th.

The peace conference met at Lausanne, Switz., on Nov. 20, 1922. The Turkish delegation, led by Gen. Ismet Inönü, arrived as victors and on an equal footing with the principal Allied powers (Great Britain, France, Italy and Japan). Greece, Bulgaria and Yugoslavia were also represented, while the United States sent an observer. The Turks secured at Lausanne practically everything they demanded in their "national pact" adopted at Erzurum in July and reaffirmed at Sivas in Sept. 1919 (*see* Turkey). The former Arab provinces were not claimed, but otherwise Turkey recovered everything which was Turkish in 1914.

The peace treaty was signed on July 24, 1923, together with 16 other diplomatic instruments. The treaty confirmed the rectification of the Turco-Syrian frontier in Turkey's favour, which had been made by the Franco-Turkish agreement of Oct. 20, 1921. The destiny of Mosul (*q.v.*) was referred, by agreement, to the League of Nations. The position of the Bosporus and the Dardanelles was defined by a special convention. (*See* Straits Question.) Turkey recognized the annexations of Cyprus by Great Britain and of the Dodecanese by Italy. Greece obtained the islands of Samothrace, Lemnos, Lesbos, Chios, Samos and Ikaria. The Turco-Greek boundary in Thrace was withdrawn to the Maritsa (Evros) river leaving the port of Alexandroupolis (formerly Dedeagach) to Greece. The Turco-Bulgarian frontier was readjusted as compared with the treaty of Neuilly (*q.v.*). The special spheres of influence in Anatolia, which had been assigned to France and Italy by an agreement of Aug. 10, 1920, between those two powers and Great Britain, were tacitly dropped. There was no further question of giving autonomy to Turkish Kurdistan or of ceding Turkish territory to Armenia (*q.v.*). No restrictions were imposed on the Turkish armed forces, and no control was asserted by the Allies over Turkish finances. A convention respecting conditions of residence and business and jurisdiction in Turkey, as well as a declaration relating to the administration of justice, replaced the capitulations (*q.v.*). On Jan. 30, 1923, the Greek and Turkish delegations signed a separate convention providing for the compulsory exchange of national minorities, with a special exemption in favour of Greeks domiciled in the city of Istanbul and of Turks domiciled in western Thrace.

German Reparations.—The Lausanne conference of June–July 1932 was held to liquidate the payment of reparations by Germany to the former Allied and Associated powers. Attended by representatives of the creditor powers (Great Britain, France, Belgium and Italy) and of Germany, the conference resulted in agreement on July 9, 1932, that the conditions of world economic crisis made continued reparation payments impossible. Germany, however, was to deliver to the Bank for International Settlements, set up in 1929, 5% redeemable bonds to the value of 3,000,000,000 Reichmarks. The creditor governments canceled war debts as between themselves, but made a "gentleman's agreement" that the Lausanne protocol would not be ratified until they had reached a satisfactory agreement about their own war debts to the United States. Although never ratified, the Lausanne protocol in effect ended attempts to exact reparations from Germany. In Germany it was claimed as a great diplomatic victory by Chancellor Franz von Papen. *See* also Reparations.

See also references under "Lausanne, Conferences of" in the Index.

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LAUTARO (? –1557), an Indian who led the native Araucanian uprising against the Spanish conquerors in south-central Chile, 1553–57. Nothing is known of his origins or early life, but it is probable that he was born in northern Chile and forced during his boyhood to serve as a groom in the stables of the Spanish conquistador, Pedro de Valdivia. Escaping southward into Araucanian Indian country soon after Valdivia began conquering it in 1550, Lautaro joined the Araucanians. These were fierce and resourceful fighters who were losing their war against the Spaniards because they had neither a unifying tribal organization nor any experience of acting together. Lautaro succeeded in unifying the Araucanians and then led them in battle, further improving on the shrewd tactics and stratagems by which they had so often defeated the Spaniards. He was killed at the battle of Peteroa in 1557, but the Araucanians continued their resistance and the region was not finally pacified until the 1880s. Lautaro's name became famous through the epic poem *La Araucana,* written by one of Valdivia's soldiers, Alonso de Ercilla y Zúñiga, and long con-

sidered a classic of the Spanish language. Lautaro's enduring fame also rests on the fact that the Chileans have come to consider him their national hero, symbolizing their Indian heritage and their ideals of freedom and justice. (C. B. K.)

LAUTRÉAMONT, COMTE DE (pseudonym of ISIDORE LUCIEN DUCASSE) (1846–1870), French poet, recognized in mid-20th century as a major influence, with Baudelaire and Rimbaud, on the development of modern French poetry, was born at Montevideo, Urug., on April 4, 1846. His father, chancellor in the French consulate, had the reputation of an eccentric. In 1860 he was sent to France for his schooling, first to the *lycée* at Tarbes, later to Pau. He set out for Paris in 1868, ostensibly to attend the École Polytechnique, and disappeared into obscurity. *Les Chants de Maldoror,* the poem in prose which he wished to publish under the pseudonym of comte de Lautréamont, was printed in 1869; alarmed by the poem's violence and fearing prosecution the Belgian publisher refused to send it to the booksellers. The *Poésies,* a shorter work, was printed in a small edition in June 1870. He died in Paris on Nov. 4 of the same year. No portrait of him exists.

Maldoror was published in 1890; it remained unnoticed until the Surrealists discovered it in the 1920s and adopted the author as one of their exemplars. The use of juxtaposed images was a device which Lautréamont employed to produce his most disquieting and ferocious effects; "beautiful . . . as the chance encounter of a sewing-machine and an umbrella on an operating-table" became a justification of surrealist aesthetics. Above all it was the savagery of protest in the *Chants,* as if revolt against the human condition had achieved definitive blasphemy, that acted like a ferment among the poets and painters. Yet when *Maldoror* is examined critically and brought into relationship with the *Poésies* it can be seen that all is paradox in this extraordinary work: the romantic imagery is used to disinfect romanticism, the proclamation of revolt is made to undermine the dogmas of revolution, and the rhetoric which appears out of control is in fact precisely articulated. For Lautréamont literature had become a succession of meaningless "tics" and he willed the destruction of literature because, as he affirmed, "poetry must be made by all. Not by one."

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LAUTREC, HENRI DE TOULOUSE: *see* TOULOUSE-LAUTREC, HENRI DE.

LAUTREC, ODET DE FOIX, VICOMTE DE (1485–1528), French soldier prominent in the Italian campaigns of Francis I's reign, was a brother of the king's mistress, Françoise, comtesse de Châteaubriant, whose influence procured high offices for him and for his two brothers, Thomas, seigneur de Lescun, and André, seigneur de l'Esparre or Asparros, likewise military commanders. In 1515 Lautrec took part in the campaign of Marignano and was created marshal of France. In 1516 he received the government of the duchy of Milan and by his severity made the French domination insupportable. In 1521 he defended the duchy against the Spanish army, but in 1522 he was defeated at the Bicocca and was forced to evacuate the country. Exculpating himself, he received again, in 1527, the command of the army of Italy, occupied the duchy and was then sent to undertake the conquest of the kingdom of Naples. The defection of Andrea Doria and plague in the French camp brought on a fresh disaster. Lautrec caught the infection and died before Naples on Aug. 15, 1528.

LAUZUN, ANTONIN NOMPAR DE CAUMONT, DUC DE (1633–1723), French army officer whose effrontery won him conspicuous advancement and notable disgrace at the court of Louis XIV. He was born at Lauzun in Guienne in May 1633, a younger son of Gabriel de Caumont, comte de Lauzun, and Charlotte de Caumont-La Force. Known at first as the marquis de Puyguilhem (Péguilin, etc.), he was brought up from 1647 with the children of the marshal Antoine de Gramont, with whose daughter Catherine, later princesse de Monaco, he fell much in love. Turenne (married to his mother's cousin) favoured his military career. Puyguilhem was appointed colonel of the king's foreign dragoons (1658), accompanied Mazarin to the peace negotiations with Spain (1659) and served with the army in Lorraine and in Italy (1663–64). In 1665 he displayed such brazen jealousy at Louis XIV's attentions to Madame de Monaco that he was sent to the Bastille for six months. Further military service led him to the new charge of colonel general of the dragoons in 1668. In 1669 he was sent to the Bastille again for venting his rage against Madame de Montespan, under whose bed he had hidden to overhear her perfidiously dissuading Louis from making him grand master of the artillery. Soon released, he was made one of the captains of the king's bodyguard in July.

When the king's rich cousin Mademoiselle, duchesse de Montpensier, astonishingly proposed marriage to the comte de Lauzun (as Puyguilhem now was), the king first consented, then, when the princes and Madame de Montespan objected, withdrew his consent (Dec. 18, 1670). Showered with compensatory honours, Lauzun indulged in more outbursts against Madame de Montespan. Arrested in Nov. 1671 and imprisoned at Pinerolo till April 1681, he at last consented, in Sept. 1681, to renounce Dombes and Eu (lands assigned to him by Mademoiselle) so that they could go to Madame de Montespan's son, the duc du Maine. He was allowed to return to Paris in 1682. Soon afterward, with the king's consent, he seems to have married Mademoiselle secretly; but from 1684 they were estranged.

Lauzun went twice to England to serve James II, in 1685 and in 1688, when he helped Mary of Modena and her son to flee to France. He commanded the French troops fighting for James in Ireland (1690). Back in France, he was created duc de Lauzun in 1692. Mademoiselle having died in 1693, he married the 14-year-old Geneviève de Durfort in 1695. Lauzun died in Paris on Nov. 19, 1723.

See A. A. de Caumont, duc de La Force, *Lauzun* (1919).

LAVA, an Italian word applied to the liquid products of volcanic activity. Streams of rain water, formed by condensation of exhaled steam often mingled with volcanic ashes so as to produce mud, are known as *lava d'acqua,* while the streams of molten matter are called *lava di fuoco.* The term lava is applied to all matter of volcanic origin which is or has been in a molten state. *See* VOLCANO; PETROLOGY; *see* also references under "Lava" in the Index.

LAVAL, ANDRÉ DE, SEIGNEUR DE LOHÉAC (*c.* 1410–1486), French soldier, was serving in the French army against England in 1423 and was taken prisoner by John Talbot, 1st earl of Shrewsbury, after the capitulation of Laval (1428), which he was defending. After paying his ransom he was present with Joan of Arc at the siege of Orléans, at the battle of Patay and at the coronation of Charles VII. He was made admiral of France in 1437 and marshal in 1439. He served Charles VII faithfully in all his wars, even against the dauphin (1456). When the latter became king as Louis XI, Laval was dismissed from the marshal's office. He took refuge in Brittany, then joined the League of the Public Weal; after the peace of St. Maur-des-Fossés (1465) he was restored to favour and recovered the marshal's baton. The king also granted him the offices of lieutenant general to the government of Paris and governor of Picardy. In 1472 he was successful in relieving Beauvais, besieged by Charles the Bold, duke of Burgundy.

LAVAL, CARL GUSTAF PATRIK DE (1845–1913), Swedish scientist, engineer and inventor, who was a pioneer in high-speed machinery, was born on May 9, 1845, in Blasenborg. He received his B.S. and Ph.D. degrees from the University of Uppsala in 1872. De Laval is remembered for his invention of a cream separator in 1878 and of an impulse turbine in 1888. In addition, his invention and development of a divergent-nozzle, flexible-shaft, double-helical gear laid the foundation for most steam-turbine development that followed. He also constructed and operated a reversible turbine for marine use in 1893 and designed and operated a complete power plant with initial steam pressure of 3,400 lb. in 1896. A De Laval reaction turbine, patented in 1883, reached a speed of 42,000 r.p.m., corresponding to about 200 m. per second tip speed. He died in Stockholm on Feb. 2, 1913. (G. W. SM.)

LAVAL, FRANÇOIS DE MONTMORENCY (1623–1708), first Roman Catholic bishop of Canada, was born into one of the greatest families of France, at Montigny-sur-Avre (Eure) on April 30, 1623. He studied under the Jesuits at the then famous colleges of La Flèche and Clermont in Paris, was ordained priest in 1647 and took his degree in canon law at the Sorbonne. He was then named head archdeacon of the diocese of Evreux. During nearly five years, he visited every parish to the great edification of all, acquiring at the same time experience that would be very helpful to him in later days. When in 1653 the great missionary Alexander de Rhodes came to Europe in search of bishops for the missions of the far east, Laval was one of the three selected. This project however did not materialize. Having resigned his office of head archdeacon, he lived (1654–58) at the *Ermitage* of Caen, a school of perfection under the direction of Jean de Bernières. In 1658 he was named bishop of Petrea *in partibus infidelium* and vicar apostolic of New France. He had already learned to know Canada through the *Jesuit Relations*, which had a great circulation among the students of La Flèche and Clermont. He knew many of the Jesuit missionaries and especially St. Gabriel Lalemant, one of his teachers at La Flèche. He landed at Quebec on June 16, 1659, and set to work immediately. Laval was a man of great vision and of strong character, and he had in a very high degree, as befitted a founder of the church in a new world, the spirit of prayer and self-denial. He organized his seminary, founded parishes and promoted the true spirit of the church among the French settlers of Canada as well as among the Indians. He had to fight against the Gallicanism of the governors and against the avidity of the traders, which was a menace to the good morals and to the survival of the Indian tribes. He was made bishop of Quebec in 1674. After his resignation in 1688 because of ill-health, he continued to take the place of his successor, Bishop de Saint-Vallier, during the latter's long stays in Europe. He was then known as "Monseigneur l'Ancien," and cherished by all for his charity and sanctity. Bishop Laval died on May 6, 1708. The Seminary of Quebec which he had founded in 1663 became in 1852 the first Catholic university of Canada and was named after him. His cause of beatification was introduced in 1880; the decree on the heroicity of the virtues of Laval was promulgated by Pope John XXIII on Feb. 28, 1960. (L. Pt.)

LAVAL, PIERRE (1883–1945), French statesman, prominent in the international affairs of the 1930s but chiefly important for his role in the Vichy government during World War II, was born June 28, 1883, at Châteldon in Puy-de-Dôme, where his father owned a small café. He entered the chamber of deputies in 1914 as a man of the extreme left, representing the Parisian working-class constituency of Aubervilliers, which continued to support him for the next 30 years. When he became a senator in 1926 he began to move to the political right, though remaining always a lone figure. After experience in various ministerial posts he became premier for the first time in Jan. 1931. Resigning in Jan. 1932, he was asked to form a new ministry and was again premier and also minister of foreign affairs for a short period before the formation of André Tardieu's cabinet, in which he served as minister of labour (Feb.–June 1932). Under Gaston Doumergue he was minister for colonies (Feb.–Oct. 1934) and then again minister of foreign affairs (Oct.–Nov.); he retained the latter post under Pierre Étienne Flandin (Nov. 1934–May 1935); and he was again both premier and minister of foreign affairs from June 1935 to Jan. 1936. He left his mark mainly on French foreign policy, in which he was a staunch advocate of reaching agreement with Italy. In the international crisis caused by Italy's attack on Abyssinia he was coauthor of the Hoare-Laval agreement which proposed to appease Italy at Abyssinia's expense, and he consistently urged the need for Franco-Italian friendship.

Out of office after Jan. 1936, Laval could later claim to have had no share of responsibility for France's entry into World War II against Germany in 1939. The day after the Franco-German armistice of June 22, 1940, he joined the government of Philippe Pétain; and he helped to secure ratification of the armistice by the national assembly at Vichy in July 1940. He served as vice-premier under Pétain until Dec. 1940, when he was ousted from power. Convinced of an ultimate German victory, he urged that France must abide by the terms of the armistice and stake out a place for itself in Hitler's "new order" in Europe. But when he returned to power as "chief of government" at Vichy in April 1942, the whole prospect had changed. He then believed that France must bargain hard with Germany; and his ambiguous policy brought upon him fierce attacks from the extreme French collaborators and resisters alike and severe criticism from both Germans and British. The Germans hoped to use him to obtain better supplies of French workers for Germany and greater security for their western front while their main energies were directed against the Soviet Union. He took full advantage of German and Italian difficulties to secure his own interests and to husband French resources, while opposing the violent anti-German activities of the resistance movements and the Free French.

By the beginning of 1944 civil war was fast developing in the French countryside. The Vichy government was in its death throes, and Germany forced upon Laval the extreme collaborators whom he had hitherto kept out of power: Joseph Darnand was given a post at the end of Dec. 1943, Marcel Déat in the following March. In August Laval tried to convoke a national assembly in Paris; but events moved too fast, and on Aug. 17 he was carried off by the retreating Germans. Escaping in 1945 to Switzerland and thence to Spain, he returned to France at the end of July to stand trial for treason. The trial was conducted so badly and Laval showed so much energy and skill in his defense that proceedings were cut short. He was sentenced to death and was shot, after attempting suicide in the prison of Fresnes (Seine), on Oct. 15, 1945.

Laval's personal fortune, though large, was greatly exaggerated, and most of it derived not (as was alleged) from corruption but from the astute management of his many business interests. Although his name was so closely associated with the Vichy governments, he had little but contempt for the cult of Pétainism and the reactionary measures of its "National Revolution." Distrusted by nearly all and taken as a symbol of shady parliamentary politics in France, he held a materialistic and unheroic view of national interests which he served with immense ingenuity and craftiness and considerable courage.

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LAVAL, a town of northwestern France, prefecture of the *département* of Mayenne, 302.5 km. (188 mi.) W.S.W. of Paris. Pop. (1962) 35,835. The old feudal city with its ancient castle and narrow, irregular streets is situated on the right bank of the Mayenne river, while the later planned town has been regularly laid out on the opposite bank. The old castle, with a fine Romanesque keep overlooking the Pont Vieux, is now used as a museum. The "new" castle of the 16th century, built in Renaissance style, is occupied by the law courts. The cathedral has a Romanesque nave. Nearby is the Beucheresse gate, of early 15th-century construction, the finest remaining relic of the medieval fortifications. The modern town functions as the centre of a farming district and has engineering and textile industries. Nearby is a small lignite field. (Ar. E. S.)

Seigneurs and Comtes de Laval.—The male line of the first house of seigneurs de Laval, who had built the castle early in the 11th century, died out early in the 13th with Guy VI. Guy VII (d. 1267) was the son of Mathieu II de Montmorency's second marriage to Guy VI's heiress Emma. His great-grandsons were Guy X (d. 1347), through whom the senior line of Montmorency-Laval went on; and Foulques, paternal great-grandfather of the notorious Gilles de Rais. Guy X's granddaughter Anne, wife of Jean de Montfort (d. 1415), inherited Laval in 1412, whereupon her husband had to take the name Guy (XIII), henceforth obligatory for holders of the lordship. Their son Guy XIV (d. 1486) was created comte de Laval in 1429 and married Isabelle, daughter of John V of Brittany. His grandson Guy XVI (d. 1531) had as his first wife Charlotte of Aragon, daughter of the deposed King Frederick of Naples. With his son by a second marriage, Guy

XVII, the direct male line of Montfort-Laval died out (1547). Then Guy XVI's granddaughter Renée de Rieux became comtesse as Guyonne XVIII till 1567, when her sister's son Paul de Coligny succeeded as Guy XIX (d. 1586). On the death of his son Guy XX (1605) the title passed to Henry de La Trémoïlle, great-grandson of Guy XVI's daughter Anne de Laval, whose claims to Charlotte of Aragon's Neapolitan rights were thenceforward exploited by the house of La Trémoïlle (*q.v.*).

LAVALLEJA, a department in southeast Uruguay, was named for Juan Antonio Lavalleja (1784–1853), a hero of the fight for independence (*see* URUGUAY: *History*). Population (1962 est.) 131,204; area 4,820 sq.mi. Agriculture, which supplies milk, vegetables and industrial crops to Montevideo, pushed ranching, Lavalleja's principal activity, to the north of the department. The department has some of the few hilly areas of Uruguay. Quarrying for slate, limestone and marble, and mining of galena, emery and dolomite, once important, still took place on a limited scale in the second half of the 20th century.

(M. I. V.)

LA VALLIÈRE, LOUISE FRANÇOISE DE LA BAUME LE BLANC, DUCHESSE DE (1644–1710), mistress of the French king Louis XIV, was born at Tours on Aug. 6, 1644, the daughter of an army officer. She was brought up at the court of Louis XIII's brother Gaston, duc d'Orléans, at Blois, with his younger daughters. After Gaston's death she went to join his widow in Paris and in 1661 was appointed as a maid of honour to Henrietta of England, who had just become duchesse d'Orléans by virtue of her marriage to Louis XIV's brother. At this time Louis XIV was strongly attracted by his sister-in-law. To disguise this, it was decided that he should appear to be courting one of her maids, and the choice fell upon La Vallière. The king's pretense of loving soon turned to love, and the maid supplanted her mistress in the royal affections. Fair, with fine features, somewhat fragile looking and graceful despite a slight limp, La Vallière had no self-interest and conceived a sincere passion for the king. In July 1661 she became his mistress.

The uncrowned queen of the court festivities as soon as the royal liaison became known, La Vallière at once incurred the envy of her rivals, notably that of Henrietta and the comtesse de Soissons (Olympe Mancini): intrigues began against her and libelous pamphlets were covertly circulated. Yet despite these attacks on the one hand and Bossuet's sermons on the other, the king's passion for her at first only increased. One day in 1662, when she fled to the convent at Chaillot after a quarrel, he went himself to bring her back; he gave magnificent parties for her in his new palace at Versailles, during which she was officially presented to the court; and in 1667 he created her duchess and gave her the estate of Vaujours in Lorraine.

In 1667, however, the marquise de Montespan also became the king's mistress; and thenceforward La Vallière had to remain at court beside her rival. In 1671, when she tried again to escape to Chaillot, the king insisted on her return. It was only after years of public humiliation that, in 1674, she was allowed to enter the Carmelite convent in the Rue d'Enfer in Paris. She lived there as a nun, doing self-imposed and extremely arduous penances for her past sins, till her death on June 6, 1710.

During her retirement the duchesse de La Vallière wrote *Réflexions sur la miséricorde de Dieu,* first published in 1680. Her *Lettres,* published in 1767, are a corrupted version of her correspondence with the maréchal de Bellefonds (Bernardin Gigault). Of her children, by Louis XIV two survived infancy and were legitimized: namely Marie Anne (1666–1739), known as Mademoiselle de Blois until her marriage to Louis Armand de Bourbon, prince de Conti; and Louis, comte de Vermandois (1667–83).

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LAVATER, JOHANN CASPAR (1741–1801), Swiss writer, patriot, Protestant pastor and founder of physiognomics. As the representative of the Swiss antirational, religious and literary movement his influence was felt far beyond Switzerland itself. He was born in Zürich on Nov. 11, 1741, was a pupil of J. J. Bodmer (*q.v.*) and in 1787 became pastor of St. Peter's church in Zürich, where the spiritual force of his preaching and ministry drew people from far and near. Lavater's studies in physiognomy and his theoretical and practical interest in "magnetic" trance conditions (*see* MESMER, FRANZ ANTON) had their source in his religious enthusiasm, which drove him to search for demonstrable traces of the divine in human life. His belief in the interaction of mind and body led him to seek the traces of the spirit upon the features and to strive to follow the healing ministry of Christ. His *Physiognomische Fragmente zur Beförderung der Menschenkenntnis und Menschenliebe* (4 vol., 1775–78; Eng. trans., *Essays on Physiognomy,* 1789–98) won him a European reputation. Goethe himself worked with Lavater on the book for a time and the two enjoyed a warm friendship, later severed by Lavater's zeal for conversion.

Lavater's writings are mostly apologetics. His most important books, widely read in their time, are *Aussichten in die Ewigkeit* (1768–78), *Geheimes Tagebuch von einem Beobachter seiner selbst* (1772–73; Eng. trans., *Secret Journal of a Self Observer,* 1795), *Pontius Pilatus* (1782–85) and *Nathanael* (1786). His lyrical and epic poems are in imitation of Klopstock. With J. W. L. Gleim as a model he successfully caught the folk-song note in his once popular *Schweizerlieder* (1767).

An enthusiastic patriot, Lavater was deported to Basel for a time because of his bold protest against the violence of the French Directory. When Zürich was taken on Sept. 26, 1799, by the French, Lavater was hit by a plunderer's bullet. He never recovered and died on Jan. 2, 1801, in Zürich.

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(F. EN.)

LA VEGA, a province in central Dominican Republic. Its area is 1,329 sq.mi. and its population (1960) was 248,069. The southern section of the province is part of the Cordillera Central, with mountains rising to 10,417 ft., and the northern section is part of the fertile valley, La Vega Real. Among the leading products of La Vega are cacao, rice, coffee, tobacco and peanuts. The province was founded in 1845. Its capital, Concepción de la Vega (pop. [1960] 19,884), was founded in 1495 and was moved to the banks of the Camú river after the 1564 earthquake.

THE MCFARLAND COMPANY

LAVENDER (LAVANDULA SPICA), NATIVE TO SOUTHERN EUROPE

(D. R. D.)

LAVENDER, botanically *Lavandula,* a genus of perennial aromatic plants of the mint family (Labiatae), comprising about 20 species. The plant to which the name of lavender is commonly applied, *Lavandula spica* (*officinalis* or *vera*), is a native of the countries bordering on the Mediterranean, preferring stony slopes in open, sunny situations; it has been cultivated for centuries. The name is also applied to *L. stoechas,* often distinguished as French lavender. A perfume of lavender was used by the ancient Romans in their baths, and the dried flowers have long been used to scent chests and closets.

Lavender is an evergreen undershrub about two feet high, with grayish-green, hoary, linear leaves, rolled under at the edges

when young. The pale violet flowers, borne on an interrupted terminal spike at the summit of a long naked stalk, are covered with stellate hairs, among which are imbedded shining oil glands to which the fragrance of the plant is due.

In England and in the United States, especially near Philadelphia, Pa., and in California, lavender is cultivated for its essential oil (*q.v.*), which is freed by distillation. In the south of Europe the flowers form an object of trade. The plants in cultivation do not produce seed, and propagation is always made by slips or by dividing the roots. In the climate of New York lavender is not hardy, but southward in the U.S. and also in Britain it is hardy. The flowers are collected at the beginning of August and taken directly to the still. The yield of oil depends in great measure upon the weather. From 12 to 30 lb. of oil per acre is the average amount obtained. Oil of lavender is used chiefly in fine perfumes and cosmetics. Lavender water, a solution of the volatile oil in alcohol, with the addition of other scents, is used in a variety of toiletry articles.

Another form of lavender, with grayer leaves, is also used for the distillation of a somewhat inferior grade of essential oil known as oil of spike or spike-lavender oil. It is used in painting on porcelain and in soap manufacture and to give scent to other preparations. A closely allied species, *L. lanata,* a native of Spain, with broader leaves, is also very fragrant.

Sea lavender is *Limonium,* a genus of the leadwort family (Plumbaginaceae). Lavender cotton is *Santolina chamaecyparissus,* a low shrub from southern Europe. *See* also SCENTED PLANTS. (N. TR.; X.)

LAVERAN, (CHARLES LOUIS) ALPHONSE (1845–1922), French physician, pathologist and parasitologist, discoverer of the parasite of human malaria (*q.v.*), was born in Paris on June 18, 1845, and educated at the Strasbourg faculty of medicine. He served as an army surgeon in the Franco-German War (1870) and thereafter practised and taught military medicine until 1897, when he joined the Pasteur institute, Paris. There he remained until his death, on May 18, 1922.

Laveran was a powerful influence in developing tropical medicine research, and himself carried on fruitful work in trypanosomiasis, leishmaniasis and other protozoal diseases, in addition to his epochal work in malaria. He established the Laboratory of Tropical Diseases at the Pasteur institute (1907) and founded the Société de Pathologie Exotique (1908). He was elected to the Academy of Medicine (1893), Academy of Sciences (1901), received the Nobel prize in medicine (1907) and became commander of the Legion of Honour (1912).

Laveran published over 600 scientific papers and textbooks. His works included: *Traité des maladies et épidémies des armées* (1875); *Traité des fièvres palustres* (1884); *Traité d'hygiene militaire* (1896); *Traité du paludisme* (1898); and *Trypanosomes et trypanosomiases* (1904) with F. Mesnil.

See Marie Phisalix, *Alphonse Laveran sa vie, son oeuvre* (1923). (P. F. R.)

LAVERNA, an old Italian divinity, perhaps one of the spirits of the nether world. A cup found in an Etruscan tomb bears the inscription *Lauernai pocolom,* and in a fragment of Septimius Serenus Laverna is expressly mentioned in connection with the *di inferi.* By an easy transition, she came to be regarded as the protectress of thieves, whose operations were associated with darkness.

Laverna had an altar on the Aventine hill, near the gate called after her Lavernalis, and a grove on the Via Salaria.

LAVERY, SIR JOHN (1856–1941), British painter of portraits, interiors and landscapes, was born in Belfast, Ire., and received his art training at the Haldone Academy of Art in Glasgow, Heatherby School of Art, London (from 1879), and the Académie Julian in Paris, where he studied under T. Robert-Fleury and A. W. Bouguereau. He first exhibited at the London Royal Academy in 1886 and was elected to its membership in 1921. Lavery often spent his winters painting in Tangier, Morocco. In 1918 he was created a knight. He was president (1932–41) of the Royal Society of Portrait Painters. Lavery died at Kilmoganny, Ire., on Jan. 10, 1941.

LAVIGERIE, CHARLES MARTIAL ALLEMAND (1825–1892), French Roman Catholic ecclesiastic, cardinal archbishop of Algiers and Carthage, was importantly involved in two prime issues of the third French republic: policy in colonial north Africa and the attitude of Catholics to the Republican regime. Lavigerie was born near Bayonne on Oct. 13, 1825, and was ordained priest in 1849 after studies at St. Sulpice, Paris. Having obtained doctorates in letters and theology, he was professor at the Sorbonne, resigning to become director of the Society for the Promotion of Education in the Near East. In this capacity he raised large sums for the Christian victims of the Lebanese massacres (1859–60). Touring Lebanon, he made his first contact with the Muslim world and developed his belief in France's civilizing mission to backward lands. His success made him an official of the Roman Rota and in 1863 bishop of Nancy. Four years later he was named archbishop of Algiers and immediately found himself involved with the French authorities. Algeria had a military administration without civil liberties and with Muslims and Europeans separated. Lavigerie, who favoured assimilation, successfully defied the ban on missionary work by establishing villages for the orphaned Algerian victims of famine. For him, north Africa had a glorious Christian past and would be the springboard for the conversion of the continent. He extended his activities into Tunisia and was named cardinal in 1881 and archbishop of the restored see of Carthage (1884). His most enduring creation was the White Fathers (*q.v.*), pioneer missionaries in the Sahara, the Sudan and much of central Africa, who still flourish under the sensible rules of their founder.

In politics Lavigerie was a realist and a moderate. A royalist in 1870, he became convinced that the republic would last and that the majority of anticlerical Republicans could be won to moderation. He co-operated closely with Leo XIII's policy of conciliation. Always a bitter opponent of slavery, he spent his last years organizing antislavery societies to protect the natives of central Africa. Cardinal Lavigerie died at Algiers on Nov. 25, 1892. (J. N. M.)

LAVINIUM, an ancient town of Latium, 19 mi. S. of Rome and 2½ mi. inland, now Pratica di Mare. It was often confused with Lanuvium (*q.v.*). Its inhabitants were called Laurentes, later Laurentes Lavinates. It was known later as Laurolavinium; there was probably no separate town of Laurentum. The site consists of a hill with precipitous sides (300 ft. above sea level) on which was the ancient acropolis (now the site of the village of Pratica and a palace); traces of fortification walls apparently survived until 1850. The city spread out over a lower plateau to the south and west of the hill.

Lavinium was traditionally founded by Aeneas (*q.v.*) and his followers from Troy and was named after his wife, Lavinia, the daughter of King Latinus. There survived into Augustan times a straw hut, where Aeneas was supposed to have sacrificed a white sow and her 30 young and where he built a temple to the *penates* (*q.v.*) whose worship he established. Bronze statues of the sow and other animals were preserved in the forum. Although 30 years later the centre of government was moved to Alba Longa, Lavinium was regarded as the religious metropolis of the Latins. This claim was recognized by Rome, since in historical times Roman consuls, praetors and dictators sacrificed on the Alban mount and at Lavinium to the *penates* and Vesta, before they entered office or departed for their provinces. Lavinium, a member of the early Latin leagues, remained loyal to Rome in the wars of the 5th and 4th centuries B.C. Like many Latin towns it then fell into decay and oblivion, but is heard of again in the 2nd century A.D. In its neighbourhood were groves of bay trees (*Laurus*) and many villas of imperial times, including the famous one of the younger Pliny, and also the village of Vicus Augustinus Laurentium (excavated in 1874). Exploration has revealed traces of settlement from early Villanovan times until *c.* A.D. 400. Excavations were resumed in 1959; they revealed many altars and an early dedication to the Greek deities Castor and Pollux written in archaic Latin (*c.* 500 B.C.?).

See R. Lanciani in *Monumenti Antichi,* Reale Accademia Nazionale dei Lincei, xiii, 133 ff. (1903) and xvi, 241 ff. (1906); B. Tilly, *Vergil's*

Latium, ch. 3 (1947). *Inscription:* S. Weinstock in *Journal of Roman Studies*, l. 112 ff. (1960). (H. H. Sd.)

LAVISSE, ERNEST (1842–1922), French historian who played an important part in the revival of higher studies in France, was born at Nouvion-en-Thiérache, Aisne, on Dec. 17, 1842, and died in Paris on Aug. 18, 1922. He was educated at the École Normale Supérieure and, after working as private secretary to Victor Duruy for a time, he returned there in 1878 as *maître de conférence*, succeeding Fustel de Coulanges. In 1883 he was appointed assistant professor of modern history at the Sorbonne and in 1888 full professor. In this post, and as director of the École Normale (1904–19), after its incorporation in the University of Paris, he showed himself to be not only a brilliant historian but also an extraordinarily able organizer and teacher. On his retirement in 1919 he was made honorary director of the École Normale.

His thesis for his doctor's degree in 1875, a study on the origin of the Prussian monarchy, was crowned by the Academy in 1879, in which year he published his *Études sur l'histoire de la Prusse*. Other works on German history were *Trois empereurs d'Allemagne* (1888), *La Jeunesse du grand Frédéric* (1891, Eng. trans. 1891) and *Frédéric II avant son avènement* (1893); but Lavisse is best known for the *Histoire générale du IVe siècle jusqu' à nos jours*, 12 volumes (1893–1901), which he edited with his friend Alfred Rambaud, and for the *Histoire de France depuis les origines jusqu'à la Révolution*, 9 volumes (1908–11). His greatest work was completed in the *Histoire de France contemporaine depuis la Révolution jusqu'à la paix de 1919*, ten volumes (1920–22), of which he was also the editor.

Lavisse was admitted to the Académie Française in 1892 and, after the death of James Darmesteter, became editor of the *Revue de Paris* (1894).

LAVOISIER, ANTOINE LAURENT (1743–1794), French chemist and father of modern chemistry, was a brilliant experimenter and many-sided genius. He was born in Paris on Aug. 26, 1743. His father, an *avocat au parlement*, gave him an excellent education at the Collège Mazarin, and he studied mathematics and astronomy with Nicolas de Lacaille, chemistry with the elder Rouelle and botany with Bernard de Jussieu. In 1766 he received a gold medal from the Academy of Sciences for an essay on the best means of lighting a large town. Among his early work were papers on the analysis of gypsum, on thunder, on the aurora and on congelation and a refutation of the prevalent belief that water by repeated distillation is converted into earth. He also accompanied J. E. Guettard (1715–86) on a long geological trip and assisted him in preparing his mineralogical atlas of France. In 1768 he was nominated *adjoint chimiste* to the Academy. He passed through all the grades in the Academy, was director in 1785, and was made treasurer in 1791. His father bought him a title of nobility in 1772. In 1768 he became *adjoint* to Baudon, one of the farmers-general of the revenue, subsequently becoming a full titular member of the *ferme générale*. Appointed *régisseur des poudres* in 1775, he abolished the vexatious search for saltpetre in the cellars of private houses, increased the production of the salt and improved the manufacture of gunpowder.

In 1778 he started a model farm at Fréchines, where he demonstrated the advantages of scientific agriculture. In 1785 he was nominated to the committee on agriculture, and as its secretary drew up reports and instructions on the cultivation of crops, and promulgated various agricultural schemes. Chosen a member of the provincial assembly of Orléans in 1787, he planned the improvement of the social and economic conditions of the community by means of savings banks, insurance societies, canals, workhouses, etc. He advanced money without interest to the towns of Blois and Romorantin for the purchase of barley during the famine of 1788. Attached in this same year to the *caisse d'escompte*, he presented the report of its operations to the National Assembly in 1789, and as commissary of the treasury in 1791 he established a system of accounts of unexampled punctuality. He was also asked to draw up a new scheme of taxation in connection with which he produced a report, *De la richesse territoriale de la France*. He was associated with committees on hygiene, coinage, the casting of cannon, public education, etc. Lavoisier was a member of the nobility of the Blois district. In 1789 he drew up the code of instructions (*cahier*) for the guidance of the deputies to the states-general, to which he was elected alternate deputy. He was secretary and treasurer of the commission appointed in 1790 to secure uniformity of weights and measures throughout France. This led to the establishment of the metric system.

Lavoisier's membership of the *ferme générale* was alone sufficient to make him an object of suspicion to the authorities during the French Revolution. Marat accused him of putting Paris in prison and of stopping the circulation of air in the city by the wall erected at his suggestion in 1787. In Aug. 1792 he had to leave his house and laboratory at the arsenal. In November the Convention ordered the arrest of the former farmers-general, and in May 1794 they were sent to be tried by the revolutionary tribunal. The trial lasted only part of a day and Lavoisier and 27 others were condemned to death. That same afternoon, May 8, he and his companions, including his father-in-law, were guillotined at the Place de la Révolution (now Concorde). His body was thrown into a common grave. The following day, Joseph Lagrange said, "It required only a moment to sever that head, and perhaps a century will not be sufficient to produce another like it." Lavoisier's wealthy widow married Sir Benjamin Thompson (Count von Rumford) in 1805, but because of incompatibility they separated after a few years.

Lavoisier's name is indissolubly associated with the overthrow of the phlogistic doctrine that had dominated the development of chemistry for more than a century (*see* CHEMISTRY: *History of Chemistry*), and with the establishment of the foundations upon which modern science reposes. Lavoisier's apparatus is preserved in the Musée du Conservatoire National des Arts et Métiers in Paris. The famous painting of Lavoisier and his wife by Jacques David is now in the Rockefeller institute in New York city. The statue behind the Madeleine in Paris, erected in 1900 by international subscription, was destroyed by the Germans during the occupation in World War II.

SCIENTIFIC ACHIEVEMENTS

On Nov. 1, 1772, Lavoisier deposited with the Academy of Sciences a note which stated that sulfur and phosphorus when burned increased in weight because they absorbed "air," while the metallic lead formed from litharge by reduction with charcoal weighed less than the original litharge because it had lost "air." The exact nature of the airs concerned in the processes he did not explain until after the preparation of "dephlogisticated air" (oxygen; *q.v.*) by Joseph Priestley in 1774. Then, perceiving that in combustion and the calcination of metals only a portion of a given volume of common air was used up, he concluded that Priestley's new "air" was what was absorbed by burning phosphorus, etc., "nonvital air," azote, or nitrogen remaining behind.

In a memoir presented to the Academy in 1777, read in 1779 but not published until 1781, he assigned to dephlogisticated air the name oxygen, or "acid producer," on the erroneous supposition that all acids were formed by its union with a simple, usually nonmetallic, body. Combustion was explained by Lavoisier not as the result of the liberation of hypothetical "phlogiston," but as the result of the combination of the burning substance with oxygen. On June 25, 1783, he announced to the Academy that water was the product formed by the combination of hydrogen and oxygen; however, he had been anticipated by Henry Cavendish (*q.v.*). From his knowledge of the composition of water Lavoisier was led to the beginnings of quantitative organic analysis. He burned alcohol, and other combustible organic compounds, in oxygen and from the weight of water and carbon dioxide produced calculated their composition.

Up to about this time Lavoisier's work, mainly quantitative in character, had appealed most strongly to physicists, but it now began to win conviction from chemists also. Claude L. Berthollet (*q.v.*), Louis B. Guyton de Morveau and Antoine F. Fourcroy, his collaborators in the reformed system of chemical terminology set forth in 1787 in the *Méthode de nomenclature chimique*, were among the earliest French converts to the new theory of combus-

tion; they were followed by Martin H. Klaproth and the German Academy, and by most English chemists except Cavendish, who rather suspended his judgment, and Priestley, who clung to the old ideas. The spread of Lavoisier's doctrines was greatly facilitated by the defined and logical form in which he presented them in his *Traité élémentaire de chimie (présenté dans un ordre nouveau et d'après les découvertes modernes)* (1789), and eventually they were adopted universally. The list of simple substances (elements), which could not be further decomposed by any known process of analysis, contained in the first volume of this work, includes "light" and "caloric" with oxygen, azote and hydrogen. Under the head of "oxidable or acidifiable" substances, the combination of which with oxygen yielded acids, were placed sulfur, phosphorus, carbon and the muriatic, fluoric and boracic radicals. The metals, which by combination with oxygen became oxides, were antimony, silver, arsenic, bismuth, cobalt, copper, tin, iron, manganese, mercury, molybdenum, nickel, gold, platinum, lead, tungsten and zinc; and the "simple earthy salifiable substances" were lime, baryta, magnesia, alumina and silica. The simple nature of the alkalies he considered so doubtful that he did not class them as elements. It is to Lavoisier that we owe to a great extent the modern concept of an element as against the old Greek idea.

In addition to his purely chemical work, Lavoisier, mostly in conjunction with Pierre Laplace, devoted considerable attention to physical problems, especially those connected with heat. The two carried out some of the earliest thermochemical investigations, devised an apparatus for measuring linear and cubical expansions, and employed a modification of Joseph Black's ice calorimeter in a series of determinations of specific heats (*see* CALORIMETRY). Regarding heat (*matière de feu*) as a peculiar kind of imponderable matter, Lavoisier held that the three states of aggregation—solid, liquid and gas—were modes of matter, each depending on the amount of *matière de feu* with which the substances concerned were associated. He also worked at fermentation, respiration and animal heat, looking upon the processes concerned as essentially chemical in nature. A paper discovered many years after his death showed that he had anticipated later thinkers in explaining the cyclical process of animal and vegetable life.

See also references under "Lavoisier, Antoine Laurent" in the Index.

BIBLIOGRAPHY.—A collected edition of the writings of Lavoisier, *Oeuvres de Lavoisier,* 6 vol. (1864–93), contains all his main works and memoirs from the Academy volumes as well as numerous letters, notes and reports. *See* also D. I. Duveen and H. S. Klickstein, *A Bibliography of the Works of Antoine Laurent Lavoisier* (1954); E. Grimaux, *Lavoisier 1743–1794* (1888); D. McKie, *Antoine Lavoisier* (1952); S. French, *Torch and Crucible* (1941). (D. I. D.)

LAW, ANDREW BONAR (1858–1923), the first British prime minister of colonial origin, and the leader of the Conservative party during a critical period in its history. He was born in New Brunswick, Canada, on Sept. 16, 1858, son of James Law, a Presbyterian minister of Ulster extraction. From the age of 12 Andrew was brought up by wealthy cousins near Glasgow, Scotland. He was educated at Glasgow High school, and left when he was 16 to go into business; 11 years later he became partner in a firm of iron merchants. In 1891 he married Annie Robley, by whom he had four sons and two daughters. In 1900 he entered parliament as Conservative member of parliament for the Blackfriars division of Glasgow. Politically he belonged to the party's imperialist element led by Joseph Chamberlain. In 1902 Law became parliamentary secretary to the board of trade. The landslide of 1906 lost him his seat, but almost at once he was returned in a by-election. The illness of Joseph Chamberlain made him, along with Chamberlain's son Austen, one of the leading spokesmen of the tariff reform group. In 1909 his wife died and he was plunged into gloom but emerged to take part in the battle over the Parliament act on the side of A. J. Balfour and the moderates. In Dec. 1910 he suffered a second electoral defeat but, as before, was soon returned at a by-election. He was by now a prominent, though by no means the outstanding, figure on the opposition front bench.

In the autumn of 1911 Balfour resigned the leadership of the party. The succession seemed to lie between Austen Chamberlain and Walter Long, an old-fashioned country squire, but Law, most ably advised by his new friend Max Aitken (afterward Lord Beaverbrook), profited from the deadlock. Both Chamberlain and Long withdrew in his favour and he was elected unanimously. A sombre, middle-class, teetotal, Scotch-Canadian businessman thus became leader of the party of old England. The parliamentary struggles from then until World War I were of extreme bitterness, centring largely on the question of Irish Home Rule—an issue that aroused in Law as an Ulsterman atavistic passions. His extremism, in alliance with Sir Edward Carson, frightened moderate Conservatives, but the survival of Ulster shows its effectiveness. After one or two mistakes Law soon consolidated his position as a formidable party leader. The outbreak of World War I resulted in a political truce in Britain. In May 1915 Law took office as colonial secretary in the coalition government which he virtually forced upon H. H. Asquith. At the end of 1916 he played an important part, once again advised by Aitken, in the intrigues and negotiations that resulted in the replacement of Asquith by David Lloyd George. In the new government he was chancellor of the exchequer and leader of the house of commons. Two of his sons were killed in action during 1917, a blow that increased his already deeply ingrained melancholy.

It was largely Law's decision that committed his party to the "coupon" election of 1918. He gave up the chancellorship but remained as leader of the house in the postwar coalition. In March 1921 his health temporarily broke down and he resigned from the government, being succeeded as Conservative leader by Austen Chamberlain. This ended his close association with Lloyd George, upon whose effervescent genius he had a sobering and beneficial influence. His health soon recovered, and he surveyed with a dubious eye the government's proposals for a compromise with the Sinn Féin party in Ireland.

During the spring and summer of 1922 Tory mistrust of Lloyd George mounted. There was the honours scandal that shocked the right wing, and then came the Chanak incident when Britain seemed to be on the verge of an unnecessary war with Turkey. The last straw was a proposal that the government should go to the country on a coalition basis as in 1918. A meeting of the Conservative party was held at the Carlton club on Oct. 19, 1922. After much soul searching, and independently pressed by Beaverbrook, Stanley Baldwin and Wickham Steed, the editor of the *Times,* Bonar Law decided to pronounce against the coalition. His speech was decisive and Lloyd George at once resigned, carrying with him the leading Tories in the government except for Lord Curzon. Law had to form what Churchill described as "a government of the second eleven," but he was vindicated at the general election (Nov. 1922), which he fought on the slogan of "tranquility," by a comfortable majority over all other parties combined.

His brief premiership (Oct. 1922–May 1923) was marked by two important episodes. The first was the U.S. debt settlement by Baldwin as chancellor of the exchequer. Law regarded it as most unsatisfactory and almost resigned. The second was a diplomatic rupture with France on the invasion of the Ruhr—an issue which lay outside the power of any British prime minister. Law regarded himself as playing the part of a caretaker. Before a year was out he hoped to reconcile Austen Chamberlain and the dissidents with the majority of the party and then to retire from politics. But even this much time was not granted to him. In May 1923 his health collapsed, inoperable cancer of the throat having been diagnosed. He resigned at once, declining on grounds of illness to advise the king about his successor. He died in London on Oct. 30, 1923.

Bonar Law did not hold the highest office for long enough to enable a judgment to be made upon his capacity as a statesman. He was undoubtedly a very able, if unorthodox, party leader. He once said that he cared only for two things in politics: tariff reform and Ulster. The rest was only a game. He might perhaps have added a third: the preservation of a unified Conservative party—the main motive for his last decisive step in Oct. 1922. Despite, or perhaps because of, a certain aura of sadness that enveloped him, he was much loved by both supporters and opponents

and, although varying estimates have been made since of his capacity, he was recognized in his lifetime as one of the outstanding figures on the political scene.

See Robert Blake, *The Unknown Prime Minister* (1955); Lord Beaverbrook, *Politicians and the War,* 2 vol. (1928–32).

(R. N. W. B.)

LAW, JOHN (1671–1729), Scottish monetary reformer and originator of the "Mississippi scheme," was baptized at Edinburgh, April 21, 1671. He studied mathematics, commerce and political economy in London. After killing an adversary in a duel, Law fled to Amsterdam, Neth., where he studied banking operations. A decade later Law returned to Scotland and wrote his best-known work, *Money and Trade Considered, With a Proposal for Supplying the Nation With Money* (1st ed., 1705; 2nd ed., 1720). He submitted his banking reform plan to the Scottish parliament but it was rejected.

After several other rejections, Law received permission in 1716 to try his plan in France. The French government was heavily in debt as a result of the extensive wars of Louis XIV, who died in 1715, and Law's program, which promised to reduce the public debt, held obvious appeal. With Law, however, lowering the public debt was somewhat incidental. He shared with his mercantilist contemporaries a belief that money is a creative force in economic development and that an increase in its quantity would stimulate a larger national product and would increase national power. He differed from other mercantilists in looking upon a central bank as an agency for manufacturing money in the form of bank notes that would circulate in place of gold and silver, which were scarce.

In Paris, Law founded a bank with authority to issue notes. Later he combined with his bank the Louisiana company, which had exclusive privileges to develop the vast French territories in the Mississippi valley of North America. Law's plan worked well for a few years, but ran afoul of speculative complications and political intrigue, neither of which were directly attributable to Law. As the author of the program, popularly known as the "Mississippi Bubble," Law was responsible and was forced to flee France in 1720. He died in Venice a poor man on March 21, 1729. Despite the colossal failure of the "Mississippi scheme," Law was a financial genius and an essentially honest man. *See* also BANKING; FRANCE: *History.*

BIBLIOGRAPHY.—Paul Harsin, *John Law, Oeuvres complètes,* 3 vol. (1934); H. M. Hyde, *John Law* (1948); E. J. Hamilton, "Prices and Wages at Paris Under John Law's System," *Quarterly Journal of Economics* (1937); H. G. Selfridge, *The Romance of Commerce* (1923); J. B. Perkins, *France Under the Regency* (1892). (D. Dd.)

LAW, WILLIAM (1686–1761), English spiritual writer, is widely known for his delineation of the Christian ethical ideal for human life and its actualization through the disciplined practices of private mysticism. Among his contemporaries who expressed indebtedness to his work were John and Charles Wesley, George Whitefield, Samuel Johnson and Thomas Adams. Law was born at King's Cliffe, Northamptonshire, in 1686. In 1705 he entered Emmanuel college, Cambridge, and in 1711 was elected a fellow of that college and ordained. He was dismissed from Cambridge, as a nonjuror, upon the accession of George I. By 1727 he was in residence with the family of Edward Gibbon at Putney as tutor to his son Edward, father of the historian. In 1740 Law retired to King's Cliffe, where he had inherited a small property from his father. He died there on April 9, 1761.

In addition to polemical treatises on the Bangorian controversy (*q.v.*), Law's works may be divided into two categories. (1) Ethical theory. Law's *Practical Treatise Upon Christian Perfection* (1726) and his *Serious Call to a Devout and Holy Life* espouse a mild mysticism that does not exceed the boundaries of the normative Christian theological tradition. A tract on *The Absolute Unlawfulness of Stage-Entertainment Fully Demonstrated* (1726) provoked effective criticism from John Dennis in *The Stage Defended.* (2) Mysticism. An enthusiastic admirer of Jakob Böhme (*q.v.*), though not an avowed disciple, Law in writings such as *The Way to Divine Knowledge* (1752), *The Spirit of Prayer* (1749, 1752) and *The Spirit of Love* (1752, 1754) evidences a mysticism that stresses union between the Creator and the creature in a manner that has seldom found acceptance as a normative dimension of Christian moral theology. Each of these works was vehemently criticized by competent contemporary scholars, including Wesley.

BIBLIOGRAPHY.—*See* the edition of his *Works* by G. B. Morgan, 9 vol. (1892). *See* also C. Walton, *Notes and Materials for a Complete Biography of W. Law* (1848); J. H. Overton, *William Law, Nonjuror and Mystic* (1881); A. Whyte, *Character and Characteristics of William Law, Nonjuror and Mystic* (1893); Eric W. Baker, *A Herald of the Evangelical Revival: a Critical Inquiry into the Relation of William Law to John Wesley* (1949); Arthur W. Hopkinson, *About William Law: a Running Commentary on His Works* (1948); Henri Talon, *William Law: a Study in Literary Craftsmanship* (1948). (Da. C. S.)

LAW (ARTICLES ON). Since law is one of the most significant expressions of a society's social and political development, the understanding of a society requires some insight into its legal system. *Encyclopædia Britannica's* articles on law are designed to provide this perspective, and therefore have been presented as far as possible in language intelligible to the general reader.

JURISPRUDENCE discusses the meaning, nature and purpose of law, its relation to other disciplines and the influences that have shaped it in various eras, and includes a summary of the principles of the "schools" of jurisprudence from ancient to modern times.

LEGAL PROFESSION outlines the characteristic activities of lawyers, their diverse responsibilities, and the systems of professional organization.

PRACTICE AND PROCEDURE describes the framework of legal formalities within which the moves and countermoves of counsel are made in actions at law, and the needs for which these activities were developed. The judicial systems of the United States and England are described in COURT. More detailed information is given in such articles as COUNTY COURT; CHILDREN'S COURT; COMMON PLEAS, COURT OF; EQUITY; HIGH COMMISSION, COURT OF; JUSTICE OF THE PEACE; QUARTER SESSIONS, COURT OF; QUEEN'S BENCH, COURT OF; SUPREME COURT OF THE UNITED STATES, THE. Other articles on judicial organization and activity are APPEAL; CONTEMPT (LEGAL); COSTS; DAMAGES; EVIDENCE; HABEAS CORPUS; INDICTMENT; INJUNCTION; JUDGMENTS AND DECREES; JUDICIARY AND COURT OFFICERS; JURY.

COMMON LAW describes the system of law characteristic of England and of those nations, including the United States, that have inherited or adopted English legal traditions. EQUITY discusses the legal principles developed to assure justice in situations not adequately covered by specific laws or common-law precedents.

CIVIL LAW deals with systems, widely prevalent in Europe and Latin America, that are based on the law of the Roman empire as set forth in the compilation of Justinian and his successors.

CONSTITUTION AND CONSTITUTIONAL LAW is supplemented by BILL OF RIGHTS, ENGLISH; BILL OF RIGHTS, UNITED STATES; CIVIL LIBERTIES; DUE PROCESS; HABEAS CORPUS. The rules and principles under which governmental departments exercise the powers vested in them are treated in ADMINISTRATIVE LAW. Lawmaking processes in the U.S. and attempts to co-ordinate these are discussed in LEGISLATION; the comparable article for Great Britain is STATUTE LAW.

MARRIAGE, LAW OF, is supplemented by ANNULMENT; DIVORCE; HUSBAND AND WIFE, LAWS CONCERNING; WOMEN, LEGAL POSITION OF. Articles on children include ADOPTION; CHILDREN, LAWS CONCERNING; CHILDREN'S COURT; JUVENILE DELINQUENCY.

Articles on testamentary disposition and related topics include ESTATE AND INHERITANCE TAXES; ESTATES, ADMINISTRATION OF; INHERITANCE; INTESTATE SUCCESSION; PROBATE; TRUST; WILL.

Articles on topics affecting ownership of property include EASEMENT; EMINENT DOMAIN; HOUSING AND BUILDING LAWS; LANDLORD AND TENANT; MORTGAGE; PERSONAL PROPERTY; REAL PROPERTY AND CONVEYANCING, LAWS OF; TITLE TO LAND.

Among articles on topics related to commerce and industry are BANKRUPTCY; COMMERCIAL PAPER; COMPANY; CONTRACT; CORPORATION; DEBTOR AND CREDITOR LAW; FACTOR; INSTALLMENT CREDIT; INVESTMENT PAPER; LIEN; MONOPOLY; PARTNERSHIP; SALE OF GOODS; SECURITIES REGULATION; TRADEMARKS AND NAMES. Additional listings are given in ECONOMICS (ARTICLES

ON) and FINANCE (ARTICLES ON).

MARITIME LAW is supplemented by ADMIRALTY, HIGH COURT OF; AFFREIGHTMENT; AVERAGE; NAVIGATION LAWS; RULES OF THE ROAD AT SEA; SALVAGE; WATERS, TERRITORIAL. Other specialized areas of law are covered in such articles as AIR LAW; COPYRIGHT; HEALTH AND SAFETY LAWS; LABOUR LAW; LIQUOR LAW; MEDICAL JURISPRUDENCE; NATURALIZATION LAWS; PATENT; IMMIGRATION LAW.

CRIMINAL LAW, dealing primarily with general principles, is supplemented by CONSPIRACY; CORRUPT PRACTICES; FORGERY; HOMICIDE; PERJURY; etc. INSANITY deals with both criminal and civil liability. Among articles related to the enforcement of criminal law are ARREST; DEPORTATION AND EXILE; FEDERAL BUREAU OF INVESTIGATION; INDICTMENT; INVESTIGATION, CRIMINAL; POLICE; INTERNATIONAL CRIMINAL POLICE ORGANIZATION; SCOTLAND YARD; SECRET SERVICE, U.S. TORT deals with wrongs which are actionable by private persons as distinguished from those covered by criminal law, in which the state is a party.

National systems are discussed in AMERICAN LAW; ENGLISH LAW; FRENCH LAW, which is supplemented by CODE NAPOLÉON; GERMAN LAW; ITALIAN LAW; ISRAELI LAW; JAPANESE LAW; SOVIET LAW; etc. Codifications of national laws are discussed in CODE. International law as it affects individuals is treated in CONFLICT OF LAWS, and from the point of view of nations in INTERNATIONAL LAW, PUBLIC. Additional titles are cited in INTERNATIONAL RELATIONS (ARTICLES ON).

The systems that prevailed in the classical world are treated in GREEK LAW and ROMAN LAW. Additional articles dealing with archaic systems include ANGLO-SAXON LAW; GERMANIC LAWS, EARLY; HAMMURABI, CODE OF. ROMAN-DUTCH LAW describes the system, introduced in Holland in the 15th century, that survives in altered form in some of the former Dutch colonies. CANON LAW discusses the history and modern status of Roman Catholic, Eastern and Anglican law. Jewish law is treated in TALMUD and PENTATEUCH; Muslim law in ISLAMIC LAW.

LEGAL EDUCATION traces the evolution of legal instruction in the United States and England. INNS OF COURT AND CHANCERY treats in greater detail a system that once was the sole method of education in English law. LEGAL AID discusses systems by which legal representation is provided at little or no cost to persons unable to pay normal fees.

Biographical articles summarize the work of great legal scholars, reformers and judges; *e.g.,* John Austin, Cesare Beccaria, Sir William Blackstone, Sir Edward Coke, Hugo Grotius, Oliver Wendell Holmes, William Murray, earl of Mansfield, John Marshall.

The lists given in the above paragraphs are intended merely as an indication of the arrangement of subject matter. The Index should be consulted for more comprehensive lists of articles, also sections of articles, dealing with each topic.

LAW, PRIMITIVE. Primitive law is the law of peoples whose culture does not include the art of writing. Civilized law is the law of literate peoples; archaic law is the law of early civilizations. (*See* JURISPRUDENCE.)

Law and Culture.—Law is essentially an aspect of culture. Each human society has standardized modes of action in accordance with which individual behaviour is to be patterned. Such patterns of behaviour, called social norms, conform with what popularly are known as customs. Law is generically similar to custom in that it also prescribes patterns of behaviour. It is a characteristic of human social life that what is done by the majority in a given situation takes on the quality of what ought to be done. The norm takes on the quality of the normative.

Customs or social norms are sanctioned; they are supported by rewards or penalties for conformity or nonconformity. While the potential range of human activities is enormous, organized social living requires a restriction of the range of behaviour that may be allowed expression. Social control consists of the means by which people are induced to act in accordance with norms.

Law is a major instrument of social control. It is distinguished from mere custom by the nature of its sanctions and by the character of the persons who may apply them. The distinctive sanction of law is physical force: whipping, mutilation, imprisonment, exile or death. Primitive as well as civilized legal systems extensively exact damages and impose fines. Nonetheless, if law is operative, refusal to pay results in the use of force.

Physical coercion is not of itself legal. It may be illegal as in gangsterism or simply nonlegal as in family spankings. To be legal physical coercion must be applied officially or quasi-officially on behalf of the society and with general acceptance of its legitimacy. Individuals who apply sanctions legally must be recognized as rightfully acting on behalf of the society.

The socially recognized privilege of applying force constitutes the official element in law. Frequently in primitive law the prosecutor is the very individual who allegedly has suffered the wrong. Nevertheless, if the wrong is real and illegal, and if the injured party proceeds in accordance with due process, he may with impunity apply physical force. As reported for the Ifugao of northern Luzon in the Philippines by R. F. Barton, "If a family conduct its case faultlessly, even though the issue be only a debt, and especially if a *monkalun* ["go-between"] be sent, they may, at the termination of the truce, slay the culprit. Public opinion will uphold, and the kin of the slain are not very likely to retaliate." (Roy F. Barton, *Half-Way Sun,* p. 115, Harcourt, Brace and Company, Inc., 1930.) The private prosecutor is, on this occasion and for this offense, an official representative of social authority even though he wears no constable's badge, policeman's uniform or judicial robe.

In sum, the essential elements of law are: (1) regularity (law is a social norm); (2) official authority; and (3) the potential application of physical force as a privileged sanction. Law exists in these terms in virtually every primitive society.

Substantive and Adjective Law.—Law always has substantive and adjective (procedural) aspects. The substantive defines the norms to be enforced. The adjective describes how the norms are to be enforced and by whom.

The content of substantive law varies tremendously among primitive societies. Two features, however, are almost universal; homicide within the group in one form or another is legally punishable everywhere; adultery, with a few possible exceptions, also comes universally within the scope of legal action. It should be realized, however, that just what constitutes illegal homicide and adultery varies with the culture. For example, among the Eskimo infanticide, senilicide and invalidicide are legally privileged if committed by a relative or close friend. Among these people coitus between a married woman and a man to whom she has been lent by her husband is not illegal adultery; on the other hand it is most definitely illegal without at least the husband's implicit permission.

Sorcery, or antisocial witchcraft, is also a widespread object of legal control among primitive societies. Apparently, sorcery is seen as a form of vicarious homicide and aggression against the well-being of another. While some killing takes place even in the most peaceful of societies, there are a few primitive societies, such as existed among the Cheyenne Indians, in which there is no sorcery.

Theft, interestingly enough, is not always a subject of major concern in primitive law. Among simpler peoples access to the economic resources is generally open to all on an equal footing. Furthermore, food and implements tend to be shared freely. Primitive substantive law among food gatherers and hunters is, therefore, largely concerned with such direct personal offenses as homicide, bodily assault, sorcery and adultery rather than with goods. Among primitives who have achieved horticulture or extensive reliance on animal husbandry, however, the law of property and inheritance burgeons. The vital factor is the development of concepts of capital that may be borrowed and lent—and misappropriated. Unlawful conversion and indebtedness are great breeders of litigation among higher primitives; entry into contractual relations is common.

The greatest contrast between primitive and civilized law is in procedural differences. Forms of law are intimately related to other forms of social structure. The simpler primitive societies are characterized by decentralized, segmentary units of organization lacking over-all political authority. Each kindred, lineage or

clan has considerable autonomy, and headmen and elders function as leaders and guides to the group's activities. Where several kinship groups exist in a village, the elders may form a village council, and one of them may also serve as village headman or chief. The scope of such village or tribal authority is, however, usually limited when compared to the autonomy of the kinship groups.

In primitive law the primary authority for most legal actions is the kinship group in support of its individual members. Hence, private law, so-called, dominates most primitive law. At the same time, almost every primitive society recognizes some acts as legally punishable by the society at large or through explicitly delegated officials. Illegal acts punished by public prosecution are crimes, as against the torts of private law.

The major trend in the development of law from the most primitive societies to the most civilized is not so much a movement from status to contract, as envisaged by Sir Henry Maine, but rather a shifting of rights to prosecute and impose sanctions away from the wronged individual and his kinship group over to officials representing the general society. Emphasis is on a shift in procedural responsibility.

Law and Feud.—Although primitive legal systems have well-developed concepts of due process and are frequently ingenious and quite adequate, there is a serious defect in those based on private law. Private law involves direct negotiation by parties in disagreement. The defendant must agree to some form of punishment or restitution or there can be no settlement.

If the defendant is recalcitrant, perhaps to unreasonable demands, procedure breaks down. The defendant may deny further suit and possibly incur physical attack by the plaintiff. If the defendant has indicated that he rejects the legitimacy of the claim, he will deny the plaintiff's right to resort to force. Feud or internecine war may result.

Legal historians traditionally have seen primitive society as marked by a constant state of feud, as rent by violent retaliation and blood revenge (*see* BLOOD FEUD)—an arena of violence ruled by the law of the jungle and the retaliative *lex talionis* ("eye for eye, tooth for tooth"). Feud and blood revenge represent breakdown or absence of law. However, legal procedures or other ritual devices for avoiding or terminating feud uniformly have been found in such cultures by anthropologists. Further, the existence of feud as a social usage may serve as a device to induce conformity to the norms of substantive law in that violation of the law evokes the risks and inconveniences inherent in feud. Recourse to the good offices of a ritual chief, as among the Nuer (*q.v.*) of the African Sudan, or to the mediation of an outstanding and neutral citizen, as among the Ifugao, are examples of the primitive judicial use of a disinterested third party.

The emergence of a lineage, clan or subtribe to political dominance and chieftainship has the collateral effect of providing for authoritative third-party intervention in private law actions. The whole society may be symbolized in the person of the chief and offenses against the chief no longer are seen as private wrongs but as crimes against the society. Offenses increasingly are looked upon as breaches of the king's peace. The scope of royal courts becomes wide and penetrating as in the law of many African social systems. Centralized political and judicial authority based on factors other than the dominance of a kinship group also may be developed. Among the Cheyenne Indians, for example, such authority was vested in a tribal council of self-appointed chieftains. The heads of military fraternities also directed legal actions on behalf of the entire tribe.

Among the Pueblo Indians in the southwestern U.S., the central legal authority resides in a high priest, or in a cacique (chief), and in a council of ranking priests of the religious fraternities. In conquest-originated caste societies of the type that were common in Africa and the Mediterranean lands of antiquity centralized legal authority in the hands of a caste of conquerors was easily and regularly achieved.

Primitive Legal Sanctions.—Imprisonment is strikingly absent among primitive legal sanctions and appears to be an invention of civilized law. Primitive law aims at deterrence and restitution; imprisonment does not effect restitution; under primitive conditions imprisonment is too troublesome to be relied upon as a deterrent.

The sanction for persistent and dangerous antisocial activity in primitive law is quite generally exile or death. Otherwise, the exaction of damages is the most widespread sanction used. Nor is such a combination of sanctions a secondary substitute for feud as many 19th-century writers on legal history assumed. Feud, as has been noted, follows upon the breakdown of legal procedure. It is also significant that in a number of primitive societies in which the ideal norm calls for killing the defendant, a fine may be levied or compensatory damages accepted instead. In practice the adjective norm is not the death penalty but an economic payment. Ritual combat, as exemplified among Australian aborigines, allows for formal retribution through a mild mutilation of the wrongdoer at the hands of his victim.

The Sources of Primitive Law.—Law is generated in conflict and dispute. Substantively, law determines which course of action posed by the disputants shall be allowed to prevail and which shall be suppressed by legal penalty. Rules of law emerge from cases in action; they rest on deep-lying assumptions concerning the nature of the universe and man, and concerning the nature of what is desirable and undesirable.

Although some planned legislation has been reported among primitives, most primitive law is case-created rather than legislated. Thus, primitive law predominantly is a type of common law. As common law it is neither more nor less customary than is the common law of Great Britain and the United States. By the nature of primitive culture it is unwritten.

Religious belief is not an outstanding source of primitive law as such. Societies with elaborately developed ancestral cults tend to work religious rules into law, using legal sanctions to induce conformity to ancestral norms. In almost all primitive societies, however, the area of tabu (*q.v.*) is much wider than that of law, and many legal injunctions have no counterparts in religious or magical tabus. *See* also SOCIAL ANTHROPOLOGY: *Social Control.*

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LAWES, the surname of two 17th-century English composers.

HENRY LAWES (1596–1662) was born at Dinton, Wiltshire, on Jan. 5, 1596. Both he and his brother William (*see* below) were pupils of John Coperario. Henry Lawes was a gentleman of the Chapel Royal from 1626 and provided the music for Thomas Carew's masque, *Coelum Britannicum* (1634), in which the earl of Bridgwater's sons took part. He became teacher to Bridgwater's children and wrote the music to Milton's *Comus,* produced at Bridgwater's castle at Ludlow Sept. 29, 1634. Henry collaborated with his brother in Sir William Davenant's *Triumphs of the Prince d'Amour* (1636). The Civil War led to his relinquishing his court appointments, but he regained them at the Restoration. He provided some of the music to Davenant's *Siege of Rhodes* (1656) and wrote an anthem for Charles II's coronation. He died in London, Oct. 21, 1662, and was buried in Westminster abbey.

Henry Lawes strove to set words to music with "just note and accent," and his songs, influenced by the Italian *parlante* style, are characterized by rhyme emphasis, word repetition, many cadences and deliberate lack of rhythmic continuity. His *Choice Psalmes* (1648), one of several contemporary publications of his music, also contains pieces by his brother and a commendatory sonnet by Milton: "Harry, whose tuneful and well-measured song."

WILLIAM LAWES (1602–1645), born at Salisbury in 1602, became one of Charles I's musicians. He joined the royalists at the outbreak of the Civil War and was killed at the siege of Chester

in Sept. 1645. Although he was greatly esteemed by contemporaries, none of his music was printed until after his death, when it appeared in several publications. He wrote both vocal and instrumental music. The latter includes pieces for "broken consort" (*e.g.*, violin, bass viol, theorbo and harp) and some fine fantasias. Two large manuscript collections exist: *The Royall Consort* and the *Great Consorte*. His daring harmonies employ dissonances unusual in English music of the time. Lawes was a skilful contrapuntist and found some difficulty in adapting himself to the new "monodic" style. His later works, however, demonstrate his mastery of the idiom.

Of his masque music, only that to James Shirley's *Triumph of Peace* (1634) and Davenant's *Prince d'Amour* was known until the mid-20th century, when the music to Davenant's *Britannia Triumphans* (1638) and Shirley's *Triumph of Beautie* (*c.* 1644) was discovered. These works show William Lawes to have been a masque composer of great importance, for, of the music to court masques extant, his contribution exceeds that of any other composer.

See M. Lefkowitz, *William Lawes* (1960). (A. D. F.)

LAWES, SIR JOHN BENNET, BART. (1814–1900), English agriculturist and founder of the fertilizer industry, was born at Rothamsted Manor house, Harpenden, on Dec. 28, 1814. While still at Oxford university he became interested in growing medicinal plants on the Rothamsted estate, which he inherited on his father's death in 1822. About 1837 he began to experiment on the effects of manures on plants growing in pots, and a year or two later the experiments were extended to field crops. In 1842 he patented a process for treating phosphate rock with sulfuric acid to produce superphosphate, and thus initiated the fertilizer industry. In the following year he enlisted the services of J. H. Gilbert (later Sir Henry), with whom he worked for more than half a century doing experiments on the nutrition of crops and animals that made Rothamsted famous (*see* AGRICULTURAL EDUCATION AND RESEARCH). In 1854 he was elected a fellow of the Royal Society, which in 1867 bestowed a Royal medal on Lawes and Gilbert jointly, and in 1882 he was created a baronet. In 1889 he took measures to ensure the continuation of the Rothamsted experiments by setting aside £100,000 for that purpose and constituting the Lawes Agricultural trust. He died Aug. 31, 1900; his work was continued and expanded by A. D. Hall, who became director of Rothamsted experimental station in 1902.

See also ROTHAMSTED EXPERIMENTAL STATION. (F. C. BN.)

LAW MERCHANT (LEX MERCATORIA), originally customary rules and principles relating to merchants and mercantile transactions, adopted by merchants themselves for the purpose of regulating their dealings. It was administered for the most part in special courts, such as those of the guilds in Italy, or, as in England, in courts of the staple or piepoudre (piepowder).

The history of the law merchant in England is divided into three stages: the first, when it was a special kind of law—as distinct from the common law—administered in special courts for a special class of the community (*i.e.*, the mercantile); the second stage was one of transition, the law merchant being administered in the common-law courts, but as a body of customs, to be proved as a fact in each individual case of doubt; the third stage, which dates from the presidency over the king's bench of Lord Mansfield (*q.v.*), under whom it was molded into the mercantile law of today, which has to a large extent been codified in the Sale of Goods act (1893). *See* also MARITIME LAW.

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LAWN, a very thin fabric made from level linen or cotton yarns. It is used for light dresses and trimmings, also for handkerchiefs. The terms lawn and cambric (*q.v.*) are often intended to indicate the same fabric. In this sense of the term the derivation is from the name of the French town, Laon.

LAWNS, CARE OF. Lawns are cultivated for decoration, for golf courses (greens and fairways), ball fields, tennis courts and a number of other purposes. They may be made either by sowing seed or by setting turf or sod. In either case thorough preparation of the ground beforehand, by tilling, leveling, draining, fertilizing and raking, is essential. The mixture of grasses to be chosen depends on the use required of the lawn and on the climatic conditions. In the United States species of bluegrass, bent grass and fescue (*qq.v.*), usually in a variety of mixtures, are the chief lawn grasses in areas where summer rainfall is adequate (not less than 18–20 in.) and summer heat not great. In the western states buffalo grass (*Buchloe dactyloides*) and crested wheat grass (*Agropyron cristatum*) are often grown, as well as grass substitutes such as fog fruit (*Lippia canescens*), turfing daisy (*Matricaria tchihatchewi*) and *Dichondra repens.* In the southern states St. Augustine grass (*Stenotaphrum secundatum*), centipede grass (*Eremochloa ophiuroides*), carpet grass (*Axonopus furcatus*), bermuda grass (*q.v.*) and zoysia are used in making turfs. In Britain and northern Europe the finer lawns are made from a mixture of bents and fescues. Cheaper mixtures for coarser lawns often include rye grass, which is also used to provide vigorous growth until the finer grasses in a mixture can become established.

Whatever the kind of lawn, its plants are necessarily crowded together, and problems of cultivation arise which do not occur with wild grass. A single plant of wild grass may occupy as much as a square foot of land, whereas in home lawns as many as 100 plants may be crowded into the same area. These plants must compete with each other for food, light, air and moisture; their crowding together produces conditions favourable to fungal growth and subsequent disease.

Lawns may be laid in early spring as soon as the soil is workable or in early autumn, the latter season being preferred because there is little competition from weeds and little danger of drought.

In order to thrive, grass must have proper nutrition. Only the fescues will tolerate poor soil, and they may even become diseased if overfed with fertilizer. Bermuda, common Kentucky bluegrass, Merion Kentucky bluegrass, the bent grasses and zoysia all grow best if they receive at least four pounds of nitrogen to each 1,000 sq.ft. (about four times the amount once recommended). The single-application forms of mixed urea-form chemicals are easiest for the homeowner to use.

A typical mixture of this type contains 20 parts nitrogen, 5 parts potassium and 5 parts phosphorus (designated 20–5–5) and should usually be applied at the rate of 100 lb. to each 5,000 sq.ft. of lawn early in the spring. This fertilizer permits gradual release of nitrogen throughout the summer without injury to the turf. Therefore, it needs to be applied only once during a growing season. If older types of fertilizers (*i.e.*, 10–5–5 or 12–4–4) are used, four applications—in early spring, early June, early July and in the beginning of September—will space the feedings at about the proper intervals.

Mowing of grass compacts the soil, drives out the air and makes the entry of water difficult; it also removes the most vigorous part of the plant—the growing tip. The effects of compaction, however, can be lessened by use of spiking devices which loosen the soil and permit aeration. Top-dressing or black soil should not be applied over an old lawn because it usually introduces weeds. Despite the disadvantages of mowing it is important because regular removal of the tips forces the formation of a crown, and builds up a solid lawn surface. Grass should be cut once a week even though it may not show growth.

Excessive watering should be avoided; a moist surface favours the spread of disease. Except for the bents, most grasses do not need regular watering under normal moisture conditions. If rain does not fall for two or three weeks, the lawn should be soaked deeply, and no water added thereafter for at least a week except under arid or semiarid conditions. Overwatering is especially damaging to the fescues and Merion Kentucky bluegrass.

Fungicides control a wide range of grass diseases. One of these chemical mixtures applied before the start of winter will prevent "snow mold," a disease which works at low temperatures, particularly when the grass is covered by snow. In summertime common Kentucky bluegrass is often infected with one of the leaf spot

diseases, called summer dormancy. It can be prevented by applying fungicide at the time of the last spring frost. Where turf diseases are common, organic fertilizers such as sewerage sludge, sheep manure and blood and bone should be avoided because they feed the disease organisms as well as the lawns. Straight chemical plant foods do not.

Commercial preparations containing 85% calcium arsenate will kill many injurious insects and will control some persistent lawn weeds. The use of hormone or selective weed killers such as 2,4-D has greatly eased the keeping of a weed-free lawn, and they are often combined with fertilizers. Herbicides should not be used in winter or when the ground is cold, however. The best and most effective method of weed control is to exclude them by building a thick turf on good soil that will smother weed seedlings as they germinate. *See* also HORTICULTURE: *Horticulture and the Home;* WEED: *Control of Weeds.*

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(R. M. C.; X.)

LAWN TENNIS: *see* TENNIS.

LAW OF SUCCESSION, the law dealing with the inheritance of property, intestate or under a last will and testament (*see* INHERITANCE; INTESTATE SUCCESSION; WILL); also the law dealing with the succession to the crown in a monarchy or the succession to the presidential office in a republic in the event of the president's death or incapacity before the end of his term of office. *See* also references under "Law of Succession" in the Index.

(M. RN.)

LAWRENCE, SAINT (d. 258), one of the most famous Roman martyrs, was a deacon of Pope Sixtus II, whom he followed to death during the persecution of Valerian. It is said that when ordered to give up the church goods of which he had charge, Lawrence assembled the poor and infirm and proffered them as the church's treasure; and that when he was being roasted to death on a gridiron he said, "I am cooked on that side; turn me over, and eat." These details are recorded by St. Ambrose, the poet Prudentius and others, but their authenticity is far from certain; he was probably beheaded. The basilica of S. Lorenzo, outside the walls of Rome, was built over his burial place. He is named in the canon of the Roman Mass and his feast day is Aug. 10.

See H. Thurston and D. Attwater (eds.), *Butler's Lives of the Saints,* vol. iii, pp. 297–299 (1956). (D. AR.)

LAWRENCE, SAINT, OF BRINDISI (1559–1619), doctor of the church, preacher, exegete and polemicist of the Counter-Reformation, was born Cesare de Rossi at Brindisi on July 22, 1559, and educated there and at Venice. He joined the Capuchins at Verona in 1575, taking the name Lawrence. His facile memory enabled him to master many languages—Greek, Hebrew, Aramaic, Syriac, German, French, Spanish, Italian and Latin—and to excel in exegesis of the Old Testament. Under popes Gregory XIII and Clement VIII, he was appointed apostolic preacher to the Jews of Rome. Even before his ordination as a priest, Lawrence was known as an orator, and during his life he preached with success in many parts of Europe. He also held positions of authority in his order, including that of general superior (1602–05). During the battle of Stuhlweissenburg (Oct. 9–14, 1601) Lawrence accompanied the forces of the emperor Rudolf II when they defeated the Turkish army of Sultan Mohammed III; this victory was attributed in great part to the indomitable spirit of the saint, who had communicated his ardour and confidence to the Christian troops. Lawrence was also active at Madrid (where he founded a Capuchin house) and Munich in the political discussions that preceded the Thirty Years' War. He died at Belem near Lisbon on July 22, 1619, while on a mission of complaint to the Spanish monarch for the people of Naples against their viceroy. He was beatified by Pope Pius VI in 1783, canonized by Leo XIII in 1881 (feast day July 23) and declared a doctor of the church by John XXIII in 1959.

St. Lawrence's works have been published in nine volumes (1928–45). In addition to the sermons, which were aimed principally at the conversion of his hearers to a better way of life, they contain exegetical and polemical tracts.

See A. Brennan, *Life of St. Laurence of Brindisi* (1911).

(E. A. R.)

LAWRENCE, BROTHER, OF THE RESURRECTION (original name NICOLAS HERMAN) (*c.* 1605–1691), Carmelite lay brother and mystic, was a native of Lorraine and had been successively soldier, manservant and hermit before entering the Carmelite order at Paris in 1649. Employed as cook in the monastery, he learned to live a life of almost constant awareness of God's presence. His teachings on the subject were compiled after his death by the abbé de Beaufort in two volumes, *Maximes spirituelles* (1692) and *Moeurs et entretiens du Frère Laurent* (1694). These works were much praised by his contemporaries, but they appeared at a time of crisis in the history of spirituality—when F. Fénelon was engaged in his celebrated struggle with J. B. Bossuet on the nature of disinterested love—and the controversy tended to bring mysticism into disrepute, though both Fénelon and Bossuet esteemed Brother Lawrence and adopted many of his insights. Moreover, the abbé de Beaufort was secretary to Cardinal L. A. de Noailles, whose attitude to Jansenism brought him under suspicion. The result has been that Brother Lawrence and his writings have been somewhat neglected by Roman Catholics while much used in some other communions. Brother Lawrence taught that the soul should keep itself constantly in the divine presence and that formal prayer was but a continuation of this exercise.

See *The Practice of the Presence of God,* Eng. trans. by D. Attwater of selections of Brother Lawrence's prayers and letters (1926); P. Pourrat, *Christian Spirituality,* vol. 4, pp. 126 ff., 151 (1955).

(E. A. R.)

LAWRENCE, the name of a family of New England merchants and philanthropists. Of the six sons of Samuel and Susanna Parker Lawrence of Groton, Mass., five grew to manhood; four became successful merchants and one a successful lawyer. AMOS (1786–1852) went to Boston at the age of 21 and soon set up his own business. In 1808 his brother ABBOTT (1792–1855) joined him, and in 1814 they formed the firm of A. & A. Lawrence, which became one of the greatest American mercantile houses of the day. It did much for the establishment of the cotton textile industry in New England, selling the products of the developing cotton and woolen mills. Amos' health forced his retirement in 1831 and Abbott was thereafter head of the firm. Abbott promoted various New England railways, notably the Boston and Albany. The town of Lawrence, Mass., was named in his honour. He was a member of the U.S. house of representatives (1835–37, 1839–40), and was U.S. minister to Great Britain from 1849 to 1852. His greatest memorial is the Lawrence scientific school of Harvard university, which he established in 1847.

WILLIAM LAWRENCE (1783–1848) went to Boston in 1809, prospered as a commission merchant and in 1822 formed the firm of W. & S. Lawrence with his younger brother Samuel. The firm was the selling agent for a number of large textile mills. William played an important part in the establishment of the "Suffolk bank system," designed to place New England's currency on a sound basis (*see* BANKING).

LUTHER LAWRENCE (1778–1839) was educated at Harvard, practised law in Groton, Mass., became president of a bank in Lowell, Mass., and in 1838 was elected mayor of the latter city.

AMOS ADAMS LAWRENCE (1814–1886), the second son of Amos Lawrence, graduated from Harvard in 1835. He entered business as a commission merchant and formed the partnership of Mason & Lawrence in 1843. With Lawrence the principal partner, the firm was very successful and became the selling agent for a number of large textile mills.

The benefactions of Amos, Abbott and William to Groton academy led to changing its name to Lawrence academy in 1846. Amos Adams established Lawrence college in Appleton, Wis., in 1847. He also took a keen interest in the slavery question and contributed funds for the colonization of free Negroes in Liberia. He became treasurer of the New England Emigrant Aid company, which sent 1,300 settlers to Kansas where the city of Lawrence was named in his honour. When the American Civil War broke

out he raised a regiment of cavalry that became the 2nd Massachusetts regiment of cavalry. After the war, during the 1870s, he built Lawrence hall, Cambridge, Mass., for the Episcopal theological school, of which he was treasurer. (H. J. Sc.)

William Lawrence (1850–1941), U.S. Episcopalian bishop and son of Amos Adams Lawrence, was born in Boston on May 30, 1850. He studied at Harvard, Andover Theological seminary and the Episcopal Theological school at Cambridge. After serving as rector of Grace church, Lawrence, Mass., he became professor of homiletics (1884–93) and dean (1888–93) at the Episcopal Theological school. He was also preacher at Harvard university, 1888–91. On Oct. 5, 1893, Lawrence was consecrated bishop of Massachusetts, resigning in 1926. He died Nov. 6, 1941. Lawrence wrote *Life of Amos A. Lawrence* (1889); *Visions and Service* (1896); *Life of Roger Wolcott* (1902); *The American Cathedral* (1921); *Henry Cabot Lodge* (1925); *Memories of a Happy Life* (1926); and *Life of Phillips Brooks* (1930).

LAWRENCE, DAVID HERBERT (1885–1930), one of the most original and controversial English writers of the 20th century, was born on Sept. 11, 1885, at Eastwood, Nottinghamshire. He was the fourth child of a coal miner; his mother had been a teacher and had written poetry. In *Sons and Lovers,* Lawrence drew his parents as Walter and Gertrude Morel and himself as Paul; he also described his ten years' close relationship with "Miriam" (Jessie Chambers), the daughter of a local farmer. After winning a scholarship to Nottingham high school (1898), and a short time as a clerk, and as a pupil-teacher at Eastwood, at 18 he went to University college, Nottingham. In 1908 he left Eastwood for Croydon to teach at the Davidson Road school.

Lawrence had already begun writing, his first published work being a story in the *Nottinghamshire Guardian* (Dec. 1907; reprinted with introduction by P. B. Wadsworth, 1949). His first literary friend was Ford Madox Hueffer (Ford Madox Ford; *q.v.*), who placed his first novel, *The White Peacock* (1911), and published his work in the *English Review.* Hueffer did not like *The Trespasser* (1912), Lawrence's second novel, based on a visit to the Isle of Wight with a friend he calls "Helen"; but Edward Garnett (then reader to the publishers, Heinemann) did, and Garnett became for a time Lawrence's most helpful literary friend.

An epoch in Lawrence's life which was only to cease with his death began when he met Frieda Weekley in April 1912. She was the aristocratic German wife (née von Richthofen) of the professor who had taught Lawrence at Nottingham. Lawrence left with her for Germany in May 1912. So began a restless, nomadic, gypsying life, and a difficult but intensely intimate marriage relationship which was to form the underlying theme of much of Lawrence's later fiction. While abroad Lawrence was working on *The Rainbow* (publ. 1915; expurgated ed. New York, 1916). He returned with Frieda to England in June 1913; and while there met John Middleton Murry and Katherine Mansfield (*qq.v.*). After living for a time in Italy Lawrence and Frieda returned to England and were married in July 1914. Meanwhile *Sons and Lovers* (1913), his first mature novel, was not selling widely, but it made him well known. His first volume of short stories, *The Prussian Officer and Other Stories,* was published in 1914; his first volume of poems, *Love Poems and Others,* had been published in 1913.

The years of World War I were a dark period in Lawrence's life. Wandering restlessly about England, he dreamed of an ideal community, "Rananim," into which to escape from the horrors of the contemporary world, and intermittently urged his friends to join him in it, wherever it should be; unfortunately, these friends included many talented but egotistic people who disliked each other, as their later memoirs have shown. One of them at this time was Lady Ottoline Morrell, the wife of a member of parliament, who lived at Garsington manor, near Oxford. Flamboyant, stately and eccentric, with a beautiful home and considerable social power, she was a devoted and kindly patron of literature and the arts. Her striking personality emerges clearly in a collection of her writings, *Ottoline* (1963, ed. by R. Gathorne-Hardy). In 1915 Lawrence earnestly hoped that she would assist him in forming a new community. He met Bertrand Russell at Garsington; they planned a series of lectures together, and exchanged many letters, but soon quarreled. The "Breadalby" chapter of *Women in Love* (completed 1916; privately printed, New York, 1920) shows Lawrence's revulsion from the Garsington milieu. Meanwhile *The Rainbow,* which had already caused a rift between Lawrence and Edward Garnett, was officially banned as obscene. Lawrence, in despair with Lady Ottoline, turned to Murry; they collaborated in a short-lived magazine, *The Signature,* but the collaboration was not wholehearted, and Murry and Katherine Mansfield disliked *The Rainbow.* A planned emigration to Florida was postponed, partly because of Lawrence's health and partly because of difficulties over Frieda's passport; so in 1916 the Lawrences went to live in a cottage at Zennor, near St. Ives, Cornwall, and the Murrys came to live nearby. But there was conflict between the two couples, which may be reflected in *Women in Love,* in which "Gudrun" is based on Katherine Mansfield. After conscription was introduced (April 1916), Lawrence underwent several unpleasant experiences at the hands of the military authorities. His first "medical" and other wartime ordeals are vividly described in the "Nightmare" chapter of *Kangaroo* (1923). During 1917 an atmosphere of suspicion and hostility grew around the Lawrences in Cornwall; Lawrence was distrusted because he wrote and had a beard, and because his wife was German. Ordered by the police to leave in Oct. 1917, they spent the rest of the war in London and Derbyshire.

After the war Lawrence resumed his friendly relationship with Murry, who accepted an article of his for *The Athenaeum,* but the rejection of a second article led to another quarrel, and the two men did not meet for some years. Lawrence then thought of going to the United States, and in order to raise money from an American publisher wrote his brilliant, if idiosyncratic, *Studies in Classic American Literature* (1923). Meanwhile, Frieda left for Germany in Oct. 1919; Lawrence went to Italy, where he met Norman Douglas (*q.v.*) at Florence, and Douglas' friend Maurice Magnus, thus beginning a tragicomic relationship described in Lawrence's introduction to Magnus' *Memoirs of the Foreign Legion* (1924). The Lawrences later took a house near Taormina in Sicily. Lawrence's trip to Sardinia at this time led to his travel book *Sea and Sardinia* (1921). During 1920 his financial position improved; his work began to sell in the United States, and he found a London publisher (Martin Secker) who was willing to reissue *The Rainbow* and to bring out *Women in Love* (1921). One of the books he sold to Secker was *The Lost Girl* (1920). In the summer of 1920 the Lawrences went to stay with Frieda's mother in Germany, and there Lawrence wrote *Fantasia of the Unconscious* (1922), a treatise on his psychological theories; shortly afterward he completed his novel *Aaron's Rod* (1922).

Throughout 1921 Lawrence's desire to leave Europe was growing. Wandering about Italy, Germany and Austria, with Frieda or alone, he grew restless; and his disgust with Europe was accentuated by trouble over *Women in Love,* which had been attacked in the London gutter press as "a loathsome study of depravity." He therefore accepted an invitation from an American couple, Earl and Achsah Brewster, who were studying Buddhism in Ceylon, to take a bungalow there with Frieda. But, soon repelled by Buddhism and Ceylon, the Lawrences went on to Australia. The novel that resulted from this visit, *Kangaroo,* shows Lawrence momentarily weary of his mystic doctrines of sex and power, and the messianism of *Aaron's Rod,* and conscious of the consequences to himself and Frieda of their mode of life. In Aug. 1922 Lawrence at last decided to accept an invitation from Mabel Dodge, a rich American woman who had admired *Sea and Sardinia,* to join her at Taos, New Mexico.

In a singular work, *Lorenzo in Taos* (1932) (Lawrence was often called "Lorenzo" by his friends), Mrs. Dodge (Luhan) has described the difficult relationships between herself, Lawrence, Frieda and others settled there. In March 1923 Lawrence left for Mexico, where he became fascinated by Aztec civilization; retiring to a watering place on Lake Chapala, he began *The Plumed Serpent.* He left for New York in June, planning to return to Europe, but, homesick for Mexico, decided not to go; his indecision exasperated Frieda, and she went off to Europe alone. In

Dec. 1923 Lawrence arrived in London, and was met by Frieda and Murry. During their estrangement, Murry had adversely reviewed Lawrence's major novels; moreover, Lawrence had quarreled with Katherine Mansfield. After her death (Jan. 1923) Lawrence and Murry were reconciled; but Lawrence was not enthusiastic about Murry's new paper, *The Adelphi*, and did not like the friendship between Frieda and Murry; a comment on it is his story "The Border Line" (publ. 1924). Lawrence was sounding out his friends to find out which of them would return with him to Mexico to form the nucleus of a new society: Catherine Carswell, in *The Savage Pilgrimage*, has described the famous Café Royal dinner at which Lawrence made this appeal. In March 1924 the Lawrences, with their aristocratic friend Dorothy Brett, left London for Taos, where opposition between Mabel Dodge and Frieda was complicated by "Brett's" presence. During the winter of 1924–25 Lawrence was seriously ill, and for the rest of his life his health became increasingly bad.

Lawrence returned to Europe in Sept. 1925. In the same year his fine short novel *St. Mawr* was published (in a volume also containing "The Princess"), and his Mexican novel, *The Plumed Serpent*, appeared in 1926. While the Lawrences were living at Spotorno, near Genoa, the final breach occurred with Murry, because (according to Murry) he would not accept Lawrence's invitation to join the Lawrence circle there, which included Lawrence's sister, Frieda's daughter and the faithful "Brett." In May 1926 the Lawrences moved to Florence; Lawrence's interest in the ancient Etruscans bore fruit in his posthumously published *Etruscan Places* (1932). During 1926 Lawrence and Aldous Huxley (*q.v.*) became close friends. Lawrence's last years were chiefly spent in painting pictures and in writing and rewriting his last novel, *Lady Chatterley's Lover*, to discharge his accumulated bitterness about society and to assert his belief in the healing possibilities for civilization of a new relationship between men and women. Published in a limited edition in Florence (1928) and in Paris (1929), this appeared in an expurgated version in 1932. The full text was only published in 1959 in New York and in 1960 in London, when it was the subject of a sensational court case (*Regina* v. *Penguin*) which turned largely on the justification of the use in this novel of "tabooed" sex words.

Lawrence's health grew rapidly worse while he was working on *Lady Chatterley*, and his *Pansies* (1929), light verses thrown off during this period, shows his social mortification also. At this time he also composed the poignant story *The Man Who Died* (1931). The pirating of *Lady Chatterley* in the United States and the closing by the police of an exhibition of his paintings in London (1928) angered him, and he relieved his anger through more sarcastic verses: *Nettles* (1930) and *More Pansies*, included in *Last Poems* (1932). From May 1928, when he left Florence, until his death, he went from place to place in a desperate struggle for life. He worked till the end, completing *Apocalypse* (publ. 1931), a commentary on the Book of Revelation. He died on March 2, 1930, at a sanatorium in Vence, near Antibes.

Personality and Genius.—The fascination of Lawrence's personality is attested to by all who knew him, and it abundantly survives in his letters, his fiction, his poetry, his numerous prose writings, and in biographical accounts. Judgments on him range from Catherine Carswell's picture in *The Savage Pilgrimage* (1932) as charming, wise and sympathetic, to Murry's in *Son of Woman* (1931; reprinted with new introduction, 1954), tortured, sick and hate-possessed. The only certain conclusion is that he was a many-faceted and complex being, the understanding of whose thought, "message" and art cannot for long be separated from investigation of his own psychological and social problems. But above all he was an original genius who achieved at least a considerable realization of his power in imaginative terms.

Novelist.—As an imaginative writer, Lawrence is a remarkable compound of the naturalistic novelist and the poet, the realist and the mystic. But on the whole he ranks with Melville and Emily Brontë rather than with Balzac and Tolstoy; he communicates a vision, rather than creates an autonomous world of characters. His unmistakable qualities are a flamelike intensity, an elevation, an urgent movement; he transmits a feeling of inward sympathy with all he depicts, whether it belongs to the human world, or to the world of animal life, or of inanimate matter.

Lawrence's novels do not give fully harmonious expression to his genius. The greatest of them, and the most representative of his powers as a novelist, are *The Rainbow* and *Women in Love;* large canvases in which much of the detail is blurred or drawn hastily, but which as a whole have a sweeping imaginative effect. His subject here is the relations between men and women in marriage. In all his best work the depths of sexual relationship are sounded, its reality is illuminated, its meaning is restated with audacious courage. Lawrence's characters are not heroes of romance but "ordinary people"; the farm-people of *The Rainbow*, the rootless Bohemians of *Women in Love*, belong to a recognizable social world. But these novels lack realism in that they do not bring out the pressure of social forces which, even had the lovers ignored them, would have made themselves felt. Lawrence's "world" is intensely subjective; the world outside the lovers is excluded, or rejected with scorn. Although in his later novels the sexual theme is connected to other aspects of reality—in *Aaron's Rod*, to the communist upheaval in Italy after World War I; in *Kangaroo*, to an (imaginary) fascist movement in Australia; in *The Plumed Serpent*, to the struggle between Catholicism and the insurrectionary peasants of Mexico; in *Lady Chatterley's Lover*, to industrial conditions in the English midlands—yet the fiery intensity of *The Rainbow*, because of Lawrence's concentration on the sexual theme, is missing from these later works.

Lawrence's men characters are not as a rule fully defined. It is often hard to distinguish between a Will Brangwen and a Skrebensky (*The Rainbow*), a Rupert Birkin and a Gerald Crich (*Women in Love*), in their states of esoteric stress and turmoil. Don Cipriano of *The Plumed Serpent* seems to think and feel at times remarkably like the mysterious gamekeeper (Mellors) of *Lady Chatterley*, or the restless novelist-hero of *Kangaroo*. Lawrence's women are more distinct personalities, but they all have a noticeable family resemblance; the dominating will power of Lawrence's mother, the imaginative sympathy of "Miriam," the tenacious feminine resistance of Frieda, reappear in various guises. Lawrence's novels describe the continuous history of a relationship between a single pair of people; sometimes the fictional dress is transparent, as in "The Captain's Doll" (included, with "The Fox," in *The Ladybird*, 1923; U.S. title, *The Captain's Doll*). But generally in Lawrence's shorter fiction, his "tales," he achieves a greater impersonality and a more manifest creative power; stories as different as "England My England" (in the 1922 collection), "The Horse-Dealer's Daughter" (in the same collection) or "The Woman Who Rode Away" (the title story of the 1928 collection) testify to an imaginative range not always predictable from his novels.

Miscellaneous Writings.—Powerful and audacious as Lawrence's work in fiction is, it does not always create in the reader a sense of irresistible reality. Lawrence's experience and his sympathies were wide; but his writing shows a certain fixity of outlook, a narrow and obdurate concentration of vision. His later work sometimes shows a strain, a didactic harshness, an arbitrariness in the making of points or the development of situations. Some of this may be due to the lung disease which sapped his later years, and which may have contributed to the moods of anger, sarcasm or misanthropy recurring so frequently after 1920. But Lawrence's books as a whole show a remarkable breadth and generosity of interest. His work includes (besides fiction) poetry, drama, criticism, books of travel and translations. His marvelous descriptive gifts record memorably his reactions to places and people all over the world, in England, Italy, Mexico and Australia; and he gives a new form and importance to the journal of travel. In *Studies in Classic American Literature* he practises an equally unprecedented mode of criticism, studying the strange emergence of the new American "consciousness" and the American world vision. Even his excursions into metaphysics in works such as *The Crown* (1925), or *Fantasia of the Unconscious*, are full of his characteristic poetry, and lit by glints of his attractive humour. The mystery and wonder of *Twilight in Italy* (1916), the power and wit of the *Studies*, the occasional profundity of one of his

more neglected works, the "Study of Thomas Hardy" (in *Phoenix,* 1936), forbid us to relegate these works to a secondary place.

Poetry.—Lawrence's poetry deserves separate mention. In his early poems, except when he is writing in the dialect of his youthful environment, his touch is often unsure, he is too "literary," he is not fully the master of conventional forms. But by a remarkable triumph of development, he evolved a mode of writing which in its freedom and spontaneity allowed him to express what he called the "palpitating moment" of being and the "naked self." His poetry is often of great biographical interest, as in the series of poems *Look! We Have Come Through* (1917; new ed. with additions, 1958). But his most original contribution to the art of verse is *Birds, Beasts and Flowers* (1923; new ed. with prefatory notes to each section, 1930), in which he creates an unprecedented poetry of nature, based on his experiences of the Mediterranean scene and the southwestern United States.

Letters.—No account of Lawrence's work, however brief, can omit his unsurpassable letters. In their variety of tone, vivacity and range of interest, they convey a full and splendid picture of himself, his relation to his correspondents, and the exhilarations, depressions and prophetic broodings of his wandering life. They form perhaps the best introduction to his work as a whole.

Style.—Lawrence, though one of our greatest writers, is not always the most careful or exact. Emotionalism can blur his vision, and repetitiveness mar his style. Of this last mannerism he himself was fully conscious, and it is only fair to quote his own defense of it in a special preface which he wrote (Sept. 1919) for the American edition of *Women in Love:* "Fault is often found with the continued, slightly modified repetition. The only answer is that it is natural to the author; and that every natural crisis in emotion or passion or understanding comes from this pulsing frictional to-and-fro which works up to culmination." Lawrence's language in all his writings expresses the immediate feeling of life. Sometimes he falters, trying to seize some sensation or intuition too rapid and intangible to be caught; sometimes he overinsists, repeats himself, falls into jargon. But his cultivation of the "organic" style of composition, his refusal to isolate the reason from the passions and the nerves, can lead to great triumphs of symbolic art, which make the work of more deliberate artists seem contrived and cold; the scenes among the sheaves and the dunes in *The Rainbow,* the episode in *Women in Love* where Birkin shatters the image of the moon in water, are among these triumphs. Always he seeks to express, whether in novels, poems or essays, the wholeness of man; and whatever he evokes becomes rich with the feeling of the deepest impulses of life. In the modern world which he found turbid and confused, he worked through his art to discover form and coherence.

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(W. W. Ro.)

LAWRENCE, ERNEST ORLANDO (1901–1958), U.S. physicist, winner of the 1939 Nobel prize in physics for his invention of the cyclotron, was born on Aug. 8, 1901, in Canton, S.D. In 1925 he took his Ph.D. degree at Yale university, where he was a National Research fellow in physics, 1925–27. Appointed assistant professor of physics at Yale, he was associate professor at the University of California in 1928, becoming a full professor in 1930 and director (1936) of the Radiation laboratory, which at his death had a staff of over 5,000. An authority on nuclear, biological and medical physics, he was a pioneer in the development of the cyclotron, a device for accelerating nuclear particles to high speeds. The university's first 80-ton cyclotron (1933), its second 225-ton cyclotron (1938), the third cyclotron (1942) and various World War II cyclotrons used by the U.S. government were built under his supervision. For this achievement, in addition to his research on artificial radioactive elements, he was awarded the Nobel prize in physics in 1939. Lawrence also played an important role in the development of the atomic bomb. He died in Palo Alto, Calif., on Aug. 27, 1958. *See* ACCELERATORS, PARTICLE.

LAWRENCE, GERTRUDE (GERTRUD ALEXANDRA DAGMAR LAWRENCE KLASEN) (1898–1952), English entertainer and actress, one of the most popular in the first half of the 20th century, was born in London, on July 4, 1898, daughter of Alice (Banks) and Arthur Lawrence Klasen, a singer in variety and musicals under the name of Lawrence. She made her first stage appearance in Dec. 1910 in *Babes in the Wood* and toured in variety and musicals until 1916, when she was engaged for one of André Charlot's early London revues. Two years later she took over the lead in another Charlot revue when Beatrice Lillie was injured. With Miss Lillie and Jack Buchanan she was costarred in the first Charlot revue to reach New York (1924), and then starred in the Gershwin musical *Oh, Kay!* (1926). Her first straight role was in *Icebound* (London, 1928). Later she played in *Candle-Light, Private Lives* (written for her), *Tonight at 8:30* and *Susan and God,* among others. Perhaps her greatest triumph was as Liza Elliot in Moss Hart's musical play *Lady in the Dark* (1941). Her last appearance was as Anna in *The King and I* (1951). An early marriage to Francis Gordon-Howley, English director, ended in divorce. In 1940 she married Richard Aldrich, U.S. producer. She died in New York on Sept. 6, 1952.

(B. HT.)

LAWRENCE, SIR HENRY MONTGOMERY (1806–1857), English administrator in India, prominent for his work in settling the Punjab, was born at Matura, in Ceylon, on June 28, 1806. Trained at Addiscombe military college, he joined the Bengal artillery in 1823 and served at the taking of Arakan in the first Burmese War (1824–26), contracting lifelong malaria. He later qualified in Urdu, Hindi and Persian, and joined the northwestern provinces survey department in 1833. Lawrence received a political appointment in the Punjab in 1839, with charge of Ferozepur, so acquiring his great knowledge of Sikh politics. After the British disaster at Kabul in 1841, he was sent to Peshawar to use his acknowledged influence to hold the Sikhs to their alliance, and in 1842 he led a Sikh contingent to Kabul with Gen. Sir George Pollock. After settling the lapsed territory of Kaithal in 1843, he was appointed resident in Nepal. But on the outbreak of the first Sikh War, he was summoned to Ferozeshah and in 1846 was appointed agent, and later resident, at Lahore. As adviser to the Sikh council of regency he quickly secured a reduced and reorganized Sikh army, suppressed mutinies in Kangra and Kashmir and deposed the wazir Lal Singh who was implicated in the rebellion.

After the treaty of Bhairowal he wielded wider power, reorganizing district administration, appointing judicial officers and preparing a Sikh code and forbidding suttee, infanticide and forced labour. The main fault of his brilliant team of subordinates was to make the British part in Sikh rule too apparent.

Lawrence took a short home leave in 1848 and was knighted, returning to India when the second Sikh War broke out. His advice and impetuous action annoyed the new governor general, Lord Dalhousie, who, after annexing the Punjab, created a board of administration in which Sir Henry shared power with John (later Lord) Lawrence (*q.v.*) and C. G. Mansel. Henry used his par-

ticular gift to reconcile Sikh society to the change, to win the best from his district officials and to organize the internal security and effective defense of the province. Policy conflicts with his brother and Lord Dalhousie led him to seek a transfer in 1852 and he was posted to Rajputana.

Lawrence was summoned to deal with the discontents of Oudh in Jan. 1857, where annexation, precipitate land reforms and a mutinous army had created a grave situation. He took effective measures to delay the mutiny at Lucknow and to prepare the residency for its famous six-month siege (*see* INDIAN MUTINY). He was wounded on July 2 and died on July 4, 1857. The Lawrence Military asylums or schools for the children of European troops at Sanawar, Mount Abu, Murree and Ootacamund serve as his memorial in India.

See J. J. McLeod Innes, *Sir Henry Lawrence* (1898); J. L. Morison, *Lawrence of Lucknow, 1806–1857* (1934). (J. B. HA.)

LAWRENCE, JAMES (1781–1813), U.S. naval hero of the War of 1812 (*q.v.*), was born in Burlington, N.J., Oct. 1, 1781. He entered the navy as a midshipman in 1798 and saw extensive action against the Barbary pirates. He was first lieutenant to Stephen Decatur when the U.S.S. "Philadelphia," which had been captured by the Tripolitans, was destroyed in Tripoli harbour by Decatur-led forces in 1804. During the War of 1812 Lawrence commanded the U.S.S. "Hornet" in the capture of H.M.S. "Peacock." Shortly thereafter he was promoted to captain of the frigate "Chesapeake." On June 1, 1813, the "Chesapeake" accepted H.M.S. "Shannon's" challenge to a sea fight off Boston. The "Chesapeake" was decisively defeated in less than an hour and Lawrence was mortally wounded. His dying words, "Don't give up the ship," became one of the U.S. navy's most cherished traditions. (R. M. LA.)

LAWRENCE, JOHN LAIRD MAIR LAWRENCE, 1ST BARON (1811–1879), English viceroy and governor general of India, famous for his administration of the Punjab, was born at Richmond, Yorkshire, on March 4, 1811. From Haileybury college he went to Calcutta in 1830 and thence to Delhi where he served as assistant judge, magistrate and collector. At Delhi he learned to know the nobility and at Panipat, his next posting, to know the peasantry. Then, as collector of Etawah, he took part in Robert Bird's great settlement of the northwestern provinces, upon which his brother Sir Henry Lawrence (*q.v.*) was also engaged.

After sick leave in England (1840–42) he returned to India, attracted attention by organizing transport and supplies during the first Sikh War and became commissioner of the newly annexed Jullundur doab in 1846. He subdued the hill chiefs, prepared a revenue settlement, established courts and police posts, curbed female infanticide and suttee and trained a body of officials. He was twice deputized for his brother Henry as resident at Lahore. He showed himself roughly impatient of the Sikh council and eager to take financial reform into British hands. After the second Sikh War, as a member of the Punjab board of administration under Henry, he made a first summary revenue settlement and record of rights, lowering the demand and taking it in cash, abolished internal duties, introduced a uniform currency and a postal system and pressed forward with road and canal construction. To finance such work he looked to economy and the curtailment of the chiefs' estates and so clashed with Henry. Lord Dalhousie dissolved the board in Feb. 1853, appointing John head of the executive in all its branches as chief commissioner. The Punjab administration became a powerful engine of modernization, though the constant contact with the people and the care for custom shown in the law codes softened the impact.

When the mutiny began in 1857, Lawrence disarmed or dispersed the sepoy battalions in the Punjab, enlarged his irregular forces and poured troops and supplies down to Delhi. He held the Punjab steady and Dost Mohammed Khan at Kabul observed the treaty negotiated by Lawrence in Jan. 1857. He was prompt to punish, but denounced indiscriminate vengeance, urging an amnesty for the less guilty sepoys. In recognition of his immense services he was created a baronet and a knight grand cross of the Bath and given a life pension of £2,000. On his return to England in 1859 he was appointed to the council of India. After Lord Elgin's death, Lawrence became viceroy and governor general in 1864. He sought British security in a divided sepoy army and in the weakening of princely forces. As in the Punjab, he sought to centralize and unify authority, keeping financial control in the viceroy's hands, refusing an executive council to his lieutenant governors, even attacking the existence of the Bengal legislative council. He resisted the indianization of the higher civil service.

In Bengal, Oudh and the Punjab he fought to protect the interests of the peasant proprietors against the landowners. He tried by strict economy, by lowering the salt tax and by taxing the trading and professional classes to lighten the burden on the peasantry and, by railway and canal construction, to provide for their prosperity. He worked hard at public health, prison reform and primary education. He pressed for government construction of the railways and the raising of public loans for productive irrigation works. He resolutely rejected entanglement in the affairs of Afghanistan, Arabia and the Persian gulf, recognizing whichever chief secured power. He later denounced Lord Lytton's military intervention in Afghanistan in 1878.

Lawrence returned to England in 1869 and was created Baron Lawrence of the Punjab and of Grately, Hampshire. He died in London on June 27, 1879.

See R. Bosworth Smith, *Life of Lord Lawrence,* 5th ed. (1885); Dharm Pal, *Administration of Sir John Lawrence in India (1864–1869)* (1952). (J. B. HA.)

LAWRENCE, STRINGER (1697–1775), English soldier and founder of the Indian army, was born at Hereford on March 6, 1697. After about 20 years in the army, having risen from ensign to captain and seeing service at Gibraltar, in Flanders and at Culloden, he entered the service of the East India company. He took charge of their troops at Madras in 1748 and so drilled and disciplined his mixed force of Europeans, topasses (Christian Indo-Portuguese) and sepoys that by June he was able to score an early success over the French at Cuddalore. Lawrence stormed Devikottai in 1749, where Robert (afterward Lord) Clive also distinguished himself, and in 1750 headed the unsuccessful mission to Nasir Jang. He resigned that year over a pay claim but, promoted lieutenant colonel with his pay doubled, returned to Madras in 1752. He immediately relieved Trichinopoly (Tiruchirapalli), then with Clive's vigorous assistance destroyed the French force under Jacques Law, won another victory at Bahur and for 17 months in 1753 and 1754 successfully defended Trichinopoly in campaigns which totally ruined Joseph Dupleix's plans. Lawrence gallantly defended Madras against Thomas Lally in 1758 and in 1761 was made commander in chief of all company forces, with a seat on the council and a royal commission as major general in the East Indies. He finally left India in 1766 and died in London on Jan. 10, 1775.

Lawrence's experience in the royal service enabled him to transform the guards and watchmen of the company into an effective fighting force, and with inferior numbers he consistently defeated the French because his troops and officers were better disciplined and better trained. His judgment was sound, his courage and leadership in the field notable; he may rightly be regarded as the founder of the Indian army.

See J. Biddulph, *Stringer Lawrence* (1901). (J. B. HA.)

LAWRENCE, SIR THOMAS (1769–1830), the most successful English portrait painter of his day, was born at Bristol, on May 4, 1769. He was the son of an innkeeper, who in 1773 took over the "Black Bear" at Devizes, and there he won a reputation as a prodigy who made profile portraits in pencil. Later he began to work in pastel and in 1782, when his family moved to Bath, he set up professionally. He had very little regular education or artistic training. He began to practise in oils only when he moved to London in 1786. There he studied at the Royal Academy schools for a short time and was given encouragement by Sir Joshua Reynolds. He was handsome, charming and exceptionally gifted. His early success was phenomenal and in 1789, when he was 20, he was summoned to Windsor to paint Queen Charlotte. This portrait, in the National gallery, is one of the masterpieces of the time. He was elected associate of the Royal

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"THE COUNTESS OF BLESSINGTON" BY SIR THOMAS LAWRENCE. IN THE WALLACE COLLECTION, LONDON

Academy in 1791, academician in 1794, and on the death of Reynolds in 1792 succeeded him as painter in ordinary to the king and painter to the Dilettanti society.

Lawrence was a skilled draftsman. He abandoned pastel painting early but continued to make portraits in pencil and chalks. These were separate commissions and were very rarely studies for paintings, as it was his usual practice to make a careful drawing of the head and sometimes the whole composition on the canvas itself, and to paint over it. There are highly interesting references to his working methods in Joseph Farington's *Diary*.

After the death of Reynolds, Lawrence quickly became the fashionable portrait painter of the day. He presented his sitters in a dramatic, sometimes theatrical, manner which at its best produced romantic portraiture of a high order. At the same time he was anxious to succeed as a history painter in the grand manner but his most ambitious attempt, "Satan" (1797, Royal Academy), was a failure. His work was always uneven in quality and, partly through pressure of debts, he accepted far more commissions than he could execute. There is, however, a clear development in his style and with "Sir Francis Baring and His Associates" (1807, Northbrook collection) he produced a group in the great academic tradition. After the death of John Hoppner in 1810 he was patronized by the prince regent, who knighted him in 1815 and sent him in 1818 to the continent to paint the allied military leaders and heads of state. These portraits are now in the Waterloo chamber at Windsor castle. By them Lawrence was recognized as the first portrait painter of Europe and one of them, "Pope Pius VII," is his masterpiece and a work of European distinction. On his return to England in 1820 he was elected president of the Royal Academy in succession to Benjamin West. He died in London on Jan. 7, 1830.

Lawrence was a distinguished connoisseur. His collection of old-master drawings was one of the finest ever made, and he was instrumental in securing the Elgin marbles for the nation and in the founding of the National gallery. It should be recorded that he was consistently generous to artists younger than himself.

See also PAINTING: *Great Britain: Portraitists.*

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LAWRENCE, THOMAS EDWARD (1888–1935), British scholar, soldier and author, known as LAWRENCE OF ARABIA, was one of the most famous heroes of World War I. He was born in Wales on Aug. 15, 1888, at Tremadoc, Caernarvonshire. His father, Sir Thomas Robert Chapman, 7th baronet (he succeeded to the title in 1914), who came from Westmeath in Ireland, had eloped with his daughters' governess, Sara Maden. Subsequently the couple lived together as Mr. and Mrs. Lawrence and had five sons, of whom Thomas Edward was the second. The family settled in 1896 at Oxford, where Lawrence was educated at the high school and at Jesus college. His first visit to the middle east was in 1909 when he went to Syria and Palestine to study the architecture of the crusader castles—the subject of the thesis he submitted in 1910 when he took first-class honours in modern history. Later in 1910 he obtained, through the intervention of the noted archaeologist D. G. Hogarth, a demyship (traveling endowment) from Magdalen college which enabled him to join the expedition excavating the site of Carchemish on the Euphrates. He worked there, on and off, from 1911 to 1914, first under Hogarth and later under Leonard Woolley. Early in 1914 Lawrence and Woolley explored northern Sinai with Capt. S. F. Newcombe in an expedition ostensibly sponsored by the Palestine Exploration fund, but in fact designed to gain information for the war office about the Turkish side of the Turco-Egyptian border.

World War I.—On the outbreak of war Lawrence was still working on a report of the Sinai expedition. Later he joined the map department of the war office. After Britain and France declared war on Turkey he was sent (Dec. 1914) to Egypt, where he was attached to the military intelligence staff concerned with Arab affairs (later to become the Arab bureau). In Oct. 1916 Lawrence accompanied Ronald Storrs on a mission to the Hejaz, where Husain ibn Ali, amir of Mecca, had in June 1916 proclaimed a revolt against the Turks. Storrs had consultations with Husain's son Abdullah and then returned to Egypt, but Lawrence got permission to visit Abdullah's brother, Faisal, who was commanding an Arab force southwest of Medina. When Lawrence arrived back in Cairo (Nov. 1916) he was ordered to rejoin Faisal's army as political and liaison officer.

Lawrence succeeded in injecting new life into the Arab revolt: first, his energy was instrumental in securing considerable assistance from the British army in Egypt; secondly, his clear thinking perceived that the key to the strategic situation was the Damascus-Medina railway. If the railway remained open, it was obvious that the Turks would soon send sufficient reinforcements to Medina to crush the revolt. Accordingly Faisal's force moved round to the north of Medina and began to raid the railway, Lawrence making his first attack in March 1917. Meanwhile, Faisal's base was moved to the Red sea port of Wejh, which the British had captured on Jan. 24. From there Lawrence set out with Auda Abu Taya, sheikh of the Huwaitat, on May 9, 1917, in an expedition to Aqaba which they captured with a force of Huwaitat tribesmen on July 6. For this Lawrence was promoted major and made a companion of the Bath. With Aqaba as its new base, Faisal's army was better placed to co-operate with the British army advancing into southern Palestine from Egypt.

Lawrence suggested to Gen. Sir Edmund Allenby in Oct. 1917 that the Arabs should assist the British on the Jerusalem front by cutting the railway line from Dar'a in the Yarmuk valley. To this Allenby agreed, but Lawrence failed to accomplish this task and had to be content with blowing up a bridge between Dar'a and Amman. Shortly afterward, Lawrence (as usual, in Arab costume) was captured and maltreated by the Turks at Dar'a (without their realizing who their prisoner was), but he managed to escape. Lawrence was present at the victory parade in Jerusalem in December and took part in the successful action at Tafila, south of the Dead sea, in Jan. 1918, when Faisal was ordered to

move up his forces from Aqaba. For this Lawrence gained the D.S.O. and was promoted lieutenant colonel. His last action in the war was to take part in the capture of Damascus (Oct. 1, 1918). He left the city the day after Allenby and Faisal arrived, was at Cairo on Oct. 8 and was back in England on Nov. 11.

During the two years after Nov. 1916, Faisal, Lawrence and the Arabs had made a valuable contribution to the Allied cause. The Arabs never fought a major battle, but their mosquito raids detained altogether perhaps 25,000–30,000 Turkish troops who would otherwise have been available to oppose the British in Palestine. It must be recognized that the leader of the Arab army was the amir Faisal, not Lawrence, but there can be no doubt that Lawrence was its moving spirit and that, without him, the Arabs would not have made nearly so great a contribution to the war effort. (*See* also GUERRILLA WARFARE.)

Postwar Career.—In 1919 Lawrence attended the Paris peace conference as an official member of the British delegation. There he bitterly opposed the somewhat tortuous diplomacy which severed Syria and Lebanon from the remaining Arab countries and placed them under a French mandate. In 1921–22 he acted as adviser on Arab affairs to the colonial office, but in 1922, disgusted with the peace settlement, he abandoned government service. Meanwhile Lawrence and his exploits had become known to a much wider public, chiefly through a remarkably successful series of film lectures delivered during 1919 by an American press correspondent, Lowell Thomas. Lawrence had also begun to write his own account of his wartime experiences. To help him in this task, he was elected to a research fellowship at All Souls, Oxford, in Nov. 1919.

In Aug. 1922 Lawrence enlisted in the ranks of the Royal Air Force as John Hume Ross. In Jan. 1923 he was discharged after a London newspaper had revealed what he was doing. He next enlisted (March 1923) as T. E. Shaw (which name he assumed legally in 1927) in the Royal Tank Corps and was posted to Dorset where he acquired the cottage at Clouds Hill which thenceforward was his home. He was transferred to the Royal Air Force in 1925 and remained in the service until March 1935. On May 13, 1935, he had a motorcycling accident near Clouds Hill and died from his injuries six days later.

Works.—Lawrence's celebrated account of his wartime experiences, *Seven Pillars of Wisdom*, was begun in Paris in 1919. He lost the manuscript of most of his original draft (according to Lawrence, eight of ten books) later the same year when changing trains at Reading. A second draft was written by the spring of 1920. This was destroyed by Lawrence in 1922 when he completed a third draft, of which he had eight copies roughly printed by the *Oxford Times*. These were circulated among Lawrence's friends, including George Bernard Shaw and his wife who were said by Lawrence to have been responsible for many improvements and "all the present semi-colons." The revised text, about 280,000 words, was privately printed and published in 1926 as the *Seven Pillars of Wisdom*. Of this edition, which was most lavishly produced and enjoyed a fantastic *succès de snobisme*, 128 copies of 30 guineas each were sold to subscribers in England, and 22 in the United States. To cover the costs of this limited edition, Lawrence produced an abridgement, *Revolt in the Desert*, which was published in March 1927. A proper trade edition of *Seven Pillars of Wisdom* was published in 1935 after Lawrence's death: it has never since gone out of print.

Lawrence also wrote *The Mint*, a description of his service in the Royal Air Force, but at his request it was not published until 1955. Editions of *The Wilderness of Zin*, the report by Lawrence and Woolley on the Sinai expedition of 1914, and *Crusader Castles* (Lawrence's thesis) were published in 1936.

Character and Achievements.—Lawrence's exploits in World War I were exaggerated by his admirers. He was not the uncrowned king of Arabia. His activities were limited to a small corner of the Arabian peninsula and in that he was not in supreme command. Nevertheless, it is true that the successful operations of the Arab revolt were largely inspired by his genius. In the romantic glamour of his Arabian career, his versatility has not been sufficiently recognized. He not only made an outstanding man of action, but he was enough of a classical scholar to translate Homer's *Odyssey* into English verse. At the same time, while in the R.A.F., he was deeply interested in flying and was closely connected with the production of a new type of seagoing motorboat. While he was probably pre-eminently a scholar by nature, his combination of man of action, classical scholar and mechanic was rare indeed.

But the unflagging and world-wide interest in T. E. Lawrence has been due rather to his renunciation of rank, fame and money and to his enlistment in the ranks, than to his extraordinary intellectual gifts. The problem of why he gave up a brilliant career in order to enlist continues to excite speculation. A favourite explanation has been that his outlook was warped by knowledge of his illegitimate birth, which made him both aggressive, from a feeling of inferiority, and at the same time ashamed and therefore anxious to avoid publicity, and to remain unobserved. There is no doubt that he did appear to be torn by these diametrically opposed impulses, at times behaving with outrageous arrogance, at times seeming genuinely retiring and desirous of avoiding public attention. His intimates rejected the theory that his behaviour was due to a feeling of shame concerning his illegitimate birth.

Before he became involved in the Arab revolt, Lawrence showed many peculiarities of character: his puckish humour, his rudeness to those he disliked or despised, and at the same time his indifference to money, his devotion to his friends and his lack of common worldly ambition. This reduces the force of the argument that his capture by the Turks in Nov. 1917 and the homosexual humiliations which he suffered at their hands had a major effect on his character. The theory that Lawrence himself was a homosexual appears to be unfounded.

Any analysis of Lawrence's psychology must recognize first of all that he was the possessor of an extraordinarily clear, versatile and penetrating intellect. This intellectual genius enabled him to see more clearly than most men; it also inspired him with an intellectual pride and a contempt for those less gifted, which often took the form of rudeness and arrogance which it is difficult to excuse. The same penetrating intellect, however, enabled him also to appreciate the baseness and stupidity of most men, the vulgarity of the ambitious careerist and the futility of worldly titles and honours. Thus he renounced them because his mind was clear enough to see their vanity.

But with all this, Lawrence was in his way an idealist, or perhaps even a perfectionist, where he himself was concerned. Something rooted in his being drove him to inflict punishment on himself, whether in expiation of his own shortcomings or with a view to the perfecting of his own character. It was perhaps for this reason that he sometimes forced himself to endure physical hardships that appeared to have no practical purpose. The same peculiarity may have accounted for his enlistment in the ranks. Aware of his impatience with, and contempt of, men of a lower intellectual level than himself, he inflicted upon himself the discipline of constant association with the lower ranks of the army and the air force, in a way of life deprived of all privacy. Yet neither side of his character achieved a complete victory, and even until his death, his mind seemed to remain a battlefield of conflicting tendencies.

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LAWRENCE, a city of eastern Kansas, U.S., 45 mi. W. of Kansas City; the seat of Douglas county. Lawrence is a New England town on the western prairies, founded on the south bank of the Kaw river in 1854 by a few wagonloads of antislavery radi-

cals. The first citizens were attracted to the site by the flat-topped hill near which the trail to California passed. They had come to the Kansas plains under the auspices of the New England Emigrant Aid company to outvote proslavery settlers and thus make Kansas a free state. Lawrence was named for Amos A. Lawrence, New England textile manufacturer. In the struggle over slavery the hamlet became a symbol of the free-state cause. Its partisans, called Jayhawkers, opposed the proslavery Border Ruffians. It was a noted station on the underground railroad by which slaves escaped from slave states into free territory. The town was sacked in 1856 by proslavery militia under former Democratic Sen. David Rice Atchison and in 1863 by the Confederate guerrilla W. C. Quantrill, who massacred 150 men and boys. In 1866 the University of Kansas was opened on the hill overlooking Lawrence, and in 1884 Haskell institute was established for American Indians. Strong traditions of education and culture have marked the town's development; there are a few small factories, but Lawrence is essentially a college town.

For comparative population figures *see* table in KANSAS: *Population.* (JA. M.; X.)

LAWRENCE, a city of Massachusetts, U.S., on the Merrimack River, 30 mi. from its mouth, about 25 mi. NNW of Boston; the seat of Essex County. Pop. (1960) city 70,933; Lawrence-Haverhill standard metropolitan statistical area (two cities and seven towns in Essex County, Mass., and three towns in Rockingham County, N.H.) 197,880. (For comparative population figures *see* table in MASSACHUSETTS: *Population.*) In the early 19th century Daniel Saunders, realizing the industrial potential of the site of Bodwell's Falls on the Merrimack, formed the Essex Company and in 1848 began selling power to manufacturers. The town boomed and incorporated as the city of Lawrence in 1853, becoming one of the greatest textile centres in the U.S. In the latter part of the 20th century it continued to be of importance as a textile centre. Other manufactures are electrical machinery, leather and leather products, textile-mill products, paper products, and apparel and other finished goods. (L. G. BA.)

LAWRENCIUM, a synthetic chemical element having the symbol Lr (formerly Lw) and atomic number 103, is the 14th and last member of the actinide series in the periodic system (*see* PERIODIC LAW; TRANSURANIUM ELEMENTS). It was first synthesized and identified, on an atom-by-atom basis, in 1961 at the Radiation Laboratory, University of California at Berkeley by a research group consisting of A. Ghiorso, T. Sikkeland, A. E. Larsh, and R. M. Latimer. The isotope identified was produced by the bombardment of californium (atomic number 98) with boron ions (atomic number 5) accelerated in a heavy-ion linear accelerator. This isotope decays by the emission of alpha particles with a half-life of 8 sec., may have a mass number of 258 or 259, and represents the first element to be discovered solely by nuclear means: no chemical techniques were used in its identification. The evidence consisted of the variation of yield of the 8-sec. activity with energy of the bombarding boron projectiles and the comparative yield or absence of the 8-sec. activity when californium and other transuranium elements were bombarded with various heavy ion projectiles. The discoverers proposed that the new element be named lawrencium in honour of Ernest O. Lawrence, inventor of the cyclotron and founder of the Radiation Laboratory, where this and so many other transuranium elements were discovered.

The chemical properties of lawrencium had not been investigated by the late 1960s, even by the tracer method, due to the short half-lives of all of its known isotopes, and it seemed certain that it would not be possible to work with weighable quantities of the element. It was predicted that lawrencium should exist exclusively in the III oxidation state in solution and in solid compounds. Its tripositive ion should undergo ion-exchange adsorption and elution reactions in the regular pattern of the other actinide elements, and it should behave in such systems in the manner expected for an actinide element homologous to the rare-earth element lutecium.

Isotopes of Lawrencium

Isotope	Half-life	Type* and energy of radiation (Mev)
Lr^{256}	45 sec.	α EC
$Lr^{258, 259}$	8 sec.	α 8.6

*EC=electron capture; α=alpha particle.

See G. T. Seaborg, *Man-Made Transuranium Elements* (1963). (G. T. SG.)

LAW REPORTS, under the common-law system, are the principal repository of the rules, including the construction and interpretation of statutes, developed during judicial decision. A report is "the production of an adequate record of a judicial decision on a point of law, in a case heard in open court, for subsequent citation as a precedent" (Clarence G. Moran, *The Heralds of the Law,* p. 13, Stevens & Sons, Ltd., London, 1948). In the U.S. the decisions of most appellate courts are reported and published unless they deal with settled propositions of law. Trial courts ordinarily do not write opinions, and their findings and conclusions are not ordinarily reported, but where trial courts prepare opinions in a substantial number of cases, as in New York, Pennsylvania, and the federal district courts, such opinions are reported and published. By the 1960s published U.S. decisions numbered about 4,000,000, with about 40,000 new cases being added a year.

The earliest English court reports were the *Year Books* from about 1282 to 1537. From 1537 to 1865 hundreds of series of English reports were published under the name of the reporters. During both periods reporting was a disorganized private enterprise. The reporters were volunteers who made and circulated notes of court proceedings and decisions. They have been called "the great casuists and reporters of cases—certain grave and sad men" (Moran, *op.cit.,* pp. 1–15). Their work was very uneven, and reports were often overlapping and irreconcilable. The greatest of them was Sir Edward Coke (*q.v.*), whose reports covered from 1572 to 1616. The modern report form was standardized by James Burrow (covering from 1757 to 71). In 1865 the *Law Reports* were established, and since this series has been regarded as semiofficial, although parallel series are published. A law reporter must be a barrister-at-law, whose initial report signifies that he has followed the hearing and can vouch for the accuracy of the report. Although all decisions of the highest appellate court, the house of lords, are reported, court of appeal decisions are reported only if they reveal a new principle of law or a new application and comparatively few decisions of courts of first resort are reported.

In the U.S. also the first reports, state and federal, were privately published under the reporter's name, although appointment of an official reporter was an early development. One of the early U.S. Supreme Court reporters sued his successor for copyright infringement, and the court declared the principle that "no reporter has or can have any copyright in the written opinions delivered by this court" (*Wheaton* v. *Peters,* 33 U.S. [8 Pet.] 591, 668 [1834]). Today reported opinions are almost invariably written by the court, though they are sometimes read or summarized orally from the bench, and are officially published. Late in the 19th century a private publishing enterprise began unofficial publication of all state and federal reports in the National Reporter System.

The report of a decision contains the title of the case, a statement of the facts giving rise to the litigation and its history. It then reproduces the opinion of the court, concludes with the judgment of the court; *e.g.,* affirming or reversing the judgment of the court below. The report of a modern decision is usually preceded by a headnote, *i.e.,* an analytical summary of the opinion, stating the points decided. Whether these are prepared by the official reporter or an unofficial editor, they are not authoritative, except in a very few jurisdictions where they are prepared by the court, or under its supervision, and are said to be controlling if there is a discrepancy between the headnote and the opinion.

The great mass of reported decisions gives rise to need for research tools to aid the search for relevant precedents. Fortunately these exist in abundance and variety. Legal materials are perhaps the best indexed of any body of library materials, and ingenious special reference tools have been devised. A basic de-

vice is the digest, an analytical arrangement of editorially prepared headnote paragraphs so that the lawyer may readily locate all published decisions dealing with a particular problem. Citators provide information as to how each case has been treated for purposes of precedent, and descriptive word indexes allow a factual approach when the analytical problem is difficult. (*See* further INFORMATION PROCESSING: *Indexes and Indexing.*)

Formerly, a serious problem was the time lag between decision and publication. Today "slip opinions" are often available on the day of decision; private enterprises report decisions of important courts, or any decision in a selected field, such as taxation, within days, and frequent paper-bound "advance sheets" appear.

Citation of Reports.—The layman may be puzzled by conventions used for citation, but will soon find that a substantial amount of information is contained in the brief references. There are variations, but a modern American citation is: *Bartholomew* v. *Universe Tankships, Inc.*, 263 F. 2d 437 (2d Cir. 1959). This consists of the title (names of the parties), in which *v.* is the abbreviation of the Latin *versus* ("against"); the series in which the case is reported (here the Federal Reporter, second series, privately published); the volume and page (the volume number always precedes, and the page number always follows, identification of the series of reports); identification of the court (here the United States court of appeals for the second circuit); and the date of decision.

See also COURT REPORTING.

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(B. CE.)

LAWS, CONFLICT OF: *see* CONFLICT OF LAWS.

LAWS OF WAR. Attempts to extend the moderating influence of law into the sphere of war began early in the history of civilization. The ancient monuments of Roman law, like those of earlier societies, contained rules designed to limit recourse to war and to control in some degree the conduct of hostilities. From these beginnings began a slow development, interrupted by periods of unmitigated ferocity, toward a fairly elaborate body of usage and doctrine. This body defined legal occasions for war, prescribed forms of declaration and purported to outlaw certain of the more hideous instruments and modes of warfare.

"Just War."—From St. Augustine in the 4th century to Hugo Grotius in the 17th, the apostles of universal law concentrated upon the problem of war. Rules to govern the peaceful relations of princes and republics defined those rights, the violation of which justified a declaration of war. Rulers were exhorted to take up arms only for a just cause. A just war was one fought to vindicate a violated or threatened right and conducted by means and methods not condemned by the law of nations. Only the just belligerent acquired rights by war.

The just-war doctrine, however, was of little avail. At best its rules were ambiguous exhortations, not law. Material force could hardly be mustered in its support, for sovereign entities were by definition independent of any human judgment, and to judge them was itself dangerously near giving just cause for war. The developing doctrine of neutral rights and duties tended to require that both belligerents be treated alike in order to preserve neutral rights. The 19th-century view, therefore, placed them on the same legal footing. Regardless of cause, it was not contrary to the law of nations to go to war.

By the time of Emmerich de Vattel, the writers had become somewhat less preoccupied with war and more disposed to expound and develop rules for the peaceful, day-to-day relations of governments. The rights and duties of states in regard to territory and persons, freedom of the seas, the usages of diplomatic intercourse, arbitration and mediation got more attention. Plans were sketched to banish international violence from Europe and the world. Slowly, in the literature of the law of nations (or international law, as it began to be called after the 18th century) peace came to be regarded as the normal relation between states.

Codification.—The rules of war were not yet forced into the background, however, either by the bankruptcy of the just-war doctrine or by increasing interest in an international law of peace. In the so-called law-making conferences of the last half of the 19th and first decade of the 20th century, rules of war assumed the priority which they had once had in the literature. The declaration of Paris, 1856, outlawed privateering and established clearer rules on blockade and the carriage of neutral and enemy goods by sea. The years 1863 and 1864 witnessed the series of meetings at Geneva, Switz., that established the Red Cross and drew up the first code for the care of sick and wounded soldiers irrespective of the side on which they fought. In 1868 the declaration of St. Petersburg prohibited the use of explosive bullets. The Brussels congress of 1874 produced an elaborate declaration which, though it was never itself brought into force, provided material for the later Hague regulations on land warfare. Finally, peace conferences convening at The Hague in 1899 and 1907 concentrated upon rules of war for land and sea.

National Codes.—This also was the period when governments began issuing manuals on the laws of war for the use of commanders. In this they followed the lead given by the United States when it promulgated in 1863 Francis Lieber's *Instructions for the Government of the Armies of the United States in the Field*. Besides serving as a model for manuals in other countries, the U.S. *Instructions* was the starting point for the Brussels draft, which in turn was used in the Hague regulations. Later manuals incorporated the international conventions and declarations and probably did more than any other formulation to promote their observance.

Just-War Revival.—This progressive codification was arrested and, many thought, proved useless by World War I. In the peace conferences of 1919–20, in the interwar period, and again in 1944–45, the main effort in international legislation took another direction. It reinstated the old doctrine that war was illegal except in approved circumstances and could win no legal advantages for a belligerent without approved cause. Between the covenant of the League of Nations and the United Nations charter, the Paris pact of 1928 and the Argentine antiwar pact of 1933 kept the same theme to the fore. In this revival the doctrine of just war was no longer remotely academic; it had strong official support and was to be implemented by appropriate machinery of enforcement. Governments were induced by a popular revulsion from war to enter into agreements not to resort to force in their international relations except in self-defense or in execution of collective obligations, and, further, to establish and support international organization for keeping the peace. The charters of the international military tribunals which sat in Nürnberg and Tokyo after World War II declared aggressive war an international crime, and defendants found guilty on this charge were sentenced to death. The principles recognized in the charter and judgment of the Nürnberg tribunal were endorsed by the general assembly of the United Nations and reformulated by its international law commission.

These developments in doctrine and practice were accompanied by a diminution of interest in rules purporting not to outlaw war but merely to govern the way in which it should be launched and conducted. No better illustration of this indifference could be found than the failure to establish any international code regulating war in the air. A draft completed at The Hague in 1923 failed to obtain a single ratification. Governments were under no pressure. Such public interest as there was in the advancement of international institutions was focused upon machinery to prevent war.

Atomic War.—Yet, despite all the development of international organization before and after 1945, there continued to be a universal fear that war would come again, and in a form more devastating than any previous conflict. The invention and refinement of atomic weapons revived the debate on the utility of laws intended to curb military practice. Now that the secret of such destructive instruments was known, some thought it foolish to hope that a great power hard pressed in war would not procure and use them. With this prospect of wholesale destruction and slaughter, it might well seem vain to go on elaborating codes on the treat-

ment of sick, wounded and captive soldiers, on the immunity of open cities and noncombatants, on neutral rights of trade and belligerent rights of capture and confiscation; it would be better, perhaps, to concentrate on the effort to abolish war. On the other hand, many students of history were convinced that the laws of war had in the past exercised a moderating influence, a conviction reinforced by the judgments of the international military tribunals. It was argued therefore that nations should not forego the least possibility of tempering the cruelty and destructiveness of methods and weapons that threatened unimaginable sufferings. This line of thought stimulated a fresh attempt at control.

Therefore, while the International Committee of the Red Cross prepared the way for elaborate revision of the convention regulating the treatment of casualties and captives and for the extension of equivalent protection to noncombatant populations, the governments, working under the auspices of the United Nations, explored ways of preventing the use of atomic weapons. The efforts of the Red Cross led to the Geneva conventions of 1929 and 1949, but the drive against the new instruments of war ran into formidable obstacles. Such progress as had been achieved in the direction of an operative law of war had taken place along three main lines. The rules formulated bore upon: (1) the commencement of war and its immediate effects; (2) the conduct of hostilities; and (3) relations between belligerents and neutrals.

Declaration of War.—The middle ages continued the ancient practice of notification, and an interval of three days was usually allowed before hostilities began. Thereafter, though the most respected writers still insisted upon a formal declaration, this custom was less and less observed.

For the lawyers, declaration had the advantage of fixing a date when the grave implications of war for persons, property and trade could be regarded as coming into effect. For all who objected to war on principle, it had the virtue of offering a last chance of peaceful settlement. But for the military commander it meant sacrificing the high value of surprise.

The lawyers and humanitarians won at least a temporary victory at the second Hague peace conference in 1907. Convention III, adopted there, stipulated "previous and explicit warning, in the form either of a reasoned declaration of war or of an ultimatum with a conditional declaration." The record of observance in World War I was remarkably good—56 declarations as against 3 omissions. Germany launched its attack upon Poland in 1939 and upon the U.S.S.R in 1941 without warning, while Japan opened hostilities on Dec. 7, 1941, as at Port Arthur in 1904, with a surprise bombardment. A government undeterred by the interwar accumulation of texts forbidding aggression was not likely to sacrifice the profits of unheralded assault. It was still less likely, after Hiroshima and Nagasaki, that a government which had decided to launch an atomic war would give warning. The new weapon had enlarged the premium on surprise. If the practice of declaration was to be firmly reestablished, it would probably have to await effective surrender of this type of warfare.

Enemy Persons and Property.—In the middle ages the ancient practice of imprisoning enemy subjects and confiscating their property on the outbreak of war was set aside for the benefit of merchants. On condition of reciprocity, they were left free and their goods were not taken. Gradually this immunity, granted to encourage trade, was extended to persons not engaged in commerce. By the 18th century so many treaties had been concluded securing to enemy aliens the liberty to settle their affairs and depart within a reasonable time, or to remain and carry on business on condition of good behaviour, that this liberty came to be asserted by jurists as a general right.

When World War I broke out in 1914, a new factor had entered the calculation of interest. This was the spread of universal military service and the institution of the citizen army. It was easy to justify a limiting of the right of departure on the ground that a belligerent could not be expected to contribute to the fighting manpower of his enemy. So, although Great Britain and some other belligerents permitted departure within a week after the declaration of war, Germany and Austria-Hungary detained enemy aliens of the male sex.

This was the first step in a change back toward the ancient practice. The next step was the policy of internment resorted to in increasing measure by most belligerents as the war proceeded, though in some cases this action was taken as much to protect resident enemies from mob violence as to prevent hostile activity on their part.

At the beginning of World War II, France, in fear of "fifth columns," adopted a policy of mass internment. Great Britain allowed departure up to Sept. 9, and for those enemy aliens who chose to remain, instituted a system of careful selection. Those found by special tribunals to be genuinely friendly were left at liberty. Doubtful persons were restricted in their movements to a specified distance from their place of residence and required to report at intervals to the police. Those classified as real enemies were interned. In the U.S., a presidential proclamation of Nov. 14, 1941, forbade the departure of any alien not in possession of a valid permit or exempted by special regulation from this requirement. This was followed, after Dec. 7, by further proclamations subjecting aliens of enemy nationalities to summary apprehension if deemed dangerous to the public peace or safety by the attorney general or secretary of war, and establishing a selective system much like that adopted in Great Britain.[1]

Selective Internment.—The danger of espionage, sabotage and subversion, already demonstrated in the course of World War I and greatly increased by skilled nazi tactics of penetration, was responsible for part of the change. On the other hand, there were in France, England and the U.S. large numbers of refugees from totalitarian regimes who were ready to put valuable skills at the disposal of their host countries. Considerations of humanity and expediency alike demanded for these a kind of treatment which would assimilate them with nationals. Thus a selective pattern of practice came to be approved, in which the principal criterion was frankly the security of the host country, tempered by a general obligation to avoid cruelty and by a trend toward treatment for civilians of enemy nationality not less favourable than that due to prisoners of war. On charges of violating these principles in respect both of civilians and of war-prisoners, German and Japanese leaders were tried and punished by the international courts for the trial of war criminals at Nürnberg and Tokyo.

Geneva Convention, 1949.—These were the broad principles upon which the Geneva conference of 1949, for the first time officially formulating a multilateral agreement for the protection of civilians on lines long established for captive troops, drafted its *Convention Relative to the Protection of Civilian Persons in Time of War.* Article 35 of that instrument did indeed rule that enemy nationals were to be allowed to depart like other aliens. But the proviso—"unless their departure is contrary to the national interests of the state"—left the belligerent free to make his selection. Again, though internment was not to be resorted to as a matter of course, it was permitted in cases where the national security "makes it absolutely necessary" (article 42). Finally, enemy aliens were to be given the opportunity, subject to considerations of security, to find paid employment. If security controls prevented them from earning a living, they and their dependents were to be supported by the host state. They must in all cases be allowed to receive allowances from home and from relief societies (article 39).

Enemy Property.—The belligerents in World War I adopted a practice which led to substantially the same effects as the ancient action of general confiscation. Though no general confiscation was proclaimed by the victorious powers, enemy property was placed in the hands of custodians and subsequently liquidated under provisions of the peace treaties. Against the resulting fund were charged established claims of Allied nationals against enemy subjects or governments. The defeated powers, on the other hand, were compelled to restore the property of Allied nationals and at the same time to undertake repayment to their nationals of what they lost through the seizure of their assets in Allied territories.

This procedure was repeated in World War II (treaties of peace,

[1] *See* U.S. Code, title 50, sec. 22-24, and U.S. Statutes at Large, vol. 55, pt. 2, pp. 1696-1709 (1941-42) and vol. 56, pt. 2, pp. 1933-34 and 1970-72 (1942).

Italy, articles 78–79; Bulgaria, articles 23–25; Hungary, articles 26–29; Rumania, articles 24–27). While the victors were unlikely to display any zeal in enforcing a clause of repayment to enemy nationals, it did at least give these persons the basis of a legal claim against their governments. The absence of this clause in the peace treaty with Japan (1951) was only a minor example of the way in which that settlement, in the hope of rehabilitating the country as a strong ally, lightened the exactions normally imposed on a loser.

The treaties of peace after both world wars took care not to disturb any steps taken in the course of hostilities by the victor governments in relation to enemy property. They confirmed a practice which recognized full power in the belligerents to deal with such property as they deemed expedient. But the treaties after World War II also made it clear that this power had not been pushed to the limit or used without discrimination. While the custodians seized and administered enemy property and enterprises where the national interest was thought to demand such action, they left resident enemy nationals, whose friendship was established, in full possession and use of their properties (treaties of peace, Italy, article 79, 6[c]; Bulgaria, 25, 5[c]; Hungary, 29, 5[c]; Rumania, 27, 5[c]; Japan, 14[a]2).

Merchant Ships.—Throughout the greater part of the long period when the practice of most states left the property of enemy nationals on land exempt from seizure, it was the custom to confiscate at once any merchant vessels under the enemy flag lying in port at the outbreak of hostilities. Governments even imposed embargos in anticipation of war in order to catch more ships. It was only in the Crimean War (1853–56) that the practice of allowing days of grace for loading and departure was introduced. This concession to the general interest in the ocean-carrying trade was repeated in subsequent major wars up to and including that between Russia and Japan (1904–05), although Russia then reduced the period of grace to 48 hours.

At the Hague conference of 1907, an attempt was launched to make an obligatory rule of what was still regarded in some of the greatest maritime countries as a matter of grace. The opposition of France, Great Britain, and Japan, supported by Argentina, forced a compromise which presaged subsequent retrogression from the liberal practice of the preceding 50 years. Whether as auxiliary warships or as part of the supply systems of naval formations, merchant vessels were recovering much of their earlier importance among the elements of war potential. Great Britain in particular insisted that seizure or permission to depart must be left for decision by governments according to circumstances at the time. The text of Hague Convention VI, article 1, stating that "it is desirable" that merchant ships should be allowed to depart freely, and that "the same rule should apply in the case of a ship which has left its last port of departure before the commencement of war and entered a port belonging to the enemy while still ignorant that hostilities had broken out," left the matter entirely dependent upon the belligerent's notion of his national interest. Articles 2 and 3, on the other hand, categorically prohibited the confiscation of enemy merchant ships unable to leave port within the period of grace or which were "encountered on the high seas while still ignorant of the outbreak of hostilities." Such vessels might, however, be detained for restoration at the end of the war, or requisitioned with compensation. All three articles were severely tested in World War I.

Some belligerents immediately granted days of grace. Others, like Great Britain, made permission to depart conditional on assurance of the same treatment for their shipping. When the U.S. entered the war in 1917, there were nearly 100 enemy merchantmen in U.S. ports under circumstances which exemption could not relieve. They had not been trapped by the outbreak of war; on the contrary, they had taken refuge two years earlier from the imminent danger of capture by British and French warships. Days of grace for departure would have been irrelevant. They were requisitioned and paid for by the U.S.

Strictly speaking, no part of Hague Convention VI was binding in World War I, even upon those belligerents who, unlike the U.S., had ratified it. The fact that some of the powers engaged had not ratified the convention made it inapplicable, as provided in article 6 of its text. But the judicial committee of the privy council, acting on appeals from British prize courts, held that it was in force, by implied agreement, between Great Britain and Germany (The *Blonde, Hercules,* and *Prosper,* III British and Colonial Prize Cases, pp. 1034–48.) Ships not allowed to depart on the outbreak of war were therefore not confiscated. But because international practice in the matter had been inconsistent, the British government denounced the convention in 1925.

In September 1939, a German motor vessel, the "Pomona," was seized in the port of London immediately after Great Britain's entry into World War II. The prize court held that there was no rule of customary international law to prevent confiscation, and that since Hague Convention VI had been denounced, the crown was entitled to take the ship without compensation (Hersh Lauterpacht, *Annual Digest and Reports of Public International Law Cases,* case no. 159, [1941–42]). In the "Naptha Shipper," the German prize court of Hamburg on March 19, 1943, rendered a similar decision condemning a British vessel seized without days of grace in the port of Hamburg (H. Lauterpacht, *Annual Digest,* case no. 175 [1943–45]). It is significant that the German court cited the British precedent. Reciprocity counted heavily there, as in most matters touching enemy interests.

On June 6, 1941, when more shipping had become an urgent need, a statute was enacted in the U.S. providing for the requisition of foreign vessels lying idle in the country's ports. The measure struck future friends and foes alike. Thus, six months before the Japanese attack on Pearl Harbor, 26 Italian and 3 German vessels were taken over, along with others from Denmark, Finland and Estonia and the French "Normandie," all subject to payment to the owners of the value assessed by the U.S. maritime commission.

As in relation to enemy nationals, belligerents had clearly reasserted the ancient right of dealing as they saw fit with enemy merchant shipping that had freely entered their ports. No convention controlled the chief maritime states on this matter, and some of them denied the existence of any customary rule.

Conduct of Hostilities.—Grotius, writing early in the 17th century, observed that the law of nations had long condemned the use of poisoned weapons and the poisoning of wells. Nor was it permitted to hire assassins to kill an enemy. There was an informal convention among princes against a danger which could not be met by military skill or strength, and which brought war uncomfortably home to those responsible for it.

A later motive for limiting instruments and modes of warfare was that of avoiding "unnecessary suffering." This meant suffering for which no adequate counterweight was gained in the form of military advantage. Thus, explosive bullets which caused wounds of great severity and were more often fatal than ordinary bullets, were prohibited by the St. Petersburg declaration of 1868. Ordinary bullets were sufficient to secure the essential military objective; *i.e.,* to put the target out of action. The same consideration appeared again in the Hague declarations of 1899 condemning expanding bullets and projectiles designed exclusively for the "diffusion of asphyxiating or deleterious gases." The Hague declarations of 1899 and 1907 against the discharge of explosives from balloons "or by other new methods of a similar nature," like that of 1899 against gas projectiles, were designed to protect innocent civilians from implication in a form of attack which as yet seemed quite unlikely to produce valuable military results. The growing protest against indiscriminate destruction and slaughter found further expression in the conventions of 1899 (II) and 1907 (IX) prohibiting the bombardment of undefended ports, towns, villages, dwellings or buildings, as well as in convention VIII of 1907 forbidding the laying of floating mines unless they became harmless within an hour and anchored mines which did not become harmless on breaking away.

Weapon Violations, 1914–18.—More or less substantiated charges of violating all these declarations and conventions were hurled across all fronts in World War I. It was established that explosive or expanding bullets were used from time to time; there could be little doubt that the use of mines was not kept within Hague limits; gas was employed on several fronts; and undefended

places were bombarded from land, sea and air. Most belligerents defended their action as retaliation against prior offenses by the enemy. Possibly there was less use of explosive and expanding bullets than there would have been in the absence of the agreements cited; but this was of minor consequence. The improvement of old weapons and the invention and development of new ones offered the chance of military results not imagined at The Hague, and war rapidly developed into a struggle engaging not merely armed forces but more and more nearly the whole strength of nations. With national existences believed at stake, and mass hatred at fever heat, the paper obstacles to the employment of every available means of destruction were frail indeed.

Submarines.—Before 1914 it had long been regarded as established international custom that no merchant vessel, enemy or neutral, should be sunk unless provision existed for the safety of crew and passengers. To surface warships this was not too serious a restriction, since personnel not otherwise provided for could usually be taken on board. The submarine, on the other hand, was said to be too vulnerable to wait while crew and passengers gained a place of safety, and it could offer no room for refuge. With such arguments, supported by doctrines of reprisal for enemy violations of the laws of maritime warfare, the German government asserted for its submarines the right to sink ships on sight, regardless of the plight of those on board. The result was perhaps the worst horror of a war which spurned so many civilized restraints.

After Germany's defeat this problem was attacked at the Washington disarmament conference of 1922. A treaty was drafted declaring the rule that "a merchant vessel must not be destroyed until the crew and passengers have first been placed in safety." If submarines were unable to satisfy this requirement in any given case, they must "desist from attack and from seizure." This agreement did not come into force, but its terms were incorporated in the London treaty of 1930 for the limitation and reduction of naval armaments and again in the London protocol of Nov. 6, 1936. Forty-two countries, including all the chief belligerents in World War II, became parties to the London protocol. It failed to withstand the unprecedented strains of that struggle.

Air Warfare.—The Washington Disarmament conference, which initiated the unsuccessful attempt to curb the submarine, also turned its attention to war in the air. In the articles aimed at controlling air bombardment, the Hague air rules of 1923, the code adopted followed with some modifications the Hague convention of 1907 on bombardment by naval forces. The chief object was to secure immunity for civil populations, churches, hospitals and historic and artistic monuments by confining air attack to "military objectives" (article 24). No power proved willing to take the initiative in so restricting the air arm, and the Hague rules remained unratified. Whether they would have been any more effective than the protocol on submarines is most doubtful. Much reliance had come to be placed by all the belligerents on the destructive potentialities of aircraft. Many of the great munitions factories which constituted a principal target formed part of dense urban conglomerations. There were different degrees of accuracy in the several modes of air bombardment, but all involved high civil casualties and the destruction of nonmilitary property. After 1945, when atomic bombs were first used, the trend in air warfare was toward lower rather than higher selectivity of targets.

Gas.—One self-denying ordinance of the nations in the matter of weapons was to some extent effective. The victors emerged from World War I with a horror of gas. It was rightly thought that this mode of warfare was only in the earliest stage of development, and that the clumsy experiments of 1914–18 might well be followed by improvements devastating to both armed forces and civilians. Article 171 of the treaty of Versailles prohibited "the use of asphyxiating, poisonous or other gases and all analogous liquids, materials or devices." A similar prohibition appeared in the treaties of St. Germain (1919), Neuilly (1919) and Trianon (1920), in the Treaty of Washington, 1922, and in a protocol of 1925 in which more than 40 states participated. Italy violated this convention in the war against Ethiopia in 1935–36. This illegal action contributed to winning the war because Ethiopia had no means either of defense or of retaliation against the use of poison gas.

It was known that the Great Powers between 1939 and 1945 were prepared to place at the disposal of their armies improved mechanisms of projection and gases more deadly than any used in the previous conflict. This knowledge probably counted at least as much as the solemn prewar agreements in dissuading all belligerents from recourse to this weapon. Any government contemplating a gas attack had to reckon with retaliation of incalculable effect. The same was true of the dreaded bacteriological warfare.

The experience with gas and bacteriological weapons encouraged some hope, even after the checks suffered by the Atomic Energy commission of the United Nations, that if general war again broke out, atomic weapons would not be used. The likelihood of highly destructive retaliation might prove a sufficient deterrent.

Military Occupation.—Until the 19th century, a belligerent who succeeded in occupying enemy territory was regarded as at least temporarily sovereign there. Even before acquiring such territory by conquest and annexation or by cession in a treaty of peace, he was conceded the right to impose oaths of allegiance upon the inhabitants, to levy troops there and to use public and private property as he saw fit. The more humane principles which won increasing recognition from 1840 on were codified in articles 42–56 of the 1907 Hague regulations respecting the laws and customs of war on land. That text placed strong emphasis on the positive duty of the occupying power to ensure public order, to maintain, "unless absolutely prevented," the laws in force, and especially to respect the lives and private property of the inhabitants, their family honour and rights, and their religious beliefs and practices. No oath of allegiance was to be exacted nor was military information to be demanded of the population. The costs of administration were to be defrayed so far as possible out of normal taxes. Seizure or destruction of property dedicated to religion, charity, education, arts and sciences, or of historic monuments and works of art and science, was forbidden. No general penalty was to be inflicted for acts of individuals for which the population could not be regarded as responsible.

Much of this text could be summed up as a commandment to preserve the conditions obtaining before occupation. Concessions to the brutal facts of war appeared only by way of exception. Thus the collection of money contributions over and above taxes was permitted "only for the needs of the army or of the administration of the territory . . ." Requisitions of property and services were not to be made "except for the needs of the army of occupation." These exceptions, however (coupled with the phrases—"as far as possible," and "unless absolutely prevented"—qualifying other obligations of the occupant) left a wide discretion. In World Wars I and II, over and above the advantage taken of this discretion, the letter and the spirit of the Hague regulations were repeatedly violated. The international military tribunals at Nürnberg and Tokyo found defendants guilty of atrocities in occupied territory. Yet in both conflicts the regulations, reproduced as they were in the manuals issued by the belligerents, gave spokesmen of the inhabitants a code to appeal to, and the appeal was not always in vain. Many commanders made a faithful effort to maintain a regime of occupation as favourable as that aimed at in the texts. The Geneva convention of 1949 relative to the protection of civilian persons in time of war established a more elaborate code to govern relations between an occupying power and the inhabitants. By express prohibition of many practices adopted by German armies of occupation between 1939 and 1945, and by special authority given to "protecting powers," it sought to prevent recurrence of such atrocities as mass extermination, deportation and prison camp brutality.

The Hague regulations on occupation were designed primarily for periods of military control of enemy territory while hostilities were still in progress. They were less appropriate for the regime established by a victor under an armistice or treaty of peace and intended to secure fulfilment of the terms imposed. In any event, there was nothing to prevent setting them aside by armistice or treaty accepted by the loser. Though the main principles codified at The Hague might be regarded as applicable by analogy, the

victors in 1919 assumed powers over the Rhineland and in 1945 over all Germany greater than could be justified under the text of 1907. It was particularly obvious in 1945 that no obligation to retain the nazi system of law was appropriate, and after the "unconditional surrender" of Germany, the four Allies by a declaration of June 5, 1945, "assumed supreme authority with respect to Germany," but without effecting "the annexation of Germany."

Treatment of Wounded and Prisoners.—Of all humane restraints upon military action by land and sea the most effective were those touching the treatment of wounded and captured members of the enemy forces. As late as the 17th century, the practice of nations left the fate of those taken or disabled in battle to the discretion of the belligerents. The first inroad on this liberty began in the growing revulsion against the slaughter or mutilation of the wounded, and by the 18th century treaties stipulating humane care had become numerous. Methods were too primitive and casual, however, to cope with the agonies of the wounded. In 1863 a conference was convoked at Geneva to draw up the plan of organization and action which was to become known under the name Red Cross.

The first Geneva convention on the treatment of the wounded was concluded in 1864. Accepted by almost all states, it was amended and improved in 1906, 1929 and 1949. The Hague conferences of 1899 and 1907 adapted its provisions to naval warfare, and a Geneva conference of 1929 extended them to war in the air. The text of 1949 reaffirmed in greater detail the principles of its predecessors and ruled them applicable also to civil war. It stipulated humane and equal treatment of all sick and wounded without discrimination of sex, race, nationality, religion or political opinions. Military hospitals and ambulances were declared immune from attack. Medical personnel and chaplains must be especially protected, left free to pursue their duties and returned as soon as possible to their own side. Red Cross and other authorized voluntary aid societies were entitled to the same immunities and privileges as official medical personnel.

From solicitude for the wounded, it was a short step to concern with the fate of those who fell uninjured into enemy hands. The early liberty to kill or make slaves of prisoners gave way in the 17th century to exchange and ransom. A hundred years later treaties began to regulate the conditions of their confinement. The Hague conferences of 1899 and 1907 elaborated a code which was expanded and improved at Geneva in 1929 and 1949. Like the conventions on the wounded, this series of agreements embraced most countries of the world. It called for full information about prisoners taken, and it ruled that they must be housed in sanitary quarters, provided with sufficient and wholesome food, given medical attention, paid on an agreed scale graduated according to rank, and allowed to send and receive letters and to receive parcels. Elaborate regulations were included to prohibit the employment of prisoners in excessive or dangerous work or in tasks of a military character, to establish rates of remuneration, and to ensure healthful working conditions.

The international military courts set up after World War II found many instances in which these conventions had been violated. It is nonetheless true that partly by their direct influence upon governments and partly by facilitating the labours of the International Committee of the Red Cross and the corresponding national societies, they substantially mitigated the cruelties of war. (*See* PRISONERS OF WAR.)

Neutrality.—Profound changes in belligerent-neutral relations occurred in the period 1914–1945. The concept of neutrality prevailing in 1914 had been long in developing. In the first quarter of the 19th century it was still thought possible for a government to retain the legal position of a neutral and yet, in compliance with a prewar treaty, assist one belligerent and not the other with supplies of food and munitions, money loans, special facilities of passage and sojourn, even troops and warships. A consensus was developing, however, that only the prior obligation could justify such partiality. By the end of the century the consensus excluded aid even under treaty. The resulting position was set forth in Hague conventions V and XIII of 1907, which defined the rights and duties of neutral powers and persons in war on land and sea.

The neutral was no longer free, as he had been up to the middle of the 19th century, to allow passage to belligerent forces. Warships of either side might still pass through territorial waters, but troops entering neutral territory must be interned. No troops, warships, ammunition or war material of any kind might be supplied to a belligerent by a neutral government. With one exception, however, there was no obligation to prevent private individuals or groups from supplying arms and munitions. The exception, supported by the verdict in the famous Alabama claims arbitration between the U.S. and Great Britain (1872) required states to prohibit the fitting out of men-of-war for belligerents.

Belligerents, for their part, were forbidden to use neutral territory, ports or territorial waters as a base of operations. They must perform no act of war within neutral boundaries. The liberty of belligerent men-of-war to take on fuel and other supplies or merely to remain in neutral ports was curtailed.

Neutral governments were bound to use the means at their disposal to prevent violation of these rules, and steps taken for this purpose were not to be considered unfriendly acts.

In World Wars I and II belligerents made frequent use of neutral land, water and air for military passage and as bases of operations. Ships were sent to the bottom or captured in neutral waters, and prizes brought in for shelter from recapture.

As for the neutrals, the U.S. between 1939 and 1941 led the way in a return to the ancient liberty of assistance to a belligerent deemed to have resorted to war in violation of legal obligation. "All aid short of war" to the victims of aggression and their allies was a sharp reversal of that earlier U.S. policy which had been the chief factor in building up neutrality as a status of passive impartiality excluding governmental help to either side. As belligerents multiplied their power and extended their operations around the globe, that status took on the quality of an obsolete abstraction. In the period of international organization that began in 1944, the argument was heard, as it had been in 1920, that neutrality was legally incompatible with membership in an association to prevent war. (*See* NEUTRALITY.)

Contraband.—From ancient times belligerents were conceded extensive rights of interference with neutral commerce on the high seas. Their warships were permitted to visit and search merchant vessels, and to seize any contraband goods found on board. Where such goods made up a considerable part of the cargo, the vessel itself might be brought in for trial and possible condemnation in a prize court. Acquiescence in such interference was the price paid by neutral governments, somewhat unwillingly and with frequent haggling, for freedom from any obligation to prevent their nationals from supplying belligerents. Proclamations issued by the belligerents enumerated the things that would be taken in this way.

Many treaties were concluded to limit these lists of contraband. It was easy to agree that weapons and munitions should be exposed to seizure; but the distinction between contraband and noncontraband was not clear concerning goods innocent in their existing form but easily turned to warlike use. Great Britain, with naval strength sufficient to enable it to protect its own vital supplies and at the same time to cut off those of an enemy, usually pressed for expansion of the contraband list. It was that country, seconded in the 19th century by the U.S., that won recognition for conditional contraband—goods such as food which, though not otherwise subject to seizure, became so if on their way not simply to a port of the enemy but directly to his forces.

Another Anglo-American extension of belligerent rights was developed under the heading of continuous voyage. This was the doctrine that goods might be condemned not only, as before, if captured on their way to an enemy port, but also if bound for a neutral port to be transhipped there and sent on to an enemy.

Each successive war brought its disputes about contraband. When the Hague conference of 1907 drafted its unratified convention to establish an international prize court, it was decided that a special conference would be needed to settle these differences, and the London Naval conference of 1909 was convened for that purpose. Britain itself refused to ratify the resulting declaration and it never came into force. It nevertheless acquired consider-

able authority and was applied with qualifications in the early months of World War I.

The declaration had proposed three lists. The first enumerated the weapons and military equipment that might be seized as absolute contraband. The second was made up of articles (conditional contraband) which might be appropriated if destined for enemy government or forces. It included not only food, clothing, money and vehicles, but balloons and flying machines. Finally came a list of things that must not be taken as contraband. This included raw cotton, rubber and ores.

Between 1914 and 1918, however, advancing technology and changing conceptions of the nature and scope of war completely altered the declared lists. Within the first two years following the outbreak of hostilities, the distinction between absolute and conditional contraband lost all practical significance. As nations were mobilized for the conflict, any commodity serving the supreme purpose became contraband; and all kinds of supplies consigned to neutrals but intended eventually to reach an enemy, or to replace goods delivered to an enemy, were seized and confiscated. (*See* CONTRABAND.)

Blockade.—At first merely the maritime part of siege operations, blockade was expanded through successive wars into the commercial blockade, by which 19th century belligerents claimed the right to stop all supplies, contraband or not, directed to any point in an entire enemy coast line. The expansion went on in the face of repeated protests against "paper" or "cabinet" blockades unsustained by adequate naval force. In deference to this resistance, the declaration of Paris (1856) laid down the rule that no blockade was binding unless maintained "by forces sufficient to prevent access to the enemy coast line." (*See* BLOCKADE.)

Subsequent practice refused to be limited to the literal meaning of this clause. In the U.S. Civil War, ships were condemned as lawful prize for breaking through a line guarded by an average of one man-of-war for every 6 mi. The fact that many vessels passed undetected was not held to make these seizures illegal. The declaration of London (1909) repeated the rule laid down at Paris in 1856. But submarines and aircraft made it impracticable to station warships for any length of time in narrowly defined areas. The institution of blockade merged with the newly extended concept of contraband, and belligerents in World War I used their wide-ranging fleets to stop all sea commerce with their enemies.

The declaration of London had condemned any extension of blockade by the doctrine of continuous voyage. Article 19 declared that "whatever may be the ulterior destination of a vessel or of her cargo, she cannot be captured for breach of blockade if, at the moment, she is on her way to a non-blockaded port." So limited, blockades, strictly speaking, could not serve the needs of the Allied and associated powers in the war of 1914–18. The forces maintaining the blockade could not touch shipping bound for neutral ports. But if all supplies useful in an enemy's war effort and intended to reach that enemy directly or indirectly might be defined as contraband, there was no need to stretch the liberties conceded to belligerents under the rubric of blockade. The British government nevertheless argued that blockade also must continue advancing with the times. If it would be made effective by extending it to neutral ports, the extension should be recognized as legal.

Germany's unrestricted use of the submarine was cited as justification for mounting interference with neutral trade. The legality of retaliatory measures which fell at least as heavily on neutrals as on the offending enemy was of course contested; but the necessities of powerful belligerents prevailed over juristic argument.

The liberties thus asserted by belligerents in World War I were consolidated in World War II. The one effective protection of the neutral shipper was the "navicert." Beginning in 1916, certificates were issued by representatives in neutral countries which had the effect of permitting approved vessels and cargoes to pass through the Allied naval cordon. The scope and the use of this device were greatly expanded between 1939 and 1945. (*See* ECONOMIC WARFARE.) Though it was a modern form of the safe-conduct occasionally given, after the 17th century, to approved shippers, its elaboration and wide, organized use emphasized more sharply than any previous practice the inescapable fact that when great maritime powers were at war, neutral commerce on the seas became a matter of their grace and favour. *See* GENEVA CONVENTIONS; HAGUE CONFERENCES; INTERNATIONAL LAW, PUBLIC; MILITARY GOVERNMENT; PRIZE COURTS AND PRIZE LAW; WAR; WAR CRIMES; *see* also references under "Laws of War" in the Index.

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LAWSON, ANDREW COWPER (1861–1952), U.S. geologist who headed the commission appointed to investigate the disastrous California earthquake of 1906, was born at Anstruther, Scot., on July 25, 1861. When he was six his family moved to Ontario. He was educated at Toronto and Johns Hopkins universities. As member of the Canadian geological survey (1883–90) he investigated the Pre-Cambrian rocks of southwestern Ontario, reaching conclusions which, though revolutionary, soon gained general acceptance. From 1890 until he retired in 1928, he taught at the University of California. There he organized instruction in mineralogy and petrography, developed a geology field course, and became a powerful influence throughout academic and professional circles. He founded and for 35 years edited the *Bulletin of the Department of Geology*. The report of his commission's investigation of the 1906 California earthquake marked an epoch of study in that field. Lawson's fundamental researches on isostasy and diverse geological problems, particularly in the west, resulted in many other significant publications. He died at San Leandro, Calif., on June 16, 1952. (F. M. FL.)

LAWSON, HENRY (1867–1922), Australian writer of short stories and balladlike verse which show a realism and sympathy with the underprivileged based on his own experiences. Born on June 17, 1867, near Grenfell, New South Wales, he was the son of a Norwegian sailor turned goldminer called Larsen who changed his name when registering his son's birth. The family moved to Eurunderee and he went to school there and at Mudgee. Deafness hampered him, and his life at home was a constant struggle against poverty and the unhappiness caused by family quarrels. He left school at 14 and helped his father, who was working as a builder. In about 1884 he moved to Sydney, where, in the *Bulletin*, his first verses and first short story were published (1887 and 1888). He worked on the *Boomerang* in Brisbane for six months in 1890 and for the Sydney *Worker* in 1892. His varied experiences in these years included housepainting, work at a sawmill and as a telegraph linesman, teaching at a Maori school in New Zealand and a period of wandering as a "swagman" in the bush, all of which gave him the material for his vivid, realistic writing, which by its blend of pathos and irony captured the spirit of one aspect of Australian life. A visit to England in 1900 had an unsettling effect. He separated from his wife (whom he had married in 1896), and his later years were increasingly wretched and unhappy, though material hardships were alleviated by a small allowance from his publishers and a state pension. He died at Abbotsford, near Sydney, Sept. 22, 1922.

Lawson's principal works were *In the Days When the World Was Wide and Other Verses* (1896); *While the Billy Boils* (1896); *On the Track and Over the Sliprails* (1900); *Joe Wilson and His Mates* (1901); *Children of the Bush* (1902); *Triangles of Life and Other Stories* (1913). His collected prose works appeared in 1940; collected poetical works in 1947.

See G. Mackaness, *Annotated Bibliography of Henry Lawson* (1951); *Henry Lawson, by His Mates* (1931). (C. M. H. C.)

LAWSON, VICTOR FREMONT (1850–1925), U.S. editor and philanthropist, was born in Chicago, Ill., Sept. 9, 1850, the son of Iver H. Lawson, a Norwegian immigrant, and was educated at Phillips academy, Andover, Mass. He took charge of his father's interest in the daily *Skandinaven*, and in July 1876 bought one-third of the stock of the faltering *Chicago Daily News*, which had been organized six months before by Melville E. Stone as the first one-cent newspaper in the west. Under Lawson's business management, the paper reached a circulation of 20,000 within a year.

In 1881 Lawson and Stone started a morning edition, later (1883) called the *Chicago Record*, subsequently discontinued. In 1888 Lawson bought Stone's interest, and remained sole proprietor until his death, August 19, 1925. His advocacy of a postal savings bank caused him to be called the father of the law that established it. Lawson supported Stone in his development of the Associated Press, was its president from 1894 to 1900, and a director until his death. A devout member of the Congregational church, Lawson endowed its seminary and city missionary work in Chicago, contributed to the Young Men's Christian association and supported various civic measures.

LAWTON, a city of southwest Oklahoma, U.S., 105 mi. S.W. of Oklahoma City, the seat of Comanche county, was originally part of the Choctaw-Chickasaw leased lands in the old Indian territory. In 1869 the Kiowa and Comanche Indians were settled in the area and Ft. Sill was established to control them. A settlement of traders, guides and soldiers' families was located near the fort, and in 1901, when 3,500,000 ac. of Indian lands were opened by lottery to white settlers, the town of Lawton grew up in a day. It was named for Gen. Henry W. Lawton, sent to capture the Apache leader, Geronimo. Lawton is located in a grazing and farming region and is the site of Cameron State Agricultural college, a two-year college founded in 1901. The Ft. Sill military reservation, 4 mi. N. of the city, is now an artillery centre. Lawton is the home of the Wichita Mountain Easter pageant. Recreational facilities include a fishing resort and the Wichita Mountains wildlife refuge. Pop. (1960) 61,697; standard metropolitan statistical area (Comanche county) 90,803. For comparative population figures *see* table in OKLAHOMA: *Population.* (AN. L.)

LAWYER: *see* LEGAL PROFESSION.

LAXNESS, HALLDÓR KILJAN (1902–), Icelandic writer, awarded the 1955 Nobel prize for literature, was born in Reykjavik on April 23, 1902. He wrote his first book, a romanticized peasant novel, at 17, but his style was still impersonal. Restlessly searching, he spent his youth in Europe after World War I and became a Roman Catholic. He remained abroad for several years, in France and the United States. The religious commandment to love one's neighbour took on political significance for him when he made the acquaintance of communism, whose ideas formed a recurrent pattern in his subsequent work. In 1930 he settled down in his native island, where, in quick succession, he completed the mature and important works which laid the foundation of his position as Iceland's leading author: *Salka Valka* (1934), which describes, in vigorous and realistic strokes, life in an Icelandic fishing village; *Sjalfstaet folk* (1934–35; trans., *Independent People*), a moving epic about the Icelandic small holder's struggle against nature and the community for his right to exist as a free human being; *Islandsklukkan* (1943; *The Bell of Iceland*), which deals graphically with a dark phase of the island's history under Danish rule in the 18th century. *Gerpla* (1952) is set in the Viking age and is an ironic pastiche on the Icelandic sagas. Laxness restored his Icelandic mother tongue as a sensitive instrument for great storytelling. (A. L. BR.)

LAYAMON (more strictly LAZAMON, modernized LAWMAN), early English poet, author of the romance-chronicle the *Brut* (*c.* 1200), the outstanding literary product in English of the new patriotism which developed in the 12th century. Layamon describes himself as a priest, son of Leovenath and living at Ernleze (now Arley Kings) in Worcestershire. *Le Roman de Brut*, the Anglo-Norman version, in verse, by Wace (*q.v.*), of Geoffrey of Monmouth's *Historia regum Britanniae*, controls Layamon's composition throughout, but detail is freely handled and often amplified from local tradition and personal knowledge. In about 16,000 long alliterative lines (often broken into short couplets by rhyme), the *Brut* relates the legendary history of Britain from the landing of Brutus, great-grandson of the Trojan Aeneas, to the final Saxon victory over the Britons under Cadwallader in 689. (Layamon follows Geoffrey of Monmouth in confusing Cadwallader and Caedwalla.) A third of the poem deals with the story of Arthur, but Layamon's is not a high chivalric treatment: mass war is the staple, with Arthur the splendid war-leader.

The *Brut* is preserved in two manuscripts, one roughly contemporary with the original, preserving the original language; the other, written 50 years later, showing an extensive simplification of diction, much of which must have been archaic when Layamon composed his unsophisticated and grimly fantastic history.

BIBLIOGRAPHY.—The *Brut*, edited by Sir F. Madden for the Society of Antiquaries, 3 vol. (1847) was re-edited for the Early English Text Society by G. L. Brook and R. F. Leslie (1963–). *Selections* were edited by G. L. Brook (1963). L. A. Paton's *Arthurian Chronicles*, Everyman's Library (1912), contains an incomplete translation. *See* also J. S. P. Tatlock, *The Legendary History of Britain*, chap. 23 (1950); J. E. Wells, *A Manual of Writings in Middle English, 1050–1400* (1916), with *Supplements* (1919–52). (G. SD.)

LAYARD, SIR AUSTEN HENRY (1817–1894), British archaeologist, diplomatist and politician, is remembered for his excavations of Nineveh. He was born in Paris on March 5, 1817, son of Henry P. J. Layard of the Ceylon civil service. Layard started his career in a solicitor's office in London. In 1842, after extensive traveling in Asia Minor, he arrived at Constantinople where he was employed by Sir Stratford Canning in various unofficial diplomatic missions. He left Constantinople in 1845 in order to explore the ruins of Assyria and remained in the neighbourhood of Mosul until 1847. After a few months in England he returned to Constantinople as attaché to the British embassy. In 1849 he started on a second expedition in the course of which he investigated the ruins of Babylon and the mounds of southern Mesopotamia (*see* NINEVEH). His record of this expedition is contained in *Discoveries in the Ruins of Nineveh and Babylon* (1853).

Layard was Liberal member of parliament for Aylesbury from 1852 to 1857 and for Southwark from 1860 to 1869. He was present in the Crimea during the war and freely criticized the government. In 1857 he visited India to investigate on his own behalf the causes of the mutiny of that year. From 1861 to 1866 he was undersecretary for foreign affairs in the successive administrations of Lord Palmerston and Lord John Russell. In 1868 he was appointed chief commissioner of works in Gladstone's government and a privy councilor. He was sent as envoy extraordinary to Madrid in 1869 and was ambassador at Constantinople from 1877 to 1880. Layard retired to Venice where he devoted much of his time to collecting pictures of the Venetian school and to writing on Italian art. He died in London on July 5, 1894.

LAYING ON (IMPOSITION) **OF HANDS,** a ritual act practised first in Judaism and thence adopted into Christianity. In the Old Testament it is associated with three interrelated ideas: consecration (*i.e.*, setting apart for the service of God; Num. xxvii, 18), transmission of a divine gift (Deut. xxxiv, 9) and identification (being the means whereby an offerer was linked with his sacrifice; Lev. i, 4). In the New Testament the same ideas are present, all three being connected with both ordination and baptism. Ordination involves both setting apart (Acts vi, 6) and the conveyance of a gift (I Tim. iv, 14), and implicit is the theme of identification, the one ordained sharing in the authority and being the representative of the ordainer. The laying on of hands connected with baptism is a means whereby the convert is identified and so brought into the community; it is further a setting apart for the service of God and is, on occasion, connected with the gift of the Holy Spirit (Acts viii, 17). The New Testament also provides evidence that the laying on of hands conveyed a blessing (Mark x, 16) and was a means of healing (Mark v, 23). The early church continued these several usages and added two more: the laying on of hands for the blessing of catechumens and for the reconciliation of penitents and heretics; this latter act is another example of identification, the repentant sinner or schis-

matic being thereby incorporated back into the community. The church has preserved the use of this ritual act, most notably in ordination and confirmation. (J. G. Da.)

LAZAREV, PETR PETROVICH (1878–1942), Russian physicist and biophysicist, was born in Moscow, April 1, 1878. A doctor of medicine of Moscow university (1903), he did research work in science at Strasbourg and in 1907 was appointed *Privatdozent* in physics and assistant to P. N. Lebedev at the University of Moscow. In 1912 he became professor at the Higher Institute of Technology in Moscow and from 1920 to 1931 was director of the Biophysics institute there. From 1938 to his death he was director of the Biophysical laboratories of the Soviet Academy of Sciences.

Lazarev's early investigations were in photochemistry; he showed by experiment that the velocity of photochemical reactions is proportional to the absorbed energy and does not depend on the wave length of light. Another series of his investigations was in molecular physics. Lazarev's main work, however, was the development of his physicochemical theory of the movement of ions and the consequent theory of excitation in living matter, which attempts to explain the process of senses and of muscular contraction, as well as the functions of the central nervous system.

Some of his papers were published in French (*Comptes rendus de l'Académie,* 1923–24) and in English (*Journal of General Physiology,* 1924).

LAZARUS, a contracted form of the Hebrew name Eleazar ("God has helped"), occurs in the New Testament in two connections.

1. Lazarus of Bethany, brother of Martha and Mary. John xi relates the story of his being raised from the dead after four days. In the 4th century the house and tomb of Lazarus were shown to pilgrims, and the Gospel narrative, which defines the localities with care (John xi, 18, 30, 32, 38), may be based on the story told to 1st-century visitors to Palestine.

2. Lazarus is the name given by Luke (ch. xvi) to the beggar in the parable of "Dives" and Lazarus. It is the only proper name attached to a character in the parables of Jesus.

LAZARUS, EMMA (1849–1887), U.S. poet, the author of "The New Colossus," the sonnet engraved on a memorial tablet on the Statue of Liberty, was born in New York city, July 22, 1849. Her first book (1866) included poems and translations written in her teens. At the age of 21 she published *Admetus and Other Poems* (1871), inscribed to Ralph Waldo Emerson. Much of her earlier work appeared in *Lippincott's Magazine.* In 1874 she published a prose romance (*Alide*) based on Goethe's autobiography, which was praised by Ivan Turgenev. Two years later she visited Concord and made the acquaintance of the Emerson circle, and while there read the proof sheets of her tragedy *The Spagnoletto.* In 1881 she published her excellent *Poems and Ballads of Heinrich Heine.* Another vigorous drama, *The Dance to Death,* is based on the accusation brought against the Jews of poisoning the wells and thus causing the Black Death. This was included with some translations of medieval Hebrew poems, and such shorter pieces as "The Crowing of the Red Cock" and "The Banner of the Jew" in *Songs of a Semite* (1882), dedicated to George Eliot. She devoted much of the short remainder of her life to the cause of Jewish nationalism and visited Europe in 1883 and 1885–87. In 1887 appeared *By the Waters of Babylon,* a series of prose poems, full of prophetic fire. She died in New York on Nov. 19, 1887.

See E. C. Stedman's tribute in his *Genius and Other Essays* (1911); and *Emma Lazarus, Selections from Her Poetry and Prose,* ed. with an introduction by Morris U. Schappes. (I. A.)

LAZARUS, MORITZ (1824–1903), German Jewish philosopher, was born on Sept. 15, 1824, at Filehne in Prussian Posen (Wielen in Poznan). The son of a rabbinical scholar, he was educated in Hebrew literature and history and subsequently in law and philosophy at Berlin. He was professor at Bern (1860–66), at the Kriegsakademie in Berlin (1867–73) and at Berlin university (1873). The fundamental principle of his philosophy was that truth must be sought not in metaphysical or *a priori* abstractions but in psychological investigation, and further that this investigation cannot confine itself successfully to the individual consciousness but must be devoted primarily to society as a whole. The psychologist must study mankind from the historical or comparative standpoint, analyzing the elements which constitute the fabric of society, with its customs, its conventions and the main tendencies of its evolution. In support of this *Völkerpsychologie* (folk- or comparative psychology) he founded, with H. Steinthal, the *Zeitschrift für Völkerpsychologie und Sprachwissenschaft* (1859). His chief philosophical work was *Das Leben der Seele* (1855–57; 3rd ed., 1883).

Lazarus took a leading part in the defense of Judaism and the Jews against the violent anti-Semitism of his time. He wrote *Treu und Frei: Reden und Vorträge über Juden und Judenthum* (1887); a monograph on the prophet Jeremiah (1894); and *Die Ethik des Judenthums* (vol. i, 1898; vol. ii, posthumously edited by J. Winter and A. Wünsche, 1911), which soon achieved the rank of a popular standard work as it marshals a vast array of literary sources and presents them in a pleasant and persuasive style. In 1869 and 1871 he was president of the Liberal Jewish synods at Leipzig and Augsburg. He died at Meran on April 13, 1903. His widow, Nahida Ruth Lazarus, a convert to Judaism, published his *Lebenserinnerungen* (1906) and her own biographical sketch of him, *Ein deutscher Professor in der Schweiz* (1910). His autobiographical *Aus meiner Jugend* appeared in 1913. (X.; A. An.)

LAZEAR, JESSE WILLIAM (1866–1900), U.S. physician and member of the commission which proved that yellow fever (*q.v.*) was transmitted by a mosquito vector, was born in Baltimore county, Md., on May 2, 1866. He attended Johns Hopkins university (A.B., 1889) and Columbia college of physicians and surgeons, New York city (M.D., 1892). He concluded his studies with a two-year internship at Bellevue hospital and a year's additional study in Europe, including some time at the Pasteur institute in Paris. Returning to the U.S., he set up practice in Baltimore and joined the medical staff of Johns Hopkins hospital, where he was among the first to investigate the structure of the malarial parasite. In 1900 he went to Cuba as acting assistant surgeon in the U.S. army, assigned to laboratory duty. There he was asked to join the Yellow Fever commission set up in that year which included Maj. Walter Reed, James Carroll and Aristides Agramonte. Lazear was given responsibility for the care and handling of the insects believed to be possible carriers of yellow fever, and was in charge of their application to volunteers and fever patients for experimental purposes. In the course of his work he was accidentally bitten by one of the mosquitoes, though he saw it alight on his hand and could have warded it off. He contracted the fever and died on Sept. 25, 1900, after a week's illness.

Lazear's contribution to the solution of the yellow fever scourge was ranked by Reed as equal to that of each of the other members of the commission, and he was memorialized by a tablet erected at Johns Hopkins hospital.

LAZIO (ancient Latium), a region of west central Italy, is composed of the provinces of Roma (Rome), Frosinone, Latina, Rieti and Viterbo. Area 17,203 sq.km. (6,642 sq.mi.). Pop. (1961) 3,922,783.

In the east Lazio is dominated by the central Apennines. In its northeasternmost section, near Rieti, the region includes part of the Abruzzi. Monte Terminillo (7,260 ft.), the highest peak, is in the Reatini range; other Apennine ranges within Lazio are the Sabini, Simbruini and Ernici. Limestone is the main component of the Apennines, and karst phenomena are found in a number of places. The lower foothills of the pre-Apennines are fertile; some of the valleys, such as those near Rieti and Subiaco, are among the best farming areas of the entire Apennine chain.

The western part of Lazio centres around the Campagna di Roma. To the northwest and southeast of it are four groups of ancient volcanoes, the Cimini, Volsini, Sabatini and Alban mountains, each containing one or more crater lakes, those of Bracciano, Albano, Nemi (*qq.v.*), Bolsena and Vico. The Campagna di Roma continues northwestward into the Maremma and southeastward with the Pontine marshes, while beyond Terracina lie the plains of Fondi and Formia. Southeast of the volcanic Alban

hills (*q.v.*), the Lepini, Ausoni and Aurunci, stark, denuded mountains, extend to the Garigliano river, the southern limit of Lazio.

Until the latter part of the 19th century, much of the lowland area of Lazio was marshy and malarial and its agriculture was characterized by migratory grazing, the growing of wheat in the lowlands and of grapes on the hills. Major reclamation works in the Maremma, the Campagna di Roma and the Pontine marshes (*qq.v.*) during the first half of the 20th century transformed farming in Lazio completely. Migratory grazing was greatly reduced in importance. Wheat and corn, vegetables and fruit, meat and dairy products are dominant in the lowlands, while olive groves, orchards and vineyards cover the slopes. Commercial vineyards are especially important around Montefiascone, on the Alban hills and around Terracina and Formia. Civitavecchia and Gaeta are the main fishing ports.

Industry plays a subordinate role in the economy of Lazio. Rome, the capital of the region and of Italy, is the major urban and industrial centre and the region's banking and commercial core. However, Rome's industries, with a few exceptions, are either of the artisan type (fashion) or highly specialized (motion pictures). Rome, including the Vatican city-state, is Italy's largest tourist centre, and tourism is one of the city's largest employers. Large numbers of persons are also employed by the government. In the remainder of the region chemical and pharmaceutical plants, food industries and a few small machine industries are the only ones of importance.

The transportation pattern of Lazio is dominated by Rome. The city is connected by trunk railroads with Genoa, Florence, Ancona, Pescara and Naples, and it is the centre of the highway system of central Italy. After World War II Rome also became one of Europe's busiest airports, through which many trunk lines pass to the far and middle east and to Africa. Civitavecchia, the only port of importance, is noted chiefly for its trade with Sardinia.

For the history of the region, *see* LATIUM; ITALY. (G. KH.)

LEA, HOMER (1876–1912), U.S. soldier who, 30 years before World War II, accurately foretold a U.S.-Japanese war and the early course it would take. Born at Denver, Colo., on Nov. 17, 1876, he was educated at Occidental college, Los Angeles, Calif., and at Stanford university, where he studied law. Intensely interested in military history and strategy, and unable to join the U.S. army (he was a hunchback), he went to China in 1899, where he soon was in command of a body of volunteers of K'ang Yu-wei (*q.v.*), who was plotting the overthrow of the Manchus. The plot was discovered and Lea fled to Hong Kong, where he met Sun Yat-sen. He went with Sun to Japan and later became his chief of staff. In 1901 he returned to the United States. He was back in China in 1904 for a short time, then returned permanently to California, where he wrote a novel of the Manchu regime, *The Vermilion Pencil* (1908), and dictated his well-known *The Valor of Ignorance*, published in 1909. In the latter, often termed one of the most brilliant of military analyses, Lea dwelt at length on the inordinate ambitions of the Japanese army.

Lea predicted a U.S.-Japanese war in which Hawaii would be the key position, and specified how the Japanese would conquer the Philippines and attempt an invasion of the United States proper along the coast of Washington and Oregon. Lea died Nov. 1, 1912.

L.E.A. (LOCAL EDUCATION AUTHORITY): *see* EDUCATION, HISTORY OF.

LEACOCK, STEPHEN BUTLER (1869–1944), Canadian humourist, historian and economist, was born Dec. 30, 1869, at Swanmoor, Eng., and emigrated to Canada with his parents at the age of six. From the family farm near Lake Simcoe, Ont., he was sent to Upper Canada college (1882–87) and later attended the University of Toronto, where he was graduated B.A. in 1891. After teaching for eight years at Upper Canada college, he entered The University of Chicago. In 1903, having been (according to his own account) "examined for the last time and . . . pronounced completely full," he was awarded the Ph.D. Appointed in the same year to the staff of McGill university in Montreal, he became head of the department of economics and political science in 1908 and served in that capacity until his retirement in 1936. He died at Toronto, March 28, 1944.

A prolific writer, Leacock was the author of nearly a score of monographs in the fields of history and political economy. But his true calling was humour, both as a public lecturer and as an author, and his fame now rests securely on work begun with the beguiling fantasies of *Literary Lapses* (1910) and *Nonsense Novels* (1911) and continued in some 30 books of humorous sketches and essays. Leacockian humour is typically a humour of "mellowed vision." Deeply impressed by what he called "the appalling inequalities of our human lot," he saw in the "higher" forms of humour a power to comfort and to heal. The spirit of sarcasm is foreign to his work; the laughter provoked is the laughter that unites rather than divides the human family. Leacock's weakness was that he created no plots for his books, and they therefore lack a dimension found in the writings of Dickens and Mark Twain. But for sheer youthful zest and perceptiveness in comic invention he has few rivals.

Important titles, in addition to the two mentioned, are *Sunshine Sketches of a Little Town* (1912); *Behind the Beyond* (1913); *Arcadian Adventures With the Idle Rich* (1914); *The Unsolved Riddle of Social Justice* (1920); *My Discovery of England* (1922); and *The Boy I Left Behind Me* (unfinished autobiography, 1946).

See Gerhard R. Lomer, *A Check List and Index of the Writings of Stephen Leacock* (1954). A comprehensive collection of Leacock material is housed at the Redpath library, McGill university.

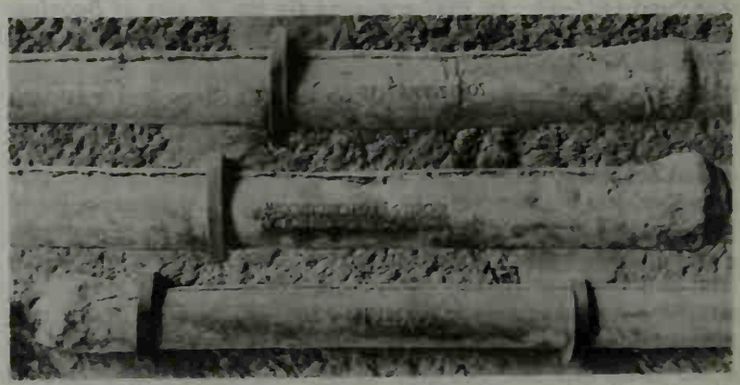
(R. L. McD.)

LEAD. Man's metallurgical knowledge of the metallic element lead antedates recorded history. Coins or medallions of lead are found in ancient Egyptian ruins and it seems probable that the extraction of lead from its ores by smelting was the first such practice recognized by man. The combination of an easily reducible metal and a low melting point would not have taxed the resources or skill of any civilization that had learned to use fire adjacent to suitable ore outcroppings, of which there were many scattered throughout the world. Even at mid-20th century, the process, commonly used, *e.g.*, at Trepca, Yugoslavia, on certain high-grade pure concentrates of lead utilizing the ore hearth or Scotch hearth, consists of little more than adding the concentrate with suitable fuel to a fire under forced draft. Certainly the discovery of this process would have called for no great powers of deduction nor would it have demanded the development of special equipment to attain necessary temperatures or to contain the molten metal.

By the time of the Roman civilization the use of lead was widespread for both utilitarian and ornamental purposes. Numerous examples of lead water pipe, still in serviceable condition, have been discovered in Roman ruins, and ornamental castings of lead 2,000 years old are not uncommon in several parts of the world.

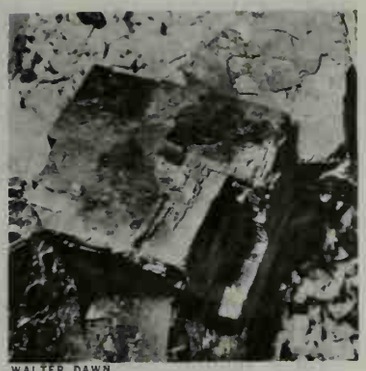
Occurrence and Production.—Although many lead minerals are known, *e.g.*, cerussite, $PbCO_3$, anglesite, $PbSO_4$, crocoite, $PbCrO_4$, wulfenite, $PbMoO_4$, these are all of very minor economic importance compared with galena, PbS, which forms the source of virtually the whole of modern lead production.

Galena crystallizes in the cubic system, has a specific gravity of about 7.5 and displays a grayish metallic lustre resembling that



ROMAN LEAD WATER PIPES

of the metal itself. Two basic types of galena deposits may be distinguished: those in which galena is intimately associated with sphalerite, zinc sulfide, ZnS, and those free from sphalerite. From the latter, high-grade concentrates are readily obtained by simple gravity processes but the former were technically useless until the advent of flotation about 1920 (*see* ORE DRESSING) enabled the zinc and lead sulfides to be separated. Two of the world's largest lead smelters outside the U.S., those at Trail, B.C., and Port Pirie, Austr., are based on the output of famous mines (at Kimberley, B.C., and Broken Hill, N.S.W., respectively) working ores of the first type.



WALTER DAWN

GALENA (LEAD SULFIDE) ON DOLOMITE

However, it is impracticable to obtain from complex lead-zinc sulfide ores concentrates of either mineral entirely free from the other. In a conventional lead smelting process the zinc in the lead concentrate passes into the slag, which will contain up to about 20% ZnO. It would obviously be desirable to treat these mixed ores without any separation stage, apart from the removal of unwanted waste rock (or gangue). The achievement of this object was announced in 1957. By close control of temperature and the ratio of CO to CO_2 a blast furnace may now be operated to produce a fluid layer of metallic lead in the hearth while the more volatile zinc (boiling point at one atmosphere 907° C.) distills away to be collected in specially designed condensers.

On a tonnage basis lead is the world's fifth most important metal, exceeded only by iron, copper, aluminum and zinc. Approximately one-quarter of the world's output is produced by U.S. smelters, which in addition to processing domestic ores treat considerable quantities of imported ores. Other major world producers normally are Australia (the world's greatest exporter), the U.S.S.R., Mexico, Canada, Peru, Yugoslavia and Morocco. Including the United States, these countries produce about three-fourths of the annual world total of 2,500,000 short tons. In addition to mine production, large amounts of lead from secondary sources are smelted and refined each year. The metallurgy of this metal is so interrelated with other elements that both its production rate and market price are influenced to a marked degree by the supply and demand of several related elements, among which are zinc, silver, copper, gold, bismuth and antimony.

Extractive Metallurgy.—While it is true, as has been stated, that high-grade clean lead concentrates can be smelted satisfactorily with elementary, almost primitive techniques, it is also true that there are relatively few places in the world where such concentrates can be produced in sufficient quantity to justify such simple smelting installations. The usual blast furnace smelting of lead permits not only the smelting of ores and concentrates in which lead is the element of principal value, but also lead ores in which other elements, particularly silver and gold, are of greater value than the lead. In some cases a portion of the charge smelted in the lead blast furnace are ores which contain little or no lead. Usually in these cases the ores or concentrates are of silver or gold associated with silica, limestone or iron pyrite and are economically added to the blast furnace charge for two reasons: first, because the silica, iron or lime is needed to balance the furnace charge to produce a satisfactory slag when smelted; and, second, because the lead in the balance of the charge is such a splendid collector for silver and gold that higher recoveries of these elements can be made than if an attempt were made to recover them directly from their ores or concentrates. Indeed it is safe to say that in many cases these silver and gold ores could not be economically handled except in a lead smelter. In addition to silver and gold, other elements are found in many lead concentrates and the smelting and refining operations must be designed to tolerate these elements and to produce eventually a refined lead acceptably free of impurities. Preferably, the impurity elements will be separated in either the smelting or refining operation in sufficient concentration to permit economical recovery of these elements for the market. In a few cases the additional cost for an element beyond a certain minimum is more than offset by its value. In most cases, either due to the low market price for the element or due to the complex metallurgy imposed by its presence, the smelting costs limit the permissible tolerance for the element even though it is of necessity recovered and eventually sold.

Thus, from lead smelting and refining operations the following elements are recovered, but there is probably no single smelter or refinery that recovers all of them: lead, silver, gold, copper, zinc, antimony, bismuth, nickel, arsenic, sulfur (in the form of one or more of its compounds), cadmium, indium, tin, selenium, tellurium, the platinum metals and possibly others. It is evident that the complete picture of the extractive metallurgy of lead would embrace, at least in part, the extractive metallurgy of many of the useful elements known to man. Certainly the usefulness of lead is influenced to a substantial degree by the recovery of these metals, for in some cases the mining costs are justified only by the coexistence of copper and zinc that can be separately concentrated and sold, and in other instances the payments for silver and gold in the lead concentrate permit an economically sound mining operation. In almost all cases the marketing of the recovered impurity elements pays at least in part for the cost of removing them and thus permits lower smelting and refining charges. Despite their importance, no effort will be made in this article to follow the extraneous elements beyond their removal from lead. For smelting and refining of these elements, *see* the separate articles on them.

Roasting.—The first basic operation in the extracting of lead from its ores and concentrates is to effect the removal of sulfur by roasting in air, which converts lead sulfide to lead oxide by the volatilization of sulfur dioxide gas. This operation is usually conducted by blending the lead ores, concentrates and fluxing ores in a thin layer on a traveling endless grate through which air is sucked. A flame ignites the charge and it burns with enough heat to sinter it; *i.e.,* convert it to a porous, not too friable, cake that breaks into lumps as it is discharged from the grate.

On the conventional form of traveling grate (usually termed a sinter machine) the charge is ignited at the top. Under the influence of a downward air current the reaction zone moves steadily to the bottom of the bed as the grate moves slowly forward over the windboxes below. During the roasting operation some metallic lead is produced by interaction between galena and its oxidation products *e.g.,* $PbS + 2PbO = 3Pb + SO_2$ or $PbS + PbSO_4 = 2Pb + 2SO_2$. Such lead tends to trickle through the grate into the windboxes, from which it must be removed at regular intervals. This obstacle to smooth running of the sinter plant has been overcome at Port Pirie, Austr., by igniting the charge at the bottom and employing an updraft.

Smelting.—The lumps of sinter, mixed with coarse coke are charged to the top of a vertical shaft or blast furnace. Such furnaces are usually rectangular in cross section and are of sufficient size to handle from 100 tons to 800 tons of charge per day. Air is forced into the furnace through pipes in a row just above the bottom, resulting in combustion of the coke as the charge descends, heating the sinter to the point where it can react with the coke, and in reduction of the oxides of many of the metals in the charge, producing liquid lead in which is dissolved silver, gold, copper, zinc, antimony, bismuth, etc. The nonreduced elements in the charge form a liquid slag, essentially an iron-lime-silicate, which, being lighter than the liquid lead, floats on top of it, permitting easy separation of these two phases. The operation, to the novice, seems simple and indeed it is simple when correctly carried out, but the operation can be accomplished successfully only by the exercise of great skill in preparing the charge and operating the furnace. Unless the ratio of iron, lime and silica is carefully balanced, a fluid liquid slag will not result and the physical operation of the furnace and separation of the metal becomes impossible. If the proper balance of coke and sinter is not maintained, the metal is not reduced and is lost in the slag. Too much reduction is just as objectionable, resulting in a "slow furnace"

and the introduction of excessive amounts of elements into the lead. If the sintering operation leaves too much sulfur in the charge, many of the recoverable elements form a matte or liquid metal sulfide which must be separately treated for recovery of values. Too much arsenic on the charge, frequently due to incorrect circulation of by-products, results in the formation of furnace speiss, or liquid metal arsenide, which has an unfortunate tendency to dissolve gold. This formation of speiss requires still further extensive treatment to recover the metal values, frequently involving expensive shipment to a plant which specializes in handling arsenical materials. However, the effect of modern technical improvements, especially in roasting practice, is to minimize or eliminate matte and speiss production in the smelting furnace.

While getting the charge successfully through the blast furnace is certainly the major step in lead smelting, the liquid metal resulting therefrom is far from a useful product. Upon cooling the liquid metal, or bullion, some of the impurities separate as drosses. Rejection of copper at this stage is usually enhanced by stirring a small quantity of sulfur into the cool, but still liquid, bullion. The drosses have to be furnace-treated to separate copper in the form of either matte or speiss, relatively low in lead, that can be shipped to a copper smelter for the recovery of this element as well as valuable impurities, such as silver and gold, that are associated with it. The furnace used for smelting dross is usually a reverberatory furnace fired with gas, oil or coal. Considerable liquid lead is separated in this furnace and joins the main flow of the lead from the blast furnace.

Refining.—The dross-free decopperized bullion is either transferred to an adjacent refinery as a liquid, or it may be cast in large five to ten ton blocks to facilitate transfer. However, in those cases where electrolytic refining is to be employed, the bullion is usually cast into anodes or plates of a few hundred pounds each, which can be hung directly in the electrolysis tanks. In this operation the electric current causes the lead at the anode to dissolve in the electrolyte. At the same time lead already dissolved is plated-out at the cathode in pure form. The lead cathodes are subsequently removed, melted and cast into pigs for the market. The impurities, left behind at the anode or remaining in the solution, must then be recovered in many complex operations.

For many years electrolytic refining was the only known method of removing bismuth from the bullion. This object may now be achieved by adding a calcium-magnesium alloy to form a bismuth-containing dross which can be skimmed off. It is also claimed that satisfactory debismuthizing can be accomplished by a potassium-magnesium alloy or by the use of sodium in the presence of caustic soda.

In the kettle refining of bullion, as contrasted with electrolytic refining, the treatment of the lead bullion is more complex but the recovery of the by-product metals is simpler and faster; simplicity and speed are most important factors when dealing with valuable metals like gold and silver. There are several kettle refining processes or modifications but in essence they all have the following steps:

1. Softening, in which the liquid metal, held in either a furnace or cast-iron or steel pots of large capacity, is oxidized with either air or a reagent to form a liquid slag containing essentially all of the more oxidizable elements; *i.e.*, arsenic, antimony, tin and zinc (and, at times, other special elements). This oxidation step can be quite selective and result in separate slags for each of the elements if desired.

2. After softening, the liquid lead is next desilverized by adding metallic zinc and raising the temperature sufficiently to dissolve it. Upon partial cooling the zinc forms a dross or crust which will contain practically all the silver and gold in the original bullion plus any copper, nickel or other elements that are occasionally found in bullion. This dross is separated from the lead by skimming and the gold and silver are separated and recovered in a parting plant. The zinc is distilled off and used over and over again since only a few pounds of zinc are lost per ton of lead desilverized.

An Australian development of this operation has led to a continuous process performed at a higher temperature. Owing to the manner in which the mutual solubility in the ternary system lead-zinc-silver changes with temperature, this process yields crusts far richer in silver and lower in lead than those obtainable from the earlier and still widely used Parkes process described in the previous paragraph.

3. The final major step is the removal of the (approximately) 1% zinc remaining in solution in the lead after desilverization. This may be done by chlorination, by another oxidation stage akin to softening, or by distillation. The latter has the advantage over the two former methods as it recovers zinc in the metallic form, in which it is immediately available for reuse in the desilverizing operation.

These refining processes all result in pig lead of remarkable uniformity and purity. Large quantities of lead are commercially available at 99.999% purity, but unfortunately, and unlike zinc and copper, there is seldom anything to be gained by using lead of this purity. In fact, for some purposes pure lead is quite undesirable because of such characteristics as coarse grain size, extreme softness, low creep strength, etc.

Copper-bearing lead is widely used whenever lead structures are exposed to strong acids. When this lead is made, by leaving copper in the lead in the smelting and refining procedure, it is called chemical lead and usually contains, in addition to 0.06% copper, small amounts of silver and nickel. When copper-bearing lead is made by adding copper to fully refined lead it is called acid lead and frequently has small quantities of bismuth present in place of silver.

Common lead nearly always contains a few hundredths of one percent of bismuth, which is frequently the only element present in more than a few parts per million. This is the base price lead that is most widely used in commerce and industry. It is always furnished unless copper-bearing lead or corroding lead is specified.

Corroding lead is used for making most of the compounds of lead, such as white lead, red lead, litharge, tetraethyl lead, etc. Since for these purposes the physical properties of the lead are of minor importance and chemical interference of impurities may influence both the process and the product, this lead is usually the purest available commercially and is limited by specification to a maximum of 0.05% bismuth and no more than 0.002% of any other element.

Uses.—The largest single use for lead is in storage batteries. In the United States the storage battery industry consumes between one-quarter and one-third of the lead smelted. However, a great deal of this lead originates in scrap storage batteries from which the recovery of lead is very high. The antimonial-lead grids and connectors of the automobile battery are produced almost entirely from scrap battery smelting, refining and alloying. The oxides for the paste in the plates, on the other hand, are generally produced from corroding lead, which is seldom obtained from scrap sources. Since a battery is about half oxide and half antimonial lead, so long as the number of automobiles on the road roughly doubles during the average life of a battery, a balanced market for the antimonial lead obtained from smelting storage batteries prevails and, in addition, the market for antimony metal is likewise satisfactory, for considerable antimony is needed to alloy with the 4% antimony metal obtained from smelting the battery, to supply the 6% to 8% antimonial lead used for the plates or grids. When the need for antimonial lead decreases, the more or less constant flow of scrap batteries creates an excess of the alloy, forcing the price down to a point where it is profitable to remove the antimony ("soften the lead") in order to find a satisfactory market. Thus antimonial lead can frequently be purchased for less than the combined value of its lead plus antimony contents; while in boom times a premium (or alloying charge) is obtained.

There are other uses for antimonial lead which, while important, have relatively slight impact on either the lead or antimony market. There is a considerable tonnage of lead containing 1% antimony used in the electric cable industry, particularly for sheathing telephone cable. While much of this metal eventually does come back on the market, the relatively long life and steadily expanding use for the metal as well as the simple melting procedures employed

for the recovery of the alloy create no problems and it has little impact on the basic smelting and refining industry.

Antimonial alloys of lead, particularly with the addition of small amounts of tin, are widely used for intricate ornamental castings. Alloys of the same general type also find use for bearings, for by mid-20th century it was discovered that with suitable support and with proper provisions for the prevention of corrosion, lead and its alloys provide the best and most economical bearing metal for many uses. The methods of supporting lead alloy bearing liners are most ingenious and vary from simple castings poured into cast-iron shells, through complicated keyed supports, including sintered high melting point metal matrices saturated with lead, and extend to deceptively simple structures obtained by electroplating films of lead on high thermal conductivity metals such as silver.

However, all the different forms of lead bearings take advantage of the basic fact that the metal is able to maintain on its surface a thin film of lubricating oil at relatively high loads and over a wide range of speeds, successfully preventing wear of the bearing surfaces. For this purpose the alloy used must be able to maintain an oil film on its surface but not be so reactive with the oil that it dissolves and is thus corroded away. In fact, corrosion resistance is one of the principal virtues of lead and is frequently the controlling factor dictating its use.

The term "chemical lead" in the United States does not imply chemically pure lead, as the term so frequently does when applied to reagents, but rather to lead most useful in building chemical equipment. Indeed, it can be asserted that the early development of the heavy chemical industry was built around the use of chemical lead as a container for reactive chemicals. Even at mid-20th century with the advancing technology in the use of metals and plastics, lead was still most widely used because of its ease of fabrication, demonstrated corrosion resistance over a wide range of conditions, ease of maintenance and repair and, after a long and useful life, high salvage value. Wherever sulfuric acid solutions are used, lead is most frequently employed. It is also the preferred material for containing phosphoric, hydrofluoric and many other corrosive solutions. It is almost ideal for containing sea water, sewage water and all but the very soft potable waters. *See* table for physical characteristics of lead.

Frequently lead is not employed where it is eminently suited because its mechanical properties require the exercise of greater engineering skill in satisfactorily adapting it to the structure required than is demanded by stronger, more rigid materials. Thus lead pipes to handle fluids at high pressures and particularly at higher temperatures have to be relatively thick or even be supported by more rigid materials. While alloys of lead are frequently stiffer than the soft lead, the improvement is relatively slight, particularly at elevated temperatures where in the case of the most widely used antimonial leads it fades out completely above the boiling point of water. Nevertheless, the antimonial lead alloys are frequently to be preferred because of their improved fatigue properties and, when properly prepared, higher resistance to creep or flow under moderate loads at room temperature. Properly made castings of antimonial lead often have properties superior to those that can be obtained by rolling or extrusion. It is for this reason that the grids in the automobile storage battery are still made by the casting technique instead of rolling and stamping processes, which certainly would produce a more uniform product. In some cases the use of antimonial lead has even been abandoned after successful initial trials because of failures of an "improved" wrought structure after it had been substituted for the cast structure originally tested.

Some Physical Properties of Lead

Symbol	Pb
Atomic number	82
Atomic weight	207.19
Isotopes (those italicized occur naturally)	198, 199, 200, 201, 202, 203, *204*, 205, *206*, *207*, *208*, 209, 210, 211, 212, 214.
Crystal system	face-centred cubic
Melting point (° C.)	327.4
Boiling point (° C.)	1,737
Electrical resistivity at 20° C., microhm-cm.	22
Thermal conductivity at 20° C.—cal./sec./sq.cm./cm./° C.	0.083
Magnetic susceptibility, c.g.s. units	-0.12×10^{-6}
Tensile strength (approx.), psi.	2,000
Modulus of elasticity (approx.), psi.	2.3×10^{6}
Specific heat at 20° C., cal./g.	0.031
Latent heat of fusion cal./g.	5.89
Latent heat of vaporization at b.p., cal./g.	204.6
Superconducting transition temp. (° K.)	7.2
Density (g./c.c.) at 20° C.	11.34
Density (g./c.c.) in vicinity of melting pt. Solid	11.005
Liquid	10.6
Coefficient of linear expansion 18—100° C., per degree	29.4×10^{-6}

The very properties that limit the application of lead in some structures are frequently responsible for its use for other purposes. Thus, its softness and ability to flow at modest temperatures permit the extrusion of lead around electric cables that are insulated with materials that would be destroyed by higher temperatures. Such cable is readily coiled, bent and straightened in transporting and installing and is most easily joined and repaired when installed. The imperviousness of lead to moisture penetration permits the maintenance of the original dielectric properties over many years, and the corrosion resistance of lead permits the inexpensive installation of such cables under conditions that would result in rapid failure of many other materials.

The high density of lead frequently prevents its economical use in competition with the lighter metals such as zinc and aluminum, but when weight is a primary consideration then lead, the heaviest of the common metals, is indeed first choice, for it can always be economically fabricated to adapt it to any method of weighting or ballasting.

The tendency for lead to flow under sustained loads frequently prevents its use for many purposes. In others, this property demands engineering provisions in the way of supports that add to the cost and limit its application. Conversely, where a material is needed to distribute the application of load upon an irregular surface, as for instance seating iron or steel on a concrete base or where mating surfaces need to be liquid- or gas-tight, the flow properties of lead make it ideal as a pad or gasket. In addition, the corrosion resistance of the metal insures satisfactory life over very long periods. A substantial use for lead is in caulking the joints of cast-iron pipe. Here the ability to cast the metal into the joint at temperatures that will not injure the pipe plus the ability to pound or caulk it tight without at the same time making a joint so stiff that it will not yield under expansion forces or misalignment are such indispensable advantages that lead is universally preferred to all other materials.

In most uses for lead its low melting point is directly or indirectly of considerable importance either in permitting the metal to be used in the first place or in effecting an important economy in the fabrication of the metal. In some cases the low melting point is the primary reason why the metal can be used. Obviously, the soft solders are a case in point since adding lead to tin lowers its melting point and incidentally its cost. Less well known are the many complex low melting lead alloys containing bismuth, tin, cadmium, indium, etc. By suitable combinations of these elements with lead the melting point can be lowered almost to room temperature and the liquid metal can be handled with no more discomfort or difficulty than the handling of hot water. Certain of these alloys containing substantial amounts of bismuth actually expand after solidification and are particularly useful for mounting tools and other objects rigidly in precise alignment at a low cost, for although the alloys are somewhat expensive they can be used over and over again with practically no loss.

In all phases of the metallurgy of lead its low melting point and its molten stability in air are important contributors to low cost refining and fabrication processes. For example, in refining lead the kettles frequently hold over 200 tons of metal. Powerful electric mixers effect complete temperature uniformity when desired and the temperature control of such large masses can be as precise as the measuring method with only the simplest of manual burner controls. Major changes in heat input are needed to bring about any rapid change in temperature of such large masses.

In many cases where lead and its alloys are being processed, it is customary to maintain large quantities of the alloy liquid at all times and to remove by pumping the small quantity needed for the individual castings, replacing the metal withdrawn with pig

or ingot to keep the liquid metal reservoir at fairly constant level. This procedure obviously can be used only in handling a metal like lead where the fuel cost to maintain the metal molten is quite low and the stability of the molten metal is high, particularly with respect to air.

In one sense of the word, none of the uses discussed so far consumes lead. They merely borrow the lead and after a period of time varying from a few years to centuries return almost all of it in the form of scrap. This very high return is due to the corrosion resistance of lead and the ease with which lead can be separated from other contaminating material. Thus a simple stripping and melting operation will return practically all the lead used for cable sheathing into a form which permits its reuse for many purposes even without refining. With rather simple refining procedures it also can be reused again as cable sheathing metal. In fact scrap lead frequently provides the bulk of metal used in making lead alloys where contaminating elements such as tin and antimony are an asset rather than a liability. Solder, type metals, bearing alloys, etc., consume much of the lead scrap available since these alloys are refined to very exacting standards after alloying and there is little advantage in employing high-purity metals initially.

Fortunately for the lead producers there are several truly consumptive uses for lead and much of the corroding lead produced in the United States goes into these uses. Corroding lead is correctly named, for, in spite of the fact that it is the highest purity lead commercially available and the general assumption that the highest purity metals are most resistant to chemical action, originally it was deliberately corroded to form basic lead carbonate or white lead. While by mid-20th century the manufacture of white lead was not so important as formerly, the production of corroding lead and its use to produce various compounds of lead was more important than ever. The growth in the use of tetraethyl lead in gasoline is more than adequate consolation for the shrinking white lead market. The production of red lead and litharge has shown a steady growth over the years and of course the growth of the nonconsumptive use in battery oxides has been phenomenal. In the ceramic field the consumption is increasing due to the special properties of lead glasses and glazes. The low melting point vitreous enamels, particularly those developed in the 1950s for application to aluminum, created additional markets for the metal in subsequent years.

For uses of lead in architecture and decorative art *see* LEADWORK.

Nuclear Shielding.—Lead is the ultimate decomposition product of certain radioactive disintegrations. Lead from such sources has an atomic weight different from that of common lead and a demonstration of this was the first proven exception to the "law of definite proportions" that was universally accepted in the 19th century. For example lead from the uranium series has an atomic weight of about 206; that from thorium, 208. A unique characteristic of lead is its ability to absorb short wave-length radiations such as X-ray and radium emanations.

Therefore, in the nucleonics industry lead is used both in the form of metal and in glass for shielding gamma rays. Glasses have been developed containing as much as 80% lead and these are most useful for windows in radiation technology. For reactor shielding where space is important, lead is the preferred material to prevent escape of gamma radiation. It is most probable that substantial quantities of lead will be used for shielding in connection with all mobile reactors and even in stationary reactors where space considerations are important or where flexibility of design is beneficial (*see* also NUCLEAR ENGINEERING).

See also references under "Lead" in the Index.

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(A. J. Ps.; H. D. S.)

LEAD-CHAMBER PROCESS: *see* SULFURIC ACID.

LEADING NOTE: *see* SCALE.

LEAD POISONING (PLUMBISM) is almost exclusively an occupational disease which is usually chronic in nature. Occupations involving potential lead exposure include the ceramic industry (where lead glaze is used), filemaking, house painting, glassmaking, copper working, plumbing and gas fitting, printing, cutlery and storage-battery manufacture.

The poison affects the entire body but especially the nervous system, the gastrointestinal tract and the blood-forming tissues. Its victims become pallid, digestion is deranged, appetite fails and painful colic with constipation supervenes. The loss of power is generally shown first in the fingers, hands and wrists, and the condition known as "wrist drop" soon follows, rendering the victim useless for work. The palsy will extend to the shoulders, and shortly after to the legs also. Other organs frequently involved are the kidneys, which become fibrotic (granular kidney). Because of optic atrophy the sight is weakened or even lost.

Lead poisoning frequently occurs accidentally in young children from the ingestion of lead-containing paints on furniture or toys and is often manifested by severe cerebral involvement ("lead encephalopathy"). *See* INDUSTRIAL MEDICINE; POISON.

See Abraham Cantarow and Max Trumper, *Lead Poisoning* (1944).
(F. L. A.)

LEADVILLE, a city of Colorado, U.S., on the headwaters of the Arkansas river at an elevation of 10,200 ft., 75 mi. S.W. of Denver, is one of the celebrated mining camps of the world. The county seat of Lake county, it is served by the Denver and Rio Grande Western and the Colorado and Southern railroads.

Gold was discovered in California gulch in 1859 and Oro City, south of the present Leadville, had a population of 5,000 in 1860. Gold mining declined in 1866 but the discovery that the carbonate of lead ores were laden with silver caused the founding of Leadville in 1878. When the Denver and Rio Grande railroad reached the city in 1880, the population was over 15,000. More than 30 silver mines on Fryer's hill continued to yield heavily until the silver market collapsed in 1893, after which the population declined. In the second half of the 20th century it was about 4,000.

About 90% of the world's molybdenum is produced at Climax (12 mi. N.E. of Leadville), where nearly a third of Leadville's male labour force was employed.

See Don L. and Jean H. Griswold, *The Carbonate Camp Called Leadville* (1951).
(HY. L. C.)

LEADWORK. Lead has two main uses in which some artistic purpose may be served: in architecture, as a material for roof coverings, gutters, piping and cisterns; and in decorative art, as a material for sculpture and applied ornament. As an architectural material it has the advantage of being easily worked and yet offers great resistance to climatic conditions. It was used in the middle ages for church roofing in preference to other materials, and from the 16th century it appeared in England in the form of gutters and pipe heads, often with cast ornament. Some of the late 17th- and early 18th-century pipe heads, cast with the arms of the owner of the house and the date of erection, are important decorative features.

The low melting point of lead and its relative freedom from contraction when solidifying make it particularly suitable for casting, and it has been used as a substitute for bronze or precious metals. The earliest-known lead sculptures are small votive figures found at Troy and Mycenae. In the Hellenistic period lead sarcophagi were known, and the Romans made much use of the metal. Large amounts of worked lead in various forms have been found in those parts of England where the Romans had permanent settlements. England was indeed one of the main lead-producing areas in the middle ages and it was more widely employed there than on the continent of Europe.

In the 12th century the German monk Theophilus, in his treatise on metalworking, refers to lead only in connection with casting rods for stained glass windows and as a material through which silver sheets might be hammered, but in England at about the same time a remarkable series of lead fonts was cast, of which 16 still survive in position, the most famous being those at Walton-on-the-Hill, Surrey, and at Wareham and

LEADWORK

PLATE

Lead font in Lady St. Mary's church, Wareham, England, 12th century

Oblong cistern of cast lead from Holy Trinity Convent, Bromley, Kent; dated 1713. Victoria and Albert museum

Lead medallion of Willibald Pirkheimer by Albrecht Dürer (1471–1528); German, 16th century. Victoria and Albert museum

Head by Franz Xaver Messerschmidt (1736–83); Austrian, 18th century. Victoria and Albert museum

Hanging cistern of cast lead with wing-top water tap of brass; English, 17th century. Victoria and Albert museum

Detail of a river god (Enns) from the lead fountain by Georg Raphael Donner (1693–1741) formerly in the Neuen Markt in Vienna, Austria. Osterreichische Galerie, Vienna

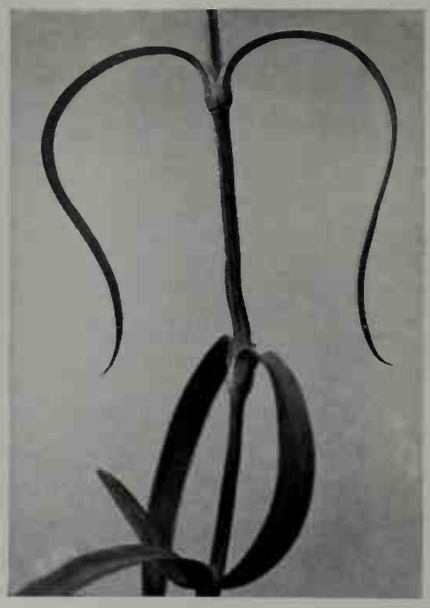
"The Three Nymphs," lead group by Aristide Maillol (1861–1944); French, 20th century. Tate gallery, London

LEADWORK, 12TH TO 20TH CENTURIES

BY COURTESY OF (TOP LEFT) ALEC TIRANTI LTD., FROM GEORGE ZARNECKI, "ENGLISH ROMANESQUE LEAD SCULPTURE," (TOP RIGHT, CENTRE LEFT, CENTRE, CENTRE RIGHT) VICTORIA AND ALBERT MUSEUM, (BOTTOM LEFT) OSTERREICHISCHE GALERIE, VIENNA, (BOTTOM RIGHT) THE TRUSTEES OF THE TATE GALLERY

LEAF

Rosette leaf arrangement in a giant Japanese butterbur

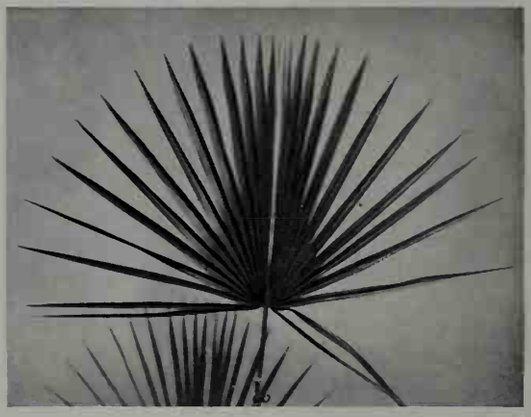


Carnation leaves in opposite arrangement

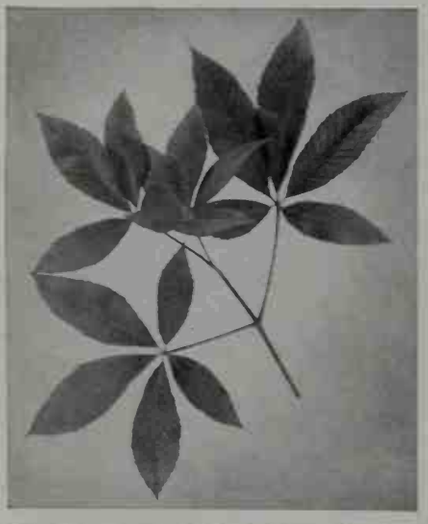
Equitant arrangement of iris leaves with parallel venation

American elm leaves, with pinnate venation, in alternate arrangement

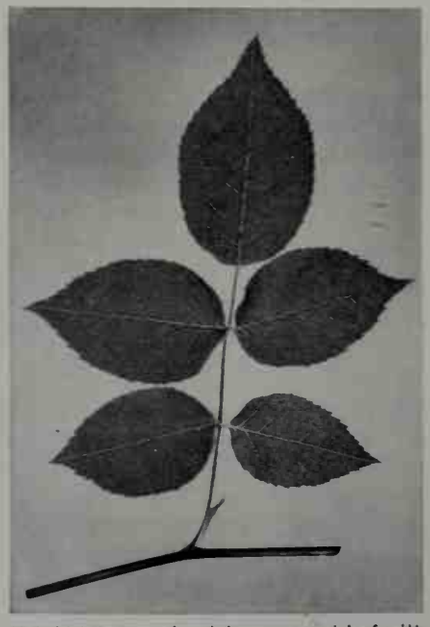
Simple maple leaf with palmate lobing and venation



Palmetto palm leaf, palmately divided with parallel venation



Palmately compound leaves of the red buckeye, in opposite arrangement



Hybrid tea rose, pinnately compound leaf with stipules at base of petiole

American starflower with leaves in whorled arrangement

LEAF ARRANGEMENT, SHAPE AND VENATION

BY COURTESY OF (SECOND ROW LEFT, BOTTOM LEFT) U.S. FOREST SERVICE; PHOTOGRAPHS, (TOP LEFT) ROCHE, (TOP RIGHT, SECOND ROW RIGHT) ROSS E. HUTCHINS, (OTHERS) J. M. CONRADER

Dorchester in Dorset. Lead was also used, doubtless because of its cheapness, for the small badges or medallions sold to pilgrims at the great medieval shrines. Not all religious institutions were wealthy, and a group of 14th-century caskets covered with lead tracery, gilded to look like precious metal, have survived in church treasuries. These were used as reliquaries, but were originally made for secular purposes.

The Renaissance passion for collecting bronze medals and plaquettes led to a demand for cheap replicas, and these were made with great precision in lead. The metal also played an important role in the goldsmiths' trade. The fashion for elaborate relief ornament of the Renaissance and Mannerist periods called for a degree of skill in modeling that was beyond the powers of the average goldsmith. The practice therefore grew up for the pattern makers of Augsburg and Nürnberg, Ger., to sell lead models of ornamental details and figures from which goldsmiths working elsewhere could in turn make molds. An extensive collection of these models is preserved in the Historisches museum, Basel, Switz. The trade expanded to include large medallions and plaquettes, the chief masters of which were the German goldsmiths, Peter Flötner, Jonas Silber and the Master H. G. (Hans Jamnitzer), and the Dutch goldsmith family of van Vianen. Lead in sculpture is more suitable for the production of small figures than of life-size statues which, if unsupported, become distorted through their own weight. Among the few life-size equestrian lead statues is one of Frederick Louis, prince of Wales, in the grounds of Hartwell house, Buckinghamshire, Eng.

A great extension of the use of lead took place with the introduction of lead garden sculpture in the late 17th century. Its silvery gray colour and resistance to the weather made it particularly suitable for use in the many formal gardens that were created at this time. The model was provided by the garden sculpture of the palace of Versailles, much of which was in marble. In England these allegorical figures and vases were mostly the work of anonymous sculptors, but some of the finer examples in the gardens of Chatsworth, Derbyshire, Castle Bromwich, Warwickshire and elsewhere were the work of Jan van Nost (d. 1700), a Belgian who had once worked for Grinling Gibbons. Sir Henry Cheere (d. 1781) had a factory for lead garden figures at Hyde Park corner, London.

English garden sculpture rarely achieves any particular aesthetic status, but in 18th-century Germany and Austria lead was used by a group of artists of the highest standing. The first to abandon the traditional materials—marble, carved wood and bronze—was the Austrian Georg Raphael Donner (d. 1741), who executed in lead some of the noblest works of sculpture of the 18th century, among them the famous fountain in the Neue Markt, Vienna (now replaced by a bronze copy), and the immensely moving *Pietà* in front of the high altar of the Carinthian cathedral of Gurk. Donner was followed by other sculptors working in lead, among them J. N. and B. F. Moll, who created the series of lead sarcophagi of the Habsburg emperors and their families in the crypt of the Capuchin church in Vienna, and F. X. Messerschmidt (d. 1783), who executed 31 of his character studies of human types in lead (one is in the Victoria and Albert museum, London). German 18th-century works in lead include the sarcophagi of the Prussian royal family by Andreas Schlüter (d. 1714) and a pair of vases 15 ft. high at Schloss Schleissheim in Bavaria.

In the 19th century lead was out of favour with sculptors, partly because improved transport made it possible to bring large blocks of marble from Italy at low cost. Its soft colouring and the fact that it does not reflect light give it certain advantages, and lead has been used in the 20th century by Aristide Maillol and by Jacob Epstein, who executed the important lead figure of the Virgin and Child in Cavendish square, London.

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LEAF, WALTER (1852–1927), English banker and Homeric scholar who translated the *Iliad,* was born at Norwood, London, on Nov. 28, 1852. His family belonged to a south London business community, evangelical in outlook, with academic and intellectual interests. Educated at Harrow and at Trinity college, Cambridge, he numbered Matthew Arnold, F. W. Farrar and A. Verrall among his earliest friends. Forced by family circumstances into a city career instead of a university one, he rose to be chairman of the Westminster bank (1918) and played a leading part in the foundation of the Institute of Bankers and the International Chamber of Commerce. The translation of the *Iliad* which he produced with Andrew Lang and E. Myers is marred by ill-judged archaisms (1882). But the second edition of his commentary (1900–02) and his works on Homeric geography represented, in spite of his "nuclear" theory of the poem's origin, the best scholarship of the day. He died at Torquay on March 8, 1927.

See C. M. Leaf, *Walter Leaf* (1932). (R. R. Bo.)

LEAF, popularly any usually flattened green structure borne laterally along the stem or axis of a typical higher plant. Green leaves are the basic food producers of the world. They manufacture food for plants, which in turn ultimately nourish and sustain all land animals. Botanically, leaves are an integral part of the stem system, and are initiated in the apical bud along with the tissues of the stem itself (*see* STEM). Certain organs that are superficially very different from the usual green leaf are formed in the same manner and are actually modified leaves; among these are the sharp spines of the Japanese barberry and the scales of an asparagus stalk or a lily bulb. The sepals, petals and other parts of a flower are considered by some to be modified leaves on a compact, modified stem (*see* FLOWER for other viewpoints).

This article is concerned mainly with the gross structure and wide variations of the leaf; information on microscopic structure and function, kept to a minimum here, can be found in the article PLANTS AND PLANT SCIENCE.

External Features.—*Blade and Accessory Organs.*—Leaves are highly diverse in size, shape and in various minor characters in different species but also to some extent on the same plant. A typical leaf has a thin, flattened and green blade or lamina attached to the stem by a leafstalk or petiole. The leaf may, however, be an inch or more thick in certain succulents, as in the century plant, and may be brilliantly coloured, as in the upper leaves of the poinsettia. Leaves may be transitory, as in cacti, where they fall off soon after developing, giving up their food-producing function to the fleshy green stems; or they may be relatively long-lived, as in many evergreens. Leaves differ, among other things, by the presence or absence of a petiole; the method

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FIG. 1.—LEAF FORM OR OUTLINE: (A) SUBULATE (JUNIPER, ENLARGED); (B) FILIFORM (CUMIN); (C) FILIFORM SEGMENTS (FENNEL); (D) LINEAR (TIMOTHY GRASS); (E) LIGULATE (AMARYLLIS); (F) OBLANCEOLATE (LETTUCE, YOUNG LEAF); (G) SPATULATE (SOW THISTLE); (H) RUNCINATE (DANDELION); (I) LANCEOLATE (BAMBOO); (J) OVATE (COLEUS); (K) ELLIPTIC (DOGWOOD); (L) OBLONG (ROSEMARY); (M) DELTOID (QUAKING ASPEN); (N) ACICULAR (PINE); (O) PANDURIFORM (FIDDLE LEAF FIG); (P) RENIFORM (GINKGO); (Q) OBOVATE (BUCKTHORN); (R) RHOMBOID (GRAPE IVY, LEAFLET); (S) ORBICULAR (FLORIST'S GERANIUM)

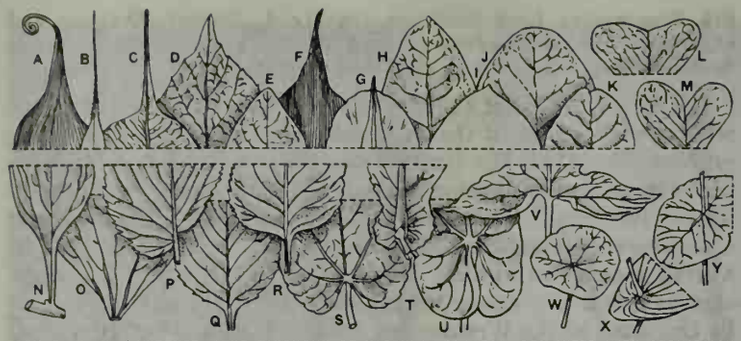

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FIG. 2.—LEAF OR PETAL BASES AND APEXES: (A) CIRROSE (GLORY LILY); (B) ARISTATE (BARLEY, GLUME TIP); (C) CAUDATE (FICUS); (D) ACUMINATE (WOOD NETTLE); (E) ACUTE (LILAC); (F) CUSPIDATE (ARMERIA, INVOLUCRAL BRACT); (G) MUCRONATE (ARMERIA, INVOLUCRAL BRACT); (H) MUCRONULATE (BARBERRY); (I) APICULATE (HOUSE LEEK); (J) OBTUSE (BOXWOOD); (K) RETUSE (SMOKE TREE); (L) EMARGINATE (OXALIS, LEAFLET); (M) OBCORDATE (OXALIS, LEAFLET); (N) ATTENUATE (BITTERSWEET); (O) CUNEATE (HORSE CHESTNUT, LEAFLET); (P) OBLIQUE (ELM); (Q) OBTUSE (CEANOTHUS); (R) TRUNCATE (POPLAR); (S) CORDATE (LINDEN); (T) AURICULATE (FICUS); (U) SAGITTATE (TAIL FLOWER); (V) HASTATE (SYNGONIUM); (W) PELTATE (NASTURTIUM); (X) PERFOLIATE (HONEYSUCKLE VINE); (Y) CONNATE-PERFOLIATE (HONEYSUCKLE VINE)

of leaf attachment to the stem and blade attachment to the petiole; the shape of the tip and base of the blade; the nature of the blade margin; and the type of venation.

A petiolate leaf has a leafstalk; a sessile leaf lacks a stalk. Among grasses and some other plants the lower portion of the leaf is clasped around the stem, forming a leaf sheath. If the leaf grows around the stem but is not clasping, it is termed perfoliate. Bladelike outgrowths on either side at the base of the petiole are called stipules. Stipules may be inconspicuous and fall early in the development of the leaf, as in some oaks; spiny, as in the black locust; small, as in the rose; or large and an important supplement to the leaf surface, as in the pea.

Shape.—Leaf shapes form an important character in plant identification, and the various, more or less diagrammatic, shapes shown in fig. 1 have been given the names shown in the figure caption. Within a general leaf shape the tip and base of the leaf may vary enough that names have been given these also, as shown in fig. 2. Thus, for example, the deltoid leaves of two species of poplar may differ in that one shows an acuminate and the other an acute leaf tip shape; these characters will then aid in distinguishing the two species.

Margins.—Leaf margins (fig. 3) may be smooth or entire (*i.e.*, with no indentations) or finely or coarsely indented. A fine-tooth margin is called serrate or dentate. Smoother and larger undulations are termed notched, wavy or scalloped. More as a matter of shape than of margin, a leaf may be cleft, with sharp incisions, or lobed, with rounded incisions.

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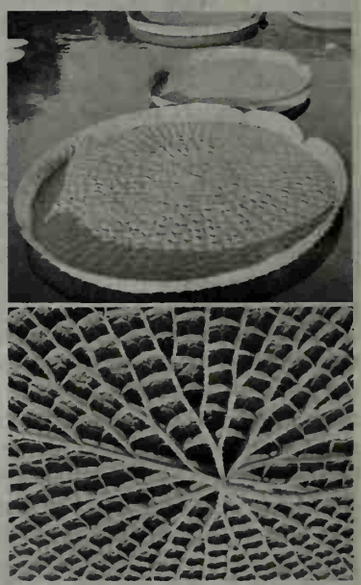
FIG. 3.—LEAF OR PETAL MARGINS: (A) ENTIRE (SMILAX); (B) UNDULATE (ECHEVERIA); (C) CRENATE (COLEUS); (D) SERRATE (ELM); (E) SERRULATE (CHERRY); (F) DOUBLE SERRATE (KERRIA); (G) INCISED (CENTAUREA, INVOLUCRAL BRACT); (H) CILIATE; (I) CLEFT (CROTON); (J) PALMATIFID (JAPANESE MAPLE); (K) REVOLUTE (LAVENDER, CROSS SECTION IN DIAGRAM); (L) CRISPATE (PARSLEY); (M) DENTATE (HONESTY); (N) DENTICULATE (CHOKE CHERRY); (O) LACERATE (ANGELICA, LEAF SEGMENT); (P) LACINIATE (CENTAUREA, RAY COROLLA); (Q) PECTINATE (PROSERPINACA); (R) LOBED (OAK); (S) PARTED (CELERY); (T) PEDATE (DRAGONROOT); (U) PINNATIFID (POLYPODY FERN)

Venation.—The two main types of leaf venation are net (in dicotyledons) and parallel (in monocotyledons). The leaves of a net-veined plant may be classed on the basis of the arrangement of their main veins as palmately or pinnately veined. In the first the main veins radiate fingerlike from the petiole. In the second, more common, arrangement an extension of the petiolar venation forms a central midrib, from which the main branches diverge like the vanes of a feather. With either main branching system the smaller veins and veinlets form a dense network throughout the leaf blade. If the leaf is lobed or cleft, the margin fits the venation pattern. Thus maple leaves, which are palmately veined, are also palmately cleft; likewise, oak leaves, pinnately veined, are pinnately lobed.

There are two types of parallel venation. In one the veins run parallel from the base of the blade to the tip, as in the iris, corn, tulip; in the other the veins run parallel to each other and at an angle to the midrib of the blade, as in the banana, India rubber plant, canna.

Simple v. *Compound Leaves.*—A simple leaf (fig. 5A), as seen in the lilac, oak or coleus, has the attachment of the petiole to the stem marked by the presence of a bud, which is wedged in the upper angle (axil) formed by the petiole and stem. The deeply lobed leaves of various oaks and maples are simple because the incisions do not cut the leaf into separate parts. If the incisions or lobes of a leaf extend to the petiole or to the midrib, separating the blade into small, leaflike parts, the leaf is classed as compound (fig. 5B), either pinnately or palmately.



W. H. HODGE

FIG. 4.—TWO VIEWS OF A GIANT WATER LILY LEAF OF THE AMAZON REGION. (TOP) TOP SIDE OF LEAF WHICH CAN REACH SIX FEET IN DIAMETER AND SUPPORT A BOY; (BOTTOM) UNDERSIDE OF LEAF SHOWING PALMATE VENATION, PELTATE BASE AND AIR POCKETS FORMED BY VEINS THAT PROVIDE BUOYANCY

In the pinnately compound leaf of the Irish potato the individual leaflets may occasionally appear to be sections of a large, potentially simple leaf that have been isolated by the deep lobing of the leaf. In the rose, ash or walnut, however, the leaflets are always distinct, with their own stalk attachments to the main axis of the leaf.

In some cases the compound leaf may appear to be an entire branch. The doubly pinnately compound leaf of the Kentucky coffee tree may reach three feet in length. It consists of a central axis with a number of pinnately arranged stalks, each stalk in turn bearing pinnately arranged leaflets two to five inches long. Such a leaf can be distinguished from a branch only by observing leaf fall (the entire leaf falls in the autumn) and the location of the axillary bud. A leaf of the Kentucky coffee tree shows no buds in the axils of the leaflets and none at the base of the lateral leaf stalks. The bud is found at the base of the main axis, demonstrating the entire structure to be a single leaf. The same test may be applied to the pinnately compound leaves of the rose and walnut and to the palmately compound leaves of the horse chestnut and Virginia creeper.

Internal Structure and Function.—Leaves vary in size from a millimetre or two to many feet in length, with a corresponding variation in width. Moss leaves may consist of a single layer of chlorophyll-containing cells with no special adaptations. The typical foliage leaf of a flowering plant, however, has a protective epidermal layer, a vascular tissue and a soft, green central tissue known as mesophyll (fig. 6).

None of the external features of a leaf has an important effect on the primary function of green leaves, the production of food in photosynthesis (*q.v.*). This depends upon the presence of the

green substance chlorophyll, upon a large total surface and upon an optimum exposure to sunlight. The surface area being the same, a single large leaf is normally as efficient as many small ones. The mass being the same, a thin leaf exposes more surface for the reception of sunlight and absorption of carbon dioxide than a thick leaf. The thin leaf is more susceptible to drying, however. (Generally, thin-leaved plants are found in moist habitats and thicker-leaved, more drought-resistant species in dry locations.) A petiole may enable a leaf to twist out of the shade of the leaves above it. Plants that grow in shady spots may thus be favoured by petiolation of their leaves. Desert plants, on the contrary, may benefit from a compact leaf arrangement that reduces water loss.

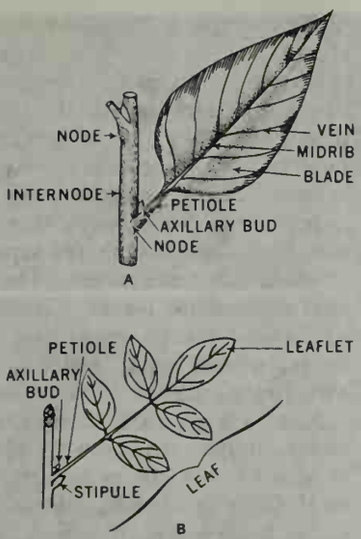


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FIG. 5.—(A) SIMPLE LEAF; (B) COMPOUND LEAF

Epidermis.—The epidermis covers the upper and lower surfaces of the leaf and is continuous with the epidermis of the stem. It consists of a single layer of cells, although it may be underlain with other layers of protective cells, particularly in evergreen leaves. The epidermal cells, strong enough to resist normal wind abrasion, are typically free of chlorophyll but may contain red or purplish anthocyanin pigments, as in red maples, purple beeches and other plants. This covering layer is perforated by small openings, the stomates (or stomata), surrounded by special, chlorophyll-containing cells, the guard cells (fig. 7).

The stomates, continuous with substomatal air spaces, permit exchange of gases between the leaf and the air. They also permit the evaporation of large quantities of water from the leaves in the process known as transpiration. The stomates are opened by the swelling of the kidney-shaped guard cells on either side of them. In wilting leaves the guard cells lose water and the stomates become closed. Stomates, then, are openings that permit gaseous exchange but may also prevent too rapid loss of moisture. Stomates are microscopic in size, but the number on a square inch of leaf surface is large, varying from a few thousand to more than 100,000. The lower surface of a leaf commonly has more stomates than the upper, and in typical leaves of woody plants there are no stomates on the upper surface.

Another feature of the epidermis is the cuticle, or a cuticularized layer, on its outer surface, which greatly reduces direct evaporation of water from the leaf. The cuticle is a very thin varnishlike layer, composed mainly of cutin, that covers the surface of most plant cells directly exposed to the air. It may become thickened in older leaves of drought-resistant plants by the accumulation of cutin or by the deposition of various waxes. Waxes that are secreted through the thin cuticle of young leaves, as in cabbage or blue spruce, are of little protective value, but a heavy deposition of wax directly beneath the cuticle and within the interstices of the outer epidermal wall may form an essentially vapour-proof barrier over the leaf surface when the stomates are closed. For example, the highly drought-resistant leafy tops cut from pineapple fruits can be thrown out in a dry field for a year and still be alive and viable when planted in moist soil.

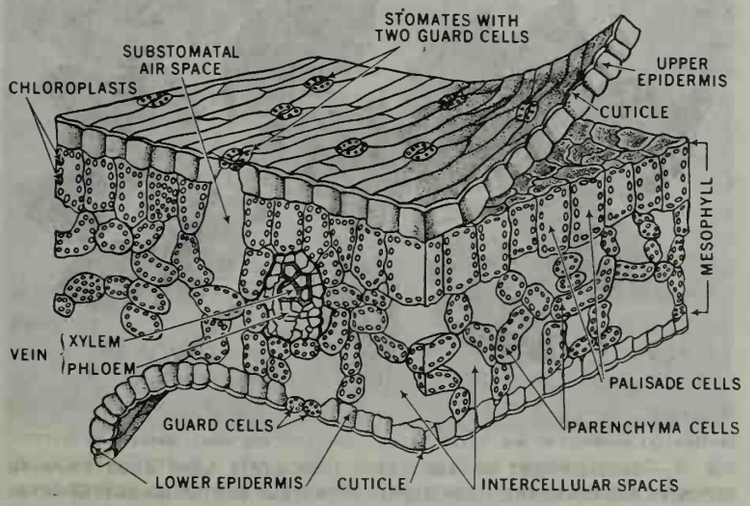
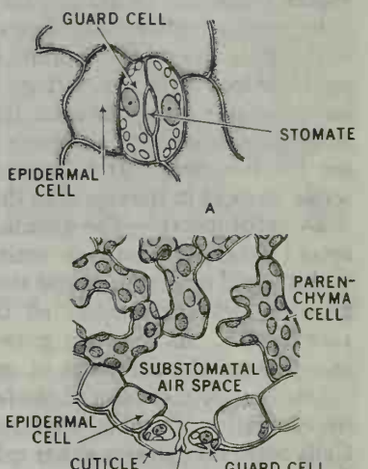


FIG. 6.—SECTION OF A FOLIAGE LEAF

Vascular System.—The veins that course through the leaf serve two main functions: as a strengthening framework and a conducting system. The fibres that accompany the conducting elements make the leaf a very durable organ even though the blade is on an average less than $\frac{1}{100}$ of an inch thick. The veins subdivide within the leaf to form characteristic patterns. In common dicotyledonous plants (*e.g.*, maple, lilac, nasturtium) the veins form a dense network. In the grasses, lilies and other monocotyledonous plants the veins subdivide at the base of the blade or along the midrib and then run more or less parallel to the apex of the leaf. In the larger veins the vascular elements of the water-conducting tissue (xylem) and the food-conducting tissue (phloem) are surrounded by strengthening tissues that frequently extend to the upper and lower epidermal layers, forming an I-beam reinforcement and a protection for the softer cells of the leaf. The smaller veins consist of xylem and phloem elements surrounded by a special layer, the bundle sheath, which appears to be important in controlling the movement of food materials from the leaf. The smallest subdivisions of the vascular system of the leaf contain only two or three xylem elements, surrounded by a bundle sheath, and conduct water and minerals to the cells of the soft mesophyll tissue. There are so many of these smallest veins that it is impossible to make a pinhole in a leaf without striking many of them.



FROM G. M. SMITH ET AL. (EDS.), "A TEXTBOOK OF GENERAL BOTANY"; REPRODUCED BY PERMISSION OF THE MACMILLAN COMPANY

FIG. 7.—(A) SINGLE STOMATE AND ADJACENT CELLS IN SURFACE VIEW; (B) VERTICAL SECTION THROUGH A STOMATE AND THE ADJACENT PORTION OF A LEAF

Mesophyll.—The central leaf, or mesophyll, consists of soft-walled, unspecialized cells of the type known as parenchyma. A cross section of a leaf, examined under a microscope, may show four to ten layers of mesophyll cells, with the number increasing to many in thick-leaved, succulent plants. In a typical dicotyledonous leaf the upper mesophyll is composed of one to four layers of elongated, tightly packed cells known as the palisade tissue because of its appearance. The lower part of the leaf is filled with an open, irregular mass of cells constituting the spongy mesophyll. The palisade tissue is not developed in grasses and may be absent or poorly developed in other plants.

The most striking feature of the mesophyll cells is the presence within them of numerous, rounded, green bodies, the chloroplasts. The chloroplasts contain chlorophylls, which give the leaf its green colour. Chloroplasts may occupy 20% of the space within the mesophyll cells. The chlorophyll content of the live, green leaf is about 0.2% by weight. These pigments are able to absorb sunlight and, in conjunction with enzymes present in the chloroplasts, to use this radiant energy in decomposing water into its elements, hydrogen and oxygen. The oxygen liberated from green leaves replaces the oxygen removed from the atmosphere by plant and animal respiration and by combustion. The hydrogen obtained from water is combined with carbon dioxide in the enzymatic processes of photosynthesis to form the sugars which are the basis of both plant and animal life. (*See* PHOTOSYNTHESIS.)

Abscission Layer and Leaf Fall.—Leaves are essentially

short-lived structures. Even when they persist for two or three years as in coniferous and broad-leaved evergreens, they make little contribution to the plant after the first year. The fall of leaves, whether completely in the first autumn in deciduous trees or irregularly after several years in evergreens, is brought about by the formation of a weak zone, the abscission layer, at the base of the petiole. Abscission layers may form when leaves are seriously damaged by insects, disease or drought. Their normal formation in autumn appears to be due, in part at least, to the shortening of the day. Perhaps the shorter days accentuate the senile changes normal in older leaves. As a result, a zone of cells across the petiole becomes softened until the leaf falls. A healing layer then forms on the stem and closes the wound, leaving the leaf scar, a prominent feature of many winter twigs and an aid in identification.

FROM K. ESAU, "PLANT ANATOMY" (1953); REPRODUCED BY PERMISSION OF JOHN WILEY & SONS, INC.

FIG. 8.—ABSCISSION ZONE OF A WALNUT LEAF, THE DARK RING OF CELLS PASSING VERTICALLY THROUGH THE CENTRE OF THE PHOTOGRAPH

In some situations, as when cotton is to be harvested mechanically, it is desirable to promote early leaf fall so as to reduce interference with harvesting. Chemical sprays that kill the leaves quickly cannot be used, for no abscission layer forms, and the adhering dead leaves are more of an obstacle to harvesting than are the live ones. It is necessary to use chemicals that induce senile changes in the leaves so that they fall cleanly from the plants.

Development.—The growing apical bud of a leafy stem, dissected carefully, shows a series of successively smaller leaves; with the aid of a microscope the new leaves are seen as small outgrowths (leaf primordia) on the sides of the rounded stem tip (*see* STEM). As the stem grows, new leaf primordia are initiated in a pattern characteristic of each plant species.

Once the primordium of the leaf is formed it develops, typically, by elongation, forming what will become the petiole and midrib. Cells begin dividing on either side of this axis, initiating the lateral, flattened leaf blade. By the time the leaf is a few millimetres long its general final shape has been established. Continued growth is by a general cell division at first, followed by extensive cell enlargement and by differentiation into the tissues of the mature leaf. Variations in the growth pattern result in the various shapes and sizes of leaves that constitute one of the distinctive features of different plants (fig. 9).

Differentiation of simple provascular elements into vascular tissues is soon accomplished; the veins of the leaf thus establish continuity with the vascular tissues of the stem.

Modifications.—Botanists classify plant structures as leaves on the basis of their origin and development rather than on their mature appearance, which may be considerably modified (fig. 10). As mentioned earlier, the spines of Japanese barberry and the scales of a bulb are classed as modified leaves on the basis of their origin as outgrowths of the apical axis meristem, and of their relation to the vascular tissues of the stem. The functioning foliage leaves of the barberry plant are borne on very short spurs that arise from the buds in the axils of the leaf spines. Spines are found also in gooseberry and in cactus. In contrast to spines, true thorns are modified branches; they are found on honey locust, Osage orange and hawthorn. The "thorns" of rose and blackberry are outgrowths of the bark and are termed prickles.

Tendrils, elongated, twining outgrowths on many vines or climbing plants, are commonly modified leaves or leaf parts. In the garden pea some of the leaflets at the ends of the pinnately compound leaves may be modified into tendrils. The leaf of the wild pea (*Lathyrus aphaca*) is modified into a single tendril, the normal functions of the leaf being shifted to the greatly expanded stipules at the leaf base. The tendrils of greenbrier are modified stipules. Other tendrils, as those of the grape, are considered to be modified stems.

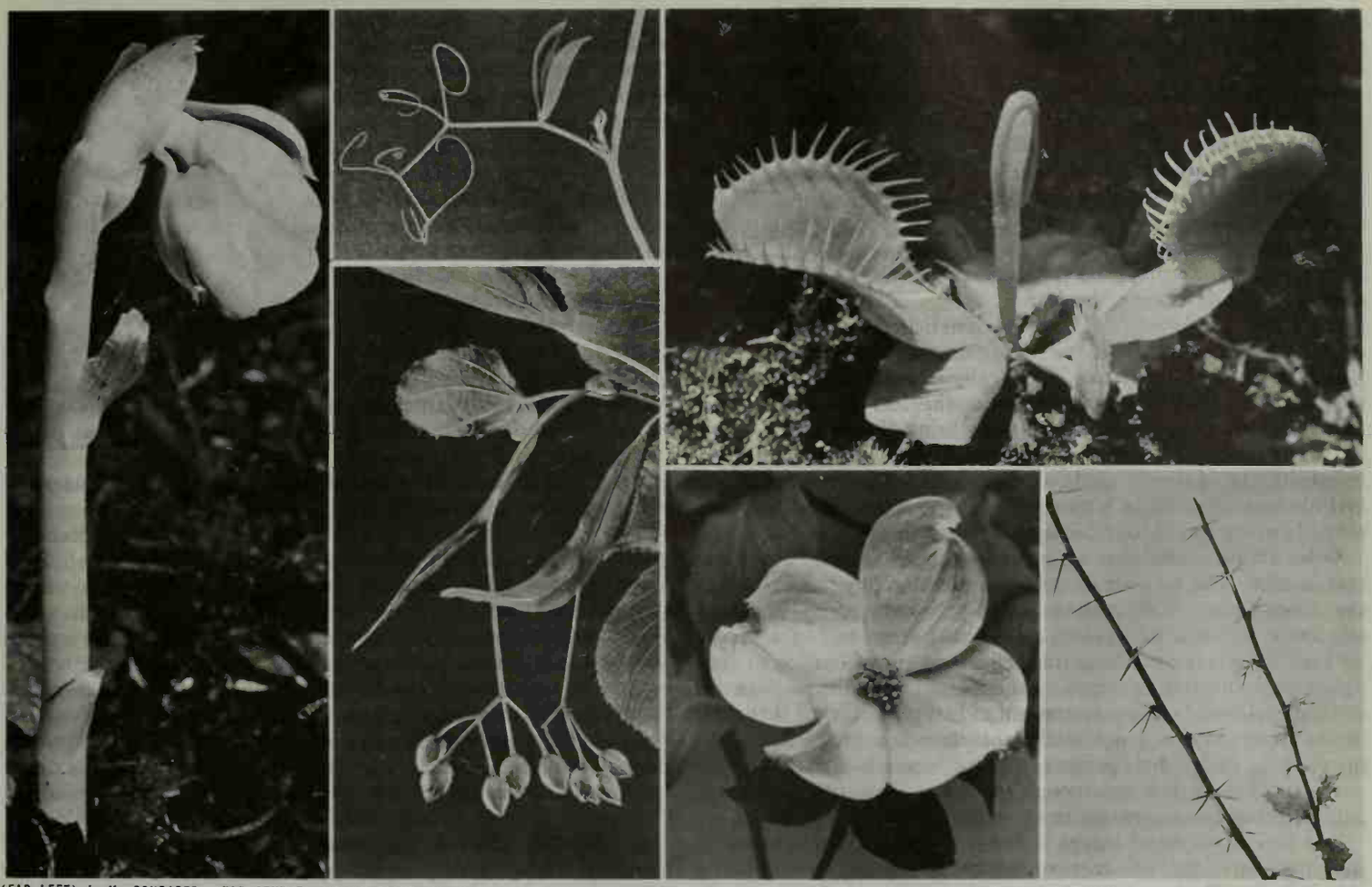
Leaves are frequently reduced to scales. In general, leaves that develop in darkness, as the leaves of rhizomes or of the stolons of Irish potatoes, do not develop beyond the scale stage. In light, however, the same organs may develop normally. Thus the rhizomes of quack, or couch, grass form scale leaves underground but normal grass leaves when they emerge. Parasitic plants such as broomrape and dodder and saprophytic plants such as Indian pipe produce only scale leaves. The scaly covering of winter buds consists of modified leaves. The leaves on the main shoots of pines are scales; the photosynthetic, green pine needles are produced on numerous, small, short lateral branches. Bracts are small, sometimes scalelike leaves associated with certain flowers.

Many leaves, particularly those of succulents, are modified for water storage. A plant with water-storage facilities combined with an effective cuticle, as in purslane, has a survival value that can be the despair of the gardener. Water storage in green leaves or in the scaly leaves of bulbs is a common adaptation in plants of dry regions. Some leaves, as in *Bryophyllum* (*Kalanchoe*), are effective in reproduction, producing small plants in the notches of the leaves; these plantlets may develop on green, fallen leaves, or on attached leaves and fall to the ground to grow independently. The leaves of some plants have a different appearance under different environmental conditions; the water buttercups which usually grow in shallow water have the submerged leaves finely divided and the emergent leaves normally lobed as in other buttercups.

Some of the most interesting leaf modifications are found in carnivorous plants. These may take the form of pitchers, as in the pitcher plants or in *Nepenthes;* of mechanical traps, as in

(BOTTOM) BY COURTESY OF U.S. FOREST SERVICE; (TOP LEFT AND RIGHT) RUTHERFORD PLATT

FIG. 9.—DEVELOPMENT OF ASH LEAF: (TOP LEFT) LEAF BUDS SHOWING OPPOSITE ARRANGEMENT; (TOP RIGHT) PINNATELY COMPOUND LEAVES OPENING; (BOTTOM) MATURE LEAVES OF WHITE ASH



(FAR LEFT) J. M. CONRADER; (TOP CENTRE, BOTTOM RIGHT) W. H. HODGE; (TOP RIGHT, BOTTOM CENTRE) RUTHERFORD PLATT; (BOTTOM LEFT) JOHN MARKHAM

FIG. 10.—EXAMPLES OF LEAF MODIFICATIONS: (FAR LEFT) LEAVES OF INDIAN PIPE REDUCED TO SCALES; (TOP CENTRE) TENDRILS OF A SWEET PEA; (TOP RIGHT) LEAVES OF THE VENUS'S-FLYTRAP ADAPTED TO CATCH INSECTS; (BOTTOM LEFT) BRACTS OF LINDEN; (BOTTOM CENTRE) LEAVES OF DOGWOOD MODIFIED TO FORM THE WHITE BRACTS OF THE FLOWER; (BOTTOM RIGHT) THORNS OF BARBERRY

Venus's-flytrap; of sticky tentacles in the sundew. The bladderworts trap small aquatic animals in traps that could serve as models for fish and lobster traps in general. In all of these plants the digested animals serve as nourishment, particularly as a source of nitrogen for the plants. (*See* CARNIVOROUS PLANTS.)

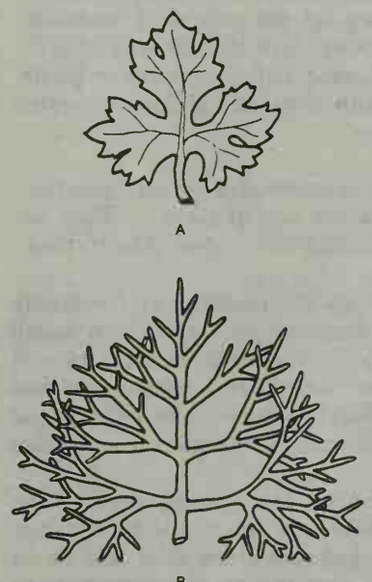
Arrangement or Phyllotaxy.—The arrangement of leaves is obviously dependent upon the order in which leaf primordia are formed on the growing embryonic tip (apical meristem) of the shoot. It may also be modified by the growth of the petiole, when this organ is present. The controlling principle in primordium development is that one leaf is not initiated directly above the last previous one. This reaction seems to depend upon vascular connections and food supply to the meristem.

The two seed leaves (cotyledons) formed by dicotyledonous plants are formed opposite each other and at the same node. This opposite arrangement may be continued, the second pair of leaves arising at right angles to the first, the third pair at right angles to the second and above the first, and so on. The opposite arrangement of leaves is seen in ashes, maples, mint and carnation among others.

In a few plants, more than two leaves are produced at a node, forming a whorl, as in catalpa and bedstraw. The leaves of the whorl also are turned so that each new leaf arises between two previous leaves rather than directly above one of them. The rosette form of leaf arrangement that occurs in dandelions, for example, is not a whorl but an alternation of leaves on a greatly shortened stem.

One leaf only at each node above the cotyledons is more common than two or more leaves. These single leaves are then alternately arranged. If the second leaf is above and opposite the first the arrangement, or phyllotaxy, is said to be alternate $\frac{1}{2}$, as in the elm. Perhaps the most common leaf arrangement in dicotyledonous plants is the alternate $\frac{2}{5}$, as in the oak or the tobacco. Note in fig. 12 that the embryonic leaf labeled one is above six, two is above seven and three is above eight. Or, considering the oldest leaf, eight, leaf seven was formed $\frac{2}{5}$ or 144° around and up the stem in a right or clockwise spiral; leaf six was $\frac{4}{5}$, leaf five $\frac{6}{5}$, leaf four $\frac{8}{5}$ and leaf three $\frac{10}{5}$, or directly above leaf eight. Both clockwise and counterclockwise spirals occur. The advantage of the alternate $\frac{2}{5}$ arrangement in exposing the leaves to sunlight is obvious from the drawing. Alternations other than the $\frac{1}{2}$ or $\frac{2}{5}$ occur infrequently.

In contrast to the dicotyledons, monocotyledonous plants have only one seed leaf, and tend to continue the pattern of one leaf at a node. Alternations of $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{2}{3}$ are common.



A

B

FIG. 11.—VARIATION IN LEAVES OF A WATER PLANT, CROWFOOT: (A) AERIAL LEAF; (B) SUBMERGED LEAF

In addition to the initial phyllotaxy much of the actual pattern of leaf arrangement is due to the twisting of the stem during growth and to the turning of the petioles and of the leaf attachment at the petiole. (Leaf arrangements are surprisingly regular in terms of the vascular system of the shoot, however.) These patterns, superimposed on the basic phyllotaxy, are often seen in the arrangement of the leaves of house plants in a window. Within one or two days the leaves of a geranium (*Pelargonium*) plant placed near a window will have become so disposed that each leaf is receiving the maximum amount of light. Similarly, the leaves on a horizontal branch become oriented with the blades

at right angles to the principal light source. The leaves on an ivy covering a wall are so arranged that the lower leaves are fit between those above them. The result is a leaf mosaic.

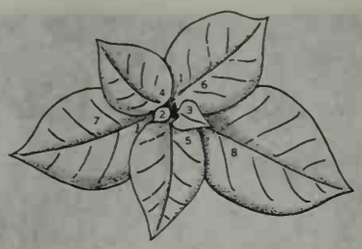


FIG. 12.—VIEW FROM ABOVE OF THE TOBACCO PLANT SHOWING $\frac{2}{5}$ PHYLLOTAXY

Leaf mosaics are formed by the differential elongation and the bending of petioles. If a shade is placed over one side of a leaf, the petiole will normally bend in such a way as to move the leaf from beneath the shade. This action is elicited by a growth hormone, which tends to become concentrated in the shaded portion of the leaf and to move unilaterally down the petiole, stimulating a one-sided growth that moves the leaf from under the shade. If this movement happens to bring the leaf into shade on the other side, a balancing effect holds the leaf in a position to receive the optimum amount of sunlight. The bending of the leaf blade on the petiole is more difficult to explain, but is presumably likewise effected hormonally.

Coloration.—The normal, green colour of leaves is, as indicated earlier, due to a small quantity of chlorophylls localized in the chloroplasts. A dark-green leaf of a Norway maple may contain twice as much chlorophyll as the light-green leaf of a poplar without there being any important effects on the utilization of sunlight and production of sugar by the leaf. Horticultural varieties of coleus, elm and elder may contain so little chlorophyll that their leaves appear yellow, particularly when grown in bright sun. The quantity of chlorophyll present in these leaves is enough to support good growth but not enough to permit these plants to compete with the greener plants in the wild.

The yellow colour of leaves is due to carotenoid and anthoxanthin pigments, the presence of which is normally masked by chlorophylls. Red- and purple-leaved horticultural plants contain anthocyanin pigments in addition to the other pigments. These plants also do not compete in the wild; the anthocyanins that they contain block much of the available light and reduce the efficiency of the chlorophyll.

The autumnal colours of many leaves are particularly appealing. The yellows are due in part to carotenoids made visible by the decomposition of the chlorophylls and in part to various yellow pigments formed from the chlorophylls themselves. The reds and purples are again anthocyanins, the formation of which is stimulated by shorter days, cool weather and bright sunshine.

See COLORATION, BIOLOGICAL; *see* also references under "Leaf" in the Index. (W. E. Ls.)

LEAF-CUTTING BEE, the name applied to solitary bees of the genus *Megachile,* which line their nests with portions of leaves or flower petals. These they cut out with their mandibles and fit together, one within the other, into thimble-shaped cells, each one containing an egg and some pollen and honey paste. There are numerous species on both sides of the Atlantic, often utilizing rose leaves.

See BEE; HYMENOPTERA.

LEAFHOPPER, the common name for small, generally greenish hopping insects that suck the sap of plants. They are homopterans of the family Cicidellidae. *See* HEMIPTERA: *Homoptera: Leafhopper;* INSECT.

LEAF INSECT, a flat green leaflike phasmid of the family Phylliidae, closely allied to stick insects (*q.v.*) and often called walking leaf. The resemblance to leaves involves form as well as colour; the legs and abdomen bear lateral expansions, and the large female tegmina (fore wings), lying edge to edge on the abdomen, forcibly suggest in their veining the midrib and veins of a leaf.

Females have reduced, functionless hind wings; males have small tegmina and ample nonleaflike and functional hind wings. Newly hatched young are reddish, but turn green after feeding on leaves a short time. Since leaf insects are phytophagous, or plant-eating, their cryptic colour and form are doubtless purely protective. Their eggs, like those of stick insects, are also probably protected from enemies by their similarity to various seeds. Leaf insects range from India and the Seychelles eastward to the Fiji Islands.

See also ORTHOPTERA.

(T. H. HL.)

ROSS E. HUTCHINS

A LEAF INSECT OF THE PHILIPPINES

LEAF MINER, any of a number of insect larvae which live and feed within the thickness of a leaf. They are chiefly caterpillars (order Lepidoptera), sawfly larvae (order Hymenoptera), beetle and weevil grubs or larvae (order Coleoptera) and maggots of two-winged flies (order Diptera). Most of the burrows or tunnels they make in leaves are either thin, winding whitish trails —characteristic of the columbine and holly leaf miners—or broad, whitish or brownish blotches—typical of the boxwood, burdock and arborvitae leaf miners. Only a few of the many kinds become really injurious, such as the spinach leaf miner, *Pegomya hyoscyami,* a maggot which sometimes ruins spinach, beet and chard leaves; it is often common enough to spoil them for greens. The most feasible method of control on garden plants is to remove and burn infested leaves. Spraying with nicotine solutions or dusting with various insecticides is effective only when the adults are emerging; the mining stage is inaccessible.

See J. G. Needham, S. W. Frost and B. H. Tothill, *Leaf-mining Insects* (1928); Martin Hering, *Biology of the Leaf Miners* (1951).

LEAGUE, HOLY (LA SAINTE LIGUE), an association of Catholics formed during the French religious wars of the 16th century. It originated as a protest against the concessions made to the Huguenots by King Henry III (*q.v.*) in the peace of Monsieur (May 1576). An association was formed at Péronne to prevent the town from being surrendered to the Huguenot leader, Henry de Bourbon, prince de Condé. Whereas earlier associations had been of local significance only, the league of Péronne appealed for support to the Catholics of France as a whole. Henry, duc de Guise, responded by forming an aristocratic league pledged to defend the Catholic religion and to revive certain ancient rights and privileges. The League was never a purely religious movement: it was used by various interests to undermine the king's authority and to promote regional particularism. Its reactionary aims were reflected in its supporters' demands at the estates-general of 1576, at Blois. Henry III tried to control the League by placing himself at its head but failed, and in the Edict of Poitiers (Sept. 1577) he ordered its dissolution.

When the Huguenot leader Henry of Navarre became heir presumptive to the throne (June 1584), the League was revived by Guise and his followers to oppose him: they chose Charles, cardinal de Bourbon, an uncle of Henry of Navarre, as their candidate for the succession, and secured the promise of Spanish assistance in the treaty of Joinville (Dec. 1584). In Paris the League was independently revived by a group of priests and bourgeois: after setting up an administrative organization and recruiting new members mainly among the proletariat, they allied with Guise's party to preserve Catholicism, extirpate heresy and root out corruption. In March 1585 the League issued a manifesto attacking the king's favourites and promising to remedy the grievances of the nation and began to raise armies in different parts of the kingdom. While northern and central France and most of the large towns joined it, the south and west remained loyal to the king. In July 1585, in the treaty of Nemours, the king attempted to placate the League by proscribing the Protestant religion and by ceding towns to the League as sureties; but his ineffectual conduct of the ensuing war against the Huguenots angered the Leaguers, particularly in Paris, where the duchesse de Montpensier (Catherine de Guise) and her preachers inflamed public opinion.

In May 1588 Henry III introduced troops into the capital to

safeguard his position, but the citizens revolted (May 12, the "Day of the Barricades") and forced him to take refuge in Chartres. In July he again capitulated to the League in the Edict of Union; but when the estates-general met at Blois in October the deputies, who were largely under the League's influence, demanded the removal of the gabelle and asked the king to create no new taxes or offices. He retaliated by having Guise and his brother Louis, the cardinal de Lorraine, assassinated, and the cardinal de Bourbon and several prominent Leaguers imprisoned (December). This action, far from incapacitating the League, turned it into a formidable revolutionary movement, supported by Spain and the papacy. A committee of 16, the *Seize*, consisting of a representative from each of the committees that administered the city for the League, took control of Paris. Charles, duc de Mayenne (*q.v.*), another brother of Henry de Guise, was elected lieutenant general of the kingdom, and in Feb. 1589 he set up a general council of 54 members, including 14 nominated by himself. Henry III's countermeasures proved of little effect: the whole of France, except for Dauphiné and a few towns mainly in the centre, now supported the League. The king had to ally himself with Henry of Navarre, but was assassinated in Aug. 1589.

While the Huguenots and some Catholic royalists acknowledged Henry of Navarre as Henry IV of France, the Leaguers acclaimed the cardinal de Bourbon as Charles X. After defeating the League's army at Arques (Sept. 1589) and Ivry (March 1590), Henry IV besieged Paris, but the intervention of a Spanish army compelled him to withdraw. Spain did not wish to see France become a Protestant country and consequently gave much support to the League. The council of 16 welcomed this and, after the cardinal de Bourbon's death (May 1590), accepted the idea of a French ruler nominated by Spain; but the more moderate Leaguers resented foreign interference and were even prepared to accept Henry IV if he agreed to become a Catholic. The rift within the League caused Mayenne to intervene in Dec. 1591: he destroyed the authority of the 16 after some of them had hanged Barnabé Brisson, Larcher and Tardif, three prominent moderates. In Jan. 1593 the estates-general, summoned by Mayenne on his own authority, met in Paris, and a Spanish envoy put forward the infanta Isabella's claim to the French throne as the daughter of Henry III's sister Elizabeth; this was rejected by the deputies, who opposed any repudiation of the Salic law. Mockery of these estates-general was reflected in the pamphlet *Satyre Ménippée*. Meanwhile talks began with Henry IV, who, after his failure to capture Rouen (1592), saw that he could not gain his kingdom by force alone: in spite of his efforts the League still controlled much of France. By announcing his readiness to embrace Catholicism, Henry made possible a settlement with the moderate Leaguers. In July 1593 he was received into the Catholic Church, and the disintegration of the League began. The people of Paris were tired of war and welcomed Henry; other towns and provinces followed suit, many nobles submitting to him in return for grants of money, offices and privileges. The papal absolution granted to Henry in Sept. 1595 deprived the remaining Leaguers of their last pretext for resistance —though the duc de Mercoeur (Philippe Emmanuel de Lorraine) held out in Brittany till March 1598. The League had failed to exclude Henry from the throne, but its resistance had shown that only a Catholic could be king of France.

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(R. J. K.)

LEAGUE OF NATIONS. The terrible losses of World War I produced, as years went by and peace seemed no nearer, an ever growing public demand that some method be found to prevent the renewal of the suffering and destruction which were now seen to be an inescapable part of modern war. So great was the force of this demand that within a few weeks after the opening of the peace conference of Paris in Jan. 1919, unanimous agreement had been reached on the text of the covenant of the League of Nations. Although the League was finally unable to fulfill the hopes of its founders, its creation was an event of decisive importance in the history of international relations. The present article offers a brief description of the origins, purposes, functions and structure of the League, together with an outline of its development and of the chief events of its history.

Origins of the Idea.—The central, basic idea of the movement was that aggressive war is a crime not only against the immediate victim but against the whole human community; that accordingly it is the right and duty of all states to join in preventing it; and that if it is certain that they will so act; no aggression is likely to take place. Such affirmations might be found in the writings of philosophers or moralists, but had never before emerged onto the plane of practical politics. Statesmen and lawyers alike held and acted on the view that there was no natural or supreme law by which the rights of sovereign states, including that of making war as and when they chose, could be judged or limited. Many of the attributes of the League were developed from existing institutions or from time-honoured proposals for the reform of previous diplomatic methods. But the basic conception as defined above, which was given the name of collective security in later discussion, was for practical purposes a new birth engendered by the unprecedented pressures of World War I.

When the peace conference met, it was generally agreed that its task should include the establishment of a League of Nations capable of ensuring future peace. Pres. Woodrow Wilson insisted that this should be among the first questions to be dealt with by the conference; and the work proceeded with far greater speed than that of territorial and military settlement, chiefly because the subject had been exhaustively studied during the war years. Unofficial societies in the United States, Great Britain, France and some neutral countries had drawn up many plans and proposals; and in doing so they in turn had availed themselves of the efforts of earlier thinkers.

Over many years lawyers had worked out plans for the settlement of disputes between states by legal means or, failing these, by third-party arbitration, and the Hague conferences of 1899 and 1907 had held long debates on these subjects. The results had been unimpressive; the 1907 conference tried in vain to set up an international court, and though many arbitration treaties were signed between individual states, they all contained reservations which precluded their application in the more dangerous disputes. However, though the diplomatists thus kept the free hand as long as possible, the general principle of arbitration—which in popular language included juridical settlement and also settlement through mediation—had become widely accepted by public opinion and was embodied as a matter of course in the covenant.

Another 19th-century development which had influenced the plan makers was the growth of international bureaus, such as the Universal Postal union, the International Institute of Agriculture and numerous others, set up to deal with particular fields of work in which international co-operation was plainly essential. They had no political function or influence but within their very narrow limits they worked efficiently, and it was naturally concluded that wider fields of social and economic life, in which each passing year made international co-operation more and more necessary, might with advantage be entrusted to similar international administrative institutions. Such ideas were strengthened by the fact that, during the war, the joint Allied commissions controlling trade, shipping, raw materials, etc., had gradually developed into powerful and effective administrative bodies. Might not these, admitting first the neutrals and later the enemy states into their councils, become world-wide centres of co-operation in their respective fields?

Yet other lessons of the war concerned the problems of armaments on the one hand and of diplomacy on the other. It was widely believed that the enormous increase in armaments undertaken by the great powers of Europe during the immediate prewar period had been not only a consequence, but also in itself a cause, of tension, hostility and finally war. Equally strong was the belief that "secret diplomacy," *i.e.*, the existence, under secret treaty, of commitments for reciprocal diplomatic or military support, had enabled statesmen and soldiers to run risks which public

opinion would never have countenanced, had they been known.

These general propositions—collective security, arbitration, economic and social co-operation, reduction of armaments and open diplomacy—inspired in various degrees the plans drawn up during the war, and it was urged from the first that they could become effective only through the creation of a great international organization charged with the duty of applying them and invested with the powers necessary to that end. Already in the spring of 1915 the name "League of Nations" was in general use among the small groups which were discussing the future organization of peace. Their ideas, encouraged by a few statesmen such as former Pres. William H. Taft in the United States and Sir Edward Grey and Lord Robert Cecil in Great Britain, gradually became known and supported. In the United States the League to Enforce Peace and in Britain the League of Nations societies acted as centres of discussion. In the presidential election of 1916 both parties advocated U.S. membership in a future league. A few months later the United States was a belligerent, and Wilson, entering on his second term, became, by right both of his personality and of his position as leader of the greatest world power, the chief spokesman of the Allied coalition. In Jan. 1918, in the historic fourteen points (*q.v.*) in which he summed up U.S. war aims, he called for the formation of "a general association of nations . . . affording mutual guarantees of political independence and territorial integrity to great and small States alike." The fourteen points were in due course accepted by all the Allies as an authentic statement of their war aims also. Thus what had seemed hardly more than a utopian hope was transmuted in a few months into the formal and official purpose of the soon-to-be-victorious Allies.

Meanwhile, both the British and French governments had appointed special committees to draw up plans for the new organization, and their reports were transmitted to Washington where Wilson and his confidential adviser Col. E. M. House were drafting proposals in their turn. A further contribution of great importance was made by the South African statesman Field Marshal J. C. Smuts, who published in Dec. 1918 his famous *The League of Nations: a Practical Suggestion,* in which he declared that the League must not be a mere diplomatic defense against war but "a great organ of the ordinary peaceful life of civilisation . . . woven into the very texture of our political system," and that in the long run its power to prevent war would depend upon the extent of its action in peace. This was to most of his contemporaries a new vision of the real nature of an effective League of Nations.

The Covenant.—With the ground thus well prepared, and under Wilson's resolute leadership, the conference was able to draw up, in a few days of intensive committee work, a document to which it gave the name of the "Covenant of the League of Nations." This text was published, as a draft, on Feb. 14, 1919. It was subjected to various criticisms, especially in the United States where Wilson's star was already on the decline, and also by the European neutrals, who had had no official share in the work. But in general it was well received; and though the first great impulse had already weakened and Allied unity had been much impaired, a final amended text was adopted on April 28, 1919, by the unanimous decision of the conference.

The covenant was a short and concise document of 26 articles. The first seven articles established the constitutional basis of the new system. By article 1, the original members consisted, first, of all the Allied signatories of the peace treaties and, second, of 13 states which had been neutral in the war, if the latter chose to join without reservation. Others could be admitted by a two-thirds majority of the assembly, and any member could withdraw after giving two years' notice.

Articles 2–5 created the directing organs of the League: an assembly composed of representatives of all members; a council composed of representatives of the United States, Great Britain, France, Italy and Japan as permanent members, with four others elected by the assembly. Articles 6 and 7 created a permanent secretariat, provided for the expenses of the League and named Geneva as its headquarters.

Articles 8 and 9 dealt with armaments. All members undertook to reduce their armaments to the lowest possible level, to suppress the evils of private manufacture of arms and to interchange full information as to their existing armaments and their programs for the future. A permanent commission was provided to advise the council on all military, naval and air questions.

Articles 10–17 embodied what may be called the central and basic idea of the League: collective security, together with the various procedures for peaceful settlement of disputes. Each member undertook (art. 10) to respect the integrity and independence of all the others and to join in preserving them against aggression. Article 11 declared that any war or threat of war was a matter of concern to all members, whether directly affected or not; every member had the right to demand that the question be considered by the council, and if necessary to insist on an immediate meeting. By article 12, all bound themselves to submit all serious disputes to peaceful settlement or to inquiry by the council and in no case to resort to war until these procedures had had time to lead to a settlement. And even then, if no settlement were reached, they promised to wait a further three months before going to war. The various methods of settlement—arbitration, legal procedure, or action by the council or the assembly—were then set out in some detail (art. 13–15), and these provisions included the establishment of a permanent international court. Under article 16 all members promised to join in common action against any other which made war in violation of the covenant, this action to take in all cases the form of economic sanctions; *i.e.,* the breaking off of all economic and other intercourse with the covenant-breaking state, and, if this were not enough, of military intervention. This article also empowered the council to expel a member which violated the covenant. And, finally, article 17 extended the system so as to provide protection against, and in certain conditions for, nonmember states.

Article 18 was designed to meet the demand for open diplomacy. It required that all future treaties be registered with, and published by, the secretariat. Article 19 empowered the assembly to propose changes in existing treaties or situations which might be a danger to peace. By article 20 all members agreed that any treaty inconsistent with the covenant was automatically abrogated, and undertook not to enter into any such engagement in the future. Article 21 declared that the covenant did not affect the validity of the Monroe Doctrine (*q.v.*).

Article 22 established the mandates system (*see* MANDATE). Articles 23 and 24 corresponded to the proposals for world-wide economic and social co-operation under the authority of the League; the members undertook to act together in matters concerning transport and communications, commercial relations, health, the drug traffic, etc., and to bring existing international agencies, such as the Universal Postal union, under the direction of the League. They agreed also to set up an International Labour organization (*q.v.*) in order "to secure and maintain fair and humane conditions of labour." Article 25 promised support for the Red Cross (*q.v.*).

Finally, article 26 defined the procedure for amending the covenant; an amendment, to be effective, must be ratified by a majority of the members, including all those represented on the council.

It will be seen from the above summary that the covenant purported to cover each and all of the main proposals which had emerged during the preparatory period—collective security; arbitration and judicial settlement, including the creation of an international court; international co-operation or control in economic and social affairs; disarmament; open diplomacy. It did not satisfy the extreme pacifists, who rejected any use of force, even to resist aggression, or the extreme internationalists, who wished the League to have its own military forces and to impose all its decisions by its own political and military authority. But in the main it fully realized the plans made during the war, and in one essential respect, the creation of efficient working institutions, it went much beyond them.

For the next 20 years the covenant continued to be, in theory, not only the guide and authority for all the activities of the League, but also the criterion by which liberal opinion in many advanced countries judged the conduct of their own and other governments.

In consequence, its text was minutely and repeatedly studied, scrutinized and debated by professors, lawyers and statesmen. This test it bore, on the whole, very successfully. A few minor problems of interpretation were unearthed, chiefly due to the fact that its English and French texts were equally authentic; but in the actual working of the League it never failed to provide both the principles and the methods required by each successive question.

This of course is not to say that its principles were always respected or that its provisions were not capable of improvement. Nevertheless, the covenant system was much more complete and well planned than might appear from the fact of the various failures and final defeat of the League. For it had received, before it even started to function, a blow so severe that it was never possible to apply the system as its founders had intended.

The covenant was in its nature an entirely separate instrument to which neutral states could accede even if they objected to other parts of the peace treaties. But it was in form a part of these, so that, though its text was finally settled in April 1919, it could only come into force at the same time as the Versailles treaty as a whole, on Jan. 10, 1920. Meanwhile, in the United States senate, the leaders of the Republican opposition, by then implacably hostile to Woodrow Wilson and all his works, had resolved to return to the policy of isolationism, which two years before seemed to have been abandoned by almost the whole country. They did not formally propose the rejection of the covenant, but they put forward a number of reservations which Wilson was certain to refuse. Not all the Republican senators were isolationists; there was indeed a clear majority for ratification, either without reservation or with such mild reservations as Wilson could have accepted; but this fell short of the two-thirds majority which the U.S. constitution requires for such decisions. In Nov. 1919 and again in March 1920 the proposal to ratify with substantial reservations was defeated, and the hope of U.S. membership disappeared, as it proved, forever.

The effect of this event upon the future of the League was, in one sense, decisive, since it ruled out all possibility of collective security as embodied in the covenant; *i.e.*, the certainty of a complete economic boycott which, it was confidently expected, would suffice to make even the most aggressive government prefer to settle its disputes by negotiation rather than by armed attack. The other component parts of the system could still function, and did in fact function, though with less effectiveness than if the United States had fully participated therein; but the knowledge that the world's greatest economic power would stand aside from sanctions robbed that part of the covenant of its main terrors for the aggressor and destroyed, in consequence, the confidence that other members could place in it.

However, the League was closely interwoven with the fabric of the peace treaties; there was hope that the senate's decision might some day be reversed; and public opinion in many countries would have strongly resisted any proposal to abandon the League. And so, in spite of the absence of the United States, the first meeting of the League council was held immediately after the ratification of the treaty of Versailles, and the League entered on the very active if not always very successful existence which ended in fact with the outbreak of World War II in 1939, though its formal demise did not take place until April 1946.

Structure of the Organization.—The League quickly became a large and complex structure. Of its principal organs and institutions, the assembly and the council, acting either under the direct terms of the covenant or on their own initiative, decided the nature, membership and competence of the rest, directed their work and provided their budget. The assembly consisted of from one to three delegates from each member nation; many states also sent a large body of substitutes and experts. The makers of the covenant had expected that the assembly would meet perhaps every third or fourth year, but at its first session in 1920 it decided to meet every September. Each session opened with a general discussion on the work done during the past year or planned for the next; this discussion often ranged also over political problems which the speaker considered ought to be dealt with by the League instead of outside it. It then settled down to two or three weeks of committee meetings. Since every delegation was represented on each committee, and these held their meetings in public, the conclusions reached in committee were usually adopted with no more than a few formal speeches in the plenary assembly. The assembly decisions required unanimity among those who voted. Thus, in theory, any member could veto any decision. In practice, such a contingency was exceedingly rare. It became customary for those who disagreed with the proposals of the majority to vote against them in committee, and having thus put their views on record, to abstain from voting in the assembly.

Except that it usually refrained from discussing political problems that were being dealt with by the council, the assembly's debates covered every part of the activities of the League. By the covenant itself, a few matters such as the admission of new members or the revision of obsolete treaties were specifically reserved to the assembly, and from the beginning it insisted on being the sole authority in regard to the budget. It showed much zeal for disarmament, on which the smaller powers, who could there make their voice effectively heard, were dissatisfied with the policy of the great powers and of the council.

The assembly was, by general consent, the most successful as well as the most original of the many innovations of the League. It was original in its constitutional nature as a world-wide conference meeting to discuss not some special question but any and

Members of the League of Nations

Member	Date of entry	Notice of withdrawal (effective after two years)
Afghanistan	Sept. 1934	..
Albania	Dec. 1920	..†
*Argentina	..	..
*Australia	..	..
Austria	Dec. 1920	..‡
*Belgium	..	..
*Bolivia	..	..
*Brazil	..	June 1926
Bulgaria	Dec. 1920	..
*Canada	..	..
*Chile	..	June 1938
*China	..	..
*Colombia	..	..
Costa Rica	Dec. 1920	Jan. 1925
*Cuba	..	..
*Czechoslovakia	..	..
*Denmark	..	..
Dominican Republic	Sept. 1924	..
Ecuador	Sept. 1934	..
Egypt	May 1937	..
El Salvador	..	Aug. 1937
Estonia	Sept. 1921	..
Ethiopia	Sept. 1923	..
Finland	Dec. 1920	..
*France	..	..
Germany	Sept. 1926	Oct. 1933
*Greece	..	..
*Guatemala	..	May 1936
*Haiti	..	April 1942
*Honduras	..	July 1936
Hungary	Sept. 1922	April 1939
*India	..	..
Iraq	Oct. 1932	..
Ireland	Sept. 1923	..
*Italy	..	Dec. 1937
*Japan	..	March 1933
Latvia	Sept. 1921	..
*Liberia	..	..
Lithuania	Sept. 1921	..
Luxembourg	Dec. 1920	..
Mexico	Sept. 1931	..
*Netherlands	..	..
*New Zealand	..	..
*Nicaragua	..	June 1936
*Norway	..	..
*Panama	..	..
*Paraguay	..	Feb. 1935
*Persia	..	..
*Peru	..	April 1939
*Poland	..	..
*Portugal	..	..
*Rumania	..	July 1940
*Siam	..	..
*Spain	..	May 1939
*Sweden	..	..
*Switzerland	..	..
Turkey	July 1932	..
*Union of South Africa	..	..
Union of Soviet Socialist Republics	Sept. 1934	..§
*United Kingdom of Great Britain and Northern Ireland	..	..
*Uruguay	..	..
*Venezuela	..	July 1938
*Yugoslavia	..	..

*Original members. †Annexed by Italy, April 1939. ‡Annexed by Germany, March 1938. §Declared to be no longer a member of the League, by council resolution, Dec. 14, 1939.

all questions of international relations. It was still more original in its spirit, since it gave equal rights and opportunities to be heard to all powers whether great or small and sought deliberately to follow the open and direct methods of a parliament rather than the formalities of a diplomatic gathering.

The council was originally intended to consist of five great powers—the United States, Great Britain, France, Italy and Japan—as permanent members, together with four others elected by the assembly for limited periods. It was expected that Germany would in due course, and that the U.S.S.R. someday might, become permanent members and that the nonpermanent membership might be correspondingly increased. But the United States seat was never occupied, and the number of elected members was increased to six in 1922 and to nine in 1926, so that the intended majority of great powers was never realized.

After the first year, when it met almost every month, the council held three or four regular sessions a year, though it was not until 1923 that it formally decided to meet at fixed dates in March, June, September and December of each year. It also met in special session when necessary. In the early years, its members were usually represented either by statesmen who, after holding high office, had withdrawn from active politics, such as Arthur Balfour or Léon Bourgeois, or by professional diplomatists. In 1925 the European members began to send their foreign ministers to each meeting, a change which greatly enhanced the authority and importance of the council; and this continued to be the normal practice until the last days of the League.

The main business of the council was political. It dealt not only with the major disputes which might endanger peace, but with countless small problems arising out of the peace treaties or submitted to it by the states concerned—problems of frontier adjustment; disputes arising from frontier incidents or accusations of wrongs done to minorities; problems concerning particular areas of constant tension, such as Danzig or the Saar territory, where treaty settlements entrusted administrative or arbitral decisions to the council; reports from committees, such as those dealing with disarmament or with the mandated territories. In any dispute likely to lead to a rupture, the votes of the parties concerned did not count. With this exception, all decisions of substance required unanimity; and all League members concerned in the question under discussion had, for the occasion, the rights of council membership. Actual cases of veto or deadlock were very few; but without doubt the council tended, in consequence, toward compromise or delay rather than clear-cut decisions.

In organizing the secretariat, Sir (James) Eric Drummond, the first secretary-general from 1919 to 1933, struck out on a completely new path when he and his French and U.S. deputies built up a strictly international institution in which it was understood from the first that all officials were to act in independence of their own national authorities. If this ideal was not always realized, it is still true to say that it governed the attitude of the secretariat as a whole and that the latter was rarely if ever accused of partiality on national grounds. As regards its efficiency, the secretariat early reached a high standard and maintained it. In spite of prophecies to the contrary, officials from many different countries were able to work together with zeal and cordiality, and the secretariat was as proud of its corporate spirit as any national service could be. Its work, however, and that of the League in general, was throughout hampered by poverty. At each assembly the League members, especially the richest ones, made devoted efforts to cut down its expenditure to the bone. The average annual budget for the League, the International Labour organization and the permanent court combined was less than $5,500,000. This covered not only running costs but also capital expenditure, including the great Palais des Nations which was completed in 1937. Nevertheless the opponents of the League were able to establish the legend that it was an expensive and extravagant institution.

The assembly, council and secretariat were the central organs of an extensive structure of auxiliary institutions. These fell into two main categories: those of a legal or political character, set up to assist the League in its duty of preventing tension and settling disputes, and those of a social or economic character, whose advice was often sought in connection with political disputes, but whose main function was to organize and extend the habit of international co-operation in social and economic affairs.

The principal organs of the first category were the Permanent Court of International Justice; the Permanent Mandates commission; the minorities committees of the council; and the commissions concerned with military affairs and with the problems of disarmament. Of these, the court and the mandates commission were by general consensus highly efficient bodies which rendered valuable service to the League and to peace. The minorities committees, and indeed all the continuous though mainly secret work of the council for the protection of minorities, were bitterly criticized, on exactly opposite grounds, by the minorities and by the governments concerned. In truth, they redressed not a few injustices, but the council's responsibilities in this field were completely disproportionate to its powers. (For details *see* INTERNATIONAL COURT OF JUSTICE; MANDATE; MINORITIES; DISARMAMENT.)

In the second category, the most important organs were—besides the International Labour organization, administratively a part of the League but otherwise autonomous—the Economic and Financial organization; the Organization for Communications and Transit; the Health organization; and the Intellectual Co-operation organization. To these must be added those dealing with more strictly humanitarian affairs—the control of the drug traffic, the protection of women, child welfare, the abolition of slavery and the refugee problem. Several of these were in themselves complex organizations, comprising regular conferences, a standing committee and numerous subcommittees for special subjects. It is impossible here to attempt even a summary of the immense mass of work done by these bodies, whether in the form of general agreements and treaties, of expert advice and assistance to particular countries or groups of countries, or of consultation and exchange of ideas and methods.

This work formed a continuous, if often inconspicuous, background to the political action of the League; though often frustrated by political conditions, it represented in total a very great contribution to human welfare. It was done without payment, the members—usually eminent experts in their own fields—receiving nothing beyond their expenses.

POLITICAL HISTORY

The 20 years of the League's active existence fell into four periods: (1) 1920–23, a period of growth, during which the League increased its membership and established its machinery, but had little concern with the chief political problems of the time; (2) 1924–31, from the beginnings of reconciliation in Europe to the Japanese aggression in Manchuria, a period of relative stability; (3) 1931–36, from the Manchurian war to Mussolini's victory in Ethiopia and the formation of the Rome-Berlin axis, a period of conflict, during which, however, as during the preceding period, the League was the main centre of international affairs; (4) 1936–39, a period of defeat for the League, during which the covenant was virtually abandoned.

First Period, 1920–23.—During the first period all the organs described above, which made up the League's working structure, were created. All the neutral states invited to accede to the covenant had done so, and three of the states defeated in the war, as well as several of those created by the peace treaties, had been admitted, enlarging the membership from 42 to 54. But while the League was thus establishing itself as a fairly efficient working institution, it was far indeed from exercising the powerful influence on world affairs which its founders had planned. While the United States remained aloof, the so-called Supreme council of the victorious powers clung to the responsibility for dealing with the more serious problems. The only important political achievements of the League in this period were the settlement of the Polish-German frontier in Upper Silesia and the rescue of Austria from financial catastrophe. In each case the council, invited to solve the problem after the Supreme council had tried and failed, did so by what was essentially a new technique in such matters,

viz., by an interlocked complex of political and economic dispositions, based on the advice of its technical organizations. The Austrian model was soon followed by League plans for Hungary, Bulgaria and Greece, and also, in great part, by the Dawes plan for restoring the collapsed economy of Germany (*see* REPARATIONS), although this last was not effected by the League.

The climax of discord and disorder in the postwar period was reached in 1923, when the French occupied the Ruhr in order to force the payment of reparations, and Mussolini occupied Corfu in order to force the Greek government to pay compensation for the murder on Greek soil of a group of Italian officers. The Corfu dispute was expected by many to be fatal to the League, since in this, the first sharp conflict between League members in which the principle of collective security might seem to be involved, Mussolini got his way by methods which plainly violated the covenant. But, under severe pressure in the council and assembly, he was reduced to getting it by a trick and not by continuing to defy the League, and was obliged to evacuate Corfu much sooner than he had intended. The event showed that the League, even if unable to enforce swift decisions, was able to make the way of the aggressor hard and unpleasant.

The Second Period, 1924–31.—The following months produced a notable reversal of the situation, and the League was now to enter upon the second period of its life. New governments in London and Paris set themselves to create better relations with Germany and the U.S.S.R., and both declared that their policy would henceforth be based on the League. The Supreme council had ceased to function; the system of hasty conferences was abandoned; and for the next 12 years Geneva became the main working centre of international affairs. During the first seven of these, the world was free from any serious armed conflict; the minor quarrels with which the council had to deal, though often unpleasant and difficult, usually ended in compromise and did not threaten the stability of the League or the peace of the world.

In the reconstruction of Europe, the question of Germany's admission to the League assumed great importance. It was demanded by Germany as a symbol of its restoration to equality with other great powers, and as enabling it to share in the general management of international affairs, including those arising from the peace treaties. The proposal to admit Germany to the League was supported by the former neutrals and by liberal opinion everywhere as a real beginning of reconciliation, and those who called for reconciliation called also for the execution without further delay of the covenant provisions for disarmament. In France, Poland and other countries which were neighbours of Germany, these sentiments were not absent, but were accompanied by deep anxiety lest the military ambitions of the German empire might again become uppermost in the Weimar republic, and the attitude of the powerful right-wing parties in Germany gave substance to their fears. They maintained that the security provided by the covenant was inadequate and that disarmament could only be undertaken after they had received guarantees of prompt and effective support in case a new aggression should take place. (German armaments had been drastically cut down by the treaty, but its neighbours believed that it was evading these obligations.)

Many other League members, including those of the British Commonwealth, considered the covenant not as inadequate but as the utmost limit of what they could safely promise. But they believed also that disarmament would ensure peace and prosperity, and that if this were achieved they could afford to reaffirm and even strengthen the League's obligations.

Thus it became accepted League doctrine that increased security was a necessary condition for disarmament and that general disarmament was a necessary condition of security. This double thesis was embodied by the assembly of 1923 in a draft treaty of mutual security, which, however, was promptly rejected by all the principal countries except France.

In rejecting this treaty many governments observed that League action in a crisis might often be retarded through disagreement as to which of the conflicting states was in truth the aggressor and which the victim. The answer seemed to be that the aggressor was evidently that state which refused to submit the dispute to arbitration or other peaceful settlement. When, therefore, the assembly of 1924 resumed the effort to reach the combined goals of disarmament and security, it added arbitration as a third component which should make the whole plan workable and complete. From this formula, and from the long studies of earlier assemblies and committees, it drew up what was in effect a treaty of arbitration, mutual security and disarmament. To show that its purpose was not to replace the covenant but to reinforce it, the new plan was called the protocol of Geneva. It constituted, no doubt, on paper, the most complete system of collective security ever devised. It was enthusiastically approved by the assembly. Ten countries, including France, signed it, and others, including Italy and Japan, seemed ready to do so. But a change of government in London, and the natural fears felt by commonwealth countries lest they find themselves in conflict with the United States, led to its rejection by Great Britain.

Further negotiation might well have removed these difficulties; but at this point the German foreign minister, Gustav Stresemann, made a new proposal for calming the reciprocal fears of France and Germany, viz., that France, Germany, Britain and Italy should jointly guarantee the inviolability of the existing Franco-German frontier and also the demilitarization of the Rhineland. After long negotiation, this plan was elaborated (Oct. 1925) into the group of treaties known as the Locarno pacts (*see* LOCARNO, PACT OF).

The Locarno pacts were interwoven at every point with the institutions of Geneva, and their entry into force was made conditional on Germany's admission to the League. Stresemann indeed had already been making cautious approaches to the council on the subject, and had received a friendly reply. All members of the League were now strongly in favour of German membership, and a special meeting of the assembly was held in March 1926 to pass the necessary resolutions. Unexpected difficulties then arose. All agreed that Germany should become a permanent member of the council, and the fellow signatories of Locarno had promised to support this. But now Spain, Brazil and Poland demanded the same privilege, and Stresemann justifiably declared that this was contrary to the spirit of the Locarno agreement. The assembly had to be adjourned. Six months later a compromise was effected. The assembly created only one permanent seat, that of Germany; but it increased the elected members from six to nine, three of which might, at the end of their three-year period, be re-elected for further periods. These semipermanent seats were intended to meet the claims of Spain, Poland and Brazil. Brazil, however, preferred to withdraw from the League altogether.

For the next three years the foreign ministers of France, Great Britain and Germany (Aristide Briand, Austen Chamberlain and Stresemann) kept a directing hand upon the activities of the League. Their regular participation three or four times a year gave fresh authority to the council's meetings. On the other hand, the smaller powers felt that their interests were treated as of little importance and that the Locarno group was indifferent, even unfriendly, toward the general development of the League. Still more serious was the council's excessive preoccupation with European problems; the Latin-American and Asian members felt themselves, and in fact were, neglected. The council's authority had never been so high, but its activities had never been so limited.

Two dangerous disputes, the first between Great Britain and Turkey over the question of whether Mosul and its province should belong to Turkey or to Iraq, the second arising from a frontier fight between Greek and Bulgarian forces, had been settled successfully just before the entry of Germany. Thereafter the council had to cope with nothing more grave than the frequent quarrels between Poles and Germans—quarrels which were bitter enough, but did not seem dangerous until the terrible economic depression which struck the world at the end of 1929. In Germany, from then on, mass poverty and unemployment revived old resentments and gave a new impulsion to the Nazi movement and the demands for rearmament and revenge, while the other powers, each struggling with its own economic difficulties, had little interest to spare for international affairs.

It is necessary here to refer briefly to the laborious efforts made throughout these years at Geneva to reach an effective

agreement on disarmament. In approving the protocol, the assembly had expected it to be speedily followed by a world disarmament conference. After Locarno, it seemed once more that the road to disarmament was clear. The council therefore appointed (Dec. 1925) a commission to prepare the way for the conference. Germany, the United States and the U.S.S.R. agreed to send delegates to this preparatory commission, which for the next five years held many long, difficult and sometimes stormy meetings. At first, progress was retarded chiefly by disagreements among the victorious powers. But as the years passed without definite result, the question of German armaments rose more and more into the foreground. The treaty of Versailles stated that the restrictions it imposed on German armaments were "intended to render possible the initiation of a general limitation." Stresemann's own demands, at least in public, were for equality of status based on reduction by the victorious powers; but the alternative—to reach equality by rebuilding Germany's armed forces—made a deep appeal to the German nation. Stresemann's death in 1929 and the spectacular advance of the Nazi party led to a still more complete deadlock. The German demand for rearmament became more threatening. The powers who feared a German attack were the more resolved to keep their superiority in weapons.

When at last the World Disarmament conference did meet, in Feb. 1932, the preparatory work of the commission was neglected and the question of German equality dominated all others. The German delegation was withdrawn in July 1932, and only returned in December after receiving assurances that in the future convention Germany would possess equality of rights with all the other signatories. But in the next months Hitler became master of Germany, and in the atmosphere of fear and mistrust created by this event the conference could make no progress. In Oct. 1933 Hitler, finding that the entente powers proposed to maintain the restrictions of the peace treaty for another four years, seized the occasion to make a spectacular withdrawal from the conference and from the League. From then on Germany was openly rearming and all prospects of disarmament disappeared.

The Third Period, 1931–36.—The third period of League history, the period of conflict, opened with the sudden attack made in Sept. 1931 by the Japanese army on the Chinese authorities in Manchuria. This was clearly an act of war in violation of the covenant, although Japan declared at first that the troops would be withdrawn, and later (Feb. 1932) created a puppet state of Manchoukuo and claimed that this removed any legal ground for League intervention. This was the first major test of the covenant system. No more difficult circumstances could be imagined. Many of the smaller members of the League, and pro-League opinion everywhere, called for the strict application of the covenant; *i.e.*, an economic boycott of Japan. But the chief council members were themselves in the grip of economic crisis; the cooperation of the United States and the U.S.S.R. was certain to be refused; and economic sanctions were never seriously envisaged. After long negotiations, in which the United States did give its support, even permitting a U.S. delegate to sit with the council through one session, a commission of inquiry was appointed, which, reaching Manchuria in April 1932, found the new state of Manchoukuo already established. Nevertheless, the commission drew up a full report, concluding that Manchuria should be returned to Chinese sovereignty, with various safeguards for the rights and needs of Japan. The conclusions of this report were unanimously adopted by the assembly (Feb. 1933). Japan rejected them, and a month later withdrew from the League.

Thus the year 1933 saw the League's failure to protect China against aggression, the breakdown of the disarmament conference and the withdrawal of Japan and Germany. It saw also the failure of another great enterprise, the World Economic conference of June 1933. From the beginning the League had attached high importance to the work of its Economic and Financial organization. Its first big conference on the subject (Brussels, June 1920) had indeed preceded the first assembly. Thereafter it had for several years followed an ascending curve; after taking a great share in restoring some stability to the European currencies, it had turned to the deeper economic problems. The first World Economic conference, held in 1927, ended in a unanimous report describing the need for a freer and fuller flow of international commerce, the obstacles which impeded it and the measures needed to achieve it. And in the next two years much progress was made toward carrying out its recommendations. All this, however, foundered in the economic storm; each country sought to protect its own economy by tariffs, quotas and prohibitions; the plans and conventions drawn up in Geneva, including Briand's plan for a United States of Europe, were swept away. And the World Economic conference of 1933 ended in speedy and almost total failure.

Nevertheless, the normal activities of the League were neither interrupted nor reduced. The United States was now taking part in most of its work. The Soviet Union, which had obstructed and ridiculed the political work of the League, changed its attitude in 1934, through fear of Germany and Japan. Its demand for admission met with some opposition and much misgiving; but the great majority of members refused to throw back into isolation a state which now formally undertook to carry out all the obligations of the covenant. And in truth, the U.S.S.R. did give steady support to the League until shortly before the outbreak of World War II. Meanwhile, the admission of Mexico and Ecuador and the return of Argentina (absent since 1920, though it had not formally withdrawn) completed the Latin-American membership, while that of the Muslim states was extended by the entry of Turkey, Afghanistan and Iraq. In Europe a dangerous crisis following the assassination of King Alexander of Yugoslavia (Oct. 1934) was settled by the good offices of the council. Another critical moment, that of the Saar plebiscite (Jan. 1935), gave rise to the formation, for the first time in history, of a genuine international force—3,300 men from the armies of Great Britain, Italy, the Netherlands and Sweden—whose presence ensured that the plebiscite would take place without disorder. In South America the council, though it could not settle the war between Bolivia and Paraguay (1932–35), was successful in ending hostilities between Colombia and Peru (1934) and accepted responsibility for administering for a time the disputed territory of Leticia.

But in Oct. 1935 Mussolini invaded Ethiopia, after rejecting all efforts to dissuade him from the aggression which he was openly planning. By the following summer he had occupied and annexed the whole country in spite of the economic sanctions enforced against him in execution of the covenant. From this defeat the League was not destined to recover. The Fascist government was at first surprised by the League's prompt action; under British leadership the members, with only three minor exceptions, agreed to stop the export of arms and of various raw materials and all financial credit to Italy, and also to cease all imports from Italian sources. By December the effect of these measures was beginning to be seriously felt, and the League members were about to consider imposing an embargo on oil, which it seemed would quickly force Mussolini to retreat from Ethiopia.

But Mussolini was saved, and all further sanctions arrested, by the sudden action of the British and French governments, which, without consulting their fellow members, proposed to Italy and Ethiopia a settlement calculated to give the maximum satisfaction to the invader. Though existing sanctions dragged on for several months, they could not prevent the Italian victory. In May 1936 Italy annexed Ethiopia, and in July the assembly put an end to sanctions, though it continued to treat Ethiopia as an independent member of the League.

Fourth Period, 1936–45.—Meanwhile Hitler had denounced the Locarno pact (March 1936). A few months later Italy and Germany formed what was known as the Rome-Berlin axis, soon joined by Japan. All three were violently hostile to the League; among its members, only those which, like France, the U.S.S.R. or Czechoslovakia, were looking everywhere for possible support against German aggression continued to affirm their belief in collective security. While in Washington congress was passing the successive Neutrality acts, the majority of League members were declaring that they no longer considered themselves bound by the obligations of the covenant.

Although in this last period of its history the organs of the League continued to meet as before and performed some useful

tasks, the main international problems were, as in the first period, dealt with outside Geneva. In the swift succession of crises—the Spanish civil war, Japan's invasion of China, the annexations of Austria, Czechoslovakia and Albania—reference to the League was either a mere formality or else omitted. When World War II broke out in Sept. 1939, no appeal of any sort was made to Geneva. Yet in Dec. 1939 Finland did appeal for help against Soviet aggression, and the assembly decided to organize such help for Finland as it could, while the council declared the exclusion of the U.S.S.R. from the League.

No further meetings of the council or assembly took place during the war. Thanks to U.S. and Canadian hospitality, the economic and social work of the League was continued on a limited scale; but its political activity was at an end.

When, in the last years of war, the Allied leaders began to make plans for the future international organization, they rejected any idea of reviving the covenant; and that instrument was still nominally in force when the United Nations began to function (Oct. 1945). Six months later the assembly met in Geneva for the last time. The powers and functions entrusted to the League by many treaties were transferred to the new organization, which also inherited its material possessions, including the Palais des Nations; and on April 19, 1946, the existence of the League was formally ended.

If this occasion could not but be a melancholy one to all who had believed in the principles of the covenant, their regrets concerned past mistakes and misfortunes; in regard to the future, they could still hope that the United Nations would pursue the same aims with better success. The provisions of the charter were intended to correct and complete what seemed to be the imperfections of the covenant. But it remained true that in its purposes and principles, its institutions and its methods, the new organization followed, in nearly every point, the precedents of the old.

See UNITED NATIONS; *see* also references under "League of Nations" in the Index.

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LEAGUE OF WOMEN VOTERS (U.S.). An outgrowth of the movement for women's suffrage, the League of Women Voters of the United States was founded in 1920 just before the 19th amendment to the U.S. constitution, giving women the right to vote, finally was ratified. The organization's purpose is "to promote political responsibility through informed and active participation of citizens in government." The league works with all citizens although active membership is limited to women citizens.

Limiting its program to the field of government, the league centres many of its activities on registration, voting and election procedures. Although the organization is nonpartisan in that it does not support or oppose political parties or candidates, it supplies the public with factual information about the candidates through the publication of biographical material, voting records and answers to questionnaires. One of the league's pre-election services is the dissemination of information on ballot issues.

The league is a political organization, however, in the sense that it takes positions on governmental issues and works to obtain support for any legislative issue on which it takes a stand. Representatives of local and state leagues meet in biennial conventions to adopt the league's program and to make policy decisions. The members choose a few issues to work on at a time. At the local and state government level, for example, the leagues have worked for improvements in various fields, such as the structure and administration of government, the public schools, taxation, health, welfare and housing.

Some of the national issues supported by the league have been the following: grants-in-aid for maternal and child welfare; the Food, Drug and Cosmetic act; improvement and extension of the merit system in government; civilian control of atomic energy; limitation of the coverage of the federal loyalty-security program to sensitive positions; promotion of comprehensive long-range planning for conservation and development of water resources. The league has been devoted to the principle of international cooperation since its establishment. It has supported the United Nations, the Trade Agreements act, the European Recovery program, and technical assistance and economic aid to developing countries. Members are organized in approximately 1,200 leagues in all states of the union. Headquarters are in Washington, D.C. (Z. D. L.)

LEAHY, WILLIAM DANIEL (1875–1959), U.S. naval officer, chief of staff to Pres. Franklin D. Roosevelt in World War II, was born in Hampton, Ia., on May 6, 1875. He graduated from the U.S. Naval academy in 1897 and was assigned as midshipman to the battleship "Oregon." He was aboard that warship during its spectacular dash from the Pacific coast around Cape Horn to join the U.S. fleet off Cuba in the spring of 1898. The following year he was commissioned an ensign and assigned to the Asiatic station, where he saw active service during the Philippine insurrection and the Boxer uprising in China. In World War I he commanded the navy transport "Princess Matoika" and formed a lasting friendship with Roosevelt, then assistant secretary of the navy. After the war, Leahy's ability brought steady professional advancement: rear admiral in 1930, vice-admiral in 1935 and admiral in 1936. His talent for organization was early recognized, and during the post-World War I years he held all three of the navy's highest administrative offices: chief of the bureau of ordnance (1927–31), chief of the bureau of navigation (1933–35), and chief of naval operations (1937–39).

Leahy's first career ended with his retirement because of age in Aug. 1939. His second career began a few months later when President Roosevelt named him governor of Puerto Rico. He held that post until Dec. 1940 when he was appointed ambassador to the Vichy government that had been established in France after the Germans had defeated the French army. There Leahy's chief task was to stiffen French resistance to German pressure and to keep the French fleet out of German hands. After achieving some success in this difficult assignment he was recalled in 1942 to fill the newly created position of chief of staff to Roosevelt. As liaison man between the president and the armed services, Leahy conferred with Roosevelt daily, presided over the joint chiefs of staff, and participated in almost all of the major military and diplomatic decisions of the war years. He was made a fleet admiral in Dec. 1944 and went with Roosevelt to attend the Yalta conference in 1945. After Roosevelt's death, Leahy was asked by Pres. Harry S. Truman to continue as his personal chief of staff. He retired from this position in 1949 and the following year published a book of war memoirs, *I Was There*. This volume reveals a man of plain-spoken integrity, intense devotion to duty, and undeviating loyalty to the nation and to the presidents he served.

Leahy died on July 20, 1959, and was buried in Arlington cemetery. (M. R. E.)

LEAKE, WILLIAM MARTIN (1777–1860), British soldier, topographer and classical antiquary, renowned for his surveys of Greece, was born in London on Jan. 14, 1777. He was educated at the Royal Military academy, Woolwich, and then entered the royal artillery. In 1799 he was sent to Constantinople (Istanbul) as an artillery instructor, and during hostilities between the Turks and French in Egypt he traveled extensively in Asia Minor and the near east; his *Journal of a Tour in Asia Minor* appeared in 1824. After the French capitulation, Leake was employed (1801–02) in surveying the Nile valley. Afterward he sailed for Britain in the ship chartered to transport the Elgin

marbles, and all his maps were destroyed when the vessel sank off Cythera (Cerigo). In 1804 he was sent to assist the Turks against possible French attack, with instructions to study the geography of Greece and survey the coasts of Albania and the Peleponnese (Morea). At this time he also collected coins and antiquities, and sought to identify the sites of Heraclea Sintica and Cierium as discussed in his *Travels in Northern Greece* (1835). When war broke out between Turkey and Britain in 1807 he was imprisoned in Salonika, but later was able to persuade the pasha of Albania to negotiate for peace. He was British representative in Ioannina in 1809–10. Leake retired from the army in 1815 as a colonel and devoted himself to scholarship until his death at Brighton on Jan. 6, 1860.

Leake's collection of marbles went to the British museum; other antiquities (bronzes, vases, gems and coins) are preserved in the Fitzwilliam museum, Cambridge. His publications include *Travels in the Morea* (1830), and *Numismatica Hellenica* (1854).

(J. M. Wi.)

LEAL, ANTÓNIO DUARTE GOMES (1848–1921), Portuguese poet, journalist, publicist and pamphleteer, who reflected in his life and work the intellectual truculence and disquiet of a transitional period in European history. Born on June 6, 1848, in Lisbon, the illegitimate son of a wealthy father, who discouraged his love for poetry, he was made to accept a menial job in a solicitor's office. After a short period at the faculty of arts, and after his father's death, Leal dissipated his small fortune, leading a bohemian existence. Some of his first poems appeared in journals, and, in 1872, he became a co-editor of a new magazine, *Espectro de Juvenal*. He was then still writing in the romantic vein, and conforming to the pattern of the marmoreal beauty of the Parnassians (*q.v.*). From 1870 to 1880, however, he came under the influence of the Republican movement, and published his first political satire, *Tributo de Sangue* (1873). This poem, together with *A Canalha* (1873), derives inspiration from revolutionary agitation in Spain. In 1881 Leal printed a vitriolic lampoon against the king, *A Traição*, which led to his imprisonment.

A highly gifted poet, he vindicated the visionary powers of prophecy, whereby, in *A Fome de Camões* (1880), he seemed to foresee his own destiny in the tragic end of Luis de Camões (*q.v.*). Imbued with the rationalist views of positivism, he wrote an uneven, apocalyptic and brilliant poem, *O Anti-Cristo* (1886), revised in 1907 in the light of his conversion. Lost in a welter of ideas, he repudiated his anticlericalism and embraced Roman Catholicism. He turned also to spiritualism and theosophy as a means of exploring the mysteries of the mind in *A Mulher de Luto* (1902). This appears to have been the constant aim of his intellectual quest, heralded in the dreamlike quality of some of the poems contained in *Claridades do Sul* (1875), which remains his best work. He died in Lisbon on Jan. 29, 1921.

Bibliography.—There is no complete edition of the works of G. Leal. Good anthologies include: *Destino de Gomes Leal*, ed. by Vitorino Nemésio (1947; augmented ed., 1953); *Antologia Poética de G. Leal*, ed. by F. C. Leão and A. O'Neill (1959). *See* also the section on Leal by Jorge de Sena in *Perspectiva da Literatura Portuguesa de Século XIX*, ed. by J. Gaspar Simões, vol. ii, pp. 159–166 (1948); J. Gaspar Simões, *História da Poesia Portuguesa do Século Vinte*, pp. 27–48 (1959); V. Nemésio, article on Leal in *Dicionário das Literaturas Portuguesa, Galega e Brasileira*, ed. by J. Prado Coelho (1960).

(L. de S. R.)

LEAMINGTON SPA (ROYAL), a municipal borough (1875) of Warwickshire, Eng., lies on both banks of the Leam river, 2 mi. E. of Warwick. Pop. (1961) 43,236. Home of the 900-year-old Midland oak, traditionally marking the centre of England, Leamington was a village of little importance until the 1780s, although its saline springs were known to the antiquary William Camden in the 16th century. The enterprise of William Abbotts and Benjamin Satchwell and the interest of local landowners caused baths to be erected over the springs and attracted the patronage of the wealthy and fashionable to create a new spa in the early 19th century. In 1838 Queen Victoria, who visited Leamington as both princess and queen, granted the town the right to the prefix "Royal." Leamington has claims to being the original home of lawn tennis, since a form of the game was invented and played in the early 1870s in the grounds of the Manor house.

Leamington's location, central to a region of England both historical and industrial, makes it a favourite residential town and a popular resort for medium-sized conferences. The Parade (built 1810–30) is a noted Midland shopping centre. The Royal Pump room (1814; restored 1953) and its saline baths have been equipped for all forms of physical medical treatment, both physiotherapy and hydrotherapy. The town has an active amateur theatre, a library and an art gallery; pleasure gardens run through the centre from west to east. The ornamental Jephson gardens, designed on land given by the Willes family of Newbold Comyn, owe their name to Henry Jephson (1798–1878), a physician who did much for the town's progress. The parish church was largely rebuilt in the 19th century. Industries include engineering, iron foundries and brickworks.

LEAP YEAR, the name given to a year containing 366 days. In early history a lunar calendar was used, but when man settled down into communities and cultivated crops, a solar calendar which coincided with the seasons was required. This raised many problems, as the time taken by the earth to complete its orbit round the sun is not a whole number of days. The orbital period is 365.242 days, or, to a first approximation, 365.25 days. To account, then, for the odd quarter day, an extra calendar day is added once every four years, as was first done in 46 B.C., under the direction of Julius Caesar. However, over many centuries, the difference between the approximate value 0.25 days and the more exact 0.242 days accumulates significantly and is adjusted by adding the extra day to only those century years exactly divisible by 400. The term "bissextile" is sometimes used for leap year. It is derived from *bis sextus dies* or a doubled Feb. 28—an allusion to the insertion of the extra day on Feb. 29.

(Cn. A. R.)

LEAR, EDWARD (1812–1888), English landscape painter, who is best known as a writer of nonsense, was born at Highgate near London on May 12, 1812, of Danish descent. The youngest of 21 children, he was brought up by his eldest sister, Ann, and from the age of 15 earned his living by drawing. In 1831 he was employed by the Zoological Society of London and in the following year appeared his *Illustrations of the Family of the Psittacidae*, the first complete volume of coloured drawings of parrots to be published in England. He worked for the British museum, made illustrations of birds for the zoologist John Gould and also, during the years 1832–36, drawings of the private menagerie at Knowsley for the 13th earl of Derby, for whose children he later produced his first *Book of Nonsense* (1846). The exacting work of drawing animals began to affect his eyesight and in 1835 he resolved to become a topographical landscape painter. In 1846 he gave a series of drawing lessons to Queen Victoria.

Lear suffered from epileptic attacks all his life and, never robust, avoided the English climate. Though timid by nature he was a constant and intrepid traveler, exploring Italy, Greece, Albania, Palestine, Syria, Egypt and later India and Ceylon. He was an indefatigable worker, often starting at dawn and producing innumerable delightfully spontaneous pen and water-colour sketches, with great topographical accuracy, meticulously annotated with place names, dates and often the hours, and with notes written on the sketches to assist him in working these up into the carefully finished watercolours and large oil paintings, showing pre-Raphaelite influence, which were his "bread and butter."

Lear's true genius, however, is apparent as the first great writer of nonsense poems. These portray a real world of fantastic creatures and nonsense words, combined with a variety of rhythm, a Tennysonian feeling for word colour and often a deep underlying sense of melancholy. They are matched, especially in the limericks (*q.v.*), by his engaging pen-and-ink drawings.

The letters to his many friends are full of irrepressible humour, puns and deliberate misspellings. Though he never married he had a natural affinity with children. During his nomadic life he lived, among other places, in Rome, Corfu and finally, with his celebrated cat "Foss," at San Remo, where he died on Jan. 29, 1888.

Lear published three volumes of bird and animal drawings, seven illustrated volumes of travel books, *e.g.*, *Journals of a Landscape Painter in Greece and Albania* (1851), and four books of nonsense. Tennyson's *Poems*, with illustrations from Lear's land-

scapes, was published posthumously in 1889.

BIBLIOGRAPHY.—*Letters of Edward Lear* (1907) and *Later Letters of Edward Lear* (1911), both ed. by Lady Strachey; Brian Reade, *Edward Lear's Parrots* (1949); *Edward Lear's Indian Journal*, ed. by R. Murphy (1953); Angus Davidson, *Edward Lear* (1938).

(R. C. T.)

LEARNED SOCIETIES: *see* ACADEMIES and under the names of specific fields of learning, as HISTORY: *Societies and Institutions;* and ARCHAEOLOGY, SOCIETIES OF; CHEMISTRY, SOCIETIES OF; LITERATURE, SOCIETIES OF; etc.

LEARNING is defined as any relatively permanent change in behaviour resulting from past experience. Changes in behaviour also are produced by nonlearning processes such as aging. Remarkable and relatively predictable alterations in performance capacities are observed between infancy and senescence; but these are independent of experience and are excluded from learning by definition; the same holds for the changes in behaviour which are the symptoms of fatigue, these being transient and therefore also excluded by definition. Learning includes any behavioural change, not merely those changes that are considered desirable or symptomatic of improvement; bad habits seem to be learned in the same general ways and for the same general reasons as good ones. Further, the definition does not restrict learning to occasions of self-conscious practice with intent to learn; conditions conducive to learning often occur without prior arrangement.

The product of learning is called a habit (*q.v.*). In spite of its familiar usage, this is a relatively theoretical notion. Technically, a habit is the change which the learning process produces. It is invisible and exists principally as a tendency or potentiality which does not reveal itself as behaviour until an appropriate occasion arises; eating habits, for example, exist continuously, though we eat only intermittently. The habit is to be distinguished from performance, which is the symptom, directly observable as behaviour, that reveals the existence and strength of the previously acquired underlying habit.

Habits develop under certain conditions and decline under others, and a grasp of these processes and their causes is central to any understanding of an organism's total behaviour. Learning occurs throughout the animal kingdom, accounting for increasing fractions of the total activity as we go up the phylogenetic scale. In human beings there is almost no skilled, purposeful activity that has not been created by past experience. William James called habit "the enormous flywheel of society."

Scientific investigation of learning involves exposing an organism to a highly controlled environment and observing the effects of systematic manipulation of this environment upon measurable aspects of ensuing behaviour. Learning is revealed by a correlated systematic and orderly change in the force, immediacy, frequency or resistance to change of the relevant behaviour. Any environmental manipulation which predictably and reproducibly effects any of these changes is established as a determinant of learning. Once the determinants of learning are known, the possibilities for constructive education and re-education are obviously enormous. In addition they significantly increase understanding of the causes of much ongoing behaviour.

The study of learning is facilitated because the basic processes are amazingly similar throughout the phylogenetic scale, despite the differing sensory capacities and potential response repertories among species. Thus much information concerning the learning process derives from experiments upon such animals as the white rat and the dog. The processes, however, can be shown to be quite general.

MODES OF ACQUISITION

There are two generally recognized learning processes: classical and instrumental conditioning. Although they both result in habit formation, the manipulations required to produce each are different, as are the kinds of behaviour susceptible to change by each procedure.

CLASSICAL CONDITIONING

Classical conditioning, also called respondent or Pavlovian conditioning, was first fully explored and described by I. P. Pavlov with a series of experiments on the salivation reflex in dogs. He made the casual observation that dogs in his laboratory routinely salivated at the sights and sounds of their imminent daily feeding. It is a tribute to Pavlov's genius that this commonplace and wholly sensible relation between a recurrent situation and behaviour aroused his curiosity, leading him to wonder whether the mere temporal relation between prefeeding stimuli (a stimulus is a part, or a change in a part, of the environment) and the food itself might not fully account for the acquired tendency to salivate before being fed. If so, he could dispense with explanations in terms of such unobservable mental events as ideas, expectations and images, and view the dog as a reagent between observable stimulus input and response output. He isolated the dog in a highly controlled environment into which stimuli (lights, sounds, touch) could be introduced by remote control, along with a bit of food to elicit salivation. By maintaining a close temporal relation between intermittent presentations of stimulus pairs, one a neutral stimulus (originally inadequate to elicit salivation, such as a bell or a light) and the other an unconditioned or reinforcing stimulus (originally adequate to elicit salivation, such as food or weak acid), Pavlov showed that the originally neutral stimulus will begin to elicit salivation even when the unconditioned stimulus is withheld. At this point the bell or light is called a conditioned stimulus, and by turning it on and off Pavlov could control the dog's salivation.

The process has been demonstrated for other organisms, including human beings, by using other stimuli. It appears to require that the presentation of two stimuli be approximately simultaneous, although conditioning will proceed optimally if the conditioned stimulus precedes the unconditioned stimulus by a fraction of a second. The magnitude of the response to the conditioned stimulus (measured, for example, as number of drops of saliva elicited) increases with successive pairings of the two stimuli. The increase per trial is very rapid at first, and continues to rise at a decreasing rate until a maximum is reached.

Respondent conditioning is reproducible and permits precise control over behaviour, but the variety of responses susceptible is strictly limited. Only responses initially elicitable by an unconditioned stimulus (that is, only reflexes) can be thus passed from stimulus to stimulus, and the form of the response changes little, if at all. The repertory is small and fixed, but it does include important aspects of emotional behaviour, such as heart rate, blood pressure, dilation of the pupil, sweating, erection of the hair, and, of course, salivation. When, for example, fear (an emotion) of an intrinsically harmless situation is acquired, the fear response is old, but the situation is new. John B. Watson in the laboratory caused the acquisition of fear in infants by pairing a loud noise (an unconditioned stimulus for extensive fear-reflex behaviour) with a white rat, which soon became an object of apparent terror. (This acquired fear was subsequently removed by processes discussed below.) Phobias, or strong irrational fears of specific objects, are sometimes discovered to have been created by one pairing of an object with an intensely fear-provoking situation. By the same process the name of a hateful situation may arouse hate. Pleasure is aroused by a return to a place that formerly gave joy-producing experiences. Classical conditioning has been used to prevent enuresis (bed-wetting) by conditioning the individual to awaken to the stimulus of a full bladder, and to discourage alcoholism by conditioning nausea to the smell of alcohol.

INSTRUMENTAL CONDITIONING

Instrumental conditioning, also called operant or trial-and-error learning, is basically a process of selecting from initial crude, unlearned behaviour those responses that are precisely and economically effective. As a rat learns successive turns in a maze, an infant learns to talk and an adult learns to play golf or drive his car, the responses to be learned cannot be produced on signal at the very onset in the way that the unconditioned stimulus produces the final response in classical conditioning. A different mode of acquisition is required. In these examples, before learning occurs the behaviour is highly variable and inadequately related to the demands of the situation.

Motivation.—An important determinant in instrumental con-

ditioning is the prior existence of a behaviour instigator called a motive or drive. There are two broad classes of motive: appetites, such as hunger or thirst, which involve deprivations; and aversions, such as discomfort and pain, which involve noxious stimulation. When either prevails, organisms tend to become increasingly and diffusely active. The unfed rat in the maze moves with the restlessness of hunger; the uninformed, worried student with the restlessness of anxiety. Motives thus account for the arousal and persistence of behaviour at the outset of learning; without some available behaviour learning would not begin (*see* MOTIVATION).

Response Selection.—Among the responses generated by motives some will tend to be especially relevant to the prevailing motive, providing access to the food or water, or cessation of the noxious stimulus. When this occurs, the response which just preceded the problem solution becomes more likely to recur when the same motive recurs.

From its dependence upon the learner's own behaviour for the solution this kind of learning is called instrumental or operant (the learner operates upon his environment). These terms are preferred to trial and error since trial and error lead to no learning at all, but trial and success do. In addition the term trial implies a foresight of the goal that seems unlikely in much learning, as in the case of the hungry rat in the maze.

Reinforcement.—Stimuli which increase the probability of recurrence of the responses which produce or simply precede them, and thus build habits, are called reinforcers. The fundamental determinant of operant conditioning is expressed in the law of reinforcement: if an operant is closely followed by a reinforcing stimulus, its strength is increased. Strength is a general term embracing all the symptoms of habits. Primary reinforcers include food, water, rest and oxygen, which reduce drives without depending on learning; secondary reinforcers, on the other hand, owe their effectiveness to earlier association with primary reinforcers and, therefore, are said to be learned. Common examples are money and signs of approval or disapproval—intrinsically worthless but of acquired value. Secondary reinforcers are particularly important in human learning; most educational reinforcements are of this derived sort, since commodities seldom change hands in classrooms. They also have been observed in nonhuman animals. Chimpanzees have learned token-rewarded behaviour, where the tokens could be exchanged for grapes; they even hoarded tokens. Rats will pull at a chain if it produces merely the click of a mechanical food magazine from which they have eaten.

Positive reinforcers (food, water, money) strengthen behaviour which produces them; negative reinforcers (pain, the sound of the dentist's drill) strengthen behaviour which terminates them. Secondary negative reinforcers produce avoidance behaviour, since if the signs of danger elicit effective response the impending disaster may be averted. The burned child does not learn to pull his hand out of the fire; he learns not to put his hand into it.

Nearly all the additional determinants of operant learning are corollary to, and concern quantitative aspects of the law of reinforcement. For example, "practice makes perfect" as a recipe for acquiring operant habits is not valid. Perfect responses, if reinforced often, become habitual, and in this sense practice is necessary. However, an experiment by E. L. Thorndike showed that practice in drawing three-inch lines without knowledge of successful approximations produced no improvement whatsoever. It will be shown below that practice, if not reinforced, is an effective way to destroy habits.

Contiguity.—In operant learning the shorter the temporal delay between response and reinforcement, the greater the effect of each reinforcement. Often reinforcement depends upon a series of prior responses, such as the several activities required to start a car. The motorist who presses the starter button before he turns the ignition key probably has been influenced by the contiguity principle; his strongest response is the activity closest in time to the reinforcing sound of a running motor, and so sometimes occurs first. Contiguity also accounts for some apparent exceptions to the law of reinforcement. Why do alcoholic habits persist in the face of the hang-over? Because the effect, however awful, is delayed, leaving the immediate more pleasant effects of alcohol in full command. Bribes may be considered as reinforcers, but they do not affect the intended behaviour because they violate the direction of a reinforcer's effect, which is apparently always upon the preceding response.

Quality and Amount.—Reinforcers have different effects as a function of their quality and amount. Water, for example, is a potentially stronger reinforcer than food. Chimpanzees make fewer mistakes in performing when they are reinforced with bananas than when reinforced with lettuce, according to the observations of O. Tinklepaugh; and J. B. Wolfe and M. D. Kaplon reported that chicks will run faster to four grains of wheat than to one.

Schedule.—Finally, reinforcement may be administered following successive responses according to any arbitrary schedule. If each occurrence of a given response is reinforced, the schedule is said to be continuous. This is the schedule most frequently used in experimental studies of learning. It is particularly useful in early stages of learning where reinforceable responses are likely to be few and far between. However, the habits created by extensive continuous reinforcement are remarkable for their instability in the face of a failure of reinforcement. If reinforcement is discontinued, the habit persists briefly, appearing in flurries, and soon vanishes. The discontinuance of reinforcement is called an extinction schedule. The speed and progress of the extinction process are intimately related to the nature of the preceding reinforcement schedule.

Any schedule in which reinforcement is given for only a portion of the appropriate responses is said to be intermittent. These schedules were extensively investigated in the pigeon by B. F. Skinner and C. B. Ferster. The results are readily observable when similar schedules are used with human beings. There are four basic programs: (1) Fixed-interval schedules provide reinforcement only for the first response that occurs after a specified time since the last reinforcement. If the response can occur at any time, the effect of this schedule is such that many responses occur toward the end of the time interval, few at the beginning. The schedule resembles working on salary; industrial managers have found it necessary to introduce additional reinforcers, such as time cards and foremen, to maintain work rates just after payday. Extinction after a fixed-interval schedule shows that the habit persists much longer, reinforcement for reinforcement, than habits formed after a continuous schedule. (2) Fixed-ratio schedules reinforce every *n*th response; for example, only every 10th or 100th response in a series of similar responses. Again, the rate of response is highest as the end of the ratio is approached, and falls abruptly after the reinforcement. The schedule is like piecework, which labour unions look upon with disfavour because it places a premium on extremely high rates of production, which may be injurious to health. Extinction after fixed-ratio reinforcement is fairly rapid but may involve hundreds of responses appearing at a very high rate. (3) Variable-interval and (4) variable-ratio schedules space reinforcements randomly with respect to time or serial position of the response. Both schedules generate steady response rates and subsequent extinction is marked by a slow, steady drop in the occurrence of the response.

The modes in which reinforcement is applied are obviously important variables in learning. The data may be summarized by saying that the momentary likelihood that a response will occur is governed by the momentary likelihood that it will be reinforced. Persistence and calm in the face of failure can be encouraged in children if continuous (spoiled-child) schedules are avoided in their training. Scheduling helps in understanding the origins and strengths of otherwise curious behaviour: ritualistic superstitions such as telling dice to "come seven" may acquire enormous strength because of random (variable-ratio) reinforced responses; as Skinner showed, a pigeon left hungry before a food magazine that intermittently opens and closes will soon be behaving ritualistically, because of the accidental coincidence of some response with the hopper's opening.

Shaping.—A barrier to the application of operant conditioning principles in practical training is the frequent unavailability of the desired response at the outset. The law of reinforcement requires that the response to be learned must occur before it can

be reinforced. A child is trained to say "elephant" not simply by waiting for him to say it. The good teacher starts out leniently, reinforcing responses that merely resemble the desired word. This reduces the variability of random behaviour to instances which are in the right direction. Some variability in the successive forms of reinforced responses will always remain. With increasingly strict reinforcement, the desired response may be successively approximated to produce precise control. This process is called shaping. Trainers of animals are able to condition long and complicated acts for which no components, much less their serial arrangement, were originally in the animals' repertories. The process resembles the activities of the parent who settles at first for the approximations of baby talk but insists on more adult forms as the child matures.

STIMULUS CONTROL OVER PERFORMANCE

In classical conditioning the role of stimuli, particularly the conditioned stimulus, in eliciting the conditioned response is obvious. In operant conditioning, although drive conditions are essential to reinforcement, the role of stimuli in evoking and guiding learned responses is also strong since most reinforcers are obtainable only in certain environments. The rat in a maze, for example, is guided by the stimulus properties of each choice point as his maze-running habit is performed. The rat (like human beings) has a number of food-getting habits. Which habit is activated when hunger grows is determined by the environment at the moment. The man starting for his refrigerator from his living room exhibits quite a different habit from the one he shows when he starts from his bedroom.

Stimulus Generalization.—Even the dog in Pavlov's highly controlled experimental chamber rarely is stimulated by a flashing light in precisely the same way from moment to moment. Differences in the angle of his head, slow changes in the light sensitivity of his eyes and other factors will present the stimulus differently each time. Since he is nevertheless successfully conditioned, it may be concluded that small differences in the conditioned stimulus do not preclude learning. The tendency for the effectiveness of a conditioned stimulus to spread to other values of the stimulus is called stimulus generalization, and appears intrinsic to the process; it normally occurs.

The test for the limits of stimulus generalization is exemplified in a dog conditioned to salivate to a tone of specific pitch and loudness. After conditioning has reached full strength (pairings of food and tone no longer increase the number of drops salivated to tone alone) the response to new tones of higher and lower pitch is measured. These tones will be discovered to have acquired considerable eliciting strength by stimulus generalization. The generalized response is predictable and orderly: it will measure less than that elicited by the original tone, and will diminish as the new tone increasingly departs from the original pitch. The infant with the conditioned fear of a white rat described earlier was observed to become very uneasy, even frightened, when a woman visitor appeared in the hospital wearing a white fur collar. Possibly stimulus generalization would account for the poet's reaction to John Fell, although he himself could not (*see* FELL, JOHN).

Stimulus generalization in operant learning is less well investigated than in respondent learning, since in the former persisting, complex situations rather than intermittent, simple stimulus events tend to be the rule. However, with proper arrangements, results similar to those of tests upon respondents are observed. For example, Skinner showed that if a pigeon is trained to peck at a key illuminated by a light spot of small diameter, slow increase in the size of the spot progressively weakens the strength of the response. Speech, which is operant behaviour, shows the obvious influence of stimulus generalization. We may call a person by another's name on the basis of some similarity in appearance, behaviour or status. Children learning to talk often generalize by calling anything which can be sat upon a "chair," and their tendency at an early age to call all men "daddy" is well known.

An interesting if somewhat baffling variant of stimulus generalization can be observed in adults. If a response (usually a respondent such as sweating elicited by a mild electric shock) is conditioned to a printed word, the same response will subsequently be elicitable by any synonym of that word. For example, if the word "style" is paired with shock, the sweating response can be elicited not only by "style" but by the word "fashion" as well. The unexpected feature of this outcome is that the two stimuli have very little physical similarity, which is the usual basis of generalization effects. Because of this, and because the phenomenon obviously depends upon prior learning, it is called mediated stimulus generalization. The explanation usually suggested is that words susceptible to this effect always evoke a common response appropriate to their common meaning, and that the effective stimulus in both the original and generalized evocations is this common meaning.

Discrimination.—The spread of stimulus generalization is spontaneous, but it can be narrowed by the processes of discrimination. Discrimination involves principally the maintenance of conditioned strength of one stimulus by continuing to pair it with the unconditioned stimulus, while an adjacent stimulus is intermittently presented without the unconditioned stimulus. The effect is to extinguish the response to the adjacent stimulus. In this fashion the original spread of generalization may be narrowed severely, so that the response remains strong and prompt to the conditioned stimulus but vanishes for other values. There are definite limits to the ultimate fineness of discrimination, however. Two stimuli may be so similar in physical characteristics that any conditioning of one generalizes fully to the other. In this event no amount of discrimination training can produce different responses to the two, and the organism is said to be unable to tell the difference between them.

Application of discrimination procedures permits statements concerning the sensory acuities of laboratory animals. For example, if a dog's salivation response is conditioned to a red light by pairing it with food, while a green light is intermittently presented always without food, in time the dog will salivate to red light but not to green. Thus far, it might be inferred that the dog has colour vision; that is, he behaves differently to different colours. However, if the brightness of the green light is now varied, a brightness will be discovered to which the dog will salivate. No amount of additional discrimination training with red and green lights of equal brightness will lead to differential response. Hence it is concluded that the dog is colour-blind.

Most human discriminations are verbally reported. The training behind this involves operants, but the reinforcements are casually administered as part of learning to talk and seldom are studied as such. Among the more fascinating complications to be accounted for is how such abstract qualities of situations as beauty, or of acts such as honesty, are discriminative and evoke the words "beautiful" or "honest." These depend upon the response habits of their viewers for their very existence. In other animals even such rudimentary abstractions as colour, length or weight are quite lacking, because they have not been trained in the necessary discriminations.

MODES OF HABIT BREAKING

Habit breaking is a problem of special practical and theoretical importance. Because of unfortunate stimulus contiguities, undesirable emotional responses become attached to situations a person is forced to meet or, as in the case of the phobias, arranges to avoid. Because of carelessly applied reinforcements, a parent may unwittingly create habits of lying, whining, temper tantrums (which may not be emotional at all) or overdependency in his child. If the habit is strong, what can be done to reduce its strength? Several techniques are commonly tried; not all of them are efficient.

Extinction.—The procedures in extinction involve, in the case of respondent habits, repeated unreinforced elicitation of the response by the conditioned stimulus; response magnitude will progressively decline and finally disappear. If the extinction experiences occur closely together in time, a rest period will lead to the reappearance of the response when the conditioned stimulus is represented. This effect is known as spontaneous recovery, spontaneous because resurgence takes place without reconditioning. It is surely not truly spontaneous, however, but probably depends on the dissipation of fatigue effects generated during the earlier ex-

tinction experiences; part of what appeared then to be true loss of the habit was merely a temporary unresponsiveness caused by momentarily overtaxing the response mechanism. The recovered strength may be discouraging to the learner, but it is quickly reduced by additional conditioned stimulus presentations without reinforcement.

Operant habits are extinguished in much the same way. The occasion for the response to occur is arranged, and when the conditioned response appears, the reinforcer is withheld. The strength of the habit will produce additional responses, but the occurrences will diminish at a rate determined by the reinforcement schedule that created the habit. As noted above, if the schedule was continuous, there is relatively little resistance to extinction, but the experience is likely to be accompanied by a considerable emotional display, possibly because of its abrupt novelty. Emotional surprise and annoyance occur when a cigarette coin machine fails to deliver; the coin-machine gambler responds with relative calm in the face of a failure of a similar response. If previous schedules have been intermittent, the habit may be very resistant to extinction, though largely unemotional except for discouragement at the apparent lack of progress.

Extraordinary caution needs to be exercised in all forms of extinction to make sure that no occurrences of the response are ever reinforced. Occasional "giving in" merely makes an intermittent reinforcement schedule out of what should be an extinction schedule and increases rather than decreases the persistence of the habit. A mother, for example, may have decided to discourage her child's temper tantrums by ignoring (*i.e.*, not reinforcing) them. If she gives in occasionally because the behaviour is too nerve racking, or in order to avoid a scene before visitors, she is working directly against the extinction of the habit. William James likened the occasional giving in to dropping a ball of string that has been wound up; the whole process must be started afresh.

Extinction is the opposite of conditioning; it involves withholding the condition necessary for habit building. However, it resembles habit building as an active process, requiring the occurrences of the behaviour involved. In a very real sense, extinction thus shows that one way to break a habit is to practise it, providing that practice never involves reinforcement. One psychologist (Knight Dunlap) cured himself of the habit of typing "hte" for "the" by practising a whole page of "hte." Both habit building and extinction are slow but sure. Many psychologists have concluded from very carefully controlled observations that extinction procedures are the only effective habit breakers.

Forgetting.—Forgetting appears at first glance to be an indisputably effective process for losing motor skills, and for abolishing recall of people's names and so forth. However, if forgetting means the loss of habits simply as a function of the passage of time, there is reason to doubt that it happens. The passage of time is likely to be populated by aspects of the original habit, during which the stimuli associated with the old habit occur in new contexts without reinforcement. But these are the conditions of extinction, and it is misleading to speak of time as the sole determiner of the loss. If an organism with a habit could be completely isolated from the behavioural context of its occurrence and reinforcement, it appears that the habit would remain relatively undisturbed over long periods. It is commonly claimed that the skills involved in riding a bicycle are never lost, since the stimulus and response components are very distinctive and do not occur in other activities. Speech seems a priori susceptible to unsuspected extinction, since the component sounds of the unpractised words occur repeatedly in other contexts. Often the attrition of habits over time is more apparent than real. When one tries unsuccessfully to recall a name, he often does so without the stimulus support of the named person himself; the name may immediately occur to him when the person is actually seen.

Punishment.—Possibly the most commonly tried method of habit breaking is punishment. The question in evaluating the effects of punishment is whether substituting a negative reinforcer for the previous reward produces any more rapid habit loss than does simple discontinuance of reward. Necessarily if a response is punished it is not rewarded, and so some extinction will occur. Careful investigation (as performed by W. K. Estes) indicates that punishment for specific responses does not hasten their extinction. Punishment does generate some effects which are both undesirable and misleading to the punisher. Among these is the production of sullen, frightened and other emotional behaviours which attach to the punisher (even if he is "doing it for the other's own good"). The punishment-generated emotion is likely to give a false impression that the habit has been weakened, since it inhibits all activity temporarily; thus the punished behaviour appears to have been weakened, but so has all other behaviour. When the emotion subsides, however, the punished response appears in undiminished strength, except for any weakening effect from the exclusion of positive reinforcement.

It has been suggested that the principal positive effect of punishment is that it makes the punisher feel better. It should be noted, however, that some responses cannot be merely extinguished because they cannot possibly be separated from their reinforcing consequences. For example, leaving aside the desirability of tampering with the habit of masturbation, it would appear that punishment is the only possibility for control. Punishment will reduce the frequency, perhaps to zero, by surrounding the activity with such competing emotions as shame and fear. But this is not to say the habit has been broken; its expression is suppressed. This is an instance of a more general case of habit control: a habit may become inactive without being broken if some other response is reinforced to become so strong that it literally crowds out the previous response. This effects the same ends but avoids the undesirable consequences of response substitution by punishment.

Thus, many psychologists believe that all the efficient techniques of habit breaking are variants of the extinction process. In practical control, extinction may be made easier if the procedures involve gradual exposure to the situation which evokes the habit. The fear response of the child who learned to fear the white rat was extinguished by introducing the animal, without the loud noise, in a cage located across the room. This made the child only mildly apprehensive. Each day the cage was brought a little closer until finally the child was touching the animal. At no time was the full emotion expressed.

THEORETICAL FORMULATIONS OF THE LEARNING PROCESS

Reinforcement Theory.—The foregoing account of the learning process has been given in empirical or observational terms and summarizes a great many experimental analyses. The reconstruction of these processes in more general terms is the domain of theories that are in considerable dispute generated by a lack of agreement as to what is learned. What are the necessary factors in the description of the habit, including some reference to their loci of operation? The most modest departure from a purely descriptive account is found in reinforcement theory, the most elegant and precise versions of which are given by C. L. Hull and B. F. Skinner. According to this view, reinforcement is necessary for learning and determines what is learned. Since reinforcement depends on behaviour, the laws based on such a theory contain references to the variables affecting performance or the strength of responses. What is learned, then, is simply behaviour, and the criterion of learning is to be found in the alteration of behaviour. The characteristics of learning, in this view, clearly require reference to muscle or gland activity, although since these are controlled from the nervous system, brain and spinal cord are involved. In brief, according to reinforcement theory, learning involves learning to do something.

Gestalt; Insight.—The reactions against early forms of this reconstruction of the learning process were strong and swift. From Germany came the criticisms of the Gestalt psychologists (*see* GESTALT PSYCHOLOGY), who urged that relationships are what is learned, stressing perceptual rather than response processes. They said reinforcement theorists failed to grasp this concept; because by concentrating on such devices as mazes and puzzle boxes (*see* PSYCHOLOGY, COMPARATIVE; PSYCHOLOGY, EXPERIMENTAL) they were not allowing laboratory animals to show how they would behave if they could view all parts of the learning problem at once.

In such problem situations "blind" trial and error is about all that is possible, learning is slow and appears to require many reinforcements. For example, a cat never does see the relation between what he must do, such as tilting a pole, and the consequent opening of a door which permits escape and access to food. The Gestalt psychologists showed that if all the details of a problem are visible at the outset, the solution need not emerge slowly, but may occur suddenly. The true course of learning, according to this view, is characterized by an abrupt leap from failure to success, reflecting insight (sometimes called the Aha! phenomenon) and intelligent assessment of the relations among the elements of the problem. In a simple experiment Wolfgang Köhler placed a banana outside the cage of a hungry chimpanzee, Sultan, and gave him two sticks, each too short for pulling in the food but joinable to make a single stick of sufficient length. Sultan alternately tried each stick unsuccessfully, and even used one stick to push the other along to touch the banana. This, as the report goes, gave Sultan a lot of pleasure but no banana. Later, after apparently giving up, Sultan accidentally joined the sticks, observed the result and immediately ran with the longer tool to retrieve the banana. The solution reappeared immediately when the problem was reinstated. This result is ambiguous, however. Many already conditioned responses seem to have been brought to the problem, so that the necessary motor skills were already available once Sultan accidentally rearranged the stimulus properties of the sticks. Insight in human learning is experienced, or course, but, as with Sultan, only in situations where already acquired responses are seen to be applicable when the stimulus properties of the situation are rearranged. Insight would not occur in learning to play the piano. It occurs frequently in solving mathematical problems.

Expectancy.—Criticism of reinforcement theory also was voiced by U.S. psychologists. Edward C. Tolman early argued that reinforcement theorists confused learning with performance. He conceded that organisms behave as they have been reinforced, but urged that this is not the whole story. According to reinforcement theory, the rat at the choice point *learns to* turn left; according to Tolman, the rat *learns that* food is down the left alley and, being hungry, he goes there. He also *learns that* there is nothing down the right alley except a dead end. According to Tolman an organism learns "what leads to what." This knowledge may be acquired by simply experiencing sequences of stimulus events, and no reinforcement is required at all. Tolman preferred the term "expectancy" to "habit" as the product of learning. It is a function of the brain rather than of muscles, and may never appear in behaviour at all. This seems much closer to the common-sense reconstruction: we learn facts.

Reinforcement-Expectancy Controversy.—Curiously, although the difference between the reinforcement and expectancy theories seems sharp and significant, it has been very difficult to design an experiment which unequivocally confirms one while refuting the other. One such attempt is the latent learning experiment. If Tolman was right, experience without reinforcement should lead to learning "what leads to what" without changing the initial random properties of behaviour. The learning is latent; it does not show. A hungry rat, for example, is repeatedly run through a maze but never fed at the end. During this period it has an opportunity to learn the pathway but not to use its knowledge to allay hunger. After several experiences of this sort, the goal box is baited with food which the rat discovers and eats. If it has learned during the unreinforced trials, its knowledge of the path should lead it accurately down the alley to food on the next trial.

Variants of this experiment have been tried repeatedly, starting with Hugh C. Blodgett's experiment in 1929. Blodgett's experiment indicated that learning had indeed taken place in the unreinforced trials; the previously unrewarded rats entered fewer blind alleys after their first discovery of food in the goal box than naïve rats would have done. However, the results of similar experiments performed later were equivocal, sometimes showing latent learning, sometimes not. In experiments in which latent learning does occur, reinforcement theorists have always been able to point to more or less plausible reinforcing events, often secondary, in even the unbaited maze: the rat is at least removed from the narrow confines of the alley and returned to his home cage from the goal box.

In the literature on human learning such designs are called studies of incidental learning. A person, for example, can look at a clock and afterward report accurately what time it is, yet be unable to tell whether the numerals were roman or arabic. In a typical incidental learning experiment subjects learn the content of a printed prose passage and are then tested for such details as the physical aspects of the print, misspellings and paragraphing. Such experiments generally show that incidental learning does occur but that it is weak in comparison with motivated learning of the same material.

Relevant to the reinforcement-expectancy controversy are the observations of E. R. Guthrie and G. P. Horton, who photographed cats at the moment they performed a pole-tilting response which permitted them to escape from a puzzle box. The successive escape responses of a given cat were amazingly stereotyped, involving the same musculature, stance and spatial orientation in the box, and they were remarkably different from cat to cat. Some of the postures were very clumsy; for example, one cat always backed into the pole. They argued that if a cat had learned the principle of the pole, his responses should have been more variable. He would have tilted it with whatever part of him was closest, and the elaborate and effortful posture should have been replaced by easier ones.

Additional evidence comes from studies of imitation. If learning consists of discovering "what leads to what," an untrained observer should increase in skill by watching another perform correctly. The only benefit that seems to accrue, however, is that when the observer begins to practise he knows what a correct response looks like, although he still has to learn how to effect it. There is evidence that one can learn to imitate as such, but this learning seems to depend upon reinforcement.

In general, the expectancy-reinforcement controversy cannot be said to have been resolved. Most striking, perhaps, has been the continuing support for the reinforcement position, since it appears to have a more restricted scope.

Other Formulations.—Other formulations of the learning process have been proposed. The mathematical learning theorists, principally R. R. Bush and F. Mosteller, and Estes have adapted stochastic or probability models to the description and prediction of responses, their aim being to predict the probability that a given response will occur on a given trial on the basis of past frequencies of occurrence. Among the more striking successes of this approach with human subjects has been the validation of the theoretical prediction that the frequency of choice of an alternative closely matches the frequency with which that choice is reinforced. Thus, if choice A is correct 25% of the time and choice B 75%, the alternatives later are chosen 25% and 75% of the time, respectively. This seems not at all surprising until one sees that over-all correctness is maximized if alternative B is consistently chosen.

Finally, Skinner, although writing in reinforcement terms, argues persuasively (for example, in *Science and Human Behavior*) that theories of learning are unnecessary. He urges that when functional dependencies between behaviour and all the variables which affect it are known, theory will be superfluous.

Learning and the Brain

The brain mechanisms involved in learning are only partially understood. Theories of central nervous system activity in learning abound; one popular view is that the points of juncture between incoming sensory nerves and outgoing motor nerves undergo a reduction in transmission resistance as impulses aroused by practice repeatedly pass along them. Other evidence (*e.g.*, by K. S. Lashley) suggests that this picture of a habit so precisely localized in a part of the brain is unrealistic and that habit formation and retention involve diffuse activity in the whole brain. However, certain parts of the brain do appear to be intimately related to specific aspects of the learning process. For example, a mild shock through an electrode planted in the hypothalamic region of a rat's brain will increase the strength of any response that precedes it. This defines another, rather curious, reinforcer, and suggests the brain's role in the learning process. For fuller discussions of neural

mechanisms in learning and related phenomena *see* BRAIN: *Physiology of the Brain: Experimental Investigations;* PSYCHOLOGY, PHYSIOLOGICAL; CONDITIONING; CONCEPT FORMATION, PSYCHOLOGY OF; CONSCIOUSNESS: *Neurophysiological Mechanisms;* INTELLIGENCE: *Physiological Basis of Intelligence.*

LEARNING AND AGE

Learning can take place at any age. Human fetuses were shown to exhibit classical conditioning by D. K. Spelt. During the first month or so after birth learning is necessarily simple, since at this time the brain structures are so immature that the human infant is functionally decerebrate (brainless). During infancy and early adolescence the amount of learning that takes place is enormous. If adults learn less it is partly because there is less for them to learn. With increasing age the rate of acquisition becomes progressively slower, but the over-all loss in speed is not great for a given individual; even after some decline many older people are still faster than the average child. Some of the apparent decline in speed with age is traceable to the persistence of previously acquired habits which interfere with new responses, rather than to any loss of native capacity. In deteriorated senescence, of course, learning reverts to the low levels of very early age (*see* DEMENTIA).

In lower animals, such as the fowl, critical ages have been discovered, as reported by N. Tinbergen, during which learning is elaborate, sudden and irreversible. The process is called imprinting. For example, during a short interval soon after hatching, the baby chick or gosling is particularly susceptible to moving objects, including dogs, human beings and inanimate objects which it responds to henceforth as it would to a "mother," following it about and making sounds of distress at separation (*see* ANIMAL BEHAVIOUR: *Animal Behaviour Patterns: Instinctive and Learned Behaviour*).

In children the concept of readiness reflects observations that certain ages are optimal for acquiring such skills as toilet habits, and that attempts to train before that time are pointless and occasionally deleterious. For examples, *see* READING: *Stages in Learning to Read;* INFANTS, CARE OF: *Development, Health and Comfort.*

EFFICIENCY IN LEARNING

Collateral with more academic investigations of learning there has grown an extensive body of experimental literature on the methods of efficient acquisition of motor and verbal (memorizing) skills. Some generalizations from this literature will be discussed here; they are particularly applicable to human learning in which practice with intention to learn is prominent.

Practice.—Few people would hope to learn to swim or play the piano by merely reading a book on the subject; most know that skill depends upon actual practice. The same requirement holds for the acquisition of information from a text, although it is much less likely to be applied. In a pioneer study A. I. Gates showed that although reading a text will result in some recall as tested later, the same amount of time divided between reading and self-recitation with the book closed will significantly increase the amount recalled. Up to 80% of total study time may profitably be spent not looking at the book at all, but in self-recitation. This result was repeatedly observed in subsequent analyses. The advantages of self-recitation have been traced to improved motivation generated as the learner observes his progress, and to the opportunity during recitation to correct errors on the spot and to devote extra time to difficult passages; but primarily the advantage seems to be that the learner is practising recall, and this is the response that he wishes to acquire.

Closely related to this outcome is the question of transfer of training (*see* TRANSFER OF TRAINING). An earlier educational philosophy, called the doctrine of formal discipline, was based upon the notion that training in mathematics was conducive to logical thinking, that the study of Latin improved all language skills, and so on through a list of subjects required not for their own contents but for their presumed effect upon other mental powers. The doctrine presupposes that transfer of training is strong and positive; that is, that practice on one task will lead to improved performance in another, unpractised task. If transfer occurs, it is not strictly necessary to practise the response to be learned. Nearly all controlled tests have shown, however, that transfer is disappointingly weak and may even be negative, since training in one skill may interfere with acquisition of another. Studying Latin leads to learning Latin, but it has very little beneficial effect upon memory, aside from the acquisition of study habits that may be useful in learning another language. Its benefits in increased knowledge of English vocabulary and grammar are weak, and some of its effects upon the subsequent learning of another language may be negative, because of the intrusion of Latin words and constructions.

Transfer is strongest when two tasks have common stimulus or response components. It is usually positive when previously learned responses must be learned to new stimuli; it is usually negative when new responses must be learned to stimuli previously associated with other responses. In general, it is most efficient to practise directly the responses one wishes to acquire.

Massed versus Distributed Practice.—Although no precisely optimal durations can be specified, it is usually observed that a given time distributed in blocks over several practice sessions, with rest or other activities intervening, leads to more learning than does the same amount of time spent in continuous, uninterrupted practice. The practice sessions should be long enough to allow warm-up to overcome an initial period of inefficiency. Massed practice tends to favour repetition of errors while the rest period favours the disappearance of errors and retention of correct responses. The rest periods also permit recovery from fatigue and maintain a higher level of interest and motivation.

Cramming for school examinations is intensive massing of practice. It is not found that forgetting after cramming is unusually rapid; however, more learning can be accomplished if the same amount of study is spaced over a longer interval. In some instances it has been shown that more skill can accrue from less total practice time, if the shorter time is distributed and the longer massed.

Whole versus Part Learning.—In memorizing a lengthy speech or poem one tends to master each part (*e.g.*, paragraph or stanza) as a separate unit before proceeding. Whether it is more efficient (in terms of total time or number of repetitions for perfect recall) to learn by trying to recite the whole piece each time cannot be unequivocally stated. From many experiments it is tempting to conclude that the whole method would be more efficient if learners could be persuaded to try it. Even in experiments, however, the apparent slowness of early progress with the whole method is discouraging to learners and creates unfavourable attitudes toward the task; but those who persist learn more quickly than with the part method. Whole learning has the advantage of spacing repetitions of any stanza more widely than does the part method; it also eliminates the part learner's task of learning to put the stanzas in proper order after he has committed them separately to memory. A compromise, the progressive-part method, probably combines the advantages of both. The learner memorizes the first part perfectly, then the second, and repeats them in proper order. Next he learns the third part, and immediately attaches it to the first two parts, and so on. This method is somewhat wasteful in that the early parts are extraordinarily overlearned, but learners like it. It is said that professional actors and orators usually learn speeches by the whole method, which takes advantage of the internal logical and sequential properties of the lines, and minimizes omissions of material in performance.

Retention.—The most obvious factor favouring long-term retention is the strength of original learning. A task may be learned to perfection as exhibited by one errorless performance, but retention of the skill will be better after an additional series of perfect trials. This procedure is called overlearning. The nature of the activities immediately following the initial learning also affects recall. Retention is greatest when the interval between learning and recall is filled with inactivity. Some experimenters have verified the effectiveness of sleep as a form of such inactivity, while others have found similar enhancement of retention by requiring their subjects to read college humour magazines as an approximation to doing nothing.

Retention may deteriorate as the postlearning activity increasingly resembles the learning task. If the material to be retained is a list of adjectives, subsequent learning of a list of their synonyms will interfere with recall of the first list. Practice on a list of numbers on the other hand, will leave the retention of a previously learned list of adjectives relatively intact.

Understanding the Learning Process.—Learning efficiency is increased by a general understanding of the principles of learning. For example, the learner should know that the rate of improvement during practice on a complex task is by no means steady. It is very rapid at first; the first few trials often account for mastery of a considerable fraction of the total. Each subsequent trial contributes decreasingly; for example, the difference between the skilled marksman and a fairly good shot may involve hundreds of hours of practice. It is also useful to anticipate the period of no improvement, called a plateau, that often occurs in complex task learning. Plateaus tend to appear in graphs of the rate of learning when separate response components begin to merge into continuous, smooth acts. For example, a plateau is commonly found in learning to send Morse code. When the learner's skill in sending letters reaches a high point, he is able to begin to learn to send whole words. The transition is necessary if the skill of the expert is to be acquired, but it involves a period of no increase in speed. However, during the plateau the letter-sending habits are being overlearned to that point of near automaticity which frees the sender to read ahead and reduce the interval between letters. The plateau seems unavoidable, but understanding its nature and function reduces discouragement and anxiety while it lasts.

Programmed Learning.—A recent contribution to the technology of education, programmed instruction was suggested by the formal, psychological analysis of the learning process. In this method of teaching, a subject matter is reduced to small parts, usually stated as simple sentences or formulas. Ordered in a sequential fashion, these elements are presented one at a time, lacking a crucial word, symbol or number which the learner must supply correctly before proceeding. The mechanics of the process may involve a program printed on a roll of paper presented one step at a time by a so-called teaching machine. The learner supplies the missing content directly upon the roll. A pull on a lever then advances the paper to move the student's answer behind a transparent window and to reveal the answer that was expected; if these match, the student is reinforced. Other forms of presentation include programmed textbooks, in which the incomplete item is given on one page, with the missing information and the next item on the following page. Whatever the method of presentation, theoretically the learner benefits from the constant check on his accuracy and understanding, from such small consecutive steps that he seldom makes a time-consuming mistake, and from the immediate opportunity to have his correct responses reinforced. Programmed devices can be employed at the student's own rate; unlike live teachers, they can avoid excessively large steps and never become bored or impatient. In a sense, the program is like a tutor. It continually requires the learner to give evidence of his understanding rather than simply letting him read with uncertain comprehension. *See* PROGRAMMED LEARNING; *see* also references under "Learning" in the Index.

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(K. MACC.)

LEASE: *see* LANDLORD AND TENANT; LAND TENURE: ECONOMIC AND AGRARIAN ASPECTS.

LEAST SQUARES, METHOD OF. The method of least squares is a mathematical tool based on the idea that the value which best represents (or fits) a given set of quantities is one which minimizes the sum of the squared differences between itself and these quantities. For example, according to the least squares principle, the arithmetic mean of a set of repeated experimental measurements subject to random error is the value which best represents the set (*see* MEAN).

Thus, if $m_1, m_2, \ldots, m_n$ are measured values of an unknown μ, the expression $Q(\hat{\mu}) = (m_1 - \hat{\mu})^2 + (m_2 - \hat{\mu})^2 + \ldots + (m_n - \hat{\mu})^2$ must be minimized with respect to the variable $\hat{\mu}$. The minimizing or best-fitting value of $\hat{\mu}$ is the arithmetic mean $(\overline{m})$ of the observed m's, $\hat{\mu} = \overline{m} = (m_1 + m_2 + \ldots + m_n)/n$, by virtue of the algebraic identity $Q(\hat{\mu}) = Q(\overline{m}) + n(\hat{\mu} - \overline{m})^2$.

More generally, a value y may depend on several quantities x_1, $x_2, \ldots, x_k$ in accordance with a relationship $y = \gamma_1 x_1 + \gamma_2 x_2 + \ldots + \gamma_k x_k + e$, where the γ's are unknown constants and e signifies random error. Such a formula might express, for example, the dependence of the yield y of a chemical reaction on temperature x_1, pressure x_2, and the concentration x_3 of the reacting material. If there were no random error $(e = 0)$ then in principle the γ's could be determined exactly by varying the conditions (x's) through a set of k experiments, measuring the corresponding yields (y), and solving simultaneous equations for the γ's. In practice such ideal circumstances almost never arise. Instead, a set of $n \geq k$ experiments is performed and the values of y and the x's for the jth of the n experiments are recorded as $y_j, x_{1j}, x_{2j}, \ldots, x_{kj}$. By the method of least squares the best estimates of the γ's are the numbers $\hat{c}$ which minimize the sum of squared deviations $Q(\hat{c}) = \Sigma_j(y_j - \hat{c}_1 x_{1j} - \hat{c}_2 x_{2j} - \ldots - \hat{c}_k x_{kj})^2$. Let $a_{hi} = \Sigma_j x_{hj} x_{ij}$ and $b_h = \Sigma_j x_{hj} y_j$. When the x's are linearly independent the normal equations $\Sigma_i a_{hi} c_i = b_h$ determine a unique set of c's. The values $\hat{c}_i = c_i$ minimize $Q(\hat{c})$ because of the identity $Q(\hat{c}) = Q(c) + \Sigma_j[\Sigma_i x_{ij}(\hat{c}_i - c_i)]^2$, the second term on the right being positive unless $\hat{c}_i = c_i$, $i = 1, 2, \ldots, k$. The example concerning μ is recognized as a special case, through the identifications $y = m$, $k = 1$, $x_1 = 1$, $\gamma_1 = \mu$, $a_{11} = n$, $b_1 = \Sigma_j m_j$; there is only one normal equation, $nc_1 = \Sigma_j m_j$, and its solution is $c_1 = \overline{m}$.

Detailed justification of the method depends on appropriate assumptions concerning the random error term e, and is a part of that branch of statistical theory known as the analysis of variance. The reader may wish to consult H. Scheffe, *The Analysis of Variance* (1960).

Quite another area of application of the principle of least squares may be briefly indicated. If $f(x)$ is a function with period 2π, to be approximated by a trigonometric polynomial $T(x) = a_0 + a_1 \cos x + \ldots + a_n \cos nx + b_1 \sin x + \ldots + b_n \sin nx$, a natural and convenient measure of the accuracy of the approximation is the quantity $Q(T) = \int_0^{2\pi} [f(x) - T(x)]^2 \, dx$, and the least squares best approximation is that which minimizes $Q(T)$. When this is carried through it is found that the familiar Fourier coefficients furnish the solution.

See also FOURIER SERIES.

See R. V. Churchill, *Fourier Series and Boundary Value Problems,* 2nd ed. (1963).

(J. G. WL.)

LEATHER is animal hide or skin that has been converted by chemical treatment and processing, known as tanning, to a stable and nonputrescible state. The objectives of tanning are to render hides and skins resistant to decomposition or bacterial decay, particularly when wet; to improve certain physical properties, such as tensile strength, flexibility, resilience, abrasion resistance and permeability to water vapour; and to impart to the leather chemical properties such as nonsolubility in water at relatively high temperatures. Untanned hide or skin substance becomes soluble in water at approximately 140° F. (60° C.) while many types of leather remain stable at the boiling point of water.

The principal hides or skins used in the manufacture of leather are sheep- and lambskins, cattle hides, goat- and kidskins and calfskins. These types represent more than 90% of the world production of leather. Other hides and skins used commercially

include those of horse, pig, kangaroo, deer, reptile, seal and walrus. The major raw materials are by-products of meat consumption. Every country possesses some hide and skin supplies. The estimated annual world production of the major hides and skins is as follows: sheep- and lambskins, 152,000,000; cattle hides, 120,000,000; goat- and kidskins, 65,000,000; calfskins, 30,000,000.

In the tanning process, the thin outer layer (epidermis) and subcutaneous layer (fatty flesh) of skin are removed; the thick, dense layer (derma) of skin that lies between the epidermis and flesh is the portion used in making leather (*see* SKIN: *Skin in Lower Vertebrates*). The derma consists of connective tissue and fat cells in proportions that vary according to the kind of animal and such other factors as its age, sex and general health. The derma within a particular hide also may vary according to the location in the hide. A large proportion of fat produces soft, spongy leather because air spaces are created when the fat is removed during tanning. The relative amount of connective tissue present influences the strength, elasticity and grain of the finished leather. The tanning process aims at separating these fibres without damaging them, thereby making the leather pliable without lowering its tensile strength.

The following materials occur naturally in animal skin—water, proteins, fat, carbohydrates and minerals. About 95% of the protein in the derma of calf, steer and cow hides consists of collagen. The small amount of fat present is converted during tanning to lime soaps and then is removed. The minerals naturally present include chlorides, sulfates, phosphates and silicates of sodium, potassium, calcium and magnesium. The chief carbohydrate is glycogen. When the skin reaches the tannery, it may also contain materials introduced artificially, such as salts added during curing.

This article discusses first the history of leather; then the major types of leather, including imitation leather; the care of leather; the preparation of hides and skins for tanning; the tanning process; and the finishing processes following tanning. The processes described are the ones used generally; variations occur between plants and between countries.

HISTORY

The production and use of leather is identified with the earliest artifacts and recorded history of every known culture. Egyptian carvings dating to 3000 B.C. depict leather dressers at work. Leather articles in the British museum include shoes, sandals and other products of the 21st dynasty and earlier. The literature and history of classic Greece contain abundant evidence of tanning as a flourishing art and trade.

Presumably the accidents of geography, climatic conditions and the flora and fauna of various regions determined specific methods of enhancing the utility of hides and skins. Knowledge of vegetable tanning seems to have been acquired in prehistoric times. In the Roman era Pliny refers to tanning with bark and to the usefulness of certain woods and berries. During the medieval period tanning flourished in the near east and a great variety of leathers was introduced to Europe by the Moors. Morocco leather, as a result, became widely known throughout Europe for its fine quality and beautiful colour. By the 15th century the art of leather tanning was once more widespread in Europe, fostered by the guilds in principal mercantile cities.

In the 18th century the principles of vegetable tanning and the use of specialized instruments as well as crude machines were well known. While a scientific basis for the action of tannic acid was not formulated, the empiric value of materials such as oak bark, sumac, valonia, hemlock and other vegetable materials was well established. Until the end of the 19th century the only basic change in the character of leather production was the introduction of power-driven machinery.

Tanning with chrome salts, introduced at the end of the 19th century, was probably the first change in the chemistry of leather manufacture in at least 2,000 years. Chrome tanning shortened the process from weeks to days. Upper leather of greater uniformity and a wide variety of performance characteristics became available to manufacturers of shoes and other leather products. Scientific principles have transformed leather production from an art to an industrial process that can be carried out wherever suitable raw materials are available. As a result, tanning has spread throughout the world. It is one of the first industries to be established in areas or nations undergoing the transition to industrialization.

By the early 1960s it was estimated that 97% of the world's supply of hides and skins, derived from the production of meat or wool, moved into commerce for consumption by the tanning industry. Leather output in the more developed countries is distinguished primarily by the greater use of labour-saving machinery, by more exact chemical and electronic control systems and by the diversification of leather output to meet higher standards of living.

MAJOR TYPES OF LEATHER

The variety of leathers produced in the United States and throughout the world covers hundreds of applications. The following classification (from Tanners' Council of America, *Dictionary of Leather Terminology,* 5th ed., 1957) lists the most important types produced:

Raw Materials of Tanning Industry and Leather Produced Therefrom

1. Cattle group
   - Steer (ox), cow and bull hides, producing leather for:
     - Shoe soles, heels, counters, welting, inner soles, etc.
     - Boot and shoe uppers
     - Harness, saddles, skirting (for saddles), horse collars, etc.
     - Traveling bags, suitcases, briefcases, straps, etc.
     - Gloves and garments
     - Machinery belting
     - Upholstery for automobiles, furniture, airplanes and decorative purposes
     - Fancy leather goods, handbags, belts, etc.
     - Bookbindings
     - Aprons
     - Buffing wheels
     - Aprons, carders, combers and pickers on textile machinery
     - Hydraulic packings and washers
     - Laces for belting, etc.
     - Lithographic purposes
     - Footballs and sporting goods
     - Razor strops
     - Suspenders
     - Scabbards
     - Rawhide
   - Kipskins (from large calves or undersized or small breeds of cattle), producing leather for:
     - Shoe uppers
     - Fancy leather goods and handbags
     - Gloves and garments
     - Shoe lining
   - Calfskins, producing leather for:
     - Boot and shoe uppers
     - Fancy leather goods and handbags
     - Gloves and garments
     - Sweatbands for hats
     - Rawhide and parchment
     - Military helmets and gas masks
     - Fine shoe linings
     - Bookbindings
     - Grips for golf clubs
     - Handicrafts
2. Sheep and lamb groups
   - Wooled skins, haired skins (cabrettas), etc., producing leather for:
     - Shoe linings and uppers, slippers and play shoes
     - Gloves
     - Bookbindings
     - Leather goods and handbags
     - Aprons
     - Chamois
     - Coats and other articles of clothing
     - Aviators' clothing
     - Sweatbands for hats
     - Parchment
     - Piano actions
     - Rollers on textile machinery
     - Military helmets
     - Millinery and caps
     - Sporting goods (balls, gloves, etc.)
3. Goat and kid group
   - Skins used for producing leather for:
     - Shoe uppers
     - Fancy leather goods and handbags

Gloves and garments
Aviators' clothing
Bookbindings
Upholstery

4. Equine group
Horse, colt, ass, mule and zebra hides, producing leather for:
Shoes
Gloves and garments
Aviators' clothing
Sporting goods (baseball covers and mitts, etc.)
Puttees
Luggage
Razor strops
Belts

5. Buffalo
Domesticated land and water buffalo (not American bison, whose hide is not tanned for leather), producing leather for:
Shoe soles and uppers
Buffing wheels
Luggage
Handbags

6. Pig and hog group
Pig, hog, boar, peccary and carpincho (a Brazilian rodent) skins, producing leather for:
Fancy leather goods and luggage
Gloves
Inner soles, counters, etc.
Saddlery and harness
Shoe uppers

7. Deer group
Fallow deer, reindeer, antelope, gazelle (dik-dik), elk and caribou skins, producing leather for:
Shoe uppers
Gloves
Clothing
Fancy leather goods
Piano actions
Mukluks

8. Kangaroo and wallaby group
Skins producing leather for:
Shoe uppers

9. Aquatic group
Seal, sea lion and walrus skins, producing leather for:
Luggage, fancy leather goods and buffing wheels
Shark, whale, blackfish, dolphin, porpoise, etc., producing leather for:
Fancy leather goods, luggage and shoe uppers
Alligator and crocodile, producing leather for:
Shoes, handbags, luggage and fancy leather goods

10. Minor classes
Ostrich skins for:
Fancy leather goods and luggage
Camel, llama, alpaca and yak:
Tanned in producing countries usually for local consumption
Lizard, snake, frog and similar skins:
Shoe uppers and fancy leather goods

Imitation Leather.—The term imitation leather was originally applied to coated fabrics with a surface simulating genuine leather. The materials later produced to imitate leather usually were referred to by brand name or by basic type; *e.g.*, vinyl plastic, rubber-coated fabric, pyroxylin fabric, etc.

The first feasible imitation leathers were based on patents issued in the United Kingdom in 1851. These covered the application of cellulose nitrate compositions to various cotton fabrics, forming a waterproof coating of sufficient substance to be given surface texture. Earlier attempts at producing imitation leather sought to form a film upon a fabric base through the oxidation of drying oils. Such coated products lack the substance and strength of pyroxylin-coated fabrics. The latter are made in various weights or gauges and may be printed or embossed to simulate leather grains.

The development of the modern plastics industry greatly increased the number of products described as imitation leather. The most important of these, polyvinyl chloride and its modifications, outstripped pyroxylin in commercial importance following 1946. Sold under various names, it is best known as vinyl or vinyl plastic. The base plastic, polyvinyl chloride, is coloured, treated with plasticizers and finally produced in continuous sheets or rolls of specified gauge or thickness. Calendering machines finish the surface to a smooth, glasslike appearance, to a mat or semigloss polish, or emboss texture in imitations of boarded (finely creased) or grained leather. In certain applications vinyl films are used unbacked but for many others they must be bonded to fabrics. Low stitch-tear strength and poor puncture resistance necessitate such backing. Other plastics or intermediates in synthetic rubber processes are used for unsupported or backed films and are marketed as imitation leather. Their principles of manufacture or treatment resemble the vinyl process; rollers are used to extrude films of uniform thickness. In general the plastics are distinguished from the older pyroxylin compounds by greater chemical resistance and more uniform physical characteristics. The lack of fibre structure in extruded films is associated generally with low resistance to penetration by sharp objects and by moderate stitch-tear strength. Electronic or heat sealing was developed to overcome the latter disadvantage.

A new class of imitation or substitute material was introduced early in 1964. These products consist of a base or substrate of nonwoven fibres, usually man-made, that are impregnated with chemical binders. The material is top coated or finished to imitate smooth and textured leathers or may be given a napped surface in imitation of suede leather.

CARE OF LEATHER

Articles made of leather need comparatively little maintenance. In general, the principles to be observed in caring for almost all leathers are as follows: (1) Wet leather articles should be dried slowly at moderate temperatures. Avoid excessive heat; if a hot radiator, for example, is used to dry wet shoes or gloves, the leather fibres will be distorted and the wearing qualities impaired. (2) Solvents such as benzene, carbon tetrachloride or naphtha should be used only with the greatest care in removing soil or dirt spots. Some modern leathers, however, are made with fibre lubricants that resist solvents and such leathers can be readily dry cleaned with commercial solvents. (3) Surface dirt on smooth leather is removed best by neutral soap; any good grade of toilet or castile soap will serve, although specially compounded saddle soaps both clean and help lubricate leather.. (4) Leather should be polished periodically with a compound of waxes and oils both to protect and enhance the surface and to aid in lubricating the fibres.

Smooth or Polished Leathers.—Shoes, luggage, upholstery, handbags and other goods made of leathers that carry a polish or lustre may be given the same basic care. Surface dirt should be removed by brushing or by wiping with a damp cloth. If the article is only superficially soiled, an application of polish and wax will restore the finish. If the dirt is firmly attached, a soap and water treatment is recommended. A damp (not wet) cloth should be applied to soap and then to leather, followed by moderate rubbing. Stains and spots that do not yield to soap and water may be removed by cleaning solvents. However, these should be handled with the greatest care; the minimum possible quantity should be used in order to avoid leaving cleaning rings and stains. After the soap and water are applied, the shoes or other articles should be wiped with a clean, damp cloth and allowed to dry slowly. One or two light coats of polish and buffing are the final step.

Suede Leathers.—Napped, sueded or brushed leathers are best cleaned with a stiff brush. Fine wire brushes remove dirt readily and also raise the nap, thereby restoring the suede texture. Light soil on suede leather shoes or garments can often be removed by rubbing with a soft rubber eraser or synthetic sponge. Grease spots and stains can be eliminated by lightly rubbing the soiled area with a cleaning solvent. If the nap of suede leather has been compacted or compressed from wear, rubbing with fine sandpaper will restore the nap. Brushing will then remove both dirt and grit, leaving the original suede surface. Most suede garments can be dry cleaned.

White Leathers.—The oil content of white leather should be maintained for the best possible service. A good white cleaner contains oils that replace the oils lost through washing and wear. Smooth white leather shoes, such as those of calf or kid, should be treated lightly with soap and water before white shoe dressing is applied. In cleaning with soap only a damp cloth need be used and excessive wetting should be avoided. The shoe should be dried immediately with a clean cloth, then a thin film of white cleaner or dressing should be applied. At no time should a thick coat of

white dressing be used since this is unnecessary and adversely affects the oils in the leather.

White suede leather or buckskin leather can be brushed with a soft wire brush to remove soil. Following the brushing a small amount of white leather dressing should be applied and then the leather should be brushed again to restore its nap. Where soil is not excessive, simple cleaning measures are successful. A fine grade of sandpaper will both remove soil and improve the nap. Frequently the use of a soft eraser will remove superficial soil.

Commercial or proprietary white shoe cleaning preparations are primarily emulsions of titanium dioxide, soap and leather lubricants. These should always be applied in thin coats for best results.

Oiled Leather Work Shoes or Hunting Boots.—This is a class of leather specially treated with oils and waterproofing compounds for use in heavy-duty footwear. It is designed to repel water and to retain maximum softness after wetting. In general, the care of such leather requires cleaning with mild soap and water and subsequent lubrication.

For the latter purpose commercially available preparations may be used, although it will be found that a 10% to 20% solution of sulfonated castor, neat's-foot or cod-liver oil will suffice. The number of applications, at intervals of at least one day, is determined by the degree of flexibility and dryness desired.

Upholstery Leather.—Upholstery leather requires minimum cleaning. Waxes or polishes should be applied only rarely, if ever, and only in light coats. Upholstery leather is best cleaned by washing with mild soap and a minimum of water. The soap film should then be removed with a clean damp cloth so that the leather can dry free of soap residue. In cases where leather has been subjected to hard usage and is excessively dry, a very light application of sulfonated oil to the clean grain surface will aid in rejuvenating the leather.

Mildew or Mold.—The growth of mold on leather can be prevented by two simple methods. First, because no molds can live without moisture, leather or leather articles should be kept dry and free of excessive humidity. Leather articles should not be stored in a humid atmosphere, particularly where ventilation is poor and temperature is high. If this precaution cannot be taken, special fungicide compounds may be used to inhibit molding. Preparations containing paranitrophenol, for example, in concentrations sufficient to represent .3 to .5 of 1% of the weight of leather will effectively prevent mold growth.

Industrial and Harness Leathers.—The two requisites for the care of industrial leathers, such as transmission belting, and harness or saddlery leathers are proper cleaning with mild soap and water and the application of dressings for fibre lubrication. In the case of transmission belting, it is important to avoid excessive oiling that would lower the friction coefficient or cause the belt to change in dimension. Dressings used for transmission belting contain sulfonated oils or greases that are compounded to keep fibres lubricated without affecting pulley tension. Harness and saddlery require regular cleaning with soap and water to remove soil and perspiration, and the use of saddle soaps or sulfonated oils for conditioning the leather.

PREPARATION OF HIDES AND SKINS FOR TANNING

Preservation.—Since hides and skins that are to be processed in commercial tanneries must be accumulated in large quantities after slaughter and flaying and prior to tanning, temporary preservation at the packing plant is essential. Several methods are used to accomplish what is generally known as curing. In some areas, the hides or skins may be air-dried to inhibit bacterial decay. Modern packing plants employ wet salting; penetration of hides and skins by brine solution over an interval of days or weeks effectively inhibits bacterial growth. After curing with salt, hides or skins may be stored for prolonged periods without deterioration. Modern hide warehouses employ refrigeration as a further safeguard against decay. The best-quality cattle hides and calfskins are packed, shortly after flaying, with clean, coarse salt, which dissolves in the water of the hide. A saline solution is thereby formed that prevents the putrefactive action of bacteria. Hides and skins treated in this manner are described as wet-salted and can be held for considerable periods without decay under favourable conditions of humidity and temperature. A similar result is achieved by immersing hides in a brine solution until they are thoroughly saturated. When the transport of cured hides involves long periods of time, salt may be used for immediate preservation followed by drying, to produce dry-salted stock. Although drying preserves skins against decomposition, it lowers the quality of the product and causes difficulties later in tannage. Skins are dried either spread on the ground or suspended from poles. Decay and insect damage during drying can be avoided by treatment with an arsenical solution. Most sheep- and lambskins from which the wool has been removed are preserved by pickling in a solution of sulfuric acid and salt and are shipped in casks containing the pickling solution.

Soaking.—After hides and skins enter the tannery, the first major operation is soaking. This operation has two purposes—first, to remove water-soluble material that might interfere with later operations; second, to cause the fibres to absorb water so that their normal shape and dimension are restored. In addition to the salt employed in curing, other water-soluble matter in the raw stock removed by soaking includes soluble proteins from blood and lymph. Soaking also softens and facilitates subsequent mechanical removal of dung and any other extraneous material present. The removal of soluble proteins is hampered by the epidermis and by layers of fatty tissue on the flesh side of hides and skins. Bacterial control is essential during soaking inasmuch as soluble proteins extracted by water provide nutrients for potentially enormous multiplication of bacteria with commensurate damage to the stock.

In modern practice, the soaking of wet-salted stock is often preceded by a preliminary washing in revolving drums, using adequate changes of cold water containing antiseptics. The hides or skins may be mechanically agitated in the washing by an arrangement of pegs within the rotating drum so designed as to cause continuous separation and flexing. Following the washing, hides or skins are immersed in vats of from 1,000 to 2,500 gal. capacity, using fresh water at relatively low temperatures. The soaking may be continued for several hours or days until a desired physical condition is achieved. Throughout the operation a compromise is sought between the risk of damage from prolonged washing and the optimum removal of soluble and other unwanted materials.

Special difficulties are met in the treatment of dry hides or skins where washing must restore the normal structure of fibres as well as remove foreign substances. During drying, fibres tend to change in shape as well as in size, depending on the speed of the process and the temperature used. The fibres adhere to films formed by oxidized natural greases, retarding uniform penetration of water in the soaking. Chemical and mechanical means are utilized to condition the skins properly. An alkaline solution is frequently employed both to separate and to swell the fibres in the soak waters. Soaking is interspersed by milling in rotating drums with the object of flexing the stock to separate fibres and assist the absorption of water in the soaking vats. Alternate treatment of the hides or skins in vats and drums is continued until a state of adequate flexibility is reached and the water content of the stock has been increased several times. Throughout soaking, great care must be exercised to prevent bacterial growth and excessive swelling of the hides or skins, which might cause lasting deformation of the fibre structure.

Fleshing.—The purpose in this operation is to remove subcutaneous adipose tissue and flesh. This is done by fleshing machines on which rotating bladed cylinders under pressure cleanse the flesh side of the hide or skin. While there is variation in tannery practice in the sequence of fleshing and other early steps, the procedure is virtually standard in modern plants. Hides also may be fleshed at the packing plant, before being cured, to reduce shipping costs.

Unhairing.—The next essential preparatory stage is loosening and removing the hair from the grain (outermost) surface. In this operation the hair must be loosened from the follicles, which

represent indentations of the epidermis into the derma, and then removed mechanically. The process can be carried out by a variety of methods, of which the most important and widely used is liming.

Liming.—The results of liming are complex. In addition to preparing for unhairing, liming also loosens and dissolves the epidermal layers of cells. The fibrous portions of derma belong chiefly to the collagen class of proteins whereas hair and the outermost surface of skin are composed of keratins, which are destroyed by alkalies much more rapidly than is collagen. Consequently, an alkali solution is used to separate keratin from collagen; the limited solubility of lime is adapted to this purpose. The degree of liming directly influences ease of hair removal and also determines to some extent the properties of the leather, such as plumpness, stretch and solidity. Liming usually involves immersion of hides and skins in a mixture of lime and water, using vats with as much as 2,500 gal. capacity.

The quantity of lime used is greatly in excess of the amount soluble in the amount of water used so that a saturated solution is always present and the major portion of the lime is suspended in the liquor. During the process of immersion, the raw material is periodically withdrawn from the vat, piled up and allowed to drain. Mechanical agitation by paddle wheels is employed for some types of hides and skins to stir up the undissolved lime in order to maintain the solution at or near saturation, to assist the diffusion of the lime into and among the skins and to prevent skins from packing. Where still vats are used, the lime is also agitated, even in the intervals when the raw stock has been withdrawn to drain.

The time required for easy unhairing through liming is greatly shortened by the use of sharpening agents, of which the principal one is sodium sulfide. The hydrolysis of sodium sulfide produces sodium sulfhydrate (sodium hydrosulfide), which acts specifically on keratin, accelerating the loosening of the hair. Other chemical agents such as dimethylamine are also used to accelerate the liming process. In the treatment of sheepskins, where it is not desirable that the wool come in contact with lime, a heavy paste of lime is applied to the flesh side of the skins. After several hours, the hydrosulfide diffuses through the skin to the epidermis, where it dissolves the cells holding the wool. Each skin must be painted individually to assure minimum contact of wool and lime.

Other Systems.—Dehairing systems other than liming are employed to a minor extent. Enzymes may be applied to hides and skins previously prepared by soaking in a caustic solution. Sodium sulfide can be used in very strong solution, although the hair may be dissolved or disintegrated. The commercial value of the hair is, of course, lost in this reaction.

An older method of dehairing, now virtually obsolete, consists of sweating, which is essentially a controlled putrefaction of the cells composing the hair sheaths, induced by temperature and moisture. Sweating was supplanted by the chemical means of unhairing and is used in modern plants only for lower grades of dry hides and for the removal of wool from some types of sheepskins. The sweating system involves hanging hides and skins in a closed chamber where the air is kept warm and humid. The sweat chamber is usually lined with glazed tile or other nonporous material to facilitate the thorough periodic cleansing required to remove microorganisms. Temperature, humidity and ventilation must be regulated to hold the reaction within desired limits.

Final Steps.—When hides and skins have been prepared for unhairing, the loosened hair is removed by machines of several types. In principle, the unhairing machine applies dull rotating blades that rub the hair off the grain surface of the hide or skin without scratching or causing damage to the grain. On some kinds of hides and skins, machine unhairing is followed by hand treatment with dull knives to assure a completely clean grain surface.

Washing and Deliming.—Several further steps are necessary to prepare the stock for tanning. Surface lime and some protein decomposition products are removed by washing in running water at temperatures of 60° to 70° F. (16° to 22° C.). Extended washing at this stage is avoided to prevent the formation of loose grain in the stock. A more complete and controlled removal of the lime content is then effected by soaking and paddling in vats with acidified solutions. This both delimes and produces the mildly acid equilibrium desired in hides and skins prior to tanning. The pH maintained during the deliming process is selected according to the characteristics desired in the finished leather. The degree of deliming is correlated with final softness, pliability and stretch or resilience. In the case of sole, belting and industrial leathers, the deliming is limited to the removal of alkali from the surface. For lighter leathers, acidification is continued until a more uniform pH exists through the cross section of the hide or skin. Great reliance must be placed at this stage, as in all modern leather production, upon precise measuring and recording instruments such as electrometric and colorimetric pH indicators.

Bating.—During liming, several physical and chemical changes take place that must be rectified before tanning. Light types of leather are subjected to bating to attain a smoother and clearer grain or greater softness and pliability. In this process, the hides are placed in vats containing ammonium sulfate or chloride as the deliming agent and certain enzymes that act selectively to remove proteins and also to improve colour. Bating aids the removal of degradation products of the epidermis, hydrolyzes elastin fibres, controls plumpness, regulates pH values and aids in further deliming.

Pickling.—Many types of stock are tanned directly after bating and rinsing, but certain types, particularly those intended for chrome tanning, are first pickled. This process consists of bringing the stock to a condition of equilibrium in a bath of sulfuric acid and salt of fixed concentration. Drumming in such a solution brings the material to a uniform state of acidity, imparts a final cleansing and contributes to softness in the leather.

TANNING

After the preliminary preparation, hides and skins are ready for the chemical conversion to leather, known as tanning. The oldest system of tanning relied on the action of vegetable material containing tannin (*q.v.*), or tannic acid, but modern technology developed a large number of chemical agents and processes to produce leather. Tanning with chrome compounds came to be the most important method in volume of production, although vegetable tanning remained basic for certain kinds of leather.

A number of synthesized products, derived principally from phenols and hydrocarbons, possess characteristic tanning or leathermaking properties. These products are generally manufactured by mixing phenolsulfonic acids with formaldehyde under exact conditions. Syntans, as such products are known, are not the same as natural vegetable-tanning substances and are rarely used exclusively. However, they are extremely useful as retanning agents in the production of both chrome and vegetable leathers. Improved colour, rapid penetration and other desirable economies are effected through use of syntans, when employed as auxiliary tanning materials.

In a different category from the syntans are the agents of the resin class. While not in wide use, these products extended the horizons of leather technology by introducing new materials for the conversion of hide into stable leather with a great variety of properties.

Vegetable Tanning.—In this process extracts of infusions derived from tannin-bearing plants, barks or growths are allowed to act on hides and skins. The chemical mechanism of vegetable tanning has been accurately described. It involves the interaction of phenol and hydroxyl groups of tanning agents with protein constituents of hide and skin substance.

Tannin-Bearing Plants.—Tannin is abundantly distributed in many different forms of plant life. The tanner originally processed skins exclusively with oak bark, but modern tanners use tannin-containing materials from various sources and of different types. The tannins were formerly classified as belonging to the pyrogallol or catechol class, but this classification was superseded by more scientific groupings arranged either according to K. Freudenberg by the chemical groups of (1) hydrolyzable tannins and (2) condensed tannins; or according to W. H. Perkin in

Common Tannins

Gallotannins		Ellagitannins		Catecholtannins	
Do not produce bloom		Produce bloom		Do not produce bloom	
	Per cent tannin		Per cent tannin		Per cent tannin
Galls (*Quercus infectoria*)	50/60	Myrobalans (*Terminalia chebula*)	33/36	Canaigre (*Rumex hymenosepalum*)	25/30
Sumach (*Rhus coriaria*)	26/30	Divi-divi (*Caesalpinia coriaria*)	39/42	Gambier (*Nauclea gambir*)	35/45
		Valonia (*Quercus aegilops*)	30/40	Hemlock (*Abies canadensis*)	8/20
		Oak bark (*Quercus robur*)	10/12	Larch (*Larix europaea*)	9/10
		Algarobilla (*Caesalpinia brevifolia*)	60/80	Mimosa or golden wattle (*Acacia pycnantha*)	38/49
				Mallet bark (*Eucalyptus occidentalis*)	20/25
Tanning extracts					
Chestnut wood extract (*Castanea resca*)	26/30	Myrobalan extract (*Terminalia chebula*)	50/55	Oak wood extract (*Quercus family*)	26/28
				Quebracho extract (*Quebracho colorado*)	62/68
				Mimosa extract (*Acacia family*)	62/64

three groups: (1) gallotannins; (2) ellagitannins; and (3) phlobatannins or catecholtannins. For the practical tanner the latter grouping is of most interest. The table shows the most common tannins according to the classification of Perkin; in the table they are classified according to whether they deposit bloom—a crystalline deposition of ellagic acid—during the tanning process; the bloom produces firmness in the finished leather but is objectionable when goods are to be subsequently dyed.

Vegetable-Tanning Processes.—The processes of vegetable tanning may be considered in two distinct groups: (1) the tannage of heavy leathers, such as sole, belting, mechanical and upholstery; and (2) the tannage of light leathers for shoe uppers, linings, fancy goods, bookbindings, etc.

While similar in principle, the techniques differ by virtue of the great variation in weight or substance of raw stock and the solidity or flexibility sought in the finished leather. Throughout the vegetable-tanning process, the strength of tanning liquors is accurately controlled by instruments that record the specific gravity and the acidity of the solutions.

Tannage of Heavy Leather.—In the United States and most other countries, hides to be tanned for sole or other heavy leather are processed in sides, the hide being divided into two portions by cutting down the line of the backbone. After tanning, the finished sides are customarily divided into three main parts, the bend accounting for 50% of the area, the belly and shoulder each representing approximately 25% of the side area. In Great Britain the side usually is cut, or rounded, prior to tanning.

The tannage of sole leather usually consists of three group operations: (1) colouring, by suspending the goods in a series of weak liquors of gradually increasing strength—rocker vats are used in this first stage; (2) laying the material in a series of strong liquors, increasing in strength as the tannage proceeds, the operation being called handling and the series of vats described as handlers or layaway vats; (3) placing the goods for comparatively long periods in layer pits (called layers, or dusters) in a strong liquor after they have been dusted with a small quantity of solid tanning material.

The suspender (colouring) tannage is accomplished in a series of vats containing weak liquors that have been used previously. The sides are usually moved daily into solutions of gradually increasing strength and their position in the same vat is also changed once or twice daily. The length of time and the number of vats used varies in different tanneries.

The goods are moved from the strongest suspender vats to the layaway vats, or floaters. There they are handled daily by being drawn up on the side of the vat, allowed to drain and then transferred, in a horizontal position, to vats of gradually increasing strength of tannin. Handling becomes less necessary as the tannage proceeds. In the last stages of the handler round, it is customary in Great Britain to sprinkle the goods with a little mimosa bark, ground myrobalans or valonia as a preliminary to the layers, or dusters.

At the end of the handler round, the goods are usually almost completely tanned and are then transferred to the layers, which contain very strong liquor obtained from the leaches of previously unused tannin or by the addition of chestnut or oak wood extract. The goods may be allowed to remain in the layers for long periods without change, being lifted and transferred into solutions of increasing strength every one or two weeks. This treatment permits the deposition of bloom and produces firmer, harder, heavier and better-wearing leather.

To complete the process, the goods are removed, drained and then scoured to remove the deposited bloom from the grain.

Tannage of Light Leather.—One of the essential differences in the manufacture of calf and other light leather by the vegetable process is that the goods are commonly either bated or thoroughly delimed before tanning. The goods are sometimes pickled after bating; however, this operation may be omitted.

Usually the tannage is begun by suspending the skins in non-astringent, used liquors originally prepared from a mixture of two or more of the following materials: mimosa bark, myrobalans, gambier, quebracho, chestnut or oak wood extract. After the skins have been suspended for a period varying from two to seven days, the tannage may be completed in a handler round, the skins being finally given a retannage to lighten the colour by drumming, paddling or suspending in a warm sumac infusion. Alternatively, the tannage is sometimes done entirely in paddles using gambier in the earlier stages and gradually strengthening the tannin content of the solution by adding quebracho-myrobalan extract, chestnut extract, etc. Because calfskins are dyed in the majority of cases, the usual custom is to avoid bloom-giving tanning materials since the irregular deposition of bloom on the surface of the leather detracts from a level dyeing.

Tannage of Skivers.—Skivers are the grain portions of sheepskins that have been split in the limed condition. One of the materials most widely used in their manufacture is sumac (*Rhus coriaria*); this material readily produces a white leather that can be dyed any colour. The material, as removed from the splitting machine in limed condition, must be washed, delimed and thoroughly bated, after which it is commonly pickled and then tanned in a paddle wheel. The goods are placed in the paddle wheel with the sumac in the ground leaf form and preferably after having been infused with water for a few minutes at a temperature of 140° F. (60° C.); the tannage is usually begun at a temperature of about 90° F. (32.2° C.). The goods are usually completely tanned within 12 hours; then they may be removed, drained, rinsed in water and hung up to dry.

Vegetable Retannage.—Sometimes certain properties of vegetable tanning are added to leather produced by the chrome process (*see* below) because retanning with vegetable extracts produces leather with physical characteristics of both types. In the case of cattle-hide upper leather, for example, vegetable retanning produces greater plumpness than chrome tanning alone. Combination tannages are also employed for specialized types of sole leather in order to give them both the abrasion resistance of chrome leather and the greater thickness of vegetable leather.

Mineral Tannage.—As mentioned previously, tanning with mineral salts, primarily sodium or potassium bichromate, replaced the use of vegetable extracts for the bulk of all light hides and skins. Most shoe upper leather, for example, is produced by chrome tanning.

Alum Process.—The oldest process of tanning with mineral salts is the alum process, still used in the manufacture of some glove leather. The proportions of the materials used vary, but the following may be taken as an example: 8 lb. alum, 8 lb. salt, 3 to 5 lb. flour and 2 to 4 lb. egg yolk for 100 lb. of prepared skins. It is customary to add all of the ingredients at the beginning of the tanning and to continue the drumming for about two hours until the leather-forming process is completed. The goods are then removed, drained and dried.

Chrome Tanning by the Double-Bath Method.—This method is applied commercially chiefly in the tanning of goatskins for

the manufacture of *glacé* kid; it is also used in the tannage of calfskins for willow (smooth) calf and for machinery leathers.

The prepared pelt is first treated with a comparatively weak solution of potassium or sodium bichromate acidified with hydrochloric or sulfuric acid. After this solution has been absorbed by the skins, they are transferred to a solution of sodium thiosulfate (hypo), to which hydrochloric or sulfuric acid is added as the reduction process proceeds. The free sulfurous acid produced reduces the chromic acid, resulting from the action of the acid on the bichromate solution, into a basic chromium chloride or a basic chromium sulfate salt, the thiosulfate during the reduction process undergoing oxidation to sodium tetrathionate and sodium sulfate. At the same time, sulfur is liberated and deposited in the interstices between the fibres as well as in and on the fibres of the skins. The sulfur deposit is one of the principal features that distinguish leather tanned by the two-bath process from that produced by the one-bath method.

In the modern commercial method the skins are first pickled with sulfuric acid and common salt and then are drummed in a solution of sodium bichromate and acid. The more complete the absorption of chromic acid resulting from the chemical action the better, as this has an important influence on the finished leather. After the goods have been thoroughly impregnated, they should be of a bright orange-yellow colour. They are then removed from the solution and carefully drained for a minimum of 24 hours, after which they are passed through a striking-out (stretching) machine to lay the grain of the skin perfectly flat and remove any wrinkles that may have appeared.

The colour is reduced in the drum or paddle wheel, but in the case of heavy goods it may be done in pits. The following is probably the best procedure: the necessary quantity of sodium thiosulfate is dissolved and placed in the paddle. About one-third of the acid required, after dilution, is added to the solution of sodium thiosulfate. The mixture should be well stirred either by mechanical paddling, or by hand, with a wooden stirrer; after a few minutes the solution will become slightly cloudy as a result of precipitation of finely divided sulfur, showing that the reaction has begun. Another one-third of the diluted acid is added, and after about one hour the remainder. Generally, the reduction takes place in fairly well-defined stages indicated by the colour of the goods. In the early stages there is a change from the original yellowish orange to a darker yellow and then to a lightly brownish yellow. Later the colour becomes a greenish olive, and finally a pale bluish green.

The following are suggested quantities for the two solutions:

first bath	*second bath*
6% bichromate of soda	15% sodium thiosulfate
4½% hydrochloric acid	7½% hydrochloric acid
or	or
1¾% sulfuric acid	3% sulfuric acid

Chrome Tanning by the Single-Bath Method.—The single-bath method is used to a greater extent than is the two-bath process, particularly in the case of calfskins intended for box (double-boarded) and willow or suede finish; hides for side leathers; and sheepskins for gloving, upper leather, linings and fancy purposes.

The single-bath process is simpler and less liable to produce irregular results. The essential difference is that, whereas in the double-bath process the basic salt of chromium is formed on the fibres, in the single-bath method the basic chromium salt is applied directly to the skins in solutions of gradually increasing strength.

One of the simplest methods of preparing a single-bath chrome liquor consists of neutralizing the acid of chromium sulfate or chrome alum by adding sodium carbonate. The following proportions of sodium carbonate and chrome alum should be used to produce the salt, $Cr(OH)SO_4$, which is most generally suitable: For each 1,000 lb. of pelt to be tanned, dissolve 150 lb. chrome alum in 50 gal. water at a temperature of about 185° to 203° F. (85° to 95° C.). When all the chrome alum has gone into solution, cautiously add a solution prepared by dissolving 16 lb. soda ash or 60 lb. washing soda crystals in 25 gal. hot water. When all of the sodium carbonate has been added, the solution should be thoroughly stirred. The usual procedure is to mix together carefully in a suitable lead-lined tank equal parts of sodium bichromate and concentrated sulfuric acid after dissolving the bichromate in a small quantity of water. The reducing agent is then cautiously added until the colour of the solution is changed from the original orange-yellow to a bright bottle-green.

The following quantities produce a liquor that is considered of a satisfactory chemical composition: 200 lb. bichromate; 200 lb. sulfuric acid (95%); 50 lb. glucose; 100 gal. water. The tannage is carried out on lines more or less identical with those of vegetable leathers, the processing being done either in the drum or paddle wheel for the lighter classes of leather, and by suspension in vats for chrome sole leather, hydraulic (*i.e.*, those used as pump valves, etc.) and similar leathers. Starting with a weak solution, the strength is increased until complete penetration has been effected.

In contrast with vegetable production, leather may be made by the chrome process in hours and days instead of weeks, and greater precision is thereby afforded tanners in controlling the nature of their output. Chrome-tanned leather has exceptionally good wearing properties, high tensile strength and resistance to chemical reagents and it will stand high temperatures in wet or dry condition without detrimental effect.

Oil Tannage.—One of the earliest processes for converting pelt into leather was the application of oil and fatty substances. The object of oil tanning is the substitution of a suitable fish oil for the moisture in the fibres. The goods are first drained and then pressed to express from them as much moisture as possible. They are then hung up to partially dry. This requires careful supervision; if the goods become too dry, the fibres adhere to each other and will not absorb oil. After as much moisture as practicable has been eliminated, the goods are placed in a machine called the stocks. This consists of a semicylindrical vessel in which the goods are subjected to a hammering or beating by two heavy hammers; at the same time the goods are continuously turned over. They are sprinkled with a fish oil, usually cod-liver oil, during the process of stocking or kneading, and are processed until they become sufficiently saturated. They are then further dried, resprinkled with oil and restocked. These operations are repeated until the goods are fully saturated and practically all moisture has been replaced by fish oil. The oil is then decomposed on the fibres by the application of heat.

The modern method of manufacturing chamois leather (made from the flesh split of a sheepskin) and leather from deer, antelope and similar skins consists of impregnation with an oxidizable fish oil when the goods are in a weakly alkaline condition, and subsequently processing them to effect further oxidation of the oil on the fibres. The goods as they leave the splitting machine are relimed to further swell the fibres and decompose the fat. They are then frizzed on the split side. This operation, somewhat similar to that of hand fleshing, consists of using a sharp two-handled knife on a frizzing beam to cut away the coarse-fibred surface or ground from the split side nearest the grain. The goods are then delimed either with a fermented infusion of bran or other flour offal, or a suitable acid.

Solvent Tanning.—Considerable attention has been given to tanning with solvents, such as acetone, in place of aqueous solutions of the tanning agents themselves. Intensely rapid penetration of hide and skin fibres occurs with solvent media, thereby expediting the tanning process enormously and enabling the tanner to make prompt changes in the types of leather produced. It was believed that the commercial introduction of solvent tannage would alter leather technology as radically as the perfection of chrome tanning at the end of the 19th century. Systems of this type call for initial dehydration of hides and skins, after preparatory steps such as those followed in the conventional methods, and subsequent saturation in a solution of solvent and tanning agent.

FINISHING PROCESSES FOLLOWING TANNING

Upon leaving either the vegetable tanyard or the chrome tanning drums, leather is in a condition described as rough tanned and must be subjected to a series of finishing steps. These operations

give the product necessary solidity or flexibility, lubricate the fibres by replacing the natural oils lost in tanning, dye or colour the stock and give the surface one of the various finishes associated with leather.

Drying.—An important stage in the final manufacture of leather is the drying of the hides and skins after tanning. Humidity and temperature control are imperative in the drying process in order to maintain proper hydroscopic balance, to avoid deformation of surface and fibres by nonuniform evaporation of moisture and to condition the leather for subsequent stages of manufacture. Heavy leathers, such as sole, are dried by hanging in a ventilated dry loft. The leather is suspended from hooks on a series of horizontal rods arranged so that the current of air through the loft moves uniformly against the leather. A light coating of oil is usually applied to the wet leather before hanging in the dry loft to protect against excessive drying of the grain surface and to ensure that evaporation of moisture from the flesh side is uniform. Evenness of colour and temper (relative softness) in the finished leather depends largely on the rate of evaporation during the drying process. Heavy leather must be dried more slowly than lightweight or thin leather. Vegetable-tanned leather is dried at a slower rate than chrome-tanned leather, which can be brought to a proper state of dehumidification at comparatively high temperatures.

Tunnel drying, in which hides and skins move continuously through an enclosed tunnel under controlled heat and humidity conditions, came to be almost universally employed. Uniform rates of evaporation are thereby achieved with the final condition of the leather predetermined. Suspension of the hides and skins as they move through the drying tunnels is carried out by several methods. In the method termed pasting, skins or sides of leather are affixed with suitable pastes or mountants to clean glass or metal plates that then move automatically through the drying tunnels while suspended from overhead rails. An innovation in drying procedure was the use of infrared lamps in banks over conveyors on which skins and sides are carried.

Fat-Liquoring.—After leather has been tanned and dried, it is generally hard and stiff, lacking in pliability, mellowness and fullness. Blended oils and greases must be incorporated into the leather to give it the required softness, add to its wearability and strength and also increase resistance to cracking. Older methods of applying oils and greases, chiefly by surface deposition on wet or dry leather, were generally supplanted by the modern process of fat-liquoring. Emulsions of oil in water are utilized to secure uniform penetration and coating of leather fibres. Since oils are generally insoluble in water, soaps are used to produce stable emulsions. When wet leather is drummed with such emulsions, the tiny globules of oil penetrate the leather and combine with the fibres. Many different kinds of oils are used in fat-liquoring leather, and the choice of oil depends upon the characteristics desired in the finished leather, as well as the adaptability of the oil to the specific process used in tanning and finishing.

Currying and Stuffing.—In the production of some kinds of leather a higher grease or oil content is desired than can be obtained by the use of fat liquors. The process formerly used to impregnate any kind of leather with greases was that of currying, but in modern practice that operation is usually reserved for heavy leathers, such as belting, harness and machinery types. Lighter leathers, such as upper leather intended for hunting boots or work shoes, may be "stuffed" with microcrystalline greases to secure maximum pliability and water resistance.

Goods to be stuffed are split or shaved after tanning and drying and then are scoured either by hand or machine until the grain surface is thoroughly cleansed of bloom and excess tannins. The leather may then be retanned to obtain a better colour, after which it is ready for grease impregnation.

Grease impregnation may be done in three different ways: (1) hand stuffing; (2) drum stuffing; and (3) dipping. Hand stuffing consists in applying to the previously moistened leather a thick layer of dubbing prepared by mixing together about equal parts of beef tallow and cod-liver oil. The application is made, usually to the flesh side of the leather, with a brush, and the leather is afterward slowly dried. As drying proceeds by evaporation the more oily portions of the dubbing are absorbed by capillarity and become thoroughly distributed and absorbed by the fibres. Drum stuffing consists in drumming the leather, which has been previously put into an equable condition of moisture by damping, in a drum heated either by live steam or by hot air circulating through the vessel. Dipping is practised chiefly upon heavy leathers, for example, harness backs and strapping, and consists of immersing the leather, which has been well dried previously, in a tank filled with molten grease (usually paraffin wax). The dried leather offers little resistance to the penetration of the molten wax and complete permeation is effected in a few minutes. This impregnation is not so satisfactory as drum or hand stuffing because of the nonoxidizable and slight lubricating properties of the wax.

Dyeing.—Colour is imparted to leather either by dyeing or by applying pigment to the surface. Leather is sometimes base dyed (*i.e.*, dyed with a basic dye) to attain uniformity of the surface prior to treatment with pigment finishes. Aniline dyes are frequently used to impart depth of colour and enhance the natural-grain texture of the leather. The most widely employed methods of dyeing are: (1) drum dyeing; (2) spraying; (3) brush dyeing, or staining.

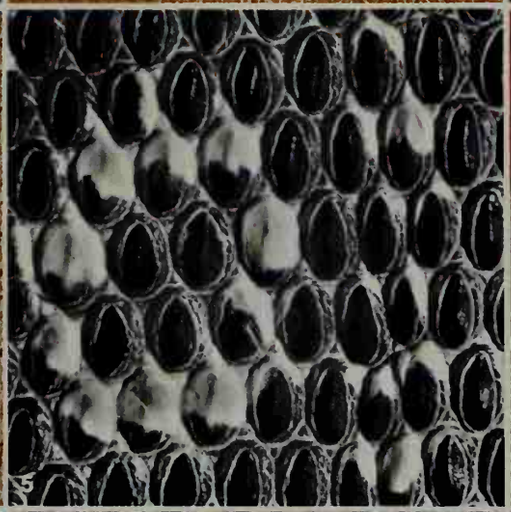
Drum dyeing and spraying are the most important methods for dyeing and colouring various kinds of leather. In the drumming operation, skins are tumbled in revolving drums containing the dye compounds, with provision for maintenance of required temperatures. The choice of acid or basic dyes is dictated by the colour standards desired or by tanning procedures and subsequent finishing steps. In the spray method the dyes are applied to the leather in an atomized state with pressure spray guns. Spraying booths or automatic sprayers geared to the movement of a conveyor belt may be used. Spraying is also employed to deposit additional colour in the form of insoluble pigments that are suspended in water or lacquer mediums. Pigment compounds may be blended with binding agents such as casein, shellac or lacquer. Pigment coats aid the tanner in securing uniformity in colour and depth of hue.

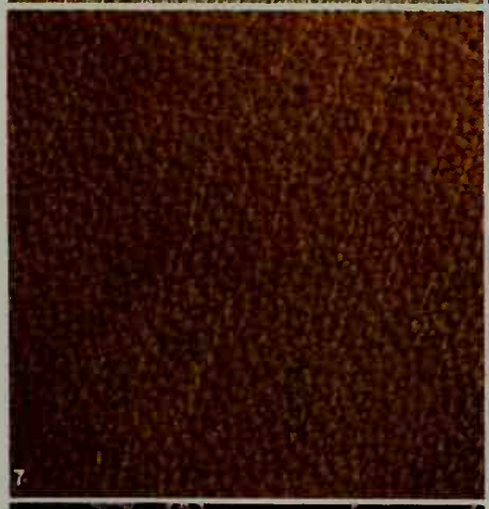
Brush dyeing can be utilized in colouring heavy types of leather such as upholstery hides, luggage and strap sides, and various specialty leathers. A weak solution of the dye is brushed on the surface of suitably prepared leather; usually two or three applications are given to obtain regularity of colour. A similar method is sometimes used in colouring glove leathers, particularly when colour is desired only on the exterior of the glove.

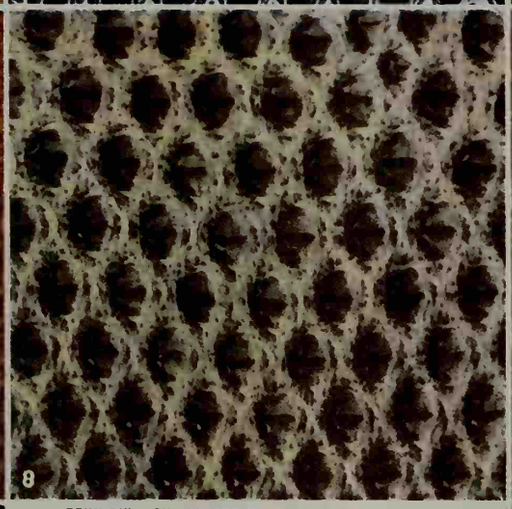
Final Finishing.—A major series of final operations in the tannery can be broadly described as finishing. This term ranges in meaning from the rolling and polishing of sole leather to the buffing that produces the fine, napped surface of suede. Finishing may be said to compare in importance with the basic tanning operation. Methods, procedures and materials used in finishing vary with the kind of texture, surface, gloss and appearance required in the final product. The following are the principles followed in finishing several major categories of leather.

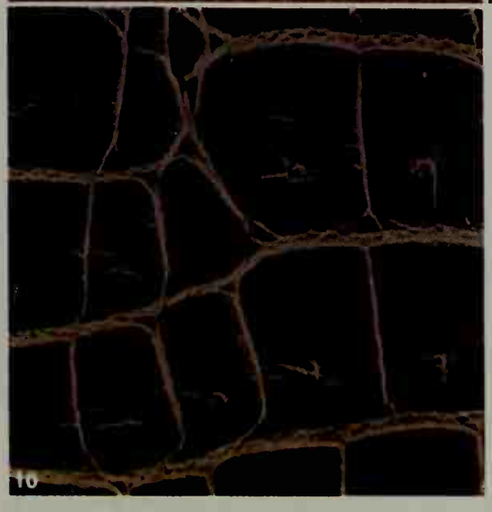
Sole Leather.—To obtain the requisite degree of firmness and solidity for satisfactory wearing qualities and ease of shoe manufacturing, sole leather must be compressed before leaving the tannery. This is done mechanically either by rolling or hammering under considerable pressure. In the United States and Great Britain, sole leather is commonly rolled, initially in a slightly damp condition and afterward in the dry state, on a pendulum type of heavy rolling machine that produces heavy pressure and heat at the moment of impact against the leather. In a later development in the United States, pneumatic machinery was employed to compact sole leather automatically.

Upper Leather.—Complex systems of upper leather finishing are demanded by the contemporary diversity of upper leather for shoes. The first step for almost all upper leather is the staking operation. This consists essentially of mechanical manipulation of hides and skins to loosen fibres and impart a required degree of softness. The flexing action of the machinery used for this purpose is regulated in accordance with the denseness or firmness of the leather. After staking, leather is buffed on the flesh side by a









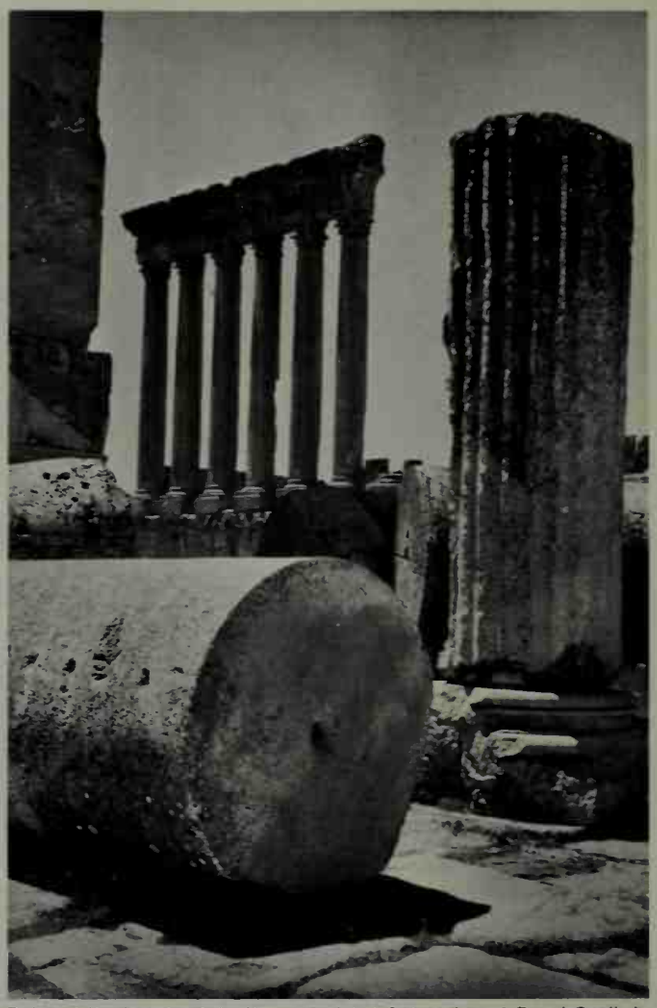
FENN-PIX; BY COURTESY OF TANNERS' COUNCIL OF AMERICA

MICROSCOPIC ENLARGEMENTS IN COLOUR OF VARIOUS KINDS OF LEATHER

1. Crushed kid. 2. Sheepskin. 3. Horsehide. 4. Kid. 5. Java ring lizard. 6. Calf suede. 7. Cowhide. 8. Watersnake. 9. Pigskin. 10. Alligator. 11. Ostrich. The magnification is approximately four linear diameters

LEBANON

A residential section of Tripoli, the second largest city of Lebanon and the terminal of the oil pipeline from Kirkuk (Iraq) to the Mediterranean



Ruins of the temple of Jupiter, completed 3rd century A.D., at Baalbek

The medieval castle built by the Crusaders at the port of Sidon (modern Saida), the principal town of Southern Lebanon

A Druze man, member of a small community of hill people who have a special closed religion of their own

Place des Martyrs, the main square of Beirut, the capital of Lebanon

VIEWS OF LEBANON

PHOTOGRAPHS (TOP LEFT, TOP RIGHT, BOTTOM LEFT) INGE MORATH—MAGNUM, (CENTRE LEFT) MANOUG FROM YERVANT SARRAFIAN, BEIRUT, (BOTTOM RIGHT) WAAGENAAR—PIX FROM PUBLIX

buffing machine, in which a rapidly rotating cylinder covered with abrasive material gives a uniform nap. In many instances the grain side is lightly buffed to remove surface defects.

When cattle hides are to be tanned or used in less than the full thickness, *e.g.*, for shoe uppers, they are split in cross section by machines with finely adjusted band knives. The upper or grain layer of the hide is the principal product and is described as grain side leather. The flesh cut is known as a split and may be tanned or finished separately. Cattle hides are also split for use in luggage, upholstery, garments and fancy leathers.

Leather that is to have a smooth, polished or lustrous finish is subjected to a series of related processing steps. These are intended to create a surface that is integrated with the leather, resistant to abrasion, capable of withstanding wetting and temperature variations and does not impair the ability of leather to transpire moisture. To achieve these qualities, several coats of prepared finish, in which dye or pigment may be included, are applied in succession to the leather. Materials ranging from casein, albumin and wax to complex resins and lacquers are embodied in the finish formulas. These are applied by machines or hand through sprays or rollers. When a highly polished surface is to be produced, leather is glazed on a machine that rapidly moves a solid glass cylinder against the leather under considerable pressure. Each stroke of the "glazing jack" creates heat and friction, which plasticize the finish and impart high lustre to the leather.

A grained effect is achieved through boarding by hand or machine. The skin is doubled, grain surface inside, and pressure is applied to the doubled portions in the required direction either by hand or with a cork-covered board, or by rotating cork-covered cylinders. The natural grain of leather is thereby enhanced and brought into sharper definition. Following boarding, the leather may be smoothed by placing the grain surface under heavy pressure with a flat polished steel plate. A combination of tanning and finishing variations produces leather of considerably greater grain texture than does tanning alone.

Pressure embossing machines of great weight are sometimes used to produce distinctive grain textures or printed effects. In this process, prior to or during finishing the grain surface of the leather is brought into contact with an engraved plate carrying the required pattern or design. Under a combination of heat and high pressure, the pattern embossed or printed on the leather becomes permanent.

In suede leathers, a fine uniform nap is desired. This is achieved by applying to the flesh side of the skin a rapidly rotating cylinder covered with emery or carborundum abrasives. Pressure is carefully adjusted and regulated to abrade fibres sufficiently so that an even, velvety surface is produced. Air-brushing or other machinery is employed to remove the fine leather dust resulting from the buffing action.

Special Finishes.—Variations in the finishing process are identified with special types of leather. Morocco is goatskin leather that has been grained by hand after glazing on a special type of glazing machine. The natural grain is raised and accentuated by working the skin while wet in five or more directions with a cork-covered graining tool. Drying the skin at a high temperature fixes the grain permanently. Patent leather bears a finish produced by successive coats of compounds incorporating linseed oil, each coat being dried before application of the next. A final stage of the finishing procedure for many leathers involves ironing on special low-temperature machines to correct any loss of smoothness.

A high degree of resistance to abrasion is achieved through the use of urethane finish compounds. Development in the chemistry of urethane finishes led to increased use of these materials for upper leather and luggage leathers. The chemical nature of the process was believed to involve reaction of urethane with leather fibre and therefore achievement of a finish *in situ* as opposed to surface film.

See also references under "Leather" in the Index.

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LEATHERHEAD, an urban district in Surrey, Eng., 20 mi. S.S.W. of St. Paul's cathedral, London. Pop. (1961) 35,554. It lies at the foot of the North Downs in the valley of the Mole, there crossed by a 14-arch bridge (1782), and in London's "green belt." The parish church of SS. Mary and Nicholas was built about 1320. The district is largely residential and includes Ashtead, Fetcham and the Bookhams. It contains a Celtic field system, several tumuli and ample evidence of Roman and Saxon occupation. St. John's school was founded in 1851.

LEATHERJACKET, the name for the dark, thick-skinned legless larvae of several large crane flies (family Tipulidae) that feed on the roots of grasses and other crops. *Tipula oleracea* is the chief offender in Europe, while *T. simplex* and others cause some damage in western North America. (*See* FLY.)

"Leatherjacket" or "leather jack" is applied to certain bony fishes with tough skins; *e.g.*, the genera *Oligoplites* and *Scomberoides* of the family Carangidae, and certain filefishes. (*See* FISH: *Ray-Finned Fishes: Perches and Perchlike Fishes.*)

Several Australian trees whose bark is smooth and tough are called leatherjackets, especially *Eucalyptus punctata.*

LEAVENWORTH, a city of northeastern Kansas, U.S., about 20 mi. N.W. of Kansas City, the seat of Leavenworth county and the oldest city in the state. Ft. Leavenworth was built by Col. Henry Leavenworth (1783–1834) in 1827 as a part of the defense of the Santa Fe trail (*q.v.*). Settlement on the present site of the city stems from the efforts of proslavery Missourians who first settled there in 1854. For a few years beginning in 1859 the Central Overland California and Pike's Peak Express company operated westward from Leavenworth. The city was incorporated in 1854 and secured a new charter in 1881.

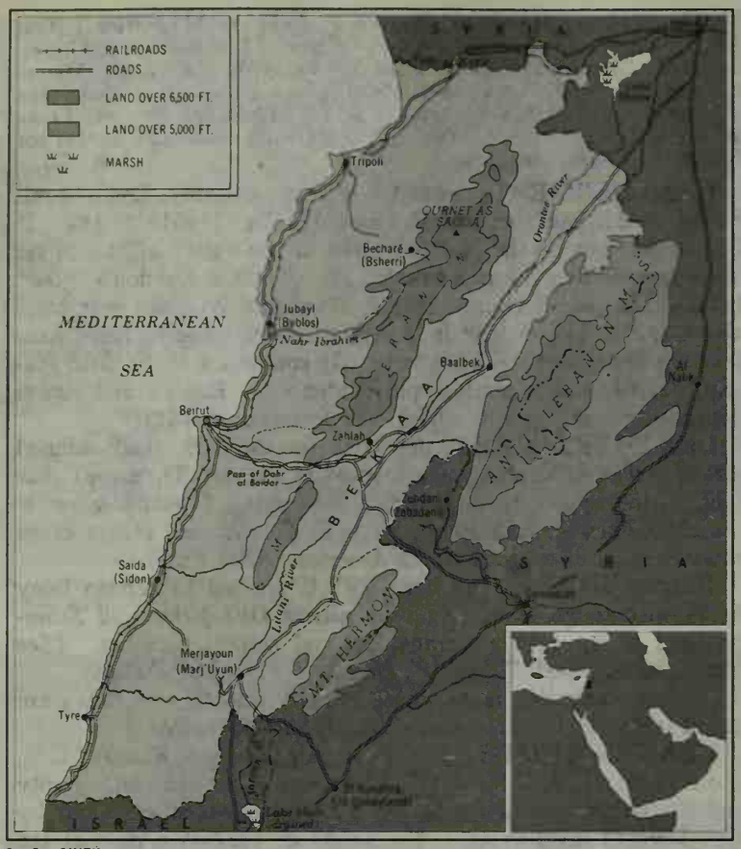
Ft. Leavenworth, north of the city, is the location of the U.S. army's Command and General Staff college for advanced training of field-grade officers. The U.S. military prison has been at Ft. Leavenworth from 1908. The federal penitentiary at Leavenworth was opened in 1895. At Lansing, near Leavenworth, is the Kansas state penitentiary and the state industrial farm for women. Leavenworth produces furniture, automobile and tractor batteries, millwork, greeting cards, steel fabrications, farm implements and uniforms. It is also a centre for handling and processing dairy, meat and other farm products.

Xavier, near Leavenworth, is the site of St. Mary's college, a Roman Catholic college for women, founded in 1860. For comparative population figures *see* table in KANSAS: *Population.*

(D. P. G.)

LEBANON (Arabic AL JUMHURIYAH AL LUBNANIYAH or AL LUBNAN; French LIBAN), an Arab republic situated on the eastern shore of the Mediterranean sea and bounded on the north and east by Syria and on the south by Israel. The state came into existence in 1920 when France, then occupying Syria and Lebanon, enlarged the former autonomous Ottoman sanjak of Mount Lebanon, which coincided with the Christian region of the Mountain. The Free French declared Lebanon independent in 1941 and French troops withdrew in 1946. The country has a maximum length of 135 mi. and is 20 to 35 mi. in width. Its land area is 4,015 sq.mi. The capital is Beirut (*q.v.*).

Physical Geography.—Lebanon is predominantly a mountainous country of great scenic beauty. From west to east it comprises four geographical regions which coincide with relief. A narrow coastal plain fringes the Mediterranean. This is dominated on the east by Mt. Lebanon which geographically is a mountain region extending for about 30 mi. north and south of Beirut. Between Mt. Lebanon and the ranges of Anti-Lebanon and Mt. Hermon lies the narrow cleft of the Bekaa (El Bika or Al Biqa') valley (ancient Coele-Syria) which is about 10 mi. wide and 80 mi. long. The Syrian-Lebanese border follows the main crest lines of Anti-Lebanon and Hermon.



C. G. SMITH

MAP OF LEBANON SHOWING PHYSICAL FEATURES, MAIN TOWNS, ROADS AND RAILROADS

The coastal plain is almost everywhere fertile and well irrigated. It is widest in the north and south, but narrow between Tripoli and Beirut, where it is frequently interrupted by rocky spurs of the foothills of Mt. Lebanon. The coast line shows a rapid alternation of sandy bays and rocky headlands. The northern end of Mt. Lebanon rises steeply from the plain of Akkar. From there to the pass or saddle of Dahr al Baidar (5,057 ft.), which carries the Damascus–Beirut road and railway, the range is widest and highest. Its average elevation is 7,000 ft., and one peak, Qurnet as Sauda (Qarnat al Sawda), rises to 10,131 ft. From Dahr al Baidar to the Litani gorge the range narrows and its average height is 5,000–6,000 ft. South of the Litani river the mountains become low and broken and then merge with the hills of upper Galilee on the Israeli border. The porous limestone of the mountains gives a poor, thin soil. The lower and middle slopes are cultivated, particularly on the west, and there ingenious tillers of the past made terraces to preserve the soil from erosion.

The Bekaa valley is a tectonic depression in the partly faulted downfold between the upfolded Lebanon, Anti-Lebanon and Hermon ranges. The highest part of the Bekaa near Baalbek (3,600 ft.) divides the waters of the north-flowing Orontes (Nahr al 'Asi), which enters Syria, from those of the south-flowing Litani (ancient Leontes), which turns west near Merjayoun (Marj 'Uyun) and traverses the south Lebanon range in a spectacular gorge. It is the only important and useful river in the country. Short torrential rivers drain the western slopes of Mt. Lebanon; but except where they are fed by large springs they are only seasonal rivers (wadies). The eastern slopes drain to the Orontes and Litani. The Anti-Lebanon range has an average height of 6,000 ft., with peaks rising to over 8,000 ft. Mt. Hermon is a single ridge, resembling a whaleback, and rises to 9,232 ft. The two ranges are separated by a broad saddle south of Zebdani (Zabadani), similar to the saddle of Dahr al Baidar in the Lebanon range.

Climate.—Lebanon has a Mediterranean type of climate, but there are sharp local contrasts as a result of the varied relief. On the coast the summers are hot and, although rainless, rather humid. Winters are very mild at low levels and rainfall is moderate, with the main rains occurring between November and March. The months May to September are normally rainless and very sunny. The average annual precipitation is 30 to 40 in. on the coast, rising to over 60 in. in the mountains. The Bekaa valley is drier and receives 15 to 25 in. precipitation. The rainfall is rather variable. The coast rarely experiences snow, but elsewhere it is frequent in winter, and at high levels covers the mountains until June. (The view presented by the snow-clad peaks is supposed to have given Lebanon its name; *laban* is Aramaic for "white.") Small patches of snow may survive in sheltered hollows on Hermon and Lebanon the whole year. The climatic contrasts in Lebanon are important for its thriving tourist trade. Mean daily maximum temperatures range from 32° C. (90° F.) in July on the coast and in the Bekaa, to 16° C. (60° F.) on the coast and 10° C. (50° F.) in the Bekaa in January. Mean minimum temperatures in January are 7° C. (45° F.) on the coast and 2° C. (35° F.) in the Bekaa. At 5,000 ft., the altitude of the highest settlements, these figures are reduced by about −9° C. (15° F.). Temperatures in summer occasionally exceed 41° C. (105° F.) at low levels.

Vegetation.—Originally much of Lebanon was covered with forest. Climatically only the northern Bekaa is a steppe or grassland area. However, several millenniums of human occupation have resulted in deforestation, and on many slopes consequent soil erosion and overgrazing have prevented natural forest regeneration. Surviving tree species on the lower and middle slopes include Aleppo pine, evergreen oak, carob, cypress, fir and deciduous oak, but these rarely form true forest. Uncultivated areas are usually covered with evergreen Mediterranean scrub. The western slopes of Mt. Lebanon have an unusually green and fertile appearance. There are many plantations at lower levels including stone pine, date palm, olive, fig, mulberry and orange trees. At higher levels deciduous fruit trees are grown. There are also a few small surviving groves of the once famous cedars of Lebanon (the best known are at Becharé [Bsherri] and Jabal Barouk) but otherwise the high slopes are rather bare and desolate. Bekaa is virtually treeless.

Animal Life.—No large wild animals survive in Lebanon. Among the smaller wild animals deer, wildcats, hedgehogs, squirrels, martens, dormice and hares are found. There are lizards and chameleons. Numerous migratory birds from Africa and Europe visit Lebanon. Flamingos, pelicans, cormorants, duck, herons and snipe frequent the marshes; eagles, buzzards, kites, falcons and hawks the mountains. Owls, kingfishers, cuckoos and woodpeckers are also common. Of the insects the mosquito was formerly the most harmful, but antimalarial work has largely eradicated the disease. (C. G. Sm.)

The People.—The Lebanese are of mixed ancestry but the majority are Arabs. They are mainly Arabic speaking, with about 6% speaking Armenian, but French and English are widely spoken in official and commercial circles. Religious divisions are of great political importance. Roughly half the population is Christian and half Muslim, each half being divided into several communities. The Maronites (*q.v.*) are the largest single community, with about 30% of the total population. Among the other Christian sects, the larger communities are the Greek Orthodox, Greek Catholics and Armenian Orthodox; smaller communities are the Armenian Catholics, Latin Catholics, Syrian Catholics, Chaldeans, Protestants and Syrian Orthodox. Among the Muslims, the Sunni are the largest community, followed by the Shi'i; together they represent upward of 45% of the total population, while the Druze (*q.v.*) may represent over 6%. Precise figures are not available, since, for the sake of political compromise, governments have refrained from holding a census since 1932. At the 1932 census the Christians had a small majority, with 50% as against the Muslim 49%, but this majority has probably been lost as a result of the higher rate of increase among the Muslims and the greater tendency for Christians to emigrate. Emigration, which in the first decade of the 20th century averaged about 15,000 a year, had dwindled to between 2,000 and 4,500 by the 1960s, while returning emigrants are officially estimated at about 1,000 annually.

The estimated population in 1961 was 2,150,526, nearly three

times that of 1932, when the last census recorded 785,543. The principal towns (pop. 1961 est.) are Beirut (298,129), Tripoli (114,443), Saida (Sidon; 32,000), Zahlah (53,131) and Tyre (16,483). Lebanon is the most densely populated country in the middle east, with a density of 536 inhabitants to the square mile.

(Do. W.; X.)

History.—In ancient geography much of Lebanon was part of Phoenicia (*q.v.*). There are important archaeological remains notably at Baalbek (*q.v.*) at the west foot of the Anti-Lebanon and at Byblos, one of the oldest continuously inhabited towns in the world. The territory of the present Lebanese republic includes a fertile coastal strip with natural harbours, a mountain range parallel to it and the Bekaa plain on the other side. It was the coast which played the greatest part in ancient history: from the 3rd millennium B.C. the Phoenician ports of Tyre, Sidon, Byblos (*qq.v.*) and Arvad (Arwad, Aradus) were centres of trade and culture. At times they were independent city-states, at times absorbed into empires (Egyptian, Assyrian, Persian, Macedonian, Roman), but they kept their civic rights even after they became part of the Roman province of Syria (*see* SYRIA: *History*). While retaining their Semitic speech the inhabitants accepted Greek literature and philosophy, Roman law and, at an early stage, the Christian religion. In ancient and classical history Mt. Lebanon (Libanus) appears only as a hinterland of economic influence: the produce of its villages fed the cities, its cedars and other trees provided wood for export.

Medieval History.—Little is known of the early inhabitants of the mountain, and the population did not begin to take its present form till the 7th century A.D. At some time in the Byzantine period, a military group of uncertain origin, the Mardaites, established themselves in the north among the indigenous population. From the 7th century onward another group entered the country, the Maronites (*q.v.*), a Christian community adhering to the Monothelite doctrine. Forced by persecution to leave their homes in northern Syria, they settled in the northern part of the mountain and absorbed the Mardaites and indigenous peasants to form the present Maronite Church and people. Originally Syriac-speaking, they gradually adopted the Arabic language although keeping Syriac for liturgical purposes. In south Lebanon Arab tribesmen came in after the Muslim conquest of Syria in the 7th century and settled among the indigenous people. In the 11th century, many were converted to the Druze faith, an esoteric offshot of Shi'a Islam (*see* DRUZE). South Lebanon became the headquarters of the faith. Groups of Shi'a Muslims settled on the northern and southern fringes of the mountain and in the Bekaa. (*See* ISLAM; SHI'ISM.) In the coastal towns the population became mainly Sunni Muslim, but in town and country alike there remained considerable numbers of Christians of various sects. In course of time, virtually all sections of the population adopted Arabic, the language of the Muslim states in which Lebanon was included.

At the end of the 11th century Lebanon became part of the crusaders' states, the north being incorporated in the county of Tripolis, the south in the kingdom of Jerusalem. In the crusader period the Maronite Church gave up the Monothelite doctrine and accepted papal supremacy, while keeping its own patriarch and liturgy. When the crusaders' states were destroyed Lebanon became part of the Mameluke state of Egypt and Syria. The Mamelukes watched it carefully because of its heterodox beliefs and the danger of contact with western Europe, and sent several punitive expeditions against it. In general, however, under the Mamelukes and the Ottoman Turks who succeeded them in the early 16th century, the people of Mt. Lebanon were left free to manage their affairs while the coastal towns were controlled directly by the government.

Ottoman Period.—Between the 15th and 18th centuries Lebanon evolved a social and political system of its own and the population took up its present position: the Shi'as were driven out of the north but increased their strength in the south; many Druze moved from south Lebanon to Jebel Druze (Jabal al Duruz) in southern Syria; Maronite peasants, increasing in numbers, moved south into districts mainly peopled by Druze. In all parts of the mountains there grew up families of notables, who controlled the land and established a "feudal" relation with the cultivators; some were Christian, some Druze, but in general the latter were politically dominant. From them arose a family, the Ma'anis, which established a princedom over the whole mountain, accepted by Christians and Druze alike. When it died out in 1697, the notables elected as prince a member of the Shihab family who were Sunni Muslims but with Druze followers, and this family ruled until 1842.

Throughout this period European influence was growing. European trading colonies were established in Saida and other coastal towns, mainly to trade in silk, the basis of the Lebanese economy from the 17th to the 20th century. French political influence was great, particularly among the Maronites, who had direct relations with the French government from 1649.

The 19th century was marked by economic growth, social change and political crisis. The growing Christian population moved southward and into the towns, and toward the end of the century emigrated to North and South America and Australia. French Catholic and U.S. Protestant mission schools, as well as schools of the local communities, multiplied: in 1866 the American mission established the Syrian Protestant college (later the American University of Beirut) and in 1881 the Jesuits started the Université St. Joseph. Such schools produced a literate class which found employment as officials and professional men. Beirut became a great international port and its merchant houses established connections with Egypt, the Mediterranean countries and England.

The growth of the Christian communities upset the traditional balance of Lebanon. The Shihab princes inclined more and more toward them, and part of the family indeed became Maronites. The greatest of them, Bashir II (reigned 1788–1840), after establishing his power with the help of Druze notables, tried to weaken them. When the Egyptian troops of Ibrahim Pasha occupied Lebanon and Syria in 1831 Bashir formed an alliance with him to try to limit the power of the ruling families and disarm the population. But Egyptian rule was ended by Anglo-Turkish intervention, aided by a popular rising, in 1840, and Bashir was deposed. With him the princedom virtually ended; his weak successor was deposed by the Turks in 1842, and from that time relations grew worse between the Maronites, led by their patriarch, and the Druze, trying to retain their traditional supremacy. The French supported the Maronites, the British a section of the Druze, while the Ottoman government encouraged a collapse of the traditional structure which would enable it to impose its own authority. The conflict ended in the civil war of 1860; the Druze were victorious, but the powers intervened, France with an army and the others diplomatically. The result was the Organic law of 1861 (modified in 1864) which gave Lebanon autonomy under a Christian governor appointed by the Ottoman sultan, assisted by a council representing the various communities. The country lived under this regime peacefully until World War I, when the Ottoman government placed it under strict control.

French Mandate.—At the end of the war Lebanon was occupied by Allied forces and placed under a French military administration. In 1920 Beirut and other coastal towns, the Bekaa and certain other districts were added to the autonomous territory as defined in 1861, to form Greater Lebanon (Grand Liban; subsequently called the Lebanese Republic). In 1923 the League of Nations formally gave the mandate for Lebanon and Syria to France. The Maronites and some other elements, strongly pro-French by tradition, welcomed this, and during the next 25 years, while France held the mandate, the Maronites were favoured. The expansion of prewar Lebanon into Greater Lebanon, however, changed the balance of the population. Although the Maronites were the largest single element they no longer formed a majority. The population was more or less equally divided between Christians and Muslims, and a large section of it wanted neither to be ruled by France nor to be part of an independent Lebanon, but rather to form part of a larger Syrian or Arab state. Relations between the communities were often tense; to ease them, the constitution of 1926 provided that the different communities should be equitably represented in public offices. Thus by convention the

president of the republic was normally a Maronite, the prime minister a Sunni Muslim and the speaker of the chamber a Shi'a Muslim.

French administration, although open to criticism on various grounds, was reasonably efficient. Public utilities and communications were improved, and education was expanded (although higher education was left almost wholly in the hands of religious bodies). Beirut prospered as a centre of trade with surrounding countries, but agriculture was depressed by the decline of the silk industry. As the middle class of Beirut grew and a real if fragile sense of common national interest sprang up alongside communal loyalties, there grew also the desire for more independence. A Franco-Lebanese treaty of independence and friendship was signed in 1936, but was not ratified by the French government. Lebanon was controlled by the Vichy authorities after the fall of France in 1940, but was occupied by British and Free French troops in 1941. The Free French representative, Gen. Georges Catroux, proclaimed the independence of Lebanon and Syria, and this promise was underwritten by the British government. Because of their own precarious position, however, the Free French were unwilling to relax control. In 1943 they were persuaded to hold elections, which resulted in victory for those who wanted independence. Their leader, Bishara al-Khuri, was elected president. The new government wished to introduce certain constitutional changes to which the French delegate-general, Jean Helleu, objected, and on Nov. 11, 1943, the president and almost the entire government were arrested by the French. This led to an insurrection followed by British diplomatic intervention; the French restored the government and transferred powers to it. After another crisis in 1945 agreement was reached on a simultaneous withdrawal of British and French troops. This was completed by the end of 1946 and Lebanon became wholly independent; it had already become a member of the UN and the Arab league.

Independent Lebanon.—From 1945 the country enjoyed general prosperity in spite of its brief participation in the Arab-Israeli war of 1948–49. Beirut grew rapidly and became a centre of entrepôt trade and a free-money market. Tripoli and Saida became the terminal points of oil pipelines from Iraq and Arabia. No large economic development plans were undertaken, however, until the adoption in 1955 of a plan to use the waters of the Litani river for electric power and irrigation, with funds supplied by the International Bank for Reconstruction and Development.

Politically the parliamentary system proved unable to restrain abuses of power. Bishara al-Khuri was deposed by a popular movement in 1952 and replaced by Camille Sham'un (Chamoun), who remained president until 1958. This was a period of growing tension between the communities and between opposing conceptions of the nature of Lebanon. Most Christians and some others thought of Lebanon as an independent state finally linked with the west; most Muslims and some others thought of it as part of a neutralist Arab world. When, after 1954, relations between the west and the Arab world deteriorated, tension grew. The Suez crisis of 1956 (*see* SUEZ CANAL) precipitated an internal conflict, the Sham'un regime being accused by Arab nationalist opinion of being too pro-western. The government was confronted with widespread armed insurrection in 1958. It was the result of a conflict of personalities and political ideas, with undertones of religious hostility, tending to draw in external forces. In July, after the revolution in Iraq, about 10,000 U.S. troops were landed as a precautionary measure at the request of Sham'un. This may have affected the general situation in the middle east, but it had little effect on the Lebanese conflict, which was finally settled by the election as president of Gen. Fuad Shihab (Shehab or Chehab), commander of the army and a member of the former princely family. He assumed office in September and a coalition government was formed of leading personalities of the two conflicting parties.

It was not easy to restore confidence between different parts of the community, and in Dec. 1961 a *coup d'état* was attempted by the Parti Populaire Syrien. But unity was gradually rebuilt. More government posts were given to Muslims and Druze; public works were carried out in the poorer districts; attention was paid to economic development; and a social security project was drawn up. Around the president there grew up a strong executive which, although backed by the army, ruled within the constitution. In foreign policy, support was given to general Arab causes (*e.g.*, in Palestine and Algeria) while preserving the special interests of Lebanon. Many Lebanese would have liked Shihab to stand for a second term, but the constitution forbade it and he refused. Charles Hilw (Helou) was elected and took office as his successor in Sept. 1964. In general he carried on Shihab's policy. Good relations were maintained with the Arab countries and the west; the social security project became law; and an economic plan was drawn up. In 1966 a determined attempt to reform the administration began. There was a financial crisis in October when the Intra Bank was unable to meet its commitments. (A. H. H.)

When fighting broke out between Israel and Egypt in the Sinai peninsula on June 5, 1967, Lebanon immediately became involved in the war with Israel. On June 6 it banned the loading of oil from the terminals of the two pipelines crossing its territory. (X.)

Administration and Social Conditions.—Lebanon is a republic, with a president, who is the head of state and of the executive, and a single-chamber legislature and council of ministers. The president is elected by a two-thirds majority of the chamber of deputies for a period of six years and may not be immediately re-elected. He appoints the members of the cabinet and nominates one of them as prime minister. In the allocation of cabinet portfolios and appointments in the civil service a due proportion among the religious sects must be observed. The single-chamber legislature with 99 members is elected by universal suffrage; women received the vote in 1952. The electoral reform law of 1960 imposed for the first time the principle of the secret ballot. It also enlarged the chamber from 66 to 99 deputies and maintained the existing ratio of 6 Christians to every 5 Muslims. There is no highly developed party system. For administration Lebanon is divided into five provinces or governorates (*muhafazat*): Bayrouth (Beirut), Liban Nord (Northern Lebanon), Mont Liban (Mount Lebanon), Liban Sud (Southern Lebanon) and La Bekaa (the eastern valley).

Living Conditions.—As a result of economic expansion, the traditional semifeudal families, predominant before World War II, have been supplanted by commercial interests, which are powerfully represented in all governments, and invest profits in acquiring land property as well as urban real estate. Among the Druze, a self-contained community, feudal loyalties to the old families are still strong. There has been no land reform. The distribution of property in land is highly unequal; small proprietors are found in remote mountain villages, but in the plain of Tripoli and the Bekaa large estates take up most of the area. More than half the cultivated land is owned by 200 landlords; cultivators on estates are either sharecroppers or hired workers. Because of rural poverty there is a considerable influx into Beirut and Tripoli, and much migration between village and town.

Urban occupations employ about half the labour force, mainly in commerce and other services. Except for the railway and oil company employees, labour is incompletely organized into unions. Although the general standard of living, by regional standards, is high, there is usually some urban unemployment. Economic progress has been uneven, and housing for the poor is insanitary and overcrowded. Health and medical services are on a moderate scale with more than 100 hospitals supplemented by a system of mobile units. Welfare is on the whole unorganized.

Justice.—Law and justice are administered in accordance with a variety of codes influenced by French theories of civil and criminal legislation. There are 56 courts of the first instance, 11 courts of appeal and 4 courts of cassation (3 dealing with civil and commercial cases and 1 with criminal cases). The council of state deals with administrative cases and the court of justice handles matters affecting state security. In addition Islamic, Christian and Jewish courts deal with matters of personal status (marriages, deaths, inheritances, etc.).

Education.—Lebanon has a highly developed system of education. In addition to the secular state schools, there are many private schools, domestic and foreign. By the early 1960s there

were more than 1,000 state schools (primary, higher primary and secondary) with well over 100,000 pupils, more than 1,200 private schools with over 150,000 pupils, and about 50,000 pupils attended nearly 100 foreign schools. There are three universities: the Lebanese university (founded in 1951); the American University of Beirut (1866), with students from all over the middle east and beyond (the teaching language is English); and the University of St. Joseph (1881) with attached schools of medicine, law and engineering, which are subsidized by the French government and administered by the Jesuit order (French is the teaching language). There are also the Académie Libanaise (1937), Beirut College for Women (1924) and the Centre d'Études Supérieures Français de Beyrouth (associated with Lyons university). A UNESCO centre to train specialists for educational administration in Arabic countries was established in 1961.

Defense.—Lebanon has an army and a gendarmery, as well as police and security forces. In the early 1960s they were estimated at: army 10,000, gendarmery 2,500, police 500 and security 250. There is a small air force of 600 men, and a navy of 200 men for coastal patrol.

The Economy.—Since independence Lebanon has enjoyed growing prosperity as an entrepôt linking the developing middle east with the western world. Beirut is a free port, and there is a large transit trade with Iraq, Jordan and other middle east states. This has benefited much since 1948 because of the Arab-Israel conflict. After World War II national income increased enormously, chiefly through the growth of trade, traffic and tourism. A unique role in the transit trade is played by the pipelines conveying oil from the Kirkuk oil fields of the Iraq Petroleum company to Tripoli and that of the Trans-Arabian company (Tapline) bringing the oil from the Saudi Arabian (Abqaiq) oil fields of the Arabian-American Oil company (Aramco) to Saida. Of the national income about 65% is derived from trade and other services, 19% from agriculture and 16% from industry, including building. Expansion has been concentrated in the capital, where the new quarter of Ras Beirut has been constructed with immense ferro-concrete apartment houses. Governments have followed a policy of nonintervention in social and economic affairs. Prosperity was sharply interrupted by the civil war of 1958.

Agriculture.—Agriculture still occupies a large proportion of the labour force. The cultivated area is small, amounting to 667,000 ac. (270,000 ha.) or 27% of the total area. High rainfall and the abundant water supply from rivers and springs favour the intensive cultivation of crops on the mountain slopes and the coastal strip, where vines, olives, tobacco and vegetables have long been established. Production of citrus fruits, apples and bananas doubled in the period 1948–58, chiefly because financiers invested in terracing and irrigation, to produce for export. The production of wheat, barley and maize (corn), mainly in the Bekaa valley, rose slowly to an average of 100,000 tons a year, while grain imports averaged 300,000 tons. Existing irrigation projects, public and private, cover about 150,000 ac. Much water is wasted through lack of storage capacity. In 1958 work was begun on the long-discussed Litani river project, to irrigate a further 50,000 ac. and generate electric power; this was expected to take 25 years to complete. Comparatively few livestock are kept; goats are the largest item, followed by sheep, cattle, horses, donkeys and mules.

Industry.—Industry remains small in scale in spite of tariff protection; its growth is hampered by lack of raw materials. Barely 40,000 workers are employed; the textile industry, with 6,000 workers, is the largest group. Other industries include cement, oil refining, sugar refining, processed food, alcoholic beverages, soft drinks, tobacco, soap, leather, paint and matches. The annual generation of electric power has reached 350,000,000 kw.hr., and output of major petroleum products is 1,000,000 tons. Tripoli is the main terminal of the Iraq Petroleum company and the oil refining centre. Saida also has oil refining. Deposits of galena, lignite and iron are small and of poor quality. No oil has been found in Lebanon. Asphalt found in the Bekaa is difficult of access.

Trade and Finance.—A large import surplus is a regular feature of Lebanon's foreign trade. In spite of the merchandise trade deficit, foreign balances have steadily increased as a result of the growth of invisible exports and the inflow of capital from other middle eastern countries and Lebanese emigrants abroad. There are no official calculations of the balance of payments, but transit trade and tourism are certainly major items. Chief trading partners are (for imports) Syria, United Kingdom, United States, Federal Republic of Germany, France and Italy; (for exports) Syria, Saudi Arabia, Jordan and Iraq.

A considerable revenue is derived from tourism and Lebanon is an all-year resort for the rich of the middle east. Luxury hotels, bathing, antiquities, the International Cultural Festival of Baalbek, the casino at Beirut and the beauty of the country attract many visitors. Lebanon's claim to be the Switzerland of the middle east also rests on the presence of wealthy political refugees from the surrounding states.

The currency is the Lebanese pound (£ L.), divided into 100 piastres. The Bank of Syria-Lebanon has the sole right of issue. The large increase in money supply in the late 1950s and early 1960s was not excessive in relation to the growing volume of business, and there has been no inflation. Government finance is conservative. Revenue is derived mainly from indirect taxation. Government investment has played little part in promoting development, though from 1954 more funds were devoted to much needed improvement in public utilities.

Transport and Communications.—Railways are now operated by the government, though formerly they were operated by the French company, Les Chemins de Fer Damas-Hama et Prolongements (D.H.P.). Routes include the standard-gauge coastal railway from Nakura (near the frontier with Israel) through Beirut and Tripoli to Homs and Aleppo, Syria; and the narrow-gauge route from Beirut through the mountains to Rayak, and thence to Damascus, Syria, with standard-gauge connection from Rayak with Baalbek and with Homs.

There are some major highways including the coastal route from Latakia, Syria, via Beirut to the Israeli frontier; another mountain route from Beirut to the Israeli frontier; another mountain route from Beirut to Shtaurah (Chtaura), branching thence to Damascus and to Homs. There is also a good network of secondary and tertiary roads. Most freight is carried by road and there are many passenger road services.

Beirut has an international airport used by world services and handling the largest volume of air transport in the middle east. There are also extensive local services which link Lebanon with other countries of the middle east.

The Lebanese broadcasting station in Beirut is controlled by the ministry of information. The Compagnie Libanaise de Télévision (owned by Time-Life Broadcast Association) and Tele Orient (Compagnie de Télévision du Liban et du Proche-Orient) are commercial services which offer programs in Arabic, French, and English.

See also references under "Lebanon" in the Index.

(Do. W.; X.)

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LEBANON, a town of Connecticut, U.S., about 27 mi. E.S.E. of Hartford. It was settled in 1695 and incorporated as a town in 1700; the name is from the biblical Lebanon.

In colonial times the town was situated on the most direct road between New York and Boston. It was the home of Jonathan Trumbull, governor of Connecticut during the American Revolution. A building (1727) came to be the site of the war office which served as the governor's headquarters and the centre from which the military and naval activities of Connecticut were directed during the revolution. The war office has been restored as a museum.

By 1790 the population of Lebanon had increased to 4,166 from 3,960 in 1774. Like many New England towns, however, the population began to decline in the early 19th century when the opening of the Erie canal and greater accessibility of farm products from the middle west made farming in New England unprofitable. By 1920 the population had declined to 1,343. In the meantime, immigrant families, mostly from eastern Europe, began moving in to replace some of the older Yankee stock. Agriculture gradually shifted to poultry and dairy farming for the markets in the growing cities.

In the latter part of the 20th century the population was about 2,500, including some who were urban commuters. Lebanon also attracts a number of summer visitors. (N. L. W.)

LEBANON, a city of Pennsylvania, U.S., 86 mi. N.W. of Philadelphia; the seat of Lebanon county. Primarily an iron and steel centre, Lebanon also manufactures textiles, electrical machinery and other products.

Germans settled in the region in the 1720s, but it was not until about 1750 that George Steitz laid out the town, at first called Steitztown. It became a borough in 1821 and a city in 1885, remaining a predominantly Pennsylvania Dutch community. Located in the fertile Lebanon valley near the famous Cornwall ore mines and other mineral deposits, it became an iron centre before the American Revolution. Its growth was stimulated by the building of the Union canal (1827) and the Lebanon Valley railroad (1857). For comparative population figures *see* table in PENNSYLVANIA: *Population.* (S. W. HM.)

LEBEDEV, PËTR NIKOLAEVICH (1866–1912), Russian physicist who succeeded in proving experimentally the existence of the extremely small pressure which light exercises on bodies, was born on March 8 (new style; Feb. 24, old style), 1866, in Moscow. In 1887 he went to study physics under A. Kundt in Strasbourg. He took his doctor's degree in 1891 and published his first research on the Mossotti-Clausius theory of dielectrics. In the same year he was appointed assistant in physics at the University of Moscow and in 1892 professor. In 1901 appeared his classical work: *Experimental Research on Light Pressure.* In 1910 (*Annalen der Physik*) he succeeded in measuring this pressure, theoretically determined by James Clerk Maxwell. In 1911 Lebedev started a private laboratory. His further work was mainly on the origin of the earth's magnetism, but his death in Moscow on March 14 (N.S.; 1, O.S.), 1912, stopped his experiments. He founded in Moscow the Lebedev Physical society. In 1913 his *Collected Researches* were published in Russian under the auspices of this society.

LE BEL, JEAN (*c.* 1290–1370), the forerunner of the great medieval Belgian chroniclers, and one of the first to abandon Latin for French, was born, probably in the province of Hainaut, at the end of the 13th century. He became a soldier, and achieved a reputation for generosity and for bravery. The constant companion of Jean, Comte de Beaumont with whom he went to England and Scotland in 1327, he wrote his *Vrayes Chroniques,* recounting the events of the reign of Edward III, at his request. Their main historical interest lies in their description of the wars between Philip VI and Edward III. Later he retired to Liège, where he had held a canonry at the cathedral since the age of about 23. He died there on Feb. 15, 1370.

His work was known only in fragments until 1861, when a manuscript was discovered in the library at Châlons-sur-Marne. A complete edition by L. Polain was published in 1863; a later edition, *Chronique de Jean le Bel,* two volumes, by J. Viard and E. Deprez, appeared in 1904–05.

Jean le Bel's value as a chronicler was to present events which he had witnessed with intelligence, accuracy, life and colour. He was the first to use the technique of interviews as a basis for establishing historical fact. His methods were developed by Jean Froissart (*q.v.*), who acknowledges his debt to Le Bel and often borrowed from his text. Some of Froissart's best-known passages, such as those dealing with the death of Robert the Bruce and the burghers of Calais, originated in this way.

See A. Colville, "Jean le Bel, chroniqueur" in *Histoire littéraire de la France,* vol. 38 (1941). (J.-E.-M.-G. D.)

LE BEL, JOSEPH ACHILLE (1847–1930), French chemist whose hypothesis concerning the asymmetric carbon atom contributed to the development of stereochemistry, was born at Péchelbronn, Bas-Rhin, on Jan. 21, 1847. He studied at the Polytechnique in Paris, and then became *préparateur* at the University of Strasbourg. Later he was assistant to Antoine J. Balard, the discoverer of bromine, and then to Charles A. Wurtz (*q.v.*). Le Bel's family owned petroleum workings at Péchelbronn, and when he inherited these lucrative properties he retired from academic work and fitted up a private laboratory.

Le Bel is remembered chiefly for his theory of the asymmetric carbon atom in optically active compounds (*see* STEREOCHEMISTRY). He and Jacobus Hendricus van't Hoff (*q.v.*) independently and almost simultaneously published their ideas in 1874. Van't Hoff seems to have been influenced more by Friedrich A. Kekulé von Stradonitz (*q.v.*) while Le Bel followed Louis Pasteur (*q.v.*). He believed the tetrahedral carbon atom represented only the simplest solution of the problem, which probably had other more general solutions. He argued that the four univalent radicals attached to a carbon atom should be considered as a problem in equilibrium. He was the first to separate an optically active component from a synthetic mixture of the two mirror-image components of a compound containing an asymmetric carbon atom. He used mostly the selective destructive action of lower organisms on the dextro and levo isomerides. He was also the first to demonstrate that the optical activity disappears when the asymmetric carbon of the type CWXYZ is changed to CX_2YZ. He predicted that other asymmetric elements would give rise to optical activity. In 1899 William J. Pope, using advanced techniques not available to Le Bel, accomplished the resolution of these optical isomers. Le Bel died in Paris on Aug. 6, 1930.

See W. J. Pope, *J. Chem. Soc.* (1930); E. Wedekind, *Zeitschrift für angewandte Chemie* (1930). (R. E. O.; X.)

LEBESGUE, HENRI LÉON (1875–1941), French mathematician whose chief claim to fame is in integration, a field he largely remade, was born at Beauvais, Oise, on June 28, 1875, and educated at the École Normale Supérieure and the University of Paris. His doctoral thesis (1902) was titled *Integral, Length, and Area.* He was *maître de conférences* at Rennes until 1906, when he went to Poitier, first as *chargé de cours* of the faculty of sciences and later as professor. About six years later he was called to Paris as *maître de conférences,* and afterward he became professor at the Collège de France. In 1917 he was awarded the Prix Saintour, and in 1922 he was elected to the Paris Academy of Sciences. He was made an honorary member of the London Mathematical society in 1924 and a foreign member of the Royal society in 1930. He died in Paris on July 26, 1941.

One of the greatest mathematicians of his day, Lebesgue was a pronounced specialist. He made one important contribution to topology in the "pavement theorem" and did some work on Fourier series and potential theory, but his main work was in integration.

Toward the close of the 19th century mathematical analysis was limited effectively to continuous functions, and artificial restrictions were necessary to keep out the growing number of exceptions. Under the classical Cauchy-Riemann definition of the integral, the operations of differentiation and integration were mutually inverse only for continuous or well-behaved functions. Influenced by the work of Émile Borel, Camille Jordan and others on theories of measure and content, Lebesgue formulated, in brilliant memoirs of 1901 and 1902, a new definition of the definite integral. The consequence of this notion of the integral is that any bounded summable function is the derivative of its indefinite integral, except perhaps for an ensemble of points of measure zero. This "Lebesgue integral" is one of the great achievements of modern real analysis.

Besides about 50 papers, a bibliography of which is given in the *Journal of the London Mathematical Society,* xix, 56–64 (1944), Lebesgue wrote two classic books: *Leçons sur l'intégration et la recherche des fonctions primitives* (1904, 1928); and *Leçons sur les séries trigonométriques* (1906). (C. B. BR.)

LE BLON (LE BLOND), **JACQUES CHRISTOPHE** (JACOB CHRISTOPH) (1667–1741), German engraver, the first to

make use of several metal plates (each for an individual colour) for printing a single impression, was born in Frankfurt am Main, May 5, 1667. He lived in Rome, Amsterdam, London and Paris. In London he was granted a patent for his discovery and formed a company that became bankrupt. Le Blon then went to Paris where he spent the rest of his life. About 50 of his plates are known, many of them reproductions of works of the old masters, and although they were printed in very large editions they are extremely rare today. He died in Paris on May 16, 1741.

See C. Dodgson, *Old French Colour-Prints* (1924). (H. Es.)

LEBOEUF, EDMOND (1809–1888), French army officer, one of the marshals of the second empire, was born at Paris on Dec. 5, 1809. Having entered the École Polytechnique at the age of 19, he took part in the July revolution of 1830 and went as second lieutenant in the artillery to the military school at Metz in August. Lieutenant in 1833 and captain in 1837, he was sent to Algeria and distinguished himself in the siege of Constantine and in subsequent campaigns. *Chef d'escadron* in 1846, second in command of the École Polytechnique from 1846 to 1850 and colonel in 1852, he was chief of staff for the French artillery in the Crimean War and on Nov. 24, 1854, was promoted general of brigade. In 1856 he was made commander of the artillery of the guards and accompanied the duc de Morny on his embassy to Russia. General of division in 1857, he was commander in chief of the artillery in the Italian campaign of 1859. Subsequently he was aide-de-camp to Napoleon III, and in 1866 he was chosen to hand over Venetia (ceded to France by the Austrians) to Victor Emmanuel II of Italy. Minister of war from Aug. 1869 and a marshal from March 1870, he felt no qualms over his country's entry into the Franco-German War.

Resigning with the other ministers of Émile Ollivier's government in Aug. 1870, after the first French reverses, Leboeuf took command of the III corps, fought well at Mars-la-Tour but had to capitulate with the Metz garrison on Oct. 29. When the Germans released him from captivity he went to The Hague, but returned to France in 1873 to testify forcefully against Marshal Bazaine (*q.v.*). He died at Le Moncel-en-Trun, near Argentan, on June 7, 1888. (L. G.)

LE BRAZ, ANATOLE (1859–1926), Breton scholar, story writer and poet, who found his inspiration in the life and legends of his native province, was born on April 2, 1859, at Duault, Côtes-du-Nord, and educated at the Lycée St. Louis and the Faculté des Lettres at Paris. He held posts as professor of philosophy at the college of Étampes (1884–86) and the Lycée of Quimper (1886–1901); as professor of French literature at the University of Rennes (1901–24) and as lecturer at Harvard university (1906). He died at Menton on March 20, 1926.

Le Braz's interest in Breton folklore led him to travel extensively in Brittany collecting the legends, customs and popular beliefs on which he based his short stories and poems. He also wrote a study of the development of Breton drama, *L'Essai sur l'histoire du théâtre celtique* (1903), and several works on drama and the novel in 18th-century France.

His publications include *Soniou Breiz-Izel* (1890); *La Chanson de la Bretagne* (1892); *Pâques d'Islande* (1897); *La Terre du Passé* (1902); *Au Pays des Pardons* (1894); *La Légende de la mort chez les Bretons-armoricains* (1893; later ed., 1923); *Vieilles Histoires du pays Breton* (1897); *Au Pays d'exil de Chateaubriand* (1909); *Ames d'Occident* (1911).

LEBRUN, ALBERT (1871–1950), 14th and last president of the third French republic, was born at Mercy-le-Haut (Meurthe-et-Moselle) on Aug. 29, 1871. Educated at the Nancy *lycée*, the École Polytechnique and the École Nationale des Mines, he became a mining engineer. As a moderate conservative he was elected a deputy in 1900 and a senator in 1920. Having been minister of colonies (1911–13), of war (1913) and again of colonies (1913–14), he served under Georges Clemenceau as minister of blockade and of liberated regions (1917–19). Raymond Poincaré appointed him head of the Caisse d'Amortissement or Sinking fund (1926–31). He was elected president of the senate in 1931 and president of the republic on May 10, 1932, and again on April 15, 1939.

Lebrun rarely sought to influence the formation of governments or the formulation of policies. In June 1940, during World War II, he would have preferred France to remain a belligerent, but he acquiesced in the cabinet's decisions that led to the armistice. In July, at Vichy, he made no attempt to defend the republic during the discussions on constitutional revision; and when Marshal Philippe Pétain became head of state Lebrun docilely retired to Vizille, near Grenoble. He was interned by the Germans at Itter in Tirol in 1943 and was released by them in 1944. At the liberation he acknowledged Gen. Charles de Gaulle as head of the provisional government, thus refusing to participate in attempts to revive the third republic. He died in Paris on March 6, 1950. His autobiography, *Témoignage* (1945), is a modest record of the most unassuming and self-effacing president that France has known. (P. W. C.)

LE BRUN (LEBRUN), **CHARLES** (1619–1690), French painter, elevated by Louis XIV to direct the artistic production of his reign, was born in Paris on Feb. 24, 1619. A protégé of the chancellor Pierre Séguier, he studied first with Guillaume Perrier, then with Simon Vouet, under whose tuition he developed a style of considerable impact ("Hercules and Diomedes," Nottingham). In 1642 he went to Rome with Nicolas Poussin and during the four years he spent there absorbed much from Poussin and from contemporary baroque painting. On his return to Paris in 1646 he was given large decorative and religious commissions; his work for the Hôtel Lambert and for Nicolas Fouquet at Vaux-le-Vicomte in the 1650s made his reputation secure. His first commission from Louis XIV dates from 1661, when he painted the first of a series of subjects from the history of Alexander. "The Tent of Darius" delighted Louis, who liked to think of himself as a latter-day Alexander. Le Brun was made first painter, given an enormous salary and until his death occupied a position of paramount importance in the artistic life of France not equaled until the advent of J. L. David at the end of the 18th century.

Colbert was quick to recognize and to further Le Brun's organizing capacities. In 1663 Le Brun was appointed director of the Gobelins, which, from being a small tapestry manufacture, expanded into a sort of universal factory supplying all the royal houses. From the 1660s, commissions for decoration of the royal palaces, notably Versailles, were given automatically to Le Brun and his assistants. In 1663, the Academy of Painting and Sculpture was reorganized, with Le Brun as director; its satellite, the Academy of France at Rome, was created in 1666. These institutions gave French art its characteristic homogeneity.

Le Brun's style, a more dramatic and earth-bound version of that of Poussin (*see* "Horatius Holding the Bridge," Dulwich) became dulled and generalized when applied to large surfaces. As a portrait painter, however, he was consistently distinguished ("The Banker Jabach and His Family," Berlin). His dictatorship lasted until the marquis de Louvois replaced Colbert on the latter's death in 1683. For the last years of his life Le Brun continued to receive the king's support, but his position declined in importance. He died at Paris on Feb. 22, 1690. *See* also PAINTING: *France: 17th and 18th Centuries: Royal Patronage.*

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LEBRUN, CHARLES FRANÇOIS, DUC DE PLAISANCE (1739–1824), French statesman, third consul from 1799 to 1804 and archtreasurer of the empire from 1804 to 1814, was born at St. Sauveur-Lendelin, in Normandy, on March 19, 1739. As a young man he was secretary to the chancellor René de Maupeou, after whose downfall (1774) he occupied himself with literary work, including a translation of the *Iliad*. In 1789, on the eve of the Revolution, he was elected to the estates-general as deputy of the third estate for Dourdan. In the Constituent Assembly he concerned himself with financial legislation. Imprisoned at Versailles in 1792, he had to stay in retirement until Robespierre's fall (1794). He represented Seine-et-Oise in the *conseil des anciens* from 1795 to 1799.

After Bonaparte's *coup d'état* of Brumaire, Lebrun was elected third consul in Dec. 1799. He took an active part in the re-

organization of the finances; and in 1804 he was appointed arch-treasurer of the empire. Governor general of the recently annexed Liguria from 1805 to 1806, he organized the new province's administration. In 1808 he accepted the title of duc de Plaisance (*i.e.*, of Piacenza), though he disapproved of the creation of a new nobility. When Louis Bonaparte abdicated the kingdom of Holland (1810), Lebrun was sent there as lieutenant general and was governor general of the new *départements* from 1811 to 1813.

Lebrun accepted the first Bourbon restoration in 1814 as a *fait accompli*. Though he had refused to vote in favour of Napoleon's deposition, Louis XVIII made him a peer of France. During the Hundred Days, however, Lebrun accepted the post of grand master of the university from Napoleon. On the return of the Bourbons in 1815 he was excluded from the chamber of peers; but he was recalled in 1819. He died at St. Mesmes (Seine-et-Oise) on June 16, 1824. A collection of his official and political writings was published in 1829 by his son Anne Charles Lebrun.

See A. B. Marie du Mesnil, *Mémoire sur le prince Lebrun, duc de Plaisance* (1828); A. A. de Caumont de La Force, *L'Architrésorier Lebrun gouverneur de la Hollande 1810–13* (1907). (C. E. Du.)

LE CATEAU, BATTLE OF (1914), the first major battle fought by British troops in France in World War I. It took place near Le Cateau, on the French side of the Franco-Belgian frontier, on Aug. 26, 1914. The British expeditionary force under Field Marshal Sir John French had advanced into Belgium; but on Aug. 24, with its left flank threatened by the German 1st army under Gen. A. von Kluck, and its French allies in retreat on its right, it began withdrawing toward Paris in what became known as "the retreat from Mons." On Aug. 25, the two British army corps became separated by the Forêt de Mormal, with the II corps (3rd and 5th divisions, under Gen. Sir H. L. Smith-Dorrien) on the northwestern flank. His troops being exhausted and hard pressed by the enemy, Smith-Dorrien decided that a temporary halt was essential, and in the evening gave orders to stand near Le Cateau. Reinforced by the newly arrived 4th division, the corps held the Germans off throughout the morning of Aug. 26. In the evening the corps broke off the engagement and continued the retreat. British casualties were about 14,000, and about 80 guns were lost. Opinion remains divided on the wisdom of, or necessity for, the decision to stand at Le Cateau.

See Viscount French, *1914* (1919). (C. N. B.)

LECCE, a city and episcopal see in the Puglia region, Italy, chief town of Lecce province, is located 50 mi. (80 km.) E.S.E. of Taranto, on the Foggia-Gallipoli railway line. Pop. (1961) 77,366 (commune). The old walled town, beyond which the modern town has arisen, has narrow winding streets and numerous baroque buildings of *pietra leccese,* a light yellow, easily worked limestone. Among the town's classical remains are a 4th-century Greco-Messapian hypogeum and a Roman amphitheatre. Lecce is a main centre of Apulian baroque architecture. The 12th-century Romanesque cathedral and the 14th-century basilica of Sta. Croce were rebuilt in this style in the 17th century. On the outskirts of the town is the church of SS. Niccolo e Cataldo, in Romanesque Norman style with Moorish influence, built in 1180 by Tancred d'Hauteville. Industries include milling, wine and oil processing, pottery, canning and the making of papier-mâché, used for religious objects and toys. Possibly built on the site of the ancient Lupiae, Lecce was known in Roman times as Aletium. It became a diocese in the 6th century and was erected into a countship by the Normans. After numerous vicissitudes it passed to the Aragonese, who fortified it. Lecce participated in the Carbonari risings of 1821 and instituted its own provisional government in 1848. During the reaction which followed, many of the inhabitants were imprisoned or exiled.

The province of Lecce, occupying the southern extremity of the Salentine peninsula or "heel" of Italy, has an area of 2,759 sq.km. (1,065 sq.mi.). Pop. (1961) 627,948. It is chiefly agricultural, producing vegetables, olives, almonds, figs and tobacco. Industries are largely based on food processing. Fishing is profitable. Important towns, besides Lecce, include San Cesario di Lecce, noted for its mineral waters, Gallipoli, Otranto (*q.v.*) and Soleto. (M. T. A. N.)

LE CHAPELIER, JEAN (or Isaac) (1754–1794), French Revolutionary leader who gave his name to the law prohibiting workers' and employers' unions, was born at Rennes in Brittany on June 12, 1754. As a barrister he won recognition through his defense of the *parlements* in 1787 and was elected deputy of the third estate for Rennes when the estates-general were convened for 1789. He was a founder of the Club Breton at Versailles, the precursor of the club of the Jacobins; and he was president of the National Assembly in Aug. 1789.

On June 14, 1791, Le Chapelier introduced the *loi Le Chapelier* which made illegal any association of workers or of employers. In fact this law, which was not repealed until 1884, affected only the workers, as their mass meetings could not be covered up, whereas it was simple for a few employers to meet over dinner and make decisions. Later socialists described the law as "monstrous," but at the time the only critic was Jean Paul Marat, who declared that it would prevent workers from taking an interest in politics. This protest, however, reveals that even Marat did not conceive of workers' unions as intended to secure increases in wages; and throughout the Revolution the Paris workers seldom demanded such increases: instead they constantly asked that the rise in the price of bread be halted.

After Louis XVI's flight to Varennes in June 1791, Le Chapelier allied himself ever more closely with the moderate reformers. He left the Jacobins and joined the Feuillants. He wanted the vote to be confined to property owners. On Sept. 29 he introduced a law designed to deprive the clubs of political significance. He was elected judge of the tribunal of cassation but resigned in 1792. On his return from a visit to England he was declared suspect, arrested and executed in Paris on April 22, 1794.

See R. Kerviler, *Recherches et notices sur les députés de la Bretagne aux états généraux . . . ,* 2 vol. (1888–89); A. Aulard, *Les Orateurs de la Constituante,* 2nd ed. (1905). (Je. Bo.)

LE CHÂTELIER, HENRY LOUIS (1850–1936), French inorganic chemist, is best known for the "Le Châtelier principle" (1888), which states that if a system is in stable equilibrium and one of the conditions is changed then the equilibrium will shift in such a way as to tend to restore the original condition. This principle is invaluable for predicting the optimum conditions for achieving a reaction, either in the laboratory or industrially. Born in Paris, Oct. 8, 1850, Le Châtelier graduated from the École des Mines in 1875, spent two years as a mining engineer and then returned (1877) to the École des Mines as professor of chemistry. He succeeded Henri Moissan at the University of Paris in 1908. Le Châtelier died at Miribel-les-Échelles, Isère, on Sept. 17, 1936.

In the course of his long career, Le Châtelier became an authority on metallurgy, on cements, glasses, fuels and explosives. He investigated the physical properties of alloys, the processes of annealing and tempering, the calcining and the setting of cements, the fusion, firing and annealing of ceramic and glassware, the combustion of fuels and the phenomenon of allotropy.

His work yielded not only many new facts, but also a wealth of theoretical principles and experimental methods. His interest in the calcining of cements led him to develop the platinum-rhodium thermocouple for measuring high temperatures and to introduce the use of the melting points of sulfur and gold to calibrate the thermocouples. He made improvements in optical pyrometry, introduced the differential dilatometer for high temperature work, worked out new methods of preparing abrasives for polishing metallographic sections and devised an improved microscope for examining such sections.

Le Châtelier was a great teacher, stressing precise measurement and scientific reasoning, and introducing facts only to illustrate general principles. He wrote prolifically, producing books on alloys, ceramics, steels, silicates, the combustion of fuels and the relationship of science to industry. He founded the *Revue de Métallurgie,* and was its editor from 1904 to 1914.

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LECHWE: *see* ANTELOPE: *Subfamily Hippotraginae.*

LECKY, WILLIAM EDWARD HARTPOLE (1838–1903), Irish historian who established his reputation as the historian of rationalism and European morals and whose study of Georgian England has become a classic, was born at Newtown park, near Dublin, on March 26, 1838. He was educated at Kingstown, Armagh, at Cheltenham and at Trinity college, Dublin. His early works, *Religious Tendencies of the Age* (1860) and *Leaders of Public Opinion in Ireland* (1861), published anonymously, were the products of his eclectic reading while a student and had small success. He had been influenced by the theologian Richard Whately and the historian Henry Thomas Buckle (*qq.v.*), and his next book, the *History of Rationalism* (1865; which included two chapters published as an essay, *The Declining Sense of the Miraculous,* 1863), while owing something to them, was welcomed by readers made familiar with evolutionary theory by Charles Darwin and the geologist Sir Charles Lyell. Lecky offered a broadly ranging narrative, showing the emergence of modern scientific thought and rational enquiry since the middle ages. The impression made by the considerable learning of this work was deepened by the appearance of its companion study, the *History of European Morals,* two volumes (1869), which explored themes initiated in the former work—the declining sense of the miraculous, the aesthetic expressions of religious belief and the complex relationship of society and morality. Pervading it was a desire to show the "natural causes" underlying the prevalence of certain theological and moral beliefs.

These works were the product of an absorption in study which allowed little time for activities other than travel. In 1871 he married Elizabeth van Dedem, lady-in-waiting to Queen Sophia of the Netherlands, but while this involved him in social duties it did not interrupt research upon his *History of England in the Eighteenth Century,* which appeared in eight volumes (12 in the 1892 ed.) from 1878 to 1890 to a chorus of praise, and it remains the most comprehensive attempt to narrate this period. Lecky's claim to impartiality was not inconsistent with that desire to refute the very different views expressed by J. A. Froude (*q.v.*) which is particularly evident in the sections dealing with Ireland.

In 1892 Lecky declined the chair of modern history at Oxford and entered politics, being elected in 1895 as a Liberal Unionist to represent Dublin university. His political philosophy is best represented by *Democracy and Liberty,* two volumes (1896), a critique suggesting the incompatibility of the one with the other. He feared the advent of socialism as retrogressive and prophesied a new despotism of the state founded on nationalism and a mass franchise. In parliament he supported ameliorative measures for Ireland but opposed Home Rule. He was made a privy councilor in 1897 and in 1902 received the Order of Merit.

Although so much of Lecky's career was absorbed by historical writing he did not enter fully into the academic world. He avoided lecturing and wrote nothing for the *English Historical Review* or the *Cambridge Modern History.* He died in London on Oct. 22, 1903. His widow re-established his ties with Dublin by founding there the Lecky chair of history.

See J. J. Auchmuty, *Lecky: a Biographical and Critical Essay* (1946); *A Victorian Historian,* ed. by H. Montgomery Hyde (1947). (H. G. Ro.)

LECLAIR, JEAN MARIE (1697–1764), French violinist and composer, known as the Leclair the Elder, who established in France the classical violin school that supplanted the earlier Italian school. Born at Lyons on May 10, 1697, he was in his youth both a musician and a braid- and lace-maker, as was his father, and also a dancer and choreographer. In 1722 he was principal dancer and ballet master at Turin. The following year he went to Paris, where he published his first book of sonatas for violin and continuo, but he shortly returned to Turin, becoming again ballet master there in 1726. Having perfected his violin studies with G. B. Somis, he returned to Paris and opened his career as a violinist-composer with brilliant success at the Concert Spirituel in 1728. His fame spread so rapidly that four years later he was the subject of an article in J. G. Walther's *Musicalisches Lexicon.* He later became a musician of the royal chamber and up to 1746 visited several princely courts. He was murdered in Paris on Oct. 22, 1764, his last years having been clouded by despair and distrust. An amazing performer whose somewhat frigid style was nevertheless remarkable for its breadth, precision and brilliance, Leclair published four books of sonatas for violin and continuo (1723–38), two books of sonatas for two unaccompanied violins (1730 and *c.* 1747), five sets of *Récréations* for two violins and continuo, and two sets of string concertos (*c.* 1737 and *c.* 1743). Despite its poor libretto, his opera *Scylla et Glaucus* (1746) has pages of great beauty.

See L. de la Laurencie, *L'École française de violon,* vol. 1 (1922); Marc Pincherle, *Jean-Marie Leclair l'Aîne* (1952). (Mc. P.)

LECLANCHÉ CELL: *see* BATTERY: *Primary Cells.*

LE CLERC (LECLERC), **JEAN** (JOHANNES CLERICUS) (1657–1736), French theologian, encyclopaedist and biblical scholar, was born in Geneva, Switz., on March 19, 1657. Educated at Geneva (under F. Turretin), Grenoble and Saumur (schools noted for radical disciplines in textual criticism of biblical and patristic documents), Le Clerc espoused rationally delineated principles of exegesis and theological method which led to his break with scholastic Calvinism and an appointment, in 1684, to the faculty of the Remonstrant seminary in Amsterdam, where he died on Jan. 8, 1736.

Pre-eminently, Le Clerc's editorship of three influential encyclopedias, *Bibliothèque universelle et historique* (26 vol., 1686–93), *Bibliothèque choisie* (28 vol., 1703–13) and *Bibliothèque ancienne et moderne* (29 vol., 1714–30), was a permanent scholarly contribution. In the field of biblical studies, however, Le Clerc attained, during his lifetime, the ambivalence of fame and notoriety. His views on the mode and extent of inspiration of the Scriptures were advanced; he denied it altogether for the Song of Songs, Ecclesiastes, Job and Proverbs. In *Sentiments de quelques théologiens de Hollande* (1685) he denied the Mosaic authorship of the Pentateuch and assigned the historical sections to King Josiah (late 7th century B.C.). *Ars critica* was published in 1696; *Harmonia Evangelica,* a harmony of the Gospels in Greek and Latin, appeared in 1699. Commentaries on the Pentateuch (1699), a translation of the New Testament (1703), further Commentaries on the historical books of the Old Testament (1708), the Psalms, the writings of Solomon and the prophetic books (1731), indicate the scope of his biblical studies.

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LECOCQ, (ALEXANDRE) CHARLES (1832–1918), one of the principal French composers of operettas after Offenbach and known for *La Fille de Madame Angot.* Born a cripple, June 3, 1832, in Paris, he studied harmony at the Conservatoire under François Bazin, composition under Fromental Halévy and the organ under François Benoit. Though he became proficient at the organ, he was prevented from continuing his studies on this instrument by his diseased hip. His first operetta was *Le Docteur Miracle* (1857), written for a competition organized by Offenbach, which shared the prize with a setting of the same libretto by Bizet. Between 1859 and 1867 he produced six one-act operettas, but it was not until the production of his three-act *Fleur de thé* (1868) that he achieved success. Nine of Lecocq's operettas were produced during the next four years, and, following the success in Brussels of *Les Cent Vierges* (1872), *La Fille de Madame Angot,* on a libretto by Clairville, P. Siraudin and V. Koning, was given there in December of the same year. Acclaimed as his masterpiece, it was performed three months later in Paris, where it ran for 411 nights. Within a year it was performed in 103 provincial towns in France, and thereafter was frequently revived in most European countries and in the United States. In 1947 some of the music was arranged by Gordon Jacob as a ballet and given as *Mam'zelle Angot.* From 1874, when *Girofle-Girofla* was produced in Brussels, to 1911, Lecocq continued to write operettas, chiefly produced in Paris, of

which the most successful was *Le Petit Duc* (1878). His single attempt at *opéra-comique, Plutus* (1886), was a failure. He also wrote polkas, mazurkas, schottisches and other dances, and five volumes of songs. Lecocq kept alive the spirit of Offenbach in the French operetta, adapting it to the more sober view of light opera that came into fashion after the Franco-German War. He died in Paris on Oct. 24, 1918.

See Charles Lecocq, "Mes Cauchemars," in *La Gazette Parisienne* (1895–97); L. Schneider, *Hervé et Lecocq* (1924). (E. Lr.)

LECONTE DE LISLE, CHARLES MARIE RENÉ (1818–1894), French poet, leader of the Parnassians (*q.v.*) who between 1865 and 1895 was acknowledged as the foremost French poet apart from the aging Hugo. With the growth of admiration for Baudelaire and the Symbolists, his reputation declined. His theories, reacting against romanticism and stressing the need for impersonality and discipline in poetry, were expressed with deliberate provocativeness and exaggeration. His epic poetry is often over-weighted by erudition and ornamentation, but his shorter poems convey a compelling and individual vision, and "Qaïn" (in *Poèmes barbares*) is one of the most impressive short epics of the century.

Born at St. Paul, La Réunion, on Oct. 22, 1818, he was sent to Rennes university in 1837 but gave up law for literature and was recalled by his family. He remained unwillingly in La Réunion from 1843 to 1845, when he returned to France to work on *La Democratie pacifique,* which propagated the theories of Charles Fourier (*q.v.*). In the poems of the next few years he drew on Greek mythology for symbols of his revolutionary views; he wrote political articles and unsuccessfully attempted practical work for the February revolution of 1848. Later, while remaining a republican, he became convinced that the poet should not engage in direct political action but should contribute to progress by re-expressing the finest traditions of the past.

His first volume of poetry was published in 1852. He eventually arranged the poems which appeared in different collections during his lifetime, to form *Poèmes antiques, Poèmes barbares* and *Poèmes tragiques. Derniers poèmes* was published posthumously in 1895. He spent most of his life in financial need, attempting to support his mother, sisters and wife by his writings. He published a series of translations from Greek and Latin; two tragedies adapted from Greek subjects, *Les Érinnyes* (1873) and *L'Apollonide* (1888); three anticlerical and republican booklets (1871–72); and, under the pseudonym Pierre Gosset, *Histoire du Moyen Age* (1876). In 1872 he became librarian of the senate, and in 1886 was elected to succeed Hugo as a member of the Académie Française. He died at Louveciennes, near Paris, July 17, 1894. His *Contes en Prose* was published in 1911.

At the centre of Leconte de Lisle's poetry is a sense of the impermanence of a vast and pitiless universe. Influenced by the new study of comparative religion and by contemporary scientific discoveries, his epics show the death of religions and civilizations—Greek, Indian, Celtic, Scandinavian, Polynesian, Jewish and Christian: and their gods, whether symbols of beauty, tyranny or suffering, are shown to be only figments of man's imagination; while his animal poems evoke a grim struggle for the survival of the fittest. Unable to find stable and eternal values, man may imagine a statuesque ideal of beauty, or may seek to lose himself in nature or in contemplating the nirvana after death. But he is spurred on by the force of desire, and by the fear that death may not be the end. Some of Leconte de Lisle's finest poems describe scenes of cosmic destruction with exultation rather than terror. They assert that, in face of the cruel forces which create and destroy an ephemeral world, the poet must savour the more sharply its rich physical beauty and the vigour of its ferocity, until he can appreciate the intensity of each moment whether of delight or suffering, an intensity which can compensate for the eternity that man can never achieve.

Leconte de Lisle's poetry is firm, sometimes to the point of rigidity, in structure, and has often a sustained dignity of tone, diction and rhythm. It uses a vocabulary of absolutes to express feelings of intense ecstasy, violence, resistance or negation. But there are other tones; sometimes the sardonic, often the graceful and delicate. He refused to see the potential beauty in everyday life from which Baudelaire was to draw poetry, but he expressed a delight in the physical world and a sense of cosmic anguish that are both his own and those of his age.

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LE CORBUSIER (Charles Edouard Jeanneret) (1887–1965), a revolutionary figure in modern architecture, was born on Oct. 6, 1887, in La Chaux-de-Fonds, Switz. Also known as a city planner, painter, sculptor and author, Corbusier made his greatest contributions in the field of civic and domestic architecture. At the age of 14 he was admitted to the art school of his native city, where his talent was recognized by one of the teachers, the painter Charles L'Eplattenier. He built his first house at the age of 18, but his career as an architect began only around 1920. In 1908 he made his first long stay in Paris and worked 15 months in the atelier of Auguste Perret, a pioneer in reinforced concrete construction; in 1910 he worked for five months in the atelier of the factory designer Peter Behrens in Berlin. He finally settled in Paris in 1917. Although Swiss by birth, he is considered French by training. Modern painting then absorbed his interests (*see* Painting: *Nonobjective Painting: Purism*). Together with A. Ozenfant and Dermée he founded the avant-garde magazine *L'Esprit Nouveau* in Oct. 1920. He began to build at that time, associating himself with his cousin, Pierre Jeanneret. The year 1923 marked the appearance of *Towards an Architecture* (Eng. trans., 1928), in which his earlier articles for *L'Esprit Nouveau* reappeared, with an appreciable influence on the architectural world. At the International Exhibition of Decorative Arts in Paris (1925) he exhibited a two-story apartment unit precursing his later residential blocks in his Pavilion de L'Esprit Nouveau, which was financed mainly by Voisin, the automobile manufacturer, whose name is also associated with Le Corbusier's model for a "contemporary city of 3,000,000 inhabitants" (Paris).

Endless ingenious methods of construction were employed by Le Corbusier. The flat roof with roof garden, which he advocated, is not merely a tribute from architecture to health but the thick concrete flags laid on sand, with open, grass-sown joints, insulate the house beneath and lessen the considerable reaction of a concrete structure to varying weather conditions. In 1927 he won first prize in the international competition for the design for the Palace of the League of Nations in Geneva, but his plan was not used. In 1925–29 his Centrosoyus (Ministry of Central Economic Planning) was built in Moscow; 1932 marked the erection of his Swiss dormitory at the Cité Universitaire, Paris. In Brazil he planned the Ministry of Health and Education building in Rio de Janeiro (1936). Among his many city-planning schemes were those for Algiers (starting in 1930), São Paulo, Rio de Janeiro, Buenos Aires, Barcelona (1933), Geneva, Stockholm, Antwerp and Nemours (1934), and his plan for the Palace of the Soviets in Moscow (1931). His scheme for a museum in 1929 was realized, to a certain extent, in Tokyo in 1956. His most extensive book on urbanism, *La Ville Radieuse,* appeared in 1935. In 1940, after the outbreak of war, he moved to the south of France. There his studies of proportion centred in the *Modulor,* which greatly awakened architectural interest in the conception of a building with coherent proportions. He was able to return to his Paris atelier in 1944. In 1946 he went to New York to co-operate on the preparation of plans for the United Nations buildings, and was a member of the board of consultants for the design of the Secretariat building (1950).

Le Corbusier's genius finally received recognition. Through the efforts of the French minister of reconstruction, Claudius Petit, he realized the Unité d'Habitation at Marseille, 1947–52. A continuous line of thought runs from the Plan Voisin (1922) to the towers of Meaux (1957), his Unité at Nantes-Rezé (1956) and

the Unité at the International Architectural exhibition in Berlin, containing 400 apartments (1957).

His project for the civic centre of St. Dié in the Vosges mountains (1945) envisaged an integrated community life previously equaled only by the Greek agora. In 1950 Le Corbusier began building Chandigarh, the capital city of Punjab. In addition to the overall plan for the city he also designed several of the major government buildings—all in reinforced concrete. His daring chapel at Ronchamp (1955) points toward a new conception of spatial and plastic imagination. Le Corbusier received a great number of distinctive honours, including honorary degrees from the University of Zürich and the Swiss Institute of Technology in Zürich; the French Legion of Honour; and a gold medal for distinguished service from Queen Elizabeth II. He died on Aug. 27, 1965, on the Riviera.

See also references under "Le Corbusier" in the Index.

Le Corbusier's *Oeuvre complète* was published in six volumes (1929 *et seq.*); other works include *When the Cathedrals Were White* (1937; Eng. trans., 1947) and *New World of Space* (1948). *See* S. Papdaki (ed.), *Le Corbusier, Architect, Painter, Writer* (1948); S. Giedion, *Space, Time and Architecture,* pp. 509–540 (1954). (S. Gn.)

LECOUVREUR, ADRIENNE (1692–1730), the leading French actress of her time, was born at Damery near Epernay on April 5, 1692, the daughter of a hatmaker. At the age of 14 she participated in an amateur performance of Corneille's *Polyeucte.* She then received instruction in acting from the actor-manager Legrand, and as a professional actress was first seen on the stage of Lille. On May 14, 1717, she made her debut on the boards of the Comédie Française in Crébillon's *Électre.* To this role, to the Monime in Racine's *Mithridate* and to the Angélique in Molière's *Georges Dandin* she brought a naturalness and simplicity not characteristic of the style of acting then current, which, combined with her beauty and charm, made her extraordinarily popular.

Lecouvreur found a friend and teacher in Michel Baron (*q.v.*), who in 1720 returned to the stage at the age of 67, and was admired by Voltaire. She died in Paris, in her prime, on March 20, 1730, and, not having renounced acting as a profession, was refused Christian burial. Though Lecouvreur enacted comedy parts with spirit and intelligence, her real domain was tragic acting.

After 1721 she was the mistress of Maurice Saxe who, however, abandoned her some time before her death. The more sensational aspects of her life were exploited by Eugène Scribe and Ernest Legouvé in their play *Adrienne Lecouvreur* (1849), which is unsatisfactory as biography but provided a leading role played by Rachel and later by Sarah Bernhardt. (A. M. N.)

LE CREUSOT, an industrial town in the *département* of Saône-et-Loire, France, is 89 km. (55 mi.) S.W. of Dijon on a branch railway line and a minor road. Pop. (1962) 33,002. The town lies in a district rich in iron ore and coal, which have been exploited since the 16th century. In 1782 Le Creusot was chosen by William Wilkinson, an English ironmaster, and Ignace de Wendel as the site of an arms factory using coke, and production, with plant brought from England, was begun in 1785. That same year the royal crystal factory was transferred to Le Creusot from Sèvres and, as the Cristallerie de la Reine, it continued in operation until well into the 19th century. The prosperity of Le Creusot, however, dates from 1837 when, after a number of attempts to continue the metallurgical industry had ended in failure, the Société des Mines, Forges et Fonderies du Creusot was purchased by the brothers Adolphe and Eugène Schneider. Concentrating originally on locomotives and river steamers, the enterprise expanded from 1874 under Eugène Schneider's direction to include gunmetal and armourplate. The first French locomotives and armourplate were produced at Le Creusot. The company, which remained in the Schneider family, maintains branches throughout France and in Canada and Brazil. Its products include steel, electrical and mining machinery, turbines and diesel engines. An electric locomotive from Le Creusot achieved the world record speed of 331 km. (205.7 mi.) an hour in 1955. The factories at Le Creusot encircle the town, which is primarily occupied by employees of the works.

LECTERN, a reading desk, usually restricted to ecclesiastical use. In the early church the ambo (*q.v.*) served as a reading desk, but by the 15th century the use of special stands for the large books then in vogue became common. On the continent, especially in Italy, there are many beautiful examples of the Renaissance period in carved wood, usually with heavily scrolled, spreading, triangular base, and a support of generally baluster type. In the Anglican Church, where the lectern is usually reserved for the reading of the lessons, a type has become traditional in which the book rest is supported on the wings of an eagle or a pelican. In many cases these are of metal.

LECTIONARY, a book containing portions (pericopes) of the Bible appointed to be read on particular days of the year. The word is also used to denote the list of such Scripture lessons.

The custom of reading extracts from the Pentateuch and the prophetic books of the Old Testament in synagogues on the sabbath (*cf.* Luke iv, 16–20; Acts xiii, 15) was taken over by the early church. Soon readings were added from the writings of the apostles and evangelists (Col. iv, 16; I Thess. v, 27; Rev. i, 3). At first the length of the portions to be read was not prescribed; Justin Martyr (about A.D. 150) says they were read "as long as time permits" (*First Apology,* 67). During the 3rd and 4th centuries several systems of lessons were devised for churches of various localities. Johannes Cassianus (about 380), in the *Institutes,* says that throughout Egypt the Psalms were divided into groups of 12, and that after each group there followed two lessons, one from the Old, one from the New Testament, implying but not absolutely stating that there was a fixed order of such lessons just as there was of Psalms. St. Basil the Great mentions fixed lessons on certain occasions taken from Isaiah, Proverbs, Matthew and Acts. From John Chrysostom and Augustine it is learned that Genesis was read in Lent, Job and Jonah in Passion week, the Acts of the Apostles in Eastertide, and lessons on the passion on Good Friday and on the resurrection on Easter day. One of the first attempts to fix, for a diocese, definite readings for special seasons during the year was made by Musaeus of Marseilles in the middle of the 5th century (reported by Gennadius).

At first the lessons were marked off in the margins of non-lectionary manuscripts of the Scriptures. Later special lectionary manuscripts were prepared, containing in proper sequence the appointed passages, each prefaced with a brief, stereotyped introduction. The Greek church developed two forms of lectionaries, one (*synaxarion*) arranged in accord with the ecclesiastical year and beginning with Easter, the other (*menologion*) arranged according to the civil year (beginning Sept. 1) and commemorating the festivals of various saints and churches. Other churches (such as the Coptic, Syrian, Armenian, Latin, etc.) produced similar volumes containing those Scripture passages which were deemed appropriate for the ecclesiastical calendar of each national church.

Among the Western churches during the medieval period the ancient usage at Rome prevailed, with its emphasis upon Advent. Milan, however, retained an alternative ancient lectionary with the old Mass, and some Spanish churches retained what is known as the Mozarabic use.

Lutheran and Anglican lectionaries differ from those in Roman Catholic usage because certain observances at which lessons had been appointed to be read had lapsed and because transpositions or substitutions were made for various reasons. Luther, being dissatisfied with the choice of many of the lessons from the Epistles in the Roman system (which were usually chosen from hortatory portions), included a greater proportion of doctrinal passages. In the Anglican Church the first edition of the Book of Common Prayer assigned for each day a passage of the Old Testament and of the New Testament to be read at both the morning and the evening services. Nearly all the saints' days, with their variety of lessons from various parts of the Scriptures, were dropped, and the new system assigned chapters of the Bible to be read consecutively. Thus, the New Testament, except Revelation, was to be read through three times a year, the Psalms once a month, as well as most of the Old Testament and large sections of the Apocrypha. Present-day liturgists in many denominations have been active in revising traditional lectionary systems.

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967; E. C. Colwell and D. W. Riddle (eds.), Studies in the Lectionary Text of the Greek New Testament, vol. i (1933); Rowland G. Finch, *The Synagogue Lectionary and the New Testament* (1939); A. Allan McArthur, *The Christian Year and Lectionary Reform* (1958); Eric Werner, *The Sacred Bridge* (1959). (B. M. M.)

LECTISTERNIUM, a rite of Greek origin, but common in Rome from 399 B.C. onward. The term is derived from Lat. *lectum sternere,* "to spread a couch." It consisted of a meal offered to gods and goddesses, represented by their busts or statues, perhaps originally by symbols. These symbols were laid upon a couch (*lectus*) or *pulvinar* (from *pulvinus,* "cushion") in the attitude of reclining. In front of the couch, which was placed in the open street, a meal was set out on a table.

On the first occasion couches were prepared for three pairs of gods—Apollo and Latona, Hercules and Diana, Mercury and Neptune. The feast, which on that occasion lasted for eight (or seven) days, was also celebrated by private individuals; the citizens kept open house, quarrels were forgotten, debtors and prisoners were released and everything done to banish sorrow. Similar honours were paid to other divinities in subsequent times, always after consultation of the Sibylline books and as a propitiatory ceremony. The gods being grouped in Greek fashion and being frequently of Greek origin, it is plain that the rite is Greek, presumably Cumaean, since the Sibylline books came from Cumae; but in this form it does not seem to be found in Greece. In addition, *lectisternia* were held annually, or oftener (for the greater part of the year in some shrines) at temples of gods originally Greek, as Ceres. This largely replaced the old Roman *epulum* or *daps,* in which a table was spread for the god, who was not visibly represented. This is not to be confused with the *sellisternium,* most reasonably explained (by L. R. Taylor) as the setting of a chair for some deity to look on at a festival. In Christian times the word was used for a feast in memory of the dead.

LECTOR (READER), in the Orthodox and Roman Catholic Churches, the second of the four minor orders (*see* HOLY ORDERS). From an early period men were set apart, under the title of *anagnostae, lectores* or readers, for the purpose of reading Holy Scripture in church. It is not known what the custom of the church was in the first two centuries, the earliest reference to readers, as an order, occurring in the writings of Tertullian (*c.* A.D. 200); there are frequent allusions to them in the writings of St. Cyprian and afterward. Cornelius, pope during 251–253, in a well-known letter mentions readers among the various church orders then existing at Rome. The custom has not fallen out of use, but the precise duties and method of appointment vary greatly.

LEDA, in Greek legend, usually described as the daughter of Thestius, king of Aetolia. Wife of Tyndareus, king of Lacedaemon, she was held by some to be the mother by him of Clytemnestra and of Castor, one of the Heavenly Twins; and mother by Zeus, who had approached her in the form of a swan, of the other Twin, Pollux, and of Helen, both of whom hatched from an egg, or eggs, laid by Leda (*see* CASTOR AND POLLUX). Others give divine parentage to both Twins and possibly to Clytemnestra also, making them all hatch from the eggs of Leda; while yet others say she bore the Twins to her mortal husband Tyndareus. Again, Leda may have hatched out Helen from an egg laid by Nemesis (*q.v.*), similarly approached by Zeus as the divine swan.

Leda's name is non-Greek, as is her husband's. Probably it is connected with the word for "woman" in Lycian inscriptions. In classical art Leda and the swan are represented in a marble group, probably a copy of a sculpture by Timotheus. (X.; H. W. PA.)

LE DAIM (LE DAIN), **OLIVIER** (d. 1484), favourite of Louis XI of France, was born at Thielt, near Bruges, in Flanders. His original surname was Necker. He became court barber and valet to Louis XI and was ennobled under the name Le Daim in 1474 and made comte de Meulan in 1477. In the latter year he was sent to influence Mary, the young heiress of Burgundy and the Netherlands, in the French king's favour, but his life was threatened and he was compelled to leave Ghent. He thereupon seized and held Tournai for the French. Le Daim amassed a fortune by intrigue and extortion and was named gentleman-in-waiting, captain of Loches and governor of St. Quentin. After the death of Louis XI he was arrested, tried before the *parlement* of Paris and, on May 21, 1484, hanged at Montfaucon without the knowledge of Charles VIII. His property was given to Louis duc d' Orléans.

See G. Picot, *Procès d'Olivier le Dain* (1877).

LEDERBERG, JOSHUA (1925–), U.S. geneticist, co-winner of the 1958 Nobel prize in medicine for his discoveries in bacterial heredity, was born May 23, 1925, in Montclair, N.J. While a student at Columbia university medical school, he took a leave of absence to work at Yale university with E. L. Tatum (*q.v.*) on bacterial genetics. The experiments were immediately successful, and Lederberg never returned to his medical class. He joined the department of genetics at the University of Wisconsin in 1947, transferring in 1959 to Stanford university medical school, where he became chairman of the department of genetics.

The experiments of Lederberg and Tatum demonstrated that, contrary to what had previously been widely believed, sexual reproduction occurs in bacteria. This and Lederberg's later experiments showed the hereditary mechanism to be similar to that in higher organisms and laid the groundwork for the study of bacterial genetics. Along with a student, N. D. Zinder, Lederberg demonstrated the phenomenon of "transduction," whereby a fragment of the chromosome is transferred from one bacterial cell to another by an infecting virus. (J. F. Cw.)

LEDOCHOWSKI, MIECZYSLAW HALKA, COUNT (1822–1902), Polish Roman Catholic cardinal and archbishop, was born on Oct. 29, 1822, near Sandomierz, in Russian Poland. As archbishop of Poznan, he resisted the "May laws," during Bismarck's *Kulturkampf* against the Roman Catholic Church (*see* GERMANY: *History*) and was imprisoned in 1874. Though made a cardinal shortly thereafter, he was not released until Feb. 1876. He went to Cracow, where his presence was made the pretext for anti-Prussian demonstrations. He thereupon went to Rome, from which, in spite of having been deposed by the civil government, he continued to direct the affairs of his diocese, not resigning till 1885. Cardinal Ledochowski died at Rome on July 22, 1902.

His nephew WŁODZIMIERZ LEDOCHOWSKI (1866–1942) was general of the Jesuit order, 1914 to 1942.

LEDOUX, CLAUDE NICOLAS (1736–1806), French architect, was born at Dormans-sur-Marne, March 21, 1736. While executed in the baroque and neoclassical styles of the time, his works also exhibit efforts to break away from traditionalism. His unexecuted projects for spherical, cylindrical and pyramidal houses have no parallel in architectural history. He won early fame building the residences of Madame du Barry, the dancer Marie Madeleine Guimard and several aristocrats. From 1775 to 1779 he erected the factory buildings and workmen's houses of the royal saltworks (Salines de Chaux) at Arc-et-Senans in Franche-Comté. Between 1775 and 1784 he carried out the theatre of Besançon and in 1783 the office building of the Ferme Générale. Four of his Parisian tollhouses have survived. After his imprisonment in 1793 as a suspect royalist, he devoted himself to the composition of his *L'Architecture* (1804), in which he presented his advanced designs for an ideal city. He died in Paris, Nov. 19, 1806.

See Emil Kaufmann, *Three Revolutionary Architects: Boullée, Ledoux and Lequeu,* American Philosophical Society, *Transactions,* vol. xlii, part 3, with complete bibliography (1952), *Architecture in the Age of Reason* (1955). (E. KN.)

LEDRU-ROLLIN, ALEXANDRE AUGUSTE (1807–1874), French lawyer whose political activity made him one of the most prominent men of the second republic, was born in Paris on Feb. 2, 1807. He was the grandson of Nicolas Philippe Ledru, who under the name "Comus" had been well known as a doctor in Louis XV's reign. Called to the bar in 1829, he appeared for the defendants in most of the cases in which republicans were charged with political offenses in the first ten years (1830–40) of the July monarchy. At the same time he began a notable contribution to French jurisprudence with his new edition of the *Journal du palais, 1791–1837,* in 27 vol. (1837), later to be supplemented by 17 vol. for 1837–47 and by the *Répertoire général de la jurisprudence française,* 8 vol. (1843–48). Elected deputy for Le Mans in 1841 with hardly a dissenting voice, he was brought to trial at Angers for the violence of his electoral speeches and sentenced to four

months' imprisonment and a fine, against which he appealed successfully on a technical point.

Ledru-Rollin at first distinguished himself chiefly by his demand for an extension of the franchise as the only means to improve the condition of the lower classes. The violence of his oratory, however, diminished its effect in the chamber, and his influence was mainly exerted through the newspaper *La Réforme,* on which he collaborated with the socialist Louis Blanc (*q.v.*). In 1846 he resigned his appointment at the Cour de Cassation.

There were acute differences of opinion between Ledru-Rollin, as a republican, and the men of the "dynastic left" (monarchists in favour of constitutional reform), such as Odilon Barrot, and these differences were hardly dissimulated during his temporary alliance with them at the time of the "banquets campaign" for electoral reform in 1847–48. When revolution broke out in 1848, Ledru-Rollin and Alphonse de Lamartine continued to debate against the royalists in the legally elected chamber until the Parisian populace stopped serious discussion by invading the chamber (Feb. 24). In the provisional government set up by the republicans on the abdication of Louis Philippe, Ledru-Rollin became minister of the interior; and after the resignation of that government he was on May 9 elected by the new constituent assembly to its executive committee. At the crisis of May 15, when the revolutionary extremists tried to set up a new government at the Hôtel de Ville, Ledru-Rollin, believing that the Bonapartists were attempting a *coup,* took the side of Lamartine and the party of order against the proletariat (*see* FRANCE: *History: The Second Republic 1848–52*). After this Ledru-Rollin never regained his influence with the working classes who considered they had been betrayed. At the presidential election in Dec. 1848 he secured only 370,000 votes. His opposition to the policy of Louis Napoleon (*see* NAPOLEON III), the new president of the republic, especially his Roman policy, led to his moving the impeachment of the president and his ministers. The motion was defeated, and next day (June 13, 1849) he headed what he called a peaceful demonstration and his enemies called armed insurrection. Condemned to deportation, he escaped to London, where he joined the executive of the Revolutionary Committee of Europe (with Kossuth and Mazzini among his colleagues). He was accused of complicity in an obscure attempt (1857) against the life of Napoleon III and again condemned in his absence to deportation. When the exceptions from the general amnesty were removed in 1870, Ledru-Rollin returned to France. Though elected in 1871 in three departments, he refused to sit in the national assembly under the government of national defense and took no serious part in politics until 1874, when he was returned to the assembly as member for Vaucluse. He died at Fontenay-aux-Roses (Seine) on Dec. 31, 1874. An edition of his speeches and political writings appeared in 1879.

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LEDYARD, JOHN (1751–1789), U.S. adventurer and explorer who accompanied Capt. James Cook on his third expedition, was born in Groton, Conn., in the year 1751. He grew to manhood in nearby Hartford and was sent to Dartmouth college for training to become a missionary among the Indians. Ledyard soon discovered that converting red men to Christianity was not his calling. However, a summer's residence among the Six Nations produced not only a passionate interest in primitive cultures but a strong urge for travel and adventure. In 1774 he shipped out as a common seaman and made, among others, a voyage to the Guinea coast. The year 1776 found Ledyard in London where he signed up to become corporal of marines in Capt. Cook's third globe-circling expedition around the Cape of Good Hope. Scant reference is made to Ledyard in Cook's *A Voyage to the Pacific Ocean,* but he is nonetheless referred to as "an intelligent man, for the purpose of gaining information."

While in North Pacific waters Ledyard shared with his shipmates a realization that sea-otter skins obtained there could be marketed in China at a great profit. In 1782, with the American Revolution virtually at an end, he returned to Long Island, N.Y., deserted his ship and the following year published *A Journal of Captain Cook's Last Voyage to the Pacific* (1783), a book based heavily upon an account by shipmate John Rickman. Ledyard hoped to stimulate American maritime interests and capital investments in sea-otter fur trade with China. He achieved the former but failed to obtain the desired financial support for his fur-trade proposals. Thus thwarted, he made his way to France, there to plead, to no avail, with the U.S. minister, Thomas Jefferson, and Commodore John Paul Jones. At this juncture Ledyard entered upon a new adventure: to walk across Russia, including Siberia. In Feb. 1788, while at Irkutsk, he was arrested and ordered out of the country. His final venture involved exploration within Africa but he got no farther than Cairo before he died. Records pertaining to Ledyard's life are rather meagre, but the known highlights of his career mark him as a resourceful and energetic American adventurer.

See J. K. Mumford (ed.), *John Ledyard's Journal* (1963).

(O. O. W.)

LEE, ARTHUR (1740–1792), U.S. diplomat who during the Revolutionary War sought recognition and aid in European capitals for the continental congress. He was born at Stratford, the family seat, in Westmoreland county, Va., on Dec. 21, 1740. He was educated in England and at the University of Edinburgh where in 1764 he received the degree of doctor of medicine. Two years later he returned to Virginia and practised medicine in Williamsburg. He also became interested in colonial politics and began writing political tracts, publishing a series of ten essays called "The Monitor's Letters" in Rind's *Virginia Gazette* in 1768. In that year he gave up medicine and returned to England, studied law, and became (1770) an agent for the colony of Massachusetts.

In 1776 Lee went to Paris as an agent of the committee of secret correspondence of the continental congress to gain information on the attitudes of the European governments toward the American Revolution. In September, Benjamin Franklin, Silas Deane and Lee were appointed commissioners to negotiate an alliance with France and to solicit aid from other governments. Lee quarreled with Deane, accused him of peculation and finally brought about his recall. He was also critical of Franklin, of whom he was jealous.

In Feb. 1777 Lee went to Spain to seek aid but received no official recognition, though he ultimately did obtain a promise of a loan from Spain, only a small part of which was ever received by the United States. In May he went to Berlin but was not received officially and accomplished nothing. On Feb. 6, 1778, Lee, Franklin and Deane signed important treaties of commerce and alliance with France. Lee was recalled in 1779 and returned to America in Sept. 1780. The following year he was elected to the Virginia house of delegates and from 1782 to 1784 served as a delegate to the continental congress. He was one of the negotiators of two prominent Indian treaties—Fort Stanwix (Schuyler) of Oct. 1784 and Fort McIntosh of Jan. 1785—and served on the U.S. treasury board from 1785 to 1789. After the adoption of the federal constitution, which he opposed, Lee retired to Landsdowne, his estate in Middlesex county, Va., where he died on Dec. 12, 1792. Lee's suspicious and polemic temperament made him one of the most controversial of America's early diplomats.

See R. H. Lee, *Life of Arthur Lee, LL.D.,* 2 vol. (1829) and C. H. Lee, *A Vindication of Arthur Lee* (1894), both partisan.

(A. DEC.)

LEE, FITZHUGH (1835–1905), U.S. cavalry general, was born at Clermont, in Fairfax county, Va., on Nov. 19, 1835. He was the grandson of Henry "Light-Horse Harry" Lee, and the nephew of the Confederate general, Robert E. Lee. After graduating from West Point in 1856 he became a cavalry subaltern. On the secession of Virginia in 1861 he joined the Confederate army and served with distinction throughout the Civil War. He was made brigadier general in 1862 and major general in 1863, commanding cavalry divisions under J. E. B. Stuart, Wade Hampton and Robert E. Lee. On April 9, 1865, at Farmville, Va., he led the last charge of the Confederates.

After the war he was conspicuous in his efforts to reconcile the South to the consequences of the war. From 1886 to 1890 he was

governor of Virginia. In 1896 he was appointed by Pres. Grover Cleveland consul general at Havana, Cuba. In that post (in which he was retained by Pres. William McKinley) he was from the first called upon to deal with a situation of great difficulty, which culminated with the destruction of the "Maine" (*see* SPANISH-AMERICAN WAR). Upon the declaration of war with Spain he re-entered the U.S. army. He was one of the three ex-Confederate general officers who were made major generals of U.S. volunteers. He was military governor of Havana and Pinar del Río in 1899, and retired as a brigadier general, U.S. army, in 1901. He died in Washington, D.C., on April 28, 1905. He wrote *General Lee* (1894) and *Cuba's Struggle Against Spain* (1899).

LEE, HENRY (1756–1818), U.S. cavalry officer during the American Revolution, and father of Gen. Robert E. Lee, was born in Prince William county, Va., Jan. 29, 1756. He graduated from the College of New Jersey (now Princeton) in 1773.

Lee's military career began as a Virginia cavalry officer immediately upon the outbreak of the American Revolution. In 1778 he advanced to the rank of major and commanded three troops of cavalry and three companies of infantry with which he won notable engagements. During this time he gained the nickname "Light-Horse Harry." His storming of Paulus Hook, N.J., on July 19, 1779, won unstinted praise from Washington. In 1780–81 Lee, now lieutenant colonel of dragoons, added luster to his name in the southern theatre at Guilford Courthouse, Eutaw Springs and Augusta. After the war he turned to politics. From 1785 to 1788 he served in the Virginia legislature. He also represented the state in the congress under the articles of confederation from 1785 to 1788. In the Virginia convention of 1788 Lee voted to ratify the federal constitution. Thereafter he served again in the state legislature (1789–91) and three terms as governor of the state (1791–94).

In 1794 Lee's political career was interrupted when Washington chose him to suppress the Whisky insurrection in western Pennsylvania. He received a temporary commission as major general in 1798 during the threatened war with France. In 1799 he returned briefly to politics, serving until 1801 in the U.S. house of representatives. He drafted the resolution passed by congress upon the death of Washington containing the words, "first in war, first in peace, and first in the hearts of his countrymen." These words were repeated by Lee in an oration delivered at Philadelphia on Dec. 26, 1799.

After 1800 Lee's life was darkened by unfortunate land speculations which brought him twice to debtor's prison. The final blow came in July 1812 when he was brutally crippled in a Baltimore riot while defending the editor of an antiwar newspaper. Broken in health and spirit he left his family in Virginia to spend his last years in the West Indies. On his way home Lee died on Cumberland Island, Ga., March 25, 1818.

See Thomas H. Boyd, *Light-Horse Harry Lee* (1931). (A. C. LA.)

LEE, IVY LEDBETTER (1877–1934), one of the pioneers of 20th-century public relations methods, was born in Cedartown, Ga., July 16, 1877. A graduate of Princeton university in 1898, he was a newspaper reporter in New York city from 1899 to 1903, when he joined the staff of the Citizens' Union. The idea on which he built a spectacular career came from observing the attacks on big business that were popular in that era. (*See* PUBLIC RELATIONS.) In 1906 he became press representative for a group of coal mine owners who had been widely criticized in the course of a strike, and also for the Pennsylvania Railroad. He persuaded his clients to drop their policy of aloof independence and to woo public opinion. Gradually the press, provided with information where there had formerly been a stone wall of secrecy, also changed its attitude toward business. Lee acquired a string of powerful clients, including the Rockefeller interests, and helped them change the "image" of big business from that of a corporate monster to an eager-to-please public servant.

Lee devoted his skill also to a heterogeneous list of organizations that included the American Red Cross during World War I, the German dye trust in the early Nazi era, and the American-Russian Chamber of Commerce in the era when the U.S.S.R. was striving for U.S. recognition. He died in New York city on Nov. 9, 1934. (J. AY.)

LEE, NATHANIEL (*c.* 1653–1692), English dramatist whose heroic plays, though often extravagant, contain many passages of great beauty, was born probably in 1653, the son of Richard Lee, a Presbyterian minister. Lee was educated at Westminster school and at Trinity college, Cambridge, taking his B.A. degree in 1668. Coming to London under the patronage, it is said, of the duke of Buckingham, he tried to earn his living as an actor, but his acute stage fright made acting impossible. His earliest play, *Nero, Emperor of Rome*, was acted in 1674 at Drury Lane. Lee made his reputation in 1677 with a blank verse tragedy, *The Rival Queens, or the Death of Alexander the Great*, which remained a favourite on the English stage down to the days of Edmund Kean. *Mithridates, King of Pontus* (1678), *Theodosius, or the Force of Love* (1680), *Caesar Borgia* (1679) —an imitation of the worst blood and thunder Jacobean tragedies —*Lucius Junius Brutus, Father of His Country* (1680), and *Constantine the Great* (1683) followed. *The Princess of Cleve* (1681) is a gross adaptation of Madame de La Fayette's exquisite novel of that name. *The Massacre of Paris* (1689) was written about this time. Lee had given offence at court by his *Lucius Junius Brutus;* he sought rehabilitation by collaborating with Dryden in *The Duke of Guise* (1682), a play which directly advocated the Tory point of view. In it part of the *Massacre of Paris* was incorporated. In 1684 Lee succumbed to insanity, which ended his literary career, although he later recovered sufficiently to be released from detention. He died in 1692 and was buried in St. Clement Danes, Strand, on May 6.

See *The Works of Nathaniel Lee,* ed. with introduction by T. B. Stroup and A. L. Cooke, 2 vol. (1954–55).

LEE, RICHARD HENRY (1732–1794), U.S. statesman prominently associated during the Revolutionary period with a progressive element, known as the Whigs, that eventually included Patrick Henry and Thomas Jefferson. He was born at Stratford, Westmoreland county, Va., on Jan. 20, 1732. One of six distinguished brothers, Richard Henry studied under private tutors in Virginia and completed his education in England. His public career began in 1757 when he became justice of the peace in Westmoreland. The following year he entered the Virginia house of burgesses and served until 1775. Both by public statements and by organizing nonimportation associations he opposed arbitrary measures of British ministries at the time of the Stamp act and the Townshend acts. In March 1773, together with Whig colleagues, he originated the plan of intercolonial committees of correspondence.

Lee was an active member of the first continental congress where admirers of his oratory compared him with Cicero. In the second continental congress he introduced three famous resolutions: (1) for declaring independence ("That these United Colonies are, and of Right ought to be Free and Independent States; that they are Absolved from all Allegiance to the British Crown"); (2) for forming foreign alliances; and (3) for preparing a plan of confederation. His first resolution was adopted on July 2 and the Declaration of Independence followed two days later. He remained active in congress until forced to resign in 1779 because of poor health.

From 1780 to 1784 Lee served in the Virginia legislature. In 1784 he was elected to the congress under the articles of confederation and remained there until 1787, acting as president in 1784–85. He played an important role in framing the Northwest Ordinance. In 1787 Lee declined election to the constitutional convention as inconsistent with his position in congress. He opposed ratification of the federal constitution because it created a "consolidated" government and lacked a bill of rights. Nevertheless, he accepted the post of senator from Virginia in the first congress where he introduced several propositions, some of which were embodied in the first ten amendments to the constitution. Lee retired from public life in 1792 and died at his estate, Chantilly, near Stratford, on June 19, 1794.

See R. H. Lee, *Life* (1825); J. C. Ballagh (ed.), *Letters,* 2 vol. (1911–14). (A. C. LA.)

LEE, ROBERT EDWARD (1807–1870), Confederate general in the American Civil War, was born at Stratford, Westmoreland county, Va., Jan. 19, 1807, the fourth child of Col. Henry Lee and his second wife, Ann Hill Carter. The families of both father and mother had long played a conspicuous part in the affairs of Virginia. Members of both families had sat regularly in the house of burgesses, served as speakers and governors, and two Lees had been signers of the Declaration of Independence. The Carters had been equally prominent in politics and unusually prosperous in business matters.

Robert Edward's own father, usually known as "Light-Horse Harry" Lee, had served with distinction as a cavalry officer under Washington in the American Revolution, and after the war he had held high political office, as a member of the Virginia legislature and as governor of the state. Young Robert knew his father only as a shadowy figure who had once been a great soldier and as a respected and beloved father who, with all his failings, never lost his dignity, glamour and charm. The tragedy of his father's later life (*see* LEE, HENRY) drew the boy closer to his mother Ann, but Henry, as the biographer Douglas S. Freeman says, "was still King of his fireside." His mistakes would help shape the lessons Ann impressed on her son and his career as a soldier would remain as a priceless heritage.

Youth.—Robert began his formal education in Alexandria, Va., at a school maintained by the Carter family for their numerous offspring and continued his studies later at the Alexandria academy. The chronic illness of his mother and the departure of his two older brothers from home forced him early to develop a mature sense of responsibility. Seemingly without much advice or pressure from others he decided that his love of mathematics and the fact that the education would cost nothing were good reasons to seek admission to West Point. Application was made in person to John C. Calhoun, secretary of war, and appointment followed in March 1825. So in July of that year Robert E. Lee began the career of a soldier.

From the beginning Lee ranked high in his class. He was proficient in both mathematics and military exercises, and during his senior year he was chosen as the adjutant of the cadet corps. On graduation in 1829 he stood at the head of his class in artillery and tactics and second in final class standings. He was commissioned in the corps of engineers.

Early Military Service.—During the next few years he saw service at Cockspur island, near Savannah, Ga., and at Ft. Monroe, Va. In the meantime he had become engaged to Mary Custis, daughter of George Washington Parke Custis of Arlington and great granddaughter of Martha Washington. On July 5, 1831, they were married. As Freeman says: "When Lee married Mary Custis, he married Arlington as well, and that, too, was to have a profound influence upon him."

A period as assistant to the chief of engineers in Washington was followed by the far more congenial work of attempting to control the shifting course of the Mississippi river, which was threatening with new sand bars to destroy the commerce of the city of St. Louis. By the skill shown in this engineering project Lee established his professional standing. Recognition came in the form of an assignment to supervise improvement in the defenses of New York harbour and later by appointment as a member of the board of engineers for Atlantic coast defenses. He was back on the New York harbour defenses when war with Mexico was declared.

On Aug. 19, 1846, Lee received his orders, and on Sept. 21, he reported to Brig. Gen. John E. Wool at San Antonio de Bexar, Tex. His work with Wool was largely that of selecting routes and preparing bridges for the advance toward Saltillo. On Jan. 16, 1847, he was ordered to report at Brazos to Gen. Winfield Scott, who was planning a move from Veracruz toward Mexico City. There Lee became a member of Scott's staff and gained his first experience in active combat. In the advances and battles that culminated in the capture of the Mexican capital, Lee won high praise for his skill in reconnaissance and in the placing and use of artillery. He was singled out for special mention in nearly every engagement and came out of the war recognized as one of the nation's outstanding young soldiers. He had advanced in rank from captain to brevet colonel.

At the end of the war in 1848 Lee returned to service with the corps of engineers and in 1852 was ordered to West Point to become superintendent of the U.S. Military academy. After three years at the academy he was appointed colonel of the newly organized 2nd Cavalry and stationed at Jefferson Barracks, St. Louis, Mo. Much of Lee's time during the next few years was spent in court-martial service or with the cavalry at frontier posts in Texas, where the Indians threatened. The death of his father-in-law in Oct. 1857 brought him back to Arlington. There the settlement of the estate and the chronic illness of his wife forced him to request extended leaves from the army. He was still at home in 1859 when orders from Washington hurried him off to Harpers Ferry, where John Brown and his men had seized the government arsenal. There he took command of a body of marines and, after giving Brown a chance to surrender, ordered the assault that broke down the doors and made Brown a captive. In three minutes the whole affair was ended. (*See* BROWN, JOHN.)

Political Opinions.—In Feb. 1860 Lee returned to his post in Texas fully conscious of the tragic difficulties into which the nation was drifting. He approved neither of slavery nor of secession. In private correspondence he wrote that the South could "justly complain of the aggressions of the North" but "that the North would cheerfully redress the grievances complained of." He saw no cause for "disunion, strife and civil war." Even after Lincoln's election and South Carolina's ordinance of secession, he still hoped that "the wisdom and patriotism of the country" would find some way of serving it. He could not believe that "our people will destroy a government inaugurated by the blood and wisdom of our patriot fathers, that has given us peace and prosperity at home, power and security abroad, and under which we have acquired a colossal strength unequalled in the history of mankind." "I feel," he wrote, "as if I could easily lay down my life for its safety."

He had, however, seemingly made up his mind as to his course in case of a sectional war before he was ordered, on Feb. 4, to report in person to the general in chief in Washington. "If a disruption takes place," he said, "I shall go back in sorrow to my people and share the misery of my native state, and save in her defense there will be one soldier less in the world than now." It was, therefore, not surprising that, in spite of General Scott's appeals and Lincoln's offer of the command of the northern armies, Lee chose to resign his commission (in April 1861) rather than to remain and fight against his own people. He evidently intended to stay on the side lines unless Virginia required his aid.

Confederate Officer.—The firing on Ft. Sumter and Lincoln's call for troops quickly settled the matter. Now Virginia, too, had to choose sides, and with its secession in April 1861 came the call for Lee to become "commander of the military and naval forces of Virginia." He accepted without hesitation. He likewise accepted rank in the Confederate army when Virginia joined the Confederacy.

The next months were consumed in preparing Virginia to resist invasion. Strategic posts on the borders from Norfolk to Harpers Ferry were seized, troops and supplies gathered and something of an organization for efficiency achieved. Busy with such basic preparations, Lee took no direct part in the first battle at Manassas (Bull Run) in July 1861. He assumed field duty only after Confederate troops in the mountains of western Virginia had been defeated by Union forces under Gen. George B. McClellan. The task of saving western Virginia was now assigned to Lee.

His first campaign ended in miserable failure. The weather was bad, the troops poorly trained and thoroughly disheartened, and co-operation among officers was sadly lacking. Lee's plans for action were good, but he allowed subordinates to overrule his decisions and entrusted vital steps to thoroughly incompetent men. He made no progress and his prestige steadily dwindled. He regained none of it in the next weeks when he failed to drive the Union army out of the Kanawha valley. West Virginia was lost. Only the unshaken confidence of Pres. Jefferson Davis prevented this being Lee's last campaign.

His second chance came when Davis placed him in command of the southeastern coast of the Confederacy that was threatened by a Union expedition out of Hampton Roads. With renewed energy he went about strengthening the defenses of Charleston, Port Royal and Savannah. Approaches were blocked, new troops enlisted and an inner line of defenses constructed beyond the reach of naval guns. Soon he could say that, "If our men will stand to their work, we shall give them trouble and damage them yet."

While Lee laboured at his fortifications, things elsewhere had gone badly for the Confederacy. Forts along western waters had fallen before the thrusts of troops under Gen. Ulysses S. Grant, and the powerful army of the Potomac, gathered and trained by McClellan below Washington, was ready to advance. Most of Kentucky and much of western Tennessee had already been abandoned and Gen. J. E. Johnston was now planning to draw back from his advanced Manassas line. European recognition had not come, and military supplies had fallen dangerously low. In March 1862 Davis ordered Lee to report to Richmond.

Military Adviser to Davis.—Lee's recall had been a part of Davis' efforts to reorganize his administration to meet the emergency. Lee was to remain in Richmond charged with the task of conducting, "under the direction of the President," the military operations "in the armies of the Confederacy." In actual practice this amounted to taking over "the minor, vexatious matters of detail and counselling of commanders in charge of the smaller armies." Lee might be consulted on major problems but in no case did he initiate or direct "any plan of magnitude."

When it became clear that McClellan's advance on Richmond was to be up the peninsula from Yorktown, Lee's task became largely one of mediating differences between Davis, who had adapted Lee's plan of shifting troops to meet every threat as it developed, and Johnston, who stubbornly insisted that all forces should be concentrated close to Richmond for a final stand.

By a diplomatic handling of each, Lee had his way. To protect Richmond from the North and in an effort to prevent the Federal troops remaining in northern Virginia under Maj. Gen. Irvin McDowell from joining McClellan, he ordered Gen. T. J. "Stonewall" Jackson to combine forces in the Shenandoah valley and strike a "sudden and heavy" blow wherever opportunity offered. Any push toward the Potomac might help.

Johnston, meanwhile, against the wishes of both Lee and Davis, had drawn his troops back to the second line of defenses nearer Richmond without striking a blow. Weeks passed and he had still shown no signs of launching an attack when news arrived of Jackson's startling victories in the valley and of McDowell's sudden turning about under orders from Washington. Here was an opportunity not to be lost. McClellan had moved forward astride the Chickahominy river with the expectation that the weaker force on the north bank would soon be strengthened by the addition of McDowell's divisions. With that threat now removed Johnston saw his chance to strike. Without consulting either Davis or Lee he launched his attack in what became known as the battle of Fair Oaks or Seven Pines. In a day of bloody fighting little was accomplished and Johnston himself was seriously wounded. To fill the gap Davis immediately placed Lee in command, with the remark: "I shall send you the order when we get to Richmond." Thus, under the most difficult of circumstances, Robert E. Lee took command of the army of northern Virginia. His was now the responsibility for saving Richmond.

Seven Days' Battle.—To gain reinforcements he immediately ordered Jackson to move as if to advance and then secretly to bring his entire force by rail to the Richmond sector. This accomplished, Lee threw his main strength against the Federal forces on the north side of the Chickahominy and began what came to be known as the Seven Days' battle (June 26–July 2, 1862). In the bloody fighting that ranged from Mechanicsville to Frayser's Farm few decisive victories were gained, and at Malvern hill the Confederates were soundly beaten. Yet McClellan fell back and shifted his base from the Pamunkey to the James. He had failed to capture Richmond and his army was soon called back to the Potomac. Lee, with inferior numbers and with little assistance from Jackson, had outgeneraled and outfought McClellan.

Second Manassas.—Even before he was fully convinced of McClellan's withdrawal Lee had sent Jackson northward to face a new army of Virginia that Lincoln had formed out of the scattered troops in that area under Maj. Gen. John Pope. When certain of McClellan's move, he himself joined Jackson with the hope of striking Pope before McClellan's troops became available as reinforcements. In a daring and unorthodox move he divided his forces in the face of the enemy and sent Jackson northward in a flanking movement that ultimately brought him to the rear of Pope's army and his base of supplies. This forced Pope to fall back to Manassas to protect his lines of communication and also possibly to catch and destroy Jackson. Jackson, however, fell back too quickly and established contact with Lee, who had skilfully maneuvered the main army into position for attack or defense. In the two days' fighting that followed, Federal assaults were sharply repulsed and the counterattack by Lee's combined forces produced the decisive victory of Second Manassas (or Bull Run).

Lee had taken great risks, but his sound judgments as to what the enemy would do and the skilful handling of his own troops removed the last doubts as to his abilities. The Confederacy had found its general.

Antietam.—Convinced that the best way to defend Richmond was to threaten Washington, Lee now decided to invade Maryland. Again he divided his forces, sending Jackson to capture Harpers Ferry while he moved forward to Frederick, Md. With McClellan back in command of the Northern army, Lee expected to have plenty of time in which to reassemble his forces and to assume the offensive. His orders, however, fell into Federal hands, and McClellan was able to act with unaccustomed speed and to anticipate Lee's every move. He thus caught the Confederates completely off balance and at Sharpsburg, near Antietam creek, in Maryland, threatened for a time the total destruction of Lee's army. But McClellan did not press his advantage, and Lee was able to withdraw his badly depleted forces across the Potomac. His invasion had failed, but he had demonstrated rare skill in the full employment of an inferior force in defensive battle.

Fredericksburg.—The long pause after Antietam enabled Lee to reorganize his army and to be prepared to face the attack that the army of the Potomac, now under Gen. A. E. Burnside, launched late in the year against Fredericksburg on the Rappahannock. Behind strong entrenchments on the heights back of the town, Lee chose to remain strictly on the defensive. The battle, therefore, was soon reduced to a series of desperate, futile Union charges in the face of deadly musketry and artillery fire. The dead piled up in rows and only nightfall ended the slaughter. A few days later the Federals fell back across the river. Whether Lee should have left his entrenchments to exploit his victory is still a matter in dispute.

Chancellorsville.—In the spring of 1863 the Union army crossed the Rappahannock and headed toward Chancellorsville with Gen. Joseph Hooker in command. He hoped to turn Lee's left and to reach the Confederate rear. Although outnumbered two to one Lee again divided his army, sent Jackson around the Federal right, while his own scanty forces, well entrenched, held the front. Again the gamble paid off. While Jackson's corps surprised and overwhelmed the Federal right, Lee demonstrated on the left front and prevented troops being sent against the turning movement. Then a juncture was made with Jackson, Chancellorsville was captured and Hooker driven back over the Rappahannock. In the confusion of the fighting Jackson was fatally wounded by one of his men. It was a victory dearly bought.

Gettysburg.—Conscious of the fact that victories on Virginia soil gained no permanent results against an enemy that would only return with more men and better equipment, Lee now planned another Northern invasion. In Pennsylvania he could find much needed provisions, and a victory there might strengthen the growing Northern demand for peace. He had hoped to concentrate most of the Confederate troops operating in the east in this drive, but only Longstreet's division was made available. With his strength now up to 73,000 Lee began a series of skilful maneuvers across Hooker's front by which he moved his army into the

Shenandoah valley and then on into Pennsylvania. He had, meanwhile, permitted Stuart's cavalry to swing eastward to the enemy's rear, but with instructions to Stuart to keep himself in a position where he could protect the right wing of the advancing army. His wide sweep, however, carried him out of contact and left Lee's scattered army without the eyes with which to observe the enemy's movements. It was by mere chance that small divisions of the contending armies struck each other on July 1, at Gettysburg, Pa. Concentration of forces followed. In the first day's fighting the Union forces were pushed back, and an early attack on the second day, as Lee planned, might have given victory. But Longstreet's slow movements, the reasons for which are still in dispute, enabled the Federal army, now under Gen. G. G. Meade, to consolidate its position and forced onto Lee the rather desperate task of assaulting impregnable positions. His heavy losses and final failure at the foot of the Round Tops ended all hopes of victory. He drew his army back across the Potomac. Meade followed later in the year, but the heavy fighting was over. It was now quite clear that without Jackson there would be no more Chancellorsvilles. (*See* GETTYSBURG.)

The Last Year of War.—With Grant's appointment as commander of the Federal armies in 1864, Lee realized that his task had been reduced to one of standing between the army of the Potomac and Richmond. With his overwhelming resources in men and materials Grant need not consider the cost of advancing.

The first stroke came early in May when Grant with 100,000 men crossed the Rappahannock near Fredericksburg. Lee could muster only 60,000 men with which to meet the advance, but the fact that Grant chose to move through the wilderness of Spotsylvania favoured the defenders. For two days (May 5th and 6th) the armies came to grips in dense thickets where orderly movements became impossible. Thin lines of Confederates withstood one Federal assault after another. In one sector, Gen. A. P. Hill with 14,500 men held his own against 40,000. In all, Grant's losses were estimated at nearly 18,000, with over 2,000 killed. But he did not retreat. He moved forward in a series of flanking movements that brought him steadily nearer Richmond. First at Spotsylvania courthouse, then at Cold Harbor, Lee moved into defensive position behind entrenchments of heavier and more complicated design. Direct assaults were repulsed with heavy losses. By May 12, Grant had lost 26,000 killed and wounded, and at Cold Harbor another 12,000 were added. From the Wilderness to Cold Harbor, Grant had lost more men than Lee had in his entire army. Lee, the ardent offensive fighter, was now exhibiting an equal mastery of defensive warfare. His losses were far lighter than Grant's, but they could not be replaced. Dependable subordinates dwindled in number, and some authorities think that Jefferson Davis interfered to hamper his plans. At any rate, Grant, in a surprise move, now threw his forces across the James and struck the defenses of Petersburg from the south. Lee quickly moved into the immediate defenses of Richmond and "the spade took the place of the musket" as Grant settled down for a siege.

The siege of Petersburg dragged on through the winter of 1864. Grant continually extended his lines, exhausting Lee's resources while Sherman and Sheridan carried the war to the Southern people. The final campaign, as Freeman says, was a "study in attenuation." Lee's lines became too thin to hold. "No food, no horses, no reinforcements!" Richmond had to be abandoned, and escape was soon impossible. To avoid the useless shedding of more blood, Lee chose surrender. At Appomattox courthouse on April 9, 1865, he met with General Grant and with calm dignity accepted the terms imposed.

Retirement and Education.—With peace Lee advised "silence, hard work, quiet behaviour and avoidance of everything that might arouse the spirit of resistance or react against the defenseless." He retired from Richmond and then accepted the presidency of Washington college (later renamed Washington and Lee university), Lexington, Va. For the next five years he remained at the college, leaving Lexington seldom unless for reasons of health or business.

As an example to southerners he applied for amnesty and pardon. His petition was not acted upon and he remained to the end of his days disbarred from office. On Oct. 12, 1870, he died at the president's home of Washington college. His courage and his dignity in these last years had deepened the affection of his people and gained the respect of all who had the ability to recognize a true gentleman.

As a general, Lee's characteristics were the ability to grasp quickly the possibilities in a given military situation, a capacity for anticipating the moves of an opponent, and a skill in open maneuver that enabled him to make the most of inferior numbers and resources. "Not once, in a major engagement, had he met the Federals on even terms . . . To extemporize, to improvise, to reorganize—that had been his constant lot." In the use of field entrenchments he contributed much to the art of war. In the power to arouse the devotion of his men he excelled. His defects lay in a tendency to trust his subordinates too much and in an unwillingness to force his decisions on them. His respect for authority sometimes seemed to dwarf his stature, but his high personal character, his devotion to what he considered his duty and his genuine humility and selflessness gives him, even as a leader of a lost cause, a unique place in American history.

See also references under "Lee, Robert Edward" in the Index.

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(AY. CN.)

LEE, SIR SIDNEY (1859–1926), English Shakespearean scholar and second editor of the *Dictionary of National Biography,* was born of Jewish parents in London, Dec. 5, 1859. Educated at the City of London school and Balliol college, Oxford, he worked for Sir Leslie Stephen on the *Dictionary* until he succeeded him as editor in 1891. He contributed 820 articles, mainly on the Elizabethans. His biographical aims and methods are described in his lecture, *The Principles of Biography* (1911), in which he emphasizes the importance of candour and of brevity.

Before the *Dictionary's* completion (1902–03), Lee had expanded his article on Shakespeare into a *Life* (1898) and in 1902 produced the facsimile edition of the first folio of Shakespeare's *Comedies, Histories and Tragedies.* In 1906 he edited Shakespeare's *Works.* In *Elizabethan and Other Essays* (publ. 1929), he drew attention for the first time to the influence of the discovery of America upon Elizabethan writers. *The French Renaissance in England* (1909) shows his interest in comparative literature, and when, after being knighted (1911), he became (1913) professor of English at East London college (later Queen Mary college), he stressed its value in promoting international understanding. He helped to found the English association (1918). Lee's other works include a *Life of Queen Victoria* (1902) and of *King Edward VII* (1925–27), on the second volume of which he was still working when he died, in London, March 3, 1926.

See A. F. Pollard, "Sir Sidney Lee and the D.N.B.," *Bulletin of the Institute of Historical Research,* vol. iv (1926–27); Charles Firth, "Sir Sidney Lee," *Proceedings of the British Academy,* vol. 15 (1929).

LEE, STEPHEN DILL (1833–1908), Confederate general in the American Civil War, was born at Charleston, S.C., on Sept. 22, 1833. He graduated from West Point in 1854 and served at frontier army posts until he resigned in Feb. 1861 to go with his state into the Confederacy. He was an aide-de-camp to Gen. P. G. T. Beauregard during the bombardment of Fort Sumter in April 1861 and later became a captain of artillery in Gen. Joseph E. Johnston's army in western Virginia. In 1862 he held artillery commands at the battles of Seven Pines, Savage's Station, Malvern Hill, Second Manassas and Antietam. In Nov. 1862, now a brigadier general, he assumed command of the artillery at Vicksburg. Immediately exchanged after the surrender of Vicksburg in July 1863, he commanded all Confederate cavalry in the southwest early in 1864, and briefly headed the department of Mississippi. In June, now a lieutenant general, he led a corps in the Army of Tennessee and fought in the battle of Atlanta. He moved north with Gen. John B. Hood's ill-fated army and finally surrendered with General Johnston in North Carolina in April 1865.

After the war he settled in Mississippi, engaged in planting, served a year in the state senate, and became the first president of Mississippi A. and M. college, serving from 1880 to 1899. He was commander in chief of the United Confederate Veterans when he died on May 28, 1908, at Vicksburg. (C. W. Te.)

LEE, TSUNG-DAO (1926–), Chinese theoretical physicist who, together with C. N. Yang (*q.v.*), received the Nobel prize in physics in 1957, was born in Shanghai on Nov. 25, 1926. He was educated at the National Chekiang university (Hankow) and the Southwest Associated (K'un-ming) university and received the Ph.D. degree at The University of Chicago in 1950. After serving briefly as research associate in astronomy there and in the physics department of the University of California, he was a member of the Institute for Advanced Study at Princeton, N.J. (1951–53); in 1953 he became professor of physics at Columbia university in New York city.

Lee and Yang were instrumental in the discovery of violations of the principle of parity conservation (the principle of space reflection symmetry), a principle previously considered generally valid. They demonstrated that for certain processes it had in fact not been established, and to test the principle pointed out specific experiments. The experiments, performed by C. N. Wu and others, proved the violation of the principle. The discovery rapidly led to substantial advances in the physics of elementary particles. Lee also made other major contributions to the fields of elementary particles, and to statistical mechanics, field theory, astrophysics and turbulence. (Jk. S.)

LEE, VERNON (pseudonym of Violet Paget) (1856–1935), English essayist and novelist whose interpretations of Italian art and letters did much to stimulate understanding of Italy, was born at Boulogne-sur-Mer, France, Oct. 14, 1856. Her parents were cosmopolitan intellectuals who finally settled in Florence. There she collected materials for *Studies in the Eighteenth Century in Italy* (1880), which brought to life for English readers the hitherto unexplored world of Metastasio and Goldoni. Her collections of essays, *Belcaro* (1881) and *Euphorion* (1884), reveal her scholarship, always enlivened by wit and imagination. After her first visit to England in 1881, she caricatured its aesthetic coteries in her novel, *Miss Brown*, 3 vol. (1884). She wrote more than 30 books, including a play, *Adriadne in Mantua* (1903), *Pope Jacynth and other Fantastic Tales* (1905) and *Vital Lies* (1912), which shows her an independent critic of social conditions. Her powerful allegorical drama, *Satan the Waster* (1920), reveals her ardent pacificism. She died at San Gervasio, Italy, Feb. 13, 1935.

See M. Baring, *Lost Lectures* (1932).

LEECH, JOHN (1817–1864), English caricaturist notable for his contributions to *Punch* magazine, was born in London on Aug. 29, 1817, the son of the Irish proprietor of the London Coffee House, Ludgate Hill. He was educated at Charterhouse where he met W. M. Thackeray, his lifelong friend. He then began to study medicine but soon drifted into the artistic profession and in 1835 published *Etchings and Sketchings by A. Pen, Esq.*, comic character studies from the London streets. His first big success was a parody on W. Mulready's postal envelope, on which appeared his device of a leech in a bottle. In 1840 Leech began contributing to magazines with a series of etchings in *Bentley's Miscellany;* he also collaborated with George Cruikshank, whose work his own resembled both in style and subject. Later, however, he excluded the horrific and satirical elements of the Gillray-Rowlandson tradition and developed a comfortable, warmly humorous middle-class urbanity, in which character is underlined by emphatic contrasts of stock types. These qualities emerge from the four etchings illustrating Dickens' *Christmas Carol* (1844), the *Comic History of England* (1847–48) and the woodcuts for the *Comic History of Rome* (1852). These were followed by numerous etchings and woodcuts of sporting scenes in R. S. Surtees' novels. His lithograph illustrations include *Portraits of Children of the Mobility* (1841), a parody illustrating the mingled pathos and humour of London street urchins; and a later, more accomplished series *Fly Leaves*.

Leech's first contribution to *Punch* appeared in the issue of Aug. 7, 1841, the beginning of a fruitful connection cut short only by his death in London on Oct. 29, 1864. At first mainly social themes occupied him, but later he began his political cartoons of the careers of Lord Brougham, Lord Palmerston, Disraeli and Lord John Russell, and of the Crimean War—notably the *General Février Turned Traitor* (1855). He lacked the sharp sting of Sir John Tenniel in this field, however, and afterward concentrated on social caricature, as in *Pictures of Life and Character from the Collection of Mr. Punch* (1862). He also contributed to *Punch* almanacs and pocketbooks, to *Once a Week* and to the *Illustrated London News*, as well as to numerous novels and miscellaneous volumes. Of these, *A Little Tour in Ireland* (1859) is noteworthy for his sensitive treatment of pure landscape.

See W. P. Frith, *John Leech, His Life and Work*, 2 vol. (1891); June Rose, *The Drawings of John Leech*, with bibliography (1950). (D. L. Fr.)

LEECH. Of the three classes of segmented worms (Annelida; *q.v.*), leeches or bloodsuckers, class Hirudinea, are the most specialized, chiefly because of their parasitic or predatory habits. They are slimy worms, from less than an inch to several inches long, having a terminal sucker at each end of a cylindrical or flattened body; in the tropics larger and more brightly coloured kinds occur. Leeches are primarily aquatic, and their dependence on moisture largely determines their distribution: most of them inhabit quiet fresh waters, but many are marine, and some are amphibious or terrestrial.

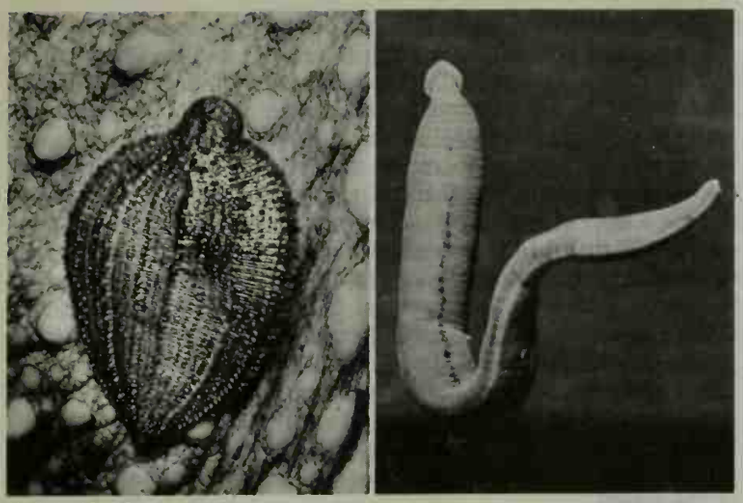
General Structure and Function.—A typical leech is broader in outline at the posterior end, where the larger sucker occurs; at the narrower, or anterior, end is a smaller sucker and the mouth. Unlike other annelids, leeches lack parapodia and setae (bristles). Some are admirably equipped for a parasitic life: the terminal suckers serve for attachment, feeding and locomotion, and the greatly expanded crop-stomach permits a considerable store of food. Most leeches possess a powerful musculature—they can readily extend and contract their bodies—which enables them to swim with strong, undulating motions, or to crawl along a solid surface like an inch worm by using the terminal suckers. Leeches are hermaphroditic, both sexes being present in a single animal. For detailed information on anatomy, physiology and classification of leeches *see* Annelida: *Hirudinea*.

Aquatic Leeches.—Marine species abound in all seas as external parasites of fishes, turtles and crustaceans. They are tenacious hangers-on, rarely leaving their hosts.

The majority of aquatic leeches are the gray-brown or olive suckers (though some have colourful markings) that are found in fresh-water lakes, ponds and muddy swimming holes throughout temperate areas to a height of 12,000 ft. (Lake Titicaca). These are chiefly free agents that attach themselves to hosts only long enough to fill the crop-stomach with blood (facultative parasitism). The medicinal leech, stock in trade of the medieval physician, is one of these types (see *Importance*, below).

Typical of the fresh-water leeches of the family Hirudidae are those belonging to the genus *Macrobdella*. They live in shallow, still waters attached to plants and to the undersides of stones and logs, often a little above the water line. These are the pests that are attracted to bathing beaches and floats by the disturbance of the water and by chemical sense. Since their bite is painless, they often attach themselves to a bather, fill with blood and drop off unnoticed. After being well-nourished by full meals taken in the spring, the leeches become sexually mature; since they are hermaphroditic, copulation leads to mutual impregnation. The fertilized eggs are deposited in a mass of thick foam secreted by an anterior band (clitellum). This foamy mass, forming a complete girdle about the leech, soon becomes stiff enough for the leech to slip out. The egg cocoon thus formed is an ellipsoidal capsule with firm, somewhat horny walls and an internal chamber containing the eggs in a nutritive albumen. The cocoon is either buried in the soil or placed under a stone or log at the water's edge. Other leeches (*Erpobdella*, etc.) deposit their eggs in blister-shaped capsules attached to plants, stones, etc.

Some related leeches such as *Philobdella* leave the water regu-



JOHN H. GERARD
AQUATIC LEECHES: (LEFT) PLACOBDELLA ON TURTLE; (RIGHT) HAEMOPIS GRANDIS IN WATER

larly to feed on earthworms and, in spring, to gorge on frogs' eggs. Another group (*Haemopis*), ill-adapted for bloodsucking, feed mainly on earthworms, insect larvae and other small animals and sometimes even on the organic ooze on the pond floor.

Proboscis leeches, which rarely swim but travel on solid surfaces with a looping motion, are mostly small, flat forms which are external facultative parasites on fresh-water salamanders, frogs and turtles. Many attack and feed on snails. They do copulate but accomplish insemination by attaching bundles of mature spermatozoa (spermatophores) to the backs of their mates, and receiving similar packets (hypodermic implantation). The active sperm eventually penetrate the body tissue and reach the egg sac. The fertilized eggs are then usually attached to the ventral surface of the parent and are carried about until they hatch, the young remaining near the parents until they are able to fare for themselves. The best known are the rather large, leaf-shaped *Placobdella picta* and *P. rugosa,* often found in large numbers clinging to the soft skin at the base of the legs of snapping turtles. These leeches often bear as many as 200 actively squirming young, which the parent protects by bending over the thin edges of its body. An African species has a permanent internal brood sac.

Another group of common fresh-water leeches, the worm leeches, Erpobdellidae, are active, long, slender types that occur in large numbers at the borders of ponds or creek pools. Only at night do they become active swimmers or crawlers in search of small worms, other leeches, insect larvae, etc. Having no jaws or "teeth," they cannot bite but will attach to freshly bleeding cuts and bruises and may gather on freshly killed and bleeding animals.

Land Leeches.—The predaceous land leeches, distinguished from the true land leeches, are most numerous in South America, where they feed largely on earthworms. The true sanguivorous land leeches—those completely unable to swim—*Haemadipsa* and related genera, are widely distributed in tropical Asia and the islands of the Pacific and Indian oceans. These bloodsuckers are among the most feared of all leeches: although they usually drop off the host after a feeding, they may enter the air passages, and sometimes even the sinuses, from which they cannot escape once they have fed and become distended with blood.

In the rain forests of India and Ceylon are found voracious land leeches, especially along trails and about cattle yards, on the ground, and in bushes and trees. These bloodthirsty types are easily aroused, and they congregate quickly to attack any passing man or beast. Prey is detected by a combination of odour, light, temperature and mechanical sensations, of which the first is probably the most important. The bites of all except the brightly coloured "stinging leeches" are painless; however, there are many cases recorded of persons injured or lost in the jungle lying helpless while myriads of leeches drained their blood.

Importance.—In human relations leeches are both useful and harmful. Early in the 19th century, when phlebotomy was most widely practised, many millions of the medicinal leech, *Hirudo medicinalis,* largely raised on leech farms, were used in Europe and America. Beneficently, the practice of bleeding with leeches has almost ceased, and only a few leeches find use in minor operations, and those mostly in the orient. Hirudin, an anticoagulant extracted from leech salivary glands, has been used to prevent blood clotting during surgical operations; in modern medicine, however, it has been supplanted by other anticoagulants. In the northern U.S. leeches are thought to be of considerable aid in the control of the snail population in lakes and ponds, thus indirectly lowering the incidence of swimmers' itch, a dermatitis caused by certain larval stages of some snails. Leeches are also excellent fish bait, especially for yellow perch and lake trout. The more colourful varieties of the medicinal leech had unusual patterns, many of which were copied into textile designs by early 19th century weavers.

As harmful agents, sanguivorous leeches affect both men and domestic and game animals. In many cases they are merely annoying and, to some persons, loathsome pests, and the slight trifid cuts they leave usually heal quickly. But in the old world tropics leeches are still a serious problem. The young of the horse leech, *Limnatis nilotica,* live in springs and wells and may enter the mouth or nostrils of any drinker, crawl into the air or food passages, grow rapidly and cause bleeding and obstruction, sometimes even the death of the host. In India the cattle leech, *Dinobdella ferox,* has similar habits and is responsible for the death of many domestic animals.

No leeches are poisonous nor are any definitely known to be intermediate hosts of human parasites, but their habits make them potential carriers of infective agents. There is evidence that the common buffalo leech, *Hirudinaria manillensis,* may transmit the rinderpest of cattle in the Philippines, and other leeches are known to be the hosts of parasites such as trypanosomes of fishes, salamanders and turtles. Species of *Theromyzon* attack both wild and domestic ducks and geese, and these and *Glossiphonia complanata* are commonly present in the air passages of wild ducks dying of botulism. The externally parasitic leeches mentioned earlier also cause heavy mortality among fishes.

Control.—Little has been done to control leeches. In areas infested with land leeches, fires and various repellants have been partially effective as deterrents. Land and fresh-water leeches are sensitive to common salt, lime and other water-absorbent substances; these compounds thrown into water around bathing beaches or floats will dispel them. Leeches inhabiting lakes controlled by dams may be killed by freezing: before the leeches have gone into winter quarters, and when a sudden drop of temperature is imminent, the water level may be rapidly lowered, leaving the bloodsuckers exposed to severe cold.

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LEEDS, THOMAS OSBORNE, 1ST DUKE OF (1632–1712), English statesman better known as the earl of Danby, who was prominent after the Restoration, was born on Feb. 20, 1632. He succeeded his father, Sir Edward, as 2nd baronet, on Sept. 9, 1647. Too young to take any part in the English Civil War, in which his father was prominent on the royalist side, he spent most of his youth and early manhood on the family estates at Kiveton and Thorpe Salvin, Yorkshire, and in spite of a short period of travel in France and Italy received little training for the active political life he was later going to pursue. He confirmed his political outlook and greatly improved his material prospects on May 1, 1653, by marrying Bridget, daughter of the royalist leader Montague Bertie, 2nd earl of Lindsey.

His actual introduction to politics, however, did not take place until the Restoration, and was mainly because of the influence of George Villiers, 2nd duke of Buckingham, to whom, like many other young Yorkshiremen, he attached himself. He was appointed successively deputy lieutenant, colonel of a foot regiment of militia and justice of the peace in the West Riding. In Nov.

1661 he became high sheriff of Yorkshire for the ensuing year and on Jan. 16, 1665, was returned to parliament at a by-election for York city. There he continued his support of Buckingham, taking a leading part in the attack on Lord Chancellor Clarendon, the duke of Ormonde and their associates, and sharing in the spoils when these statesmen were dismissed from office. On Nov. 5, 1668, he was appointed joint treasurer, and on Sept. 20, 1671, sole treasurer, of the navy; on May 3, 1672, he was admitted to the privy council; on Feb. 2, 1673, he was raised to the Scottish peerage as Viscount Osborne of Dunblane; and on June 19 of the same year he was created lord high treasurer of England.

Meanwhile his attitude toward Buckingham had been gradually changing. He had accepted Buckingham as leader of the younger generation against Clarendon and the elderly men who monopolized office after 1660; but he had no real objection to Clarendon's general policy and as Buckingham deviated further and further from that policy, supporting toleration of dissenters, alliance with France and war with the Dutch, he became increasingly doubtful of the value of any association with him. His appointment as treasurer encouraged him to develop a policy of his own, and his success in that office enabled him to do so with effect. He was not a great financier, but he had a clear head, invincible determination and a self-confidence which gained him an unusual degree of influence with the king. Within a few months of his elevation he had so far improved the financial position of the government as to be rewarded with the English titles of Baron Osborne of Kiveton and Viscount Latimer on Aug. 15, 1673, and with the further title of earl of Danby on June 27, 1674. On Feb. 12, 1674, he took Buckingham's place as lord lieutenant of the West Riding and shortly afterward friendly relations between them were broken off altogether.

Danby's policy, as it unfolded itself during the years 1675–78, was one of steady support for the Cavalier and Anglican interest at home and of uncompromising hostility to France abroad. In the domestic aspect of that policy he was on the whole successful, disapproving Catholicism and dissent alike and, in spite of the failure of his nonresisting test bill, maintaining the authority of the king and the stability of the existing regime. His success was marked by the award of the Garter on April 19, 1677; and he reached the seeming height of his power and favour with the marriage of his third daughter, Bridget, on Sept. 19, 1678, to one of the king's illegitimate children, Charles Fitzcharles, earl of Plymouth. But in foreign affairs, with which his acquaintance at best was superficial, he was less fortunate. Parliament's early confidence in the king had been shattered by the policy embodied in the secret treaty of Dover (1670), and it refused to grant the supplies necessary for a real breach with France until it was convinced that such a breach was seriously intended, while the king declined to renounce the subsidies he had for some time been drawing from France until he was confident of parliamentary support instead.

Danby's solution of the problem thus presented was to reassure parliament by engineering a marriage between Princess Mary, elder daughter of the duke of York, and William of Orange, the chief opponent of France on the continent, while at the same time conniving, though with the greatest reluctance, at the king's secret negotiations with France; but the almost inevitable result was his own downfall. During the excitement aroused by the discovery of the "popish plot," in 1678, the former English ambassador at Paris, Ralph Montagu (*see* MONTAGU, RALPH MONTAGU, 1st Duke of), told the house of commons that while raising money on the pretext of a coming war with France, Danby had also negotiated for a subsidy from France in the event of peace being declared; his plea that he had done so only by the king's command was brushed aside and he was immediately impeached. To save himself and protect the king, who was anxious to avoid inconvenient inquiries, he came to terms with the opposition leaders, promising a dissolution of the Cavalier parliament and a general election in return for the dropping of the prosecution; but the new parliament, when elected, proved even more bitter against him than its predecessor had been, and could not be induced to observe the agreement. He was committed to the Tower of London on April 16, 1679, to remain there untried until his release on Feb. 12, 1684.

For the last year of the reign of Charles II and the greater part of the reign of James II, Danby remained in retirement. James would willingly have restored him to office had Danby been prepared to support the repeal of the Test and Habeas Corpus acts, but this he declined to do and as the policy of the king advanced from one extreme to another his attitude to the government became more and more hostile. He took an active part in the conspiracy which led to the revolution in 1688, was one of the seven signatories of the famous invitation to William of Orange, raised the north of England in support of William after his landing, and in the convention of 1689 was instrumental in securing the throne jointly for William and Mary. On Feb. 14, 1689, he was appointed lord president of the council; on March 12 he was restored to his old post of lord lieutenant of the West Riding; on April 20 he was created marquess of Carmarthen; and by the spring of 1690 he had practically re-established himself as chief minister of the crown.

His second period of power, however, differed from his first in that he no longer had any important department of state under his own control and had to depend for the maintenance of his position almost entirely on the skill in party organization and parliamentary management that he had developed and employed with great success under Charles II. For four years he contrived to maintain an uneasy balance among the contending factions at William's court, endeavouring on the whole to enlist the moderate men of all parties in support of the revolution settlement. In recognition of his services he was given his final step in the peerage and created duke of Leeds on May 4, 1694. But he had many enemies on both sides and in the following year they were able to carry an impeachment against him for corruption in connection with the affairs of the East India company. No trial followed; but there was little doubt of the substantial justice of the charge and his influence thereafter greatly declined. In 1699, as a result of a reconstruction of the ministry, he was deprived of all his offices and although he recovered favour under Anne, and even entertained some hope of a real restoration to power after the Tory triumph of 1710, he never again filled any important post. He died at Easton Neston, Northamptonshire, on July 26, 1712.

Leeds was a clear and effective but not a prolific writer, and published little beyond some pamphlets in his own defense. He was, however, methodical in dealing with his correspondence and other papers, the bulk of which have survived and found their way by devious routes to the British museum. While in the hands of different owners, sections of these papers were examined by the royal commission on historical manuscripts and have been partially printed or calendared in its *Reports*—9th report, app. ii (Morrison mss.); 11th report, app. vii (Leeds mss.); 14th report, app. ix (Lindsey mss.); 15th report, app. ii (Hodgkin mss.); and the *Supplementary Report on the Lindsey Mss.* Toward the close of his life, when he was hoping for a restoration to high office, Leeds gathered together some of the most important of his pamphlets and other papers in *Memoirs Relating to the Impeachment of Thomas Earl of Danby (now Duke of Leeds) in the year 1678* (1710), and edited, with many errors and omissions, *Copies and Extracts of some Letters written to and from the Earl of Danby (now Duke of Leeds) in the years 1676, 1677 and 1678, with particular Remarks upon some of them* (1710). A more accurate and complete version of the latter publication is included in the second volume of Andrew Browning's *Thomas Osborne, Earl of Danby and Duke of Leeds 1632–1712* (3 vol., 1944–51), the first full account of the duke's life. (A. BG.)

LEEDS, a city, municipal and county borough in the West Riding of Yorkshire, Eng., 24 mi. S.W. of York by road. Pop. (1961) 510,597. Leeds lies almost at the centre of the West Riding on the river Aire. To the north and east the county is agricultural and on these sides lie the residential areas of Headingley, Alwoodley, Chapel Allerton and Roundhay. To the south and west is the industrial belt with rail routes linking the city with London, Scotland and the woolen and other industrial areas. Leeds is on the northern edge of the Yorkshire, Nottinghamshire and Derbyshire coal field.

Leeds is one of the chief centres of the clothing trade and industry. The city is an important regional centre in which many people are employed in insurance, banking, national and local government, and the distributive trades. It is also a university town and a major shopping centre for the West Riding. There are important markets, *e.g.*, Kirkgate, and also a stock exchange and corn exchange. There are few historic buildings in the city proper, and new housing estates both in the suburbs (*e.g.*, Seacroft) and in the city centre (*e.g.*, Quarry Hill flats) have replaced the former slums. The replanned City square retains the colossal equestrian bronze statue of the Black Prince (1901) by Sir Thomas Brock, and on the east side is Mill Hill chapel where Joseph Priestley, the chemist, was minister during 1767–72. Richard Oastler, the factory reformer, was born in Leeds in 1789. The town hall, containing the law courts and a large concert hall, was opened in 1858, and the civic hall offices in 1933. The city has a civic theatre, and triennial music festivals are held in the town hall.

J. ALLAN CASH

THE TOWN HALL, LEEDS, BUILT 1853–58

The parish church of St. Peter was rebuilt in 1839–41, and the present Roman Catholic cathedral of St. Anne was consecrated in 1904. In the City museum there are natural history and archaeological collections, and in the City Art gallery fine paintings and sculpture. The Central Public Library includes special libraries of commerce, science and technology, art, law and music, and an archives collection. St. Aidan's church (1894) has mosaics by Frank Brangwyn.

In 1889 the remains of the Cistercian abbey of Kirkstall (3 mi. N.W.) were presented to the town; the abbey was founded in 1152 by Henry de Lacy, and the gatehouse is now the Abbey House museum, a folk museum illustrating the life and work of the people of the region from the 17th century. Adel church (12th century) lies within the city boundary; in the city centre the church of St. John (1632–34) is a fine example of the Perpendicular style. In 1922 the corporation acquired the Tudor-Jacobean mansion and park (935 ac.) of Temple Newsam (4½ mi. S.E.), formerly (1155–1312) the property of the Knights Templars, and the birthplace (1545) of Lord Darnley. It contains collections of Leeds, Staffordshire and oriental pottery and porcelain. There are 195 parks (including Roundhay park, 616 ac.) and open spaces in Leeds. The county cricket ground is at Headingley and, to the southwest, just inside the ring road, is the Leeds United football ground. Leeds also has many golf courses including Moortown championship course.

Education.—The University of Leeds originated with the foundation of the medical school in 1831. Leeds General infirmary is a major teaching hospital in the north of England. In 1874 the Yorkshire College of Science was founded to teach subjects relating to the industries of the county. In 1884 the college and medical school amalgamated and in 1887 became one of the constituent colleges of the Victoria university. The University of Leeds was incorporated separately in 1904 since when it has expanded rapidly. There are now six faculties (arts, economic and social studies, law, science, technology and medicine). Other educational establishments include a technical college; colleges of art, commerce, housecraft, physical training; two teacher training colleges, Wesley theological college, and a boys' grammar school (founded in 1552). Other schools and evening institutes are administered by the corporation.

Communications and Industries.—In 1699 the Aire was made navigable to Leeds, and in 1760 linked with the Calder, forming the Aire and Calder canal. The Leeds and Liverpool canal, begun in 1770, was not completed until 1816. In 1812 John Blenkinsop's locomotive, drawing coal from Middleton to Leeds, inaugurated the era of steam locomotion, and by 1848 the railway system round Leeds was completed. An inland port was opened in 1958. The Leeds-Bradford airport at Yeadon is operated by the two city councils. In 1962 a 34-mi.-long motorway between Leeds and Sheffield was approved to connect the West Riding with the national motorway network.

Leeds lies in the "soft water" area of the Pennines and this influenced the introduction of the woolen industry by Flemish weavers in the 14th century. The industry was established in the Aire and Calder valleys, but it was not until the mid-16th century that Leeds was able to challenge the supremacy of York and Beverley. Even in the 17th century cloth was made in the neighbouring villages and was only finished and sold in the town. With the Industrial Revolution the woolen industry yielded pride of place to engineering, and in the 18th and 19th centuries the city was concerned mainly with industrial and agricultural equipment and distributive trades. In 1824 Joseph Aspdin of Leeds patented his invention of Portland cement. During the second half of the 19th century, engineering was in turn displaced by the wholesale clothing industry—derived from the woolen and worsted manufactures—which was introduced in 1855 and is now the largest single industry. In 1918 the Research Association for Woollen and Worsted Industries, now the Wool Industries Research association, was founded.

During the second half of the 18th century Leeds was famed for its pottery, but the industry declined and the potteries closed down in 1878. The linen trade, introduced in 1788, enjoyed a brief period of prosperity, but in the face of competition from the linen industry of Northern Ireland and from the cotton industry, only a few firms have survived. The leading industries, after wholesale clothing, are now engineering and electrical trades, paper and printing, textiles and metal goods. A new light industrial estate was set up in the 1960s on the Seacroft ring road.

History.—Leeds belonged to the kingdom and principality of Elmete and was ruled by British chieftains until Edwin conquered Northumbria in the 7th century. At the time of the Norman conquest the township consisted of seven estates, each held by a thane, but by 1086 these had been united into a single manorial estate. Leeds early became a local market centre but retained its rural character throughout the middle ages. In 1207 the lord of the manor, Maurice Paganel, granted a limited charter to the inhabitants, and in 1626 Charles I granted the first charter of incorporation and created the municipal borough to regulate and protect the woolen trade.

A new charter issued in 1661, appointing the first mayor, was superseded by a charter of 1684, which considerably reduced the independence of the borough. Restored by William III, the 1661 charter remained the basis of the municipal constitution until its reform under the Municipal Corporation act of 1835. The town became a county borough in 1889 and a city in 1893. The title of lord mayor was conferred on the chief magistrate in 1897. Leeds is a quarter sessions borough and has a separate commission of the peace. Apart from a period under the commonwealth, Leeds

had no separate parliamentary representation until 1832, when it returned two members. In 1918 the borough was divided into six parliamentary divisions, increased to seven in 1948 and reduced to six in 1955.

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LEEK (*Allium porrum*), a vigorous, hardy biennial related to the onion, belonging to the lily family (Liliaceae). In the first season of growth, leaves arise from a compressed stem or stem plate; the thick leaf bases overlap and are arranged concentrically in a nearly cylindrical bulb. The leaf blades are long, linear, solid and keeled. The base of the bulb is little if any larger than the neck. Profuse, fibrous, shallow roots grow in a tuft from the base of the stem plate. In the second season a tall solid stalk arises, bearing leaves and a large, globular, simple, terminal umbel with very numerous, regular, perfect flowers. The seeds are small, black, irregular and somewhat angular. The bulb, the thick, blanched, succulent cylinder of leaf bases, is used in the same way as green onions; the leaves may be used for flavouring.

J. E. DOWNWARD

LEEK (ALLIUM PORRUM)

The leek is native to lands of the eastern Mediterranean and near east where it was commonly cultivated and eaten in ancient times. It has been a common vegetable all over Europe and the British Isles for as long as there are records of food plants there. The Romans probably distributed it over much of Europe and introduced it to the British Isles. It is still commonly grown in all those lands but is little grown in America. The leek is the national badge of the Welsh who wear it in their hats on St. David's day.

In regions of mild winters leek seed can be sown during autumn or winter for spring harvest; in colder regions it is sown one to two months before the average date of the last spring frost. Seeds are sown shallowly in a rich, friable soil in rows about 15 in. apart for hand culture, and up to 30 in. apart for machine culture. Plants should stand two to three inches apart in the row. As the plants develop, soil is ridged up to them to blanch the leaf bases. High ridging in warm weather may induce decay.

The plants may be harvested either before or after autumn frosts and mild freezing, but must be protected from hard freezing. After removal from the soil they must be used rather promptly, just as green onions must be. They cannot be stored for long periods because of severe wilting and susceptibility to spoilage organisms. (V. R. B.)

LEE OF FAREHAM, ARTHUR HAMILTON LEE, 1ST VISCOUNT (1868–1947), British statesman and patron of the arts, who gave Chequers (subsequently the official country residence of British prime ministers) to the nation in 1921, was born at Bridport, Dorset, on Nov. 8, 1868, the son of the Rev. Melville Lee. He joined the army in 1888 and was in Canada from 1893 to 1898 as professor of military history, strategy and tactics at the Royal Military college. In 1900 he retired and was elected Conservative member of parliament for Fareham in Hampshire, which constituency he represented until 1918. He was civil lord of the admiralty, 1903–05, rejoined the army in World War I, acted as military secretary to Lloyd George, 1915–17, and was then director general of food production, 1917–18. He was created Baron Lee of Fareham in 1918. President of the board (1919–20) and minister of agriculture (1920–21), first lord of the admiralty (1921–22), he was made a viscount in 1922 for his work at the Washington conference on armaments. Lee was chairman of three royal commissions during the 1920s. He died at Avening, Gloucestershire, on July 21, 1947.

Lee gave his Buckinghamshire estate and house of Chequers to a trust, for the permanent use of British prime ministers, under an act which became effective in 1921. His work in equipping and furnishing Chequers strengthened Lee's interest in and knowledge of the fine arts, and with Samuel Courtauld he played a significant part in establishing in London the Courtauld Institute of Art, and the Warburg institute.

LEEUWARDEN, a city of northern Netherlands, capital of the province of Friesland, is located 157 km. (97 mi.) N.N.E. of Amsterdam. Pop. (1963) 85,386 (mun.). Several of the streets still have their historic canals. Among the most important old buildings are the Kanselarij (1571), originally the seat of the Court of Friesland (government and law court); the former weigh house (1598); the town hall (1724); and the Oldehove (1532), an unfinished tower which leans slightly. The Frisian museum is the most extensive provincial museum in the Netherlands. Other museums are the Princessehof, with oriental exhibits; and the Pier Pander museum, featuring the work of that sculptor. Leeuwarden is an important railway and road junction and the economic as well as the administrative centre of Friesland. Its manufactures include milk products, largely for export; cereals; tin, wood and paper packings. Engineering is also carried on. Its cattle market is important. The court of common appeals and the superior court of the three northern provinces (Friesland, Groningen and Drenthe) are located in the town. Leeuwarden was once the headquarters of the Frisian stadholders, ancestors of the present Dutch royal family. During the 16th–18th centuries it was renowned for its gold- and silverwork. (W. H. K.)

LEEUWENHOEK (LEUWENHOEK), **ANTON VAN** (1632–1723), Dutch microscopist, was born at Delft on Oct. 24, 1632, and died there on Aug. 26, 1723. For a time he was in a merchant's office in Amsterdam, but soon turned to the manufacture of microscopes and to the study of the minute structure of organized bodies by their aid.

Leeuwenhoek found that single lenses of very short focus were preferable to the compound microscopes then in use, and though his researches were not conducted on any definite scientific plan, his powers of careful observation enabled him to make many interesting discoveries. He extended M. Malpighi's demonstration of the blood capillaries in 1668, and six years later gave the first accurate description of the red blood corpuscles.

In 1677 he described and illustrated the spermatozoa in dogs and other animals, though in this discovery Stephen Hamm had anticipated him by a few months; and he investigated the structures of the teeth, crystalline lens, muscle, etc. In 1680 he noticed that yeast consists of minute globular particles, and he described the different structure of the stem in monocotyledonous and dicotyledonous plants. His discoveries were for the most part made public in the *Philosophical Transactions* of the Royal society, of which he was elected a fellow in 1680. The first representation of bacteria is to be found in a drawing by Leeuwenhoek in that publication in 1683.

His researches on the life histories of various low forms of animal life were in opposition to the doctrine that they could be produced spontaneously, or bred from corruption. Thus he showed that the weevils of granaries, in his time commonly supposed to be bred from wheat as well as in it, are really grubs hatched from eggs deposited by winged insects. His chapter on the flea, in which he not only described its structure but traced out the whole history of its metamorphoses, beginning with its first emergence from the egg, is of great interest, not so much for the exactness of his observations as for the incidental revelation of the extraordinary ignorance then prevalent in regard to the origin and propagation of "this minute and despised creature." Some asserted that the flea was produced from sand, others from dust, etc., but Leeuwenhoek showed it to be "endowed with as great perfection in its kind as any large animal," and proved that it bred in the regular way of winged insects.

Leeuwenhoek also carefully studied the history of the ant and was the first to show that what had been commonly reputed to be ant's eggs were really their pupae, containing the perfect insect nearly ready for emersion, and that the true eggs were much smaller and gave origin to maggots or larvae. He argued that the sea mussel and other shellfish were not generated out of sand found at the seashore or mud in the beds of rivers at low water, but from spawn, by the regular course of generation. He maintained the same to be true of the fresh-water mussel, whose ova he examined so carefully that he saw the rotation of the embryo, a phenomenon supposed to have been first discovered long afterward. In the same spirit he investigated the generation of eels, which were at that time supposed to be produced from dew without the ordinary process of generation.

"We can now easily conceive," Leeuwenhoek remarked in connection with his observations on Rotifera, "that in all rain water which is collected from gutters in cisterns, and in all waters exposed to the air, animalcules may be found; for they may be carried thither by the particles of dust blown about by the winds."

Leeuwenhoek's contributions to the *Philosophical Transactions* amounted to 375, and those to the *Memoirs of the Paris Academy of Sciences* to 27. Two collections of his works appeared during his life, one in Dutch (1685–1718), and the other in Latin (1715–22); a selection was translated by S. Hoole (1798).

See C. Dobell, *Antony van Leeuwenhoek and His Little Animals* (1932); B. Cohen, "On Leeuwenhoek's Method of Seeing Bacteria," *J. Bact.*, 34:343 (1937) and *The Leeuwenhoek Letters* (1937).

LEEWARD ISLANDS, a group in the West Indies, the most northerly of the Lesser Antilles. They include the Virgin Islands of the United States; the British Virgin Islands; the British colonies of St. Kitts (St. Christopher)-Nevis-Anguilla, Antigua-Barbuda-Redonda, Montserrat and Dominica; the French *département* of Guadeloupe with its dependencies of Marie-Galante, Les Saintes, Désirade, St. Barthélemy and the northern part of St. Martin; and the Netherlands Antilles territories of St. Eustatius (Statia), Saba and the southern part of St. Martin.

Leeward Islands is also the alternative name for: (1) the Îles sous le Vent in the French Pacific islands; and (2) the Lava Rock Islets, the 1,250-mi.-long western chain of the Hawaiian islands, which includes the Midway Islands. (Rd. T.)

LE FANU, JOSEPH SHERIDAN (1814–1873), Irish novelist, best known for his ghost stories, belonged to an old Dublin Huguenot family, and was related on his mother's side to Richard Brinsley Sheridan. He was born in Dublin on Aug. 28, 1814, and educated at Trinity college, Dublin. Called to the bar in 1839, he soon abandoned the law for journalism. *The Purcell Papers,* written while he was a student, show his mastery of the supernatural and were collected in three volumes in 1880. Between 1845 and 1873 he published 14 novels, of which *Uncle Silas* (1864) and *The House by the Churchyard* (1863) are the best known. He contributed numerous short stories, mostly of ghosts and the supernatural, to the *Dublin University Magazine,* which he owned and edited from 1861 to 1869. Collections of his short stories appeared in 1851, 1871 and 1872. *In a Glass Darkly* (1872), a book of five long stories, is generally regarded as his best work, and has been reprinted several times. Le Fanu also owned the *Dublin Evening Mail* and other newspapers. Two of his longer poems were set to music by Sir Charles Stanford. After his wife's death in 1858 he became a recluse, and died in Dublin on Feb. 7, 1873.

M. R. James (1862–1936) held Le Fanu to be the greatest exponent of the ghost story. Few will dissent from this opinion unless to substitute the name of James himself. A selection of Le Fanu's shorter tales was edited by James in 1923 under the title *Madam Crowl's Ghost.* (M. J. Cg.)

LEFEBVRE, FRANÇOIS JOSEPH, Duc de Dantzick (1755–1820), French general who helped Napoleon in his rise to power and became one of his marshals, was born at Rouffach in Alsace on Oct. 25, 1755. A miller's son, he had enough education to be a clerk, but entered the French guards in Paris in 1773 and was a sergeant by 1788. Under the first republic he was soon made a colonel. When Lazare Hoche was with the army of the Moselle, he helped Lefebvre to become a general (Dec. 1793).

For the next three years Lefebvre's division was the vanguard of J. B. Jourdan's army of the Rhine: at the battle of Fleurus (June 1794) it decided victory by repulsing the archduke Charles's Austrians; near Duisburg it led the first passage of the Rhine, on a moonlight night in Sept. 1795; and its general was proud of taking 12 guns at Altenkirchen not far from Bonn in spring 1796 in one of many advances on the far side of the Rhine. In 1798, after Hoche's death, Lefebvre had temporary command of the army of the Sambre and Meuse. He was recovering from a wound in 1799 when J. Bernadotte gave him the command in Paris. His support was indispensable for the *coup d'état* of Brumaire (Nov. 1799), where he subdued the chamber of the council of 500.

Senator in 1800, marshal in 1804, Lefebvre carried the sword of Charlemagne at Napoleon's imperial coronation. He with his German accent and his illiterate wife, née Catherine Hubscher and nicknamed Madame Sans-Gêne for her uninhibited behaviour, made themselves fine figures at court, but he wanted active service. In the Prussian campaign of 1807 his rough methods gave some unity to a corps of Poles and Germans in the siege of Danzig (Gdansk) from March to May; and on May 28, 1807, he was created duc de Dantzick. In 1808 he took a stronger corps to Spain, where he won the battle of Durango in October but was glad to be recalled. In 1809 he led the Bavarians against Andreas Hofer. The Russian campaign of 1812 left him exhausted, and he lost his only surviving son. In 1814 he marched patriotically with the Old Guard and Napoleon; but in April he voted in the senate for Napoleon's deposition. He died in Paris on Sept. 14, 1820.

(I. D. E.)

LEFÈVRE D'ÉTAPLES, JACQUES (Jakob or Jacobus Faber, Faber Stapulensis) (*c.* 1455–1536), French classical and biblical scholar who stimulated the great increase in biblical studies which accompanied the Reformation. Little is known of his early life save that he was born at Étaples in Picardy, possibly in 1453. He was ordained a priest and after receiving his M.A. taught in Paris. He visited Italy in 1492 and 1500 and during this period devoted himself to Italian humanist studies, especially in the Greek classics and in Neoplatonist mysticism. On returning to Paris he influenced those concerned for reform in the church, including G. Budé, F. Vatable and G. Farel. From 1507 he worked in the abbey of St. Germain-des-Prés, where his former pupil Guillaume Briçonnet (*q.v.*) was abbot. Briçonnet, on becoming bishop of Meaux some years later, began reforms in his diocese and made Lefèvre his vicar-general in 1523. In 1525 when the "men of Meaux" were suspected of Protestantism, Lefèvre moved to Strasbourg; thence he returned to Blois protected by Francis I. In 1531 he fled to Nérac, where he was supported by Marguerite of Navarre, and died there in 1536.

Lefèvre's chief interests as a scholar show his effort to divorce religious studies from the older scholasticism. Between 1492 and 1506 he wrote students' manuals on physics and mathematics and published new translations or paraphrases of Aristotle's works on ethics, metaphysics and politics with annotations. He seems to have had a religious crisis in 1505 and, influenced by the ideals of the Brethren of the Common Life (*q.v.*), turned to mysticism again. He published a volume of contemplations by Raimon Lull that year and later published mystical works by Jan van Ruysbroeck and Nicholas of Cusa. Lefèvre's most effective scholarship, however, lay in biblical studies. In 1509 he issued his *Psalterium quincuplex* (five Latin versions of the psalter, though his knowledge of Hebrew was imperfect) with a commentary emphasizing the Christocentric interpretation of the psalter. In 1521 his book rejecting the view of the three Marys of the Gospels as being one person was condemned by the Sorbonne. He wrote Latin commentaries on the Pauline Epistles (1512), the Gospels (1523) and the Catholic Epistles (1527) and translated the whole Bible into French from the Vulgate occasionally corrected by reference to the Hebrew and Greek (1530). Though his judgment could falter—he accepted the authenticity of the writings attributed to Dionysius the Areopagite and led Erasmus to differ from him on certain points of biblical interpretation—yet Lefèvre had consider-

able influence on younger scholars who improved on his methods.
See J. Barnaud, *Lefèvre d'Étaples* (1936). (B. H.)

LEFT-HANDEDNESS: *see* HANDEDNESS.

LEG, the general name for those limbs in animals that support and move the body; in man, the lower limbs. Specifically, the lower limb of man is subdivided into the thigh, from the pelvis to the knee; the leg, from the knee to the ankle; and the foot. *See* MUSCLE AND MUSCULAR SYSTEM; SKELETON, VERTEBRATE.

LEGA (BALEGA, WAREGA), a Bantu people, inhabit the rainforest and savanna highlands of the east-central part of the Republic of the Congo. They numbered well over 250,000 in the 1960s and formed the bulk of the population in the Mwenga, Shabunda and Pangi districts; some groups were dispersed in neighbouring districts. The Babembe of Fizi district are historically and culturally closely linked to them. The Lega practise shifting hoe cultivation, the staple crops being bananas, peanuts, manioc, maize (corn) and rice. They live in small compact settlements, which they may leave for long hunting parties; hunting and trapping are important economically and in socioreligious life. There is also much food gathering and fishing. The Lega have patrilineal descent and virilocal residence; complementary filiation with mother's, mother's mother's and father's mother's lineages are significant; marriage payments (shell money, strings of pearls, goats) are high; a limited polygyny and widow inheritance are common. Social organization is based on segmentary, related lineages forming autonomous political groups. The closed association of *bwame,* theoretically accessible to all males and their wives, is based on a hierarchical succession of complex initiations. Ancestral, skull, twin and spirit cults are general. The Lega have a rich literature and are famous ivory and wood carvers.

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LEGACY, in law, refers generally to a gift of property by will or testament. In the strict terminology of the older Anglo-American law, a disposition pertaining to real estate was called a devise, and the instrument containing such a provision was called a will; the beneficiary of the provision was called the devisee. A provision relating to personal property was called a bequest or, especially if it was of a sum of money, a legacy; the beneficiary in this case was called the legatee, and the instrument containing a bequest or legacy was called a testament. Since the latter part of the 19th century, these distinctions have lost much of their legal significance, so that legacy and devise are now used interchangeably to mean a disposition of property contained in an instrument in which a person, the testator, disposes of his property in the event of death.

A legacy of an identified object, such as an asset referred to as "the piece of land known as 1452 East 50th street" or "my 1959 Rolls-Royce car, motor number 15 012 781," is called a specific legacy. If at the time of the testator's death this object is no longer owned by him, the legacy can, as a general rule, not be satisfied and is said to be adeemed. A general legacy, on the other hand, is one of a sum of money or of a number of objects identified generically, such as the legacy of "100 shares of common stock of General Motors." Even if no such stock is found in the estate at the death of the testator, the executor can buy it in the market with funds of the estate and then hand the stock to the legatee. If the total value of the estate is insufficient to satisfy all legacies, the specific legacies are to be satisfied so far as they are not adeemed, while the general legatees may lose out (*i.e.,* their legacies may abate), but so that certain general legacies, for instance those made to support a needy relative, are to be paid in priority over others. If a testator has failed to express himself clearly, it may be difficult to determine whether a legacy is specific or general.

A legacy is called residuary if the beneficiary is to receive only what is left of the estate after the satisfaction of all specific and general legacies.

In the terminology of the civil law the terms legacy and legatee have a meaning somewhat different from that in Anglo-American law. In Roman law, upon the death of a person the totality of his legal rights and duties passed to a universal successor, the heir. If there was no valid testament—the term simply meant disposition of property in case of death without distinction between real or personal property—the heir was determined by the rules of intestate succession. But an heir could also be instituted by testament, and in his testament the testator could charge his heir with legacies; *i.e.,* duties to a third party, called a legatee, to whom he had to pay certain sums of money or give certain assets of the estate.

This terminology is still used in the law of Germany and of those countries with a similar system, such as Switzerland or Japan. But in the French civil code and those that follow its pattern, the term heir (*héritier*) is limited to the universal intestate successor. A person to whom a testator leaves his entire estate is called *légataire universel;* if the estate is to be shared by several beneficiaries, they are called *légataires à titre universel.* A person to whom there is to be paid a fixed sum of money or to be handed a particular asset is called *légataire particulier. See* also WILL; ESTATES, ADMINISTRATION OF. (M. RN.)

LEGAL AID, the professional legal assistance given, either free or for a nominal sum, to indigent persons in need of such help. In criminal cases most countries, and especially those in which a person accused of a crime enjoys a presumption of innocence, provide the services of a lawyer for those who have insufficient means of their own. In some countries, and especially in the United States, defender offices with salaried personnel, either publicly or privately supported, have been found to be the most economical solution. In other countries where there is no shortage of lawyers skilled in criminal law and trial practice, private lawyers undertake this duty, being assigned by the court or preferably being chosen by the accused person himself. In many countries these private lawyers receive no remuneration or only a nominal fee paid either by the state or from charitable funds. In an increasing number of countries the provision by the state of a fund sufficient to pay an adequate fee and to cover all allied expenses is considered to be necessary to ensure that the legally aided person receives proper service. Traditionally, in many countries, as one of the public-service responsibilities attached to the practice of law, lawyers also undertake to give legal aid in civil cases. Although lawyers are generally willing to assume this responsibility, it is not possible for them to meet the need completely or effectively in the larger communities; the number of cases is too large and the cost of maintaining a city law office too great. Moreover, a lawyer who can afford to give his own services free cannot be expected to incur the additional expenses necessary for a full investigation of the case.

Great Britain.—In Great Britain the government has entrusted the Law societies of England and Scotland (which are the governing bodies of solicitors) with the responsibility of administering legal aid and advice programs under the provisions of the Legal Aid and Advice act, 1949, and the Legal Aid and Solicitors' (Scotland) act, 1949. Under those plans, persons of small or moderate means are entitled to receive oral legal advice, legal assistance in connection with disputes before proceedings are started and legal aid in connection with proceedings in court. In each case the assisted person chooses his solicitor and, where there are proceedings, his barrister from a list of those who have volunteered to undertake this work. A majority of the lawyers in the country have done so.

Legal advice under these acts is available to persons whose income and capital are below prescribed limits, either free or for 2*s.* 6*d.* Application is made to a solicitor who is a member of the panel; the latter will apply a simple means test and, if that is satisfied, will give oral advice after an interview not exceeding 90 minutes. The solicitor will then claim a fee of £1 for each 30 minutes from the Law society.

Those seeking legal assistance on a free or part-fee basis must satisfy a local or area committee of the Law society, normally consisting of four practising solicitors and one practising barrister, that they have reasonable grounds for taking, defending or being

party to proceedings or for asserting or disputing a claim prior to proceedings and that it is reasonable in all the circumstances of the case that they should receive legal aid. They must also satisfy a local office of the National Assistance board that their income and capital are within limits laid down by parliament.

Once legal aid is granted, solicitor and counsel conduct the case in the same way as if they were acting for a client who himself paid their fees. The fees paid to solicitors and counsel in civil aid cases are assessed on the basis of 85% of what a taxing master would allow in a case outside the plan. The program as a whole is subsidized by the government.

United States.—In the United States there is a comprehensive network of autonomous legal aid societies, in large part organized and financed through voluntary effort, which provide legal advice without cost or for a nominal fee and, if necessary, representation in negotiation and litigation to persons who do not have the means to pay lawyer's fees. Most are charitable corporations, sponsored by bar associations, governed by community representative boards of directors and supported by contributed funds. A few are tax-supported bureaus. Service to clients is rendered generally by salaried staff lawyers and sometimes by volunteer lawyers in private practice. Organized service in the criminal courts is provided largely by defender offices, most of which are tax supported and are called public defenders. These offices provide salaried lawyers to represent indigent defendants in the courts which they serve. Volunteer service committees of local bar associations operate in the smaller communities not served by legal aid and defender offices.

The legal aid movement in the United States began in 1876 when a group of citizens of German origin in New York city formed an office intended chiefly to assist German immigrants in the protection of their legal rights. By the time this organization had broadened the scope of its activities to serve all members of the community unable to pay lawyers' fees, a similar service had been organized in Chicago which undertook to give legal assistance to all persons without means regardless of nationality, race or sex. By 1916 there were 41 legal aid organizations providing service in 37 cities, 5 of them offering help in criminal cases.

A nationwide study of legal aid made in connection with a survey of the legal profession under the sponsorship of the American Bar association revealed that by 1949 there were 90 legal aid offices operating in 83 cities and 34 defender offices. The study also disclosed the extent of the need for more such facilities, and the American Bar association and the various state and local bar associations accepted increasing responsibility for providing the movement with leadership and initiative. As a result, by the mid-1960s there were more than 230 legal aid offices in the country, about 115 defender offices and over 125 volunteer service committees of bar associations.

The national body which co-ordinates and guides the existing service and spearheads its extension is the National Legal Aid and Defender association, the direct successor of two preceding national organizations, the first of which was formed in 1911. Incorporated in 1949, the purpose of this central body was stated in its certificate of incorporation thus: "To encourage the formation of new legal aid organizations wherever they may be needed, whose purpose shall be to render legal aid without charge, if necessary, to all who may appear to be entitled thereto, and who are unable to procure such assistance elsewhere, and to promote measures for their protection, to provide a central body with defined duties and powers for the guidance of legal aid work, and to co-operate with the judiciary, the bar and all organizations interested in the administration of justice." The basic membership of the association consists of autonomous local legal aid and defender organizations but also includes bar organizations as associate members and interested individual lawyers as professional members. It conducts an annual legal aid conference and publishes a bimonthly periodical, a directory of legal aid facilities and an annual volume of committee reports and proceedings. On the equally important front of developing new facilities where needed, it serves as the vehicle by which the legal profession and the social welfare agencies of the country may pool their efforts effectively to improve the administration of justice for persons of little means.

Other Countries.—The movements in Canada, India and Pakistan have tended to follow a pattern similar to that in the United States. In the Philippines, legal aid facilities have been organized by the Women Lawyers' association. South American countries have generally made statutory provision for legal aid, and this appears to be the pattern in Europe. In France, legal aid is provided in court cases under the administration of a local Bureau de l'Assistance Judiciaire by advocates who are assigned to the court by their bar "order" and who serve without remuneration. It is estimated that approximately one-fourth of all judgments by courts of appeal in that country are rendered with the benefit of such aid.

The problem of providing legal aid has received increasing international recognition. In 1958 the International Bar association sponsored the organization of the International Legal Aid association, the purpose of which is to: (1) compile and maintain a directory of all legal aid agencies in each country; (2) collect and distribute information concerning both the services provided by such organizations and laws and other provisions regulating legal aid in the various nations; (3) develop facilities for the referral of cases on a basis of reciprocal service among the co-operating agencies; and (4) encourage the establishment of legal aid services in all countries where they may be needed, and to co-operate with bar associations, the judiciary, social welfare agencies and other international organizations interested in extending and improving legal aid and defender services.

The need for such an international facility was recognized by the League of Nations in 1924 and more recently by the International Red Cross and other international social welfare agencies, especially those concerned with migration. In addition to fostering knowledge and understanding about a professional service that is essential to the administration of justice in a free country, the program of the International Legal Aid association promotes international good will and co-operation. For newer countries emerging from colonialism, such a centre for channeling the experience of countries that have effective legal aid systems is especially helpful.

See also LEGAL PROFESSION.

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(E. A. BL.)

LEGAL EDUCATION. Education for the profession of law is the subject of this article.

UNITED STATES

At the time of the American Revolution legal education was of the apprenticeship type in the offices of practitioners. Some practitioners' offices became schools, the most famous of which was that of Judge Tapping Reeve, established in Litchfield, Conn., about 1784.

Legal education in the universities developed slowly. The first professorship of law was founded at the College of William and Mary in 1779. In a few other colleges lectures on law were soon given. The most influential were those of James Kent, professor in Columbia college, which, like Sir William Blackstone's in England, were published (*Commentaries on American Law,* 4 vol., 1826–30). The Harvard law school, the oldest existing law school was established in 1817, and several other universities soon established schools. The method of instruction, which remained dominant until the late 1800s, was a combination of lectures, textbooks and quizzes, with the textbooks often growing out of the lectures, as in the case of the notable series by Justice Joseph Story (*q.v.*).

In 1870 the case system was initiated at Harvard by C. C. Langdell. Its principal characteristic is the study of reported court cases instead of the use of texts or lectures. An accompany-

ing characteristic, developed by Langdell's colleague, J. B. Ames, is active class discussion which begins with a close analysis of a specific case and ranges widely over supposed cases suggested by students or teacher. The emphasis is more on the development of the students' intellectual powers than on conveying information. By World War I the case system was in use in the principal law schools.

In the 1920s several factors combined to bring into question the adequacy of the case method and to cause it to be varied and supplemented. One was the expansion of legislation and administrative law, with the development of new fields of great importance, such as taxation. Another factor was the growth of the social sciences and the desire to make use of their findings in law. Still another was the increasing interest in jurisprudence. The last factor was accompanied by new theories of law and evaluations of legal institutions, particularly sociological jurisprudence with its functional approach, connected with the name of Roscoe Pound, and somewhat later "legal realism."

The result was that in the 1920s and 1930s enriched curriculums were developed, with the courses stimulated by questions from philosophy and social science and with subjects reorganized to achieve greater coherence. The casebooks were no longer collections of cases alone but also contained text and nonlegal materials.

At the same time there were changes in teaching methods. Emphasis was laid on the affirmative handling of cases and problems as well as on the analytical and critical consideration of them, and increased attention was given to professional skills, such as counseling, drafting and advocacy. At times a problem method was employed that called for the consideration of new problems and their solution. Though the prevailing system of instruction continued to be the case method in large classes, undergraduate seminars and individual student research came into use and moot courts were found everywhere. The most distinctive form of independent student work is with the law review. In the U.S. most of the learned journals in law are published by the law schools, and the editors are drawn from the student bodies.

Before World War II most schools accepted all applicants who had the required amount of college work. A few schools developed a system of selective admission based on the applicant's college record and his score on a law-aptitude test. After the war numerous schools joined in developing and using an improved aptitude test, and selective admission was widely extended. The result has been a sharp change in the proportion of student failures in the entering class, which dropped from 33% or more down to 5% or less.

Two unofficial bodies have influenced law-school developments. The Association of American Law Schools, organized in 1900, prescribes standards for membership, and its annual meetings facilitate the exchange of ideas on legal education. Its yearbook reflects, in committee reports, changing stresses and methods, and its quarterly *Journal of Legal Education* is the best source of discussion in its field. The American Bar association, through its section on legal education and admission to the bar, maintains a list of schools bearing its approval. The standards of the two associations have steadily risen. In 1963 the standards included the requirement of three years of college work for admission and three years of full-time law-school work or its equivalent in part-time work for the first degree in law; or two years in college and four years in law school. Neither the law schools nor the associations prescribe the content of prelegal work, though the schools usually recommend college courses directed to the development of intellectual powers and understanding rather than to the giving of information. In 1963 the total enrollment, as reported to the American Bar association by all but a few minor schools, was about 54,000 students as contrasted with the post World War II low of 37,000 in 1953. In 1963 there were 134 schools on the approved list of the association as well as some unapproved schools in a few states.

Graduate instruction, leading to the master's degree or to the doctorate in law, is available after the first degree in law. Such study is undertaken by those who wish to specialize in selected fields and, more particularly, by those who desire to pursue law teaching or scholarly work in law. The increasing complexity of the law, the rise of new subjects and the rapid changes effected by the legislatures and the administrative commissions created a need for continuing legal education for practitioners. As a result, a new type of graduate training arose, intended for practising lawyers. The programs offer concentrated work for a short time. This work is principally under the direction of the bar associations, though law schools participate in it.

In most states study in law school is the only training in law necessary to stand the bar examination and to be admitted to practice, and no apprenticeship is required. A few states, notably Pennsylvania, have required a brief period of clerkship in a law office. Even though not required, an informal apprenticeship or association of beginning lawyers with older lawyers is common. In some schools there have been efforts, through legal clinics and in other ways, to bridge the gap between law school and practice. (*See* LEGAL AID: *United States.*) Study in a law office as the method of preparation for admission to the bar has almost disappeared. There is, however, a system of part-time study in law school, offered in the afternoon or evening for those who must earn their living while studying. The period of law study for part-time students called for by the two associations mentioned is four years, instead of three years for the full-time student.

U.S. law teachers have long contributed to legal writing and consequently to the systematization of the law. After World War I there was increasing recognition of research as a major function of law faculties. The fields of research have been extended beyond court decisions and statutes to include the operations of courts and governmental agencies, the social factors on which law rests and the evaluation of the rules and institutions of law. For the most part research is carried on by faculty members individually. In some law schools, research institutes foster the work.

A major characteristic of legal education in the U.S. is its spirit of inquiry and initiative, with consequent variety and experimentation in objectives and methods. These qualities are possible because the universities have a great measure of freedom in legal education. They are controlled neither by the organized profession nor by the government. The states exercise some indirect control through the state examination and other requirements for admission to the bar. Unlike the medical schools, the law schools make little use of practitioners as instructors and most of their teachers are full-time faculty members.

Another characteristic is the isolation of the law school from the other schools of the university. The liberal arts college developed its distinctive form before the law school appeared as part of the university, and law-school work followed the completion of the student's work in college. When the social sciences developed, they were not welcomed into the law school because of the professional, rather than academic, background of study in the common law. This was true even of political science and economics, which are close to much of the lawyer's work. These subjects found their place outside the law faculty, and not within it as in many countries. The separation is being lessened. In a few universities professors of the humanities or of the social sciences are on the law faculty. In others, members from the law and other faculties join together in seminars or in research to treat problems of common concern. Courses on the methods and processes of the law are beginning to be offered in the undergraduate college by members of the faculty of law or of political science.

After the interruption caused by World War II, two distinct but complementary movements received increasing stress. One placed emphasis on the skills of the lawyer, with more precise identification of the various skills and improved methods of developing them. The other was based on a broadened conception of the function and opportunities of the lawyer, and on a clearer recognition of the importance of his professional and social responsibility. The second movement, correspondingly, sought to broaden the law curriculum. The movements were not new, but they gained strength from the larger role of government, the opportunities of lawyers in the public service, and the magnitude and urgency of postwar problems. International legal studies were given increased attention, such as the law of nations and of inter-

national organizations and the laws governing economic relations. These studies also include foreign and comparative law, such as the civil law and the laws of Asian, African and Communist countries. A complementary comparative-law curriculum has appeared which is designed for lawyers from other countries who seek an understanding of the basic elements of the legal system of the U.S. These changes, while adding breadth and perspective, have not impaired the precision and accuracy traditional in a lawyer's training and work. U.S. legal education remains predominantly professional in outlook and content. (E. E. C.)

ENGLAND

In England, legal education falls under four main heads: (1) education for a university degree; (2) education for the barristers' and solicitors' examinations; (3) education in professional skills; and (4) subsidiary legal education. After a brief historical survey, each of these heads will be considered in turn.

History.—In the reign of Stephen (1135–54) the universities began to teach canon and civil law and to confer degrees of bachelor and doctor in these subjects. Vacarius, who began to teach at Oxford in about 1145, seems to have been the first teacher of civil law. In 1540 Henry VIII founded regius professorships of civil law at Oxford and Cambridge, but still no English law was taught there. When toward the end of the 16th century Doctors' Commons (*q.v.*) was set up in London for those doctors of law who practised in the ecclesiastical and admiralty courts, the study of any kind of law at the universities languished.

Education in English law was thus left for the inns of court and chancery (*q.v.*), as befitted the strongly procedural content of the subject. The process of education was basically a communal form of apprenticeship for seven years on a residential and collegiate basis. Students learned their law by attendance in court and at readings and moots conducted in the halls of the inns. The system reached its zenith in the reign of Henry VIII, and thereafter declined, mainly because of the appearance of printed lawbooks and because of the increasing reluctance of practitioners to devote the required time to preparing readings and of students to attend them. By the end of the 17th century there was little or no organized teaching of law, and not until toward the end of the 18th century did the modern system of a student becoming "pupil" to a particular barrister for a year or so become general. Apart from sporadic efforts by individual inns of courts for some years before and after the end of the 18th century, there was no organized teaching for the bar until in 1852 the four inns of court joined in forming the Council of Legal Education, which then started the present system of lectures; and at last in 1872 examinations (which for 20 years had merely been an alternative to attending lectures) were made compulsory for call to the bar.

Meanwhile, the apprenticeship system had become well established for attorneys and solicitors. Mere *de facto* service as a clerk for periods of five years or more ceased to suffice when a statute of 1729 required service for five years under articles of clerkship. The Law society (founded in 1825) instituted lectures in 1833 and compulsory examinations in 1836. The universities, too, had begun to teach English law. Oxford led the way with William Blackstone's lectures in 1753 and his inauguration as first Vinerian professor in 1758; and Cambridge followed with the Downing professorship in 1800. Examinations for degrees in law were instituted at Oxford in 1852 and at Cambridge in 1858.

University Education.—Under modern conditions most English universities had come to provide instruction and examinations in English law, as well as in certain other branches of law. There were many variations, but in general the principal course in law was a three-year residential course leading to the degree of B.A. or LL.B., though London conducted an LL.B. examination for external students; and higher degrees were awarded for postgraduate work of various kinds, which at London was fostered by the Institute of Advanced Legal Studies, founded in 1947. There were considerable variations between different universities, both in the subjects taught and in the style of instruction. Oxford and Cambridge, with their continued attachment to Roman law and their emphasis on the cultural aspects of law, provided a contrast with London and most provincial universities, which were rather more practical and professional in tone. Despite these variations, constitutional law, the English legal system, legal history, jurisprudence, public international law, crime, contract, tort, and real and personal property were to be found in most courses, together in some cases with a number of other subjects such as Roman law, equity, trusts, conveyancing, conflict of laws, evidence and administrative law.

Professional Education.—For the bar examinations, the principal form of organized instruction had come to be courses of lectures delivered in London each year from early October until late July by part-time readers and lecturers appointed by the Council of Legal Education, partly from the university teaching staffs and partly from practising members of the bar. The council also appointed a number of practising barristers as part-time tutors to give instruction to small groups of students in chambers on most of the subjects of the bar final examination. The bar examinations were conducted by a board of examiners, appointed by the council, which included all the readers as well as many of the lecturers and a number of others. The examinations, which were held twice a year, were divided into part i and the final, each comprising five papers. In part i, each paper could be taken at a separate examination, and university graduates who had obtained a sufficient standard in the corresponding subject in their university examinations could claim exemption. The subjects were Roman law; English and commonwealth constitutional law and English legal history; contract and tort; land law (or Hindu and Mohammedan law, or Roman-Dutch or African law); and criminal law. In the final examination, all the papers had to be taken at the same examination, and there were no exemptions. The subjects were: common law, with sale of goods and agency as special subjects; equity (including trusts), with executors and administrators and equitable remedies as special subjects; civil and criminal procedure; evidence, and company law; and any two of conveyancing, divorce, conflict of laws and public international law.

The corresponding position for the solicitors' profession after 1962 was as follows. Courses of instruction for the qualifying examination were provided in London by the Law society's college of law, staffed mainly by full-time lecturers. For those lacking a university degree in law, attendance at such a course for part i of the examination was obligatory. The examination, held twice a year by independent examiners appointed by the Law society, was divided into part i and part ii. Part i consisted of six papers, namely: constitutional and administrative law; the legal system; contract; torts; criminal law; and land law. A university law degree gave exemption from the subjects comprised in the course for the degree. Part ii consisted of seven papers, namely, conveyancing; accounts; revenue law; equity (including trusts) and succession; commercial law; company law and partnership; and family law, or local government law, or magisterial law. In each part, a candidate who passed any three subjects in the same examination could take one or more of the remaining subjects at any subsequent examination.

Although many candidates for the bar and solicitors' examinations attended the courses of instruction already mentioned, many did not, and instead attended private tutorial establishments or took correspondence courses; and some worked on their own, though for the final examinations (at which sometimes over two-thirds failed the bar final and about half the solicitors' part ii) this was a perilous course.

Education in Professional Skills.—Most teaching of professional skills in England in the early 1960s was still much as it had been for over a century. For solicitors, the apprenticeship system remained in force. University graduates, and those with ten years' service as solicitor's clerks, had to serve under articles of clerkship to a solicitor for (usually) two and one-half years, others for five years, or four, if part i had already been passed; but law graduates could instead pass part ii first and then serve only two years' articles. All except the "five years man" (one without either a degree or ten years' service as a clerk, who is articled for five years) had to pass part i, or become exempt from it, before com-

mencing articles. The bar also in the main relied on a system of apprenticeship. For long, most of those who intended to practise have "read in chambers" with a practising barrister for a year, usually after passing the final; and no barrister called since April 7, 1959, was allowed to practise in England unless he had completed or embarked upon a pupilage for at least a year. The pupil studied his master's papers, drafted his pleadings and opinions and accompanied him to court. However, since July 1951 the Council of Legal Education has successfully held practical courses of over three months' duration after each examination, and these supplemented or partly replaced reading in chambers for many, especially overseas students. The courses gave organized instruction and practice in drafting pleadings and opinions, and in advocacy, conduct in court and professional etiquette. They were severely practical, and represented England's first sustained effort in organized group instruction in the professional techniques of the law. In addition, contests in advocacy were organized by the Inns of Court Students' union, and a number of moots for students and recently called barristers were held by the inns.

Subsidiary Legal Education.—The majority of students who made law their principal subject did so for the purpose of ultimate qualification as a barrister or solicitor. But many (perhaps, indeed, the majority) of those who studied law did so for other purposes. Some other professional examinations (*e.g.*, for accountants) included a strong element of law; and many who engaged in commerce or industry attended courses of instruction in those branches of law most likely to prove of value. Many establishments such as technical colleges, evening institutes and correspondence schools throughout England provided courses of instruction to serve these needs. In addition, some university students included certain sections of law in their general education; and, often in the guise of "civics," a little elementary law was taught in the senior forms (grades) of some schools. Nevertheless, despite a wide public interest in law, especially in its more dramatic forms, it could not be said that law had established its claim to form part of a liberal and civilized education of the modern citizen.

(R. E. My.)

COMMONWEALTH OF NATIONS AND OTHER COUNTRIES

Commonwealth of Nations.—In the past, legal education in the common-law countries was based largely on the traditional English apprenticeship system, often supplemented by lectures. More recently, particularly in Canada, the tendency has been to make legal study a full-time university course, taken after at least two years' study toward a first, usually arts, degree. Law is taught at 13 Canadian universities. The LL.B. course generally lasts three years. Except in Quebec province, which follows the French tradition, the curriculum is similar to that in the U.S., and the casebook teaching method is often employed (see *United States*, above). In Australia, in the early 1960s, the full-time academic course offered for a first degree (LL.B.) by seven universities lasted four or five years and was followed by a short period of apprenticeship. The casebook teaching method has had some influence. Higher degrees were also granted. In all states it was possible, too, to qualify for legal practice without a degree, the qualifications depending on the states concerned, and these nondegree courses were accompanied by a period of apprenticeship. In New Zealand four of the six universities teach law. The course usually lasts five years, and it is common for students to work in a law firm, usually for three years, while studying for their degree. In India law is studied, at postgraduate level, in 26 universities. The time taken in practical training after graduation varies from state to state. In Pakistan four universities offer an LL.B. course, and the universities of Dacca and the Panjab also provide courses for an LL.M. and LL.D. Graduation is followed by six months' apprenticeship in the courts. In both countries instruction is generally given by lecture and there is a good deal of evening instruction.

Legal training is also given in the universities of Singapore, Ceylon, Malta, Sierra Leone, Ghana, in four universities and one professional law school in Nigeria and in the University College of Tanganyika. Legal subjects are taught in Kenya and Uganda.

Western European Countries.—Generally, law is taken as a first degree which may include Roman law, legal history and the study of legal concepts and public law as well as private law; the economic and political sciences are also taught. The students attend both formal lectures and classes. This broad, though largely theoretical, training is widely regarded as a desirable background for government or other public employment. The minority intending to practise law subsequently train as apprentices in the courts, in legal and notarial offices, or government and other administrative agencies. In France, the 15 state universities alone are permitted to grant law degrees, that of Paris having the largest faculty. Examinations are severe, and a relatively small proportion of the candidates graduate each year. The degree awarded after a four-year program (*licence*) is the prerequisite for the legal profession. The postgraduate cycle (*doctorat*) includes, after specialized courses and research, examinations and a dissertation. Further professional examinations and training are required of those electing to be civil servants, judges, law professors or choosing any branch of the legal profession (*avoué, notaire, avocat*). Thus, future members of the bar (*avocats*) must not only pass the state bar examination but must also work during a two-year stage with a senior member before becoming full-fledged members of the bar. In Germany the university course lasts up to six years; after a practical training period of three and one-half years, a second examination qualifies the candidate to be a judge or an advocate.

Other Countries.—In the U.S.S.R., law is taught at universities and law institutes, the latter being mainly for those intending to practise law. A somewhat similar system was introduced into China in 1952. In Japan undergraduates spend two years on general subjects, followed by two years' study of law, with some political science and economics. After graduating, and having passed the national examination in judiciary, two years' attendance at the Supreme Courts Legal Research and Training centre is necessary. In Latin America teaching is by formal lectures, and the subject is taken for a first degree. The curriculum often includes economics and political science. In South Africa the B.A. degree in law is followed by a two or three years' course for the LL.B., after which graduates are admitted directly to the bar. In 1961 legal training was available at nine universities (three of which were still open to nonwhite students) and at the Bantu college at Fort Hare. *See* also Legal Profession. (K. H. D.)

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LEGAL PROCEDURE: *see* Practice and Procedure.

LEGAL PROFESSION. The legal profession is the vocation based on expertness in the law and its application. The two main divisions are the judges (the bench) and the practising lawyers. This article deals first with the functions and standards of the profession generally; then with the practice of law in the United States, in England and Wales and, very briefly, in other countries. For the bench, *see* Judiciary and Court Officers.

FUNCTIONS AND STANDARDS

The primary function of the profession is to apply and utilize the law in specific cases—in short, to individualize the law. This function is manifest in the work of the advocates and the judge in the courtroom where cases are tried and decided. A lawyer will investigate the facts and the evidence by conferring with his client, interviewing witnesses and reviewing documents, and he will prepare and file the pleadings in court. He may seek a sum-

mary judgment because the opponent evidently has no case, or through discovery proceedings he may force the other side to reveal more fully the issues and the facts on which it relies. At the trial he will introduce evidence and object to improper evidence from the other side, and he will argue questions of law and of fact. If he loses, he may seek a new trial or relief in an appellate court.

Even in controversy, lawyers do more than press their cases to the end before the court. Negotiation, reconciliation, compromise —in all of which lawyers have a large part—bring about the settlement of most cases without trial.

In office work, too, the profession applies and utilizes the law. The lawyer may advise the client on the law and halt an illegal plan. In conference with the client and through negotiations with others he may aid in developing a wise plan to be embodied in a document. The law gives to private persons the power to arrange and determine their legal rights in many matters and in various ways, as through wills, contracts or corporate bylaws. In aiding these arrangements the lawyer is helping to particularize the legal rights of the parties.

Another field of work, which developed rapidly in mid-20th century, is the representation of clients before administrative commissions and legislative committees. The development was a result of the increase of government regulation of economic life.

Ordinarily the lawyer is retained by one side only, even in office matters, and is a partisan. The method for settling unresolved controversies is a competitive one—the adversary system of administration of law under which the lawyers zealously represent their respective sides. The method involves a formidable paradox —the use of partisan representatives to bring out the truth and to achieve equal justice under law. So partisan representation must be enlightened if the method is to attain its ends.

A lawyer, like other men, has several loyalties in his work. They include loyalty to his client, to the administration of justice, to the community, to his associates in practice and to himself— whether to his reasonable economic interests or to his ethical standards as a man. These diverse and at times competing loyalties must be reconciled with wisdom. It is the purpose of the standards of the profession to effect the reconciliation. For instance, the lawyer's loyalty to his client keeps him from representing another person with conflicting interests. In the trial of a case he must be zealous yet fair. The duty of fairness and candor is especially incumbent on the government's lawyer in criminal prosecutions. Of this duty the supreme court of the United States has said: "The United States Attorney is the representative not of an ordinary party to a controversy, but of a sovereignty whose obligation to govern impartially is as compelling as its obligation to govern at all; and whose interest, therefore, in a criminal prosecution is not that it shall win a case, but that justice be done" (*Berger* v. *United States,* 295 U.S. 78, 88 [1935]). The standard most troubling to laymen permits the defense of anyone accused of crime. As a canon of the American Bar association provides: "It is the right of the lawyer to undertake the defense of a person accused of crime, regardless of his personal opinion as to the guilt of the accused." The reason given is, "Otherwise innocent persons, victims only of suspicious circumstances, might be denied proper defense."

UNITED STATES OF AMERICA

History.—The history of the American legal profession goes back to England and to the profession which there developed the common law, although in the United States there was never a formal separation of barrister and solicitor as in England (*see* below). In the simple life of the early colonies the need for lawyers was not obvious. As life and law became more complex their work increased. Always there was concern with the affairs of the family and with the enforcement of the criminal law. With the development of the nation, other fields of practice became important. Land, commerce, industry and finance, taxation and government regulation—each in turn came to form a major share. The most pervasive change was the decline in advocacy and the increase in office work, which now makes up the bulk of practice.

In the work of the lawyer in the 20th century there is need for the consideration of factors reaching far beyond the rules of law. "The modern lawyer almost invariably advises his client upon not only what is permissible but also what is desirable. . . . His duty to society as well as to his client involves many relevant social, economic, political and philosophical considerations" (*United States* v. *United Shoe Machinery Corp.,* 89 F. Supp. 357, 359 [D. Mass. 1950]).

Public Role.—Leadership in public affairs has always been an actual role of U.S. lawyers. It is appropriately so, for lawyers are experts in law and in the adjustment of human relations, and law is the instrument through which government maintains stability in society and establishes justice among its citizens. In legislative as well as executive office, lawyers have been outstanding, making up, for example, more than one-half of the U.S. senate and house of representatives. In public life outside public office, they have also been conspicuously useful. Even in their daily work of applying the law to concrete cases, they aid in the development of the law. In maintaining the rights of the citizens lawyers are indispensable to the enforcement of the Bill of Rights and are thus essential to the constitutional system.

In the 20th century, however, there was a decline in the number of leaders of the bar, especially corporation lawyers, in elective office. The decline has been ascribed to the engrossing character of corporate practice. It may be due, too, to the opposition of the electorate to men identified in their minds with a single type of client. These lawyers have continued to render service in appointive office and through the guidance of institutions which are public though not political, such as universities, schools, charities, churches and cultural institutions.

Standards.—The profession's ideal of achievement is inscribed over the building of the supreme court of the United States: "Equal Justice Under Law." The basic authority over the bar (a term which in the United States includes all lawyers) rests in the courts, which have power to censure, suspend or disbar lawyers for misconduct. The Canons of Professional Ethics, approved by the American Bar association in 1908 and later amended, have been adopted by the bar associations of many states and enacted by the legislatures of a few. A short, eloquent statement on professional responsibility was adopted in 1958 by a joint committee of the Association of American Law Schools and the American Bar association.

Unlike the English barrister, the individual American lawyer has no professional duty to take every case tendered to him, but the American Bar association has reaffirmed the duty of the bar to provide the assistance of counsel for even the most unpopular defendants.

Bar Organizations.—The existing bar associations arose in the 1870s or later, though there were some in the nation's early days. For the most part the associations are voluntary, with no legal control over their members, and are territorial in scope, extending to city or state or nation. Some have a particular field or a special purpose, such as administrative law or law reform, as the basis of membership and activity. Examples are the American Law institute and American Judicature society.

The American Bar association, national in scope though not governmental in nature, was organized in 1878. The membership in the 1960s was more than 90,000 out of a total of about 220,000 U.S. lawyers. Its principal work is done by committees and sections devoted to special fields of practice, such as insurance law or labour relations, or to subjects of concern to the bar and the public, such as judicial administration and the Bill of Rights. In the 1940s the association sponsored the survey of the legal profession. The findings of more than 400 survey participants were summarized in *The American Lawyer* (see *Bibliography*).

The state bar associations were all voluntary organizations until the 1920s when the self-governing or incorporated bar was initiated. Under this system, which in the early 1960s had been established in more than half the states, the association includes all practising lawyers within a state in its membership and has considerable control over the standards of its members.

Privilege to Practise Law.—Each state grants the privilege to

practise law within its borders. The requirements for admission call for a bar examination preceded by specified periods of general and legal education. They may include approval of an applicant by a committee on character and fitness. To practise in a federal court a lawyer needs a grant of the privilege from that court, based primarily on previous admission to the bar of a state.

The exclusive character of the lawyer's privilege to practise law raises questions on what matters are within the privilege. The questions became urgent in the second quarter of the 20th century with the rise of new experts who claimed to offer a kind of expertness the lawyer did not possess, at least in the same measure, and of organizations which provided services with seemingly greater efficiency and economy. The accountant in tax matters, the title company in sales of land, the trust company in estate work are illustrations. Bar committees on unauthorized practice of law have as their announced guide the protection of the public against persons lacking the intellectual qualifications and professional standards essential in legal work. At times the committees brought suit against unauthorized practitioners, and at other times they reached agreement with representatives of such rival groups as accountants and trust companies. As late as the 1960s, however, the bar associations had given little attention to how the new specialized expertness as well as the lawyer's traditional skills were to be made available economically to clients who had need of both of them.

Methods of Providing Legal Services.—The traditional method of providing legal services is for the individual lawyer to be retained by and to represent the individual client, and in the early 1960s more than two-thirds of the lawyers still practised individually. However, the development of partnerships of lawyers has been stimulated by the growing complexity of the law. There were some very large partnerships, with 10 to 25 partners and 50 to 75 other salaried lawyers. The profession had not developed an adequate system of referral or consultation by which the general practitioner could procure the aid of the expert when needed.

Large industrial corporations increasingly employ salaried lawyers who give full time to this work. However, a corporation cannot practice law by representing others in legal matters, even though the work is done by lawyers on its staff. The prohibition against the corporate practice of law has been applied rigidly, even to nonprofit corporations organized to provide legal services to their members.

Several methods are used to provide services to the poor. The oldest is the system of assigned counsel in criminal cases, with the court designating a lawyer to represent the accused. Another method is the public defender employed and compensated by the state, county or city to represent indigent defendants. A third method is that of the legal aid societies (*see* LEGAL AID.) These organizations give representation in civil as well as criminal cases and are supported primarily by private donations.

The lawyer reference service is for those who are able to pay a fee but do not know whom they should consult. The office of the service gives the inquirer a list of lawyers competent in his case. The lawyer will confer with the inquirer for a specified small fee and determine with him whether the case merits further attention and what the additional fee shall be.

The federal government as well as the states and the counties and cities have their legal representatives. The chief law officer of the United States is the attorney general. As the head of the department of justice he is a member of the cabinet. The United States attorneys who represent the government in the district courts are under his general direction.

ENGLAND AND WALES

In England and Wales practising lawyers are divided into two branches, barristers and solicitors. Trial of cases is the characteristic activity of a barrister, office work that of a solicitor. No one may be both barrister and solicitor at the same time, though it is possible to withdraw from one branch and become a member of the other after satisfying its requirements for admission.

Barristers-at-Law.—The barristers, known also as counsel and, collectively, as the bar, have the exclusive right to appear as advocates in the superior courts and concurrent right with the solicitors in the inferior courts. Barristers also do some advisory work, as they may be asked by solicitors to give opinions or to draft documents. The more important judicial appointments are made from their ranks.

To be a barrister it is necessary to become a member of one of the four Inns of Court; that is, Lincoln's Inn, the Inner Temple, the Middle Temple and Gray's Inn (*see* INNS OF COURT AND CHANCERY). The privilege of the inns to determine who may go to the bar rests not on statute but on custom going back to the middle ages. The benchers of each inn are its governing body with disciplinary power over its members.

The general council of the bar derives its authority from the bar. The council acts in matters of general concern to the profession, and its opinions and rulings help to set the standards for barristers. For example, a barrister is bound to accept any case tendered at a proper professional fee regardless of his personal feelings, except in such special circumstances as conflicting interests of clients. This requirement, illustrated by Thomas Erskine's defense of Thomas Paine during the French Revolution, is deemed essential to the protection of liberty under law. There may be no partnership of barristers or of barrister and solicitor, and a practising barrister may not carry on any other profession or business.

The inns formerly provided a comprehensive form of legal education and apprenticeship. Their educational activities have been taken over by the Council of Legal Education established by the four inns. A student must keep the necessary terms for three years. A term is "kept" by dining at least six times (three for a university student) in the hall of the inn along with the members—a practice regarded as helping to initiate the student into the traditions of his profession. The inns still stress the apprenticeship system whereby a student or a young barrister enters the chambers of a practising barrister and, for a fee (for example, 100 guineas a year), is guided through various phases of a barrister's work.

The number called to the bar by the four inns is about 500 each year, one-third to one-half of whom are from overseas. The number actually practising, however, is only about 2,000, for the majority of those admitted withdraw from practice and engage in other activities.

Serjeant-at-law was originally the highest rank of barrister but the order became obsolete. The distinguishing mark of the rank was a close-fitting cap known as a coif. Queen's (king's) counsel, who constitute the leaders of the bar, hold a higher rank with somewhat different rights and obligations.

The two principal law officers of the crown are the attorney general and the solicitor general. The various government departments also have legal advisers. There is, however, no general system of public prosecutors. Except for the rare cases where the attorney general or the solicitor general appears, the crown retains private counsel to prosecute particular cases.

In general a barrister undertakes no work except through a solicitor. The client goes first to a solicitor who prepares and delivers his instructions to a barrister. The instructions, containing an outline of the case, are known as a brief—a term which in the United States means a written argument submitted to a court.

Solicitors.—The solicitors carry on most of the office work in law. They confer with clients, give advice, draft documents, conduct negotiations, prepare cases for trial and retain barristers for advice on special matters or for advocacy before the higher courts. They have a right to practise in all the courts as the agents for litigation or representatives of their clients, and they are deemed officers of the court, but they may appear as advocates only in the lower courts. Since the kinds of activities they engage in make up the greater part of the work of lawyers, solicitors are ten times as numerous as barristers in active practice, numbering over 20,000. Solicitors may practise in partnership with one another.

The term solicitor, in earlier days confined to the chancery courts, has supplanted the designations attorney and proctor, the former having been used in the common-law courts and the latter in the ecclesiastical and admiralty courts. The inns of chancery

and similar societies with which these lawyers were formerly associated have disappeared. The Law society is now the solicitors' organization, incorporated by parliament and entrusted with extensive duties. Its membership includes most but not all of those in practice.

The education required of a solicitor includes a law school course. A most important feature is a period of apprenticeship, under articles of clerkship, with a practising solicitor. The term of the articles is five years, reduced for university graduates, and there is usually, though not invariably, a fee paid to the principal. A woman may be a solicitor or a barrister. Only a British subject may be a solicitor, though there is no such requirement for the barrister.

The Law society has extensive authority in setting and enforcing standards for solicitors. Its rules prescribe how monies held for a client or in trust are to be kept and to be shown on books of account; compliance with the rules by each solicitor must be certified to annually by a chartered accountant or may be inquired into by inspection of the solicitor's books. The society maintains a client compensation fund to reduce or relieve losses sustained from dishonesty by a solicitor. A solicitor, unlike a barrister, may sue for his fees.

A most important part of the society's duties is the administration of the legal aid (*q.v.*) provided by parliament. The system, largely state-financed, is administered by this professional organization, thus securing the direct relationship of lawyer and client without interference by an outside intermediary.

OTHER COUNTRIES

Scotland.—The Scottish legal profession is separate from that of England and Wales, though there is a similar division into two branches—advocates and solicitors (formerly law agents). The Faculty of Advocates, headed by the dean of the faculty, is the governing body of the first branch; the Law Society of Scotland is the governing body of the solicitors. There are several ancient legal societies with picturesque titles to which a Scottish solicitor may belong, such as, in Edinburgh, the Society of Writers to Her Majesty's Signet.

Commonwealth of Nations.—The nations formerly a part of the British empire, as well as the British colonial territories, have their own distinct legal professions. In the federal nations like India, Australia and Canada, each component part of the federation, such as a state or province, has its separate profession, admission to which is prerequisite to practice in that part of the nation. Some maintain the separation of barristers and solicitors. Others have fused the two branches into one, as the provinces of Canada and some of the Australian states have done.

Civil-Law Countries.—The legal profession in the numerous and important countries of the civil law—the countries of continental Europe and Central and South America, for example—distinguished though it is, varies too widely in history and organization for discussion here. Only two matters will be mentioned.

In some countries the judiciary is a separate branch. A law graduate will decide whether he will make his career in the judicial branch or as a practising lawyer. The judges are appointed and promoted by the state and are essentially a part of the civil service.

In many countries the notaries, limited in number and wholly unlike the notary public in the United States, are persons trained in law. They have exclusive privileges in connection with some office work, such as marriage settlements and wills. (*See* also CIVIL LAW.)

Communist Countries.—In communist countries the legal profession necessarily has functions different from those in noncommunist countries because of differences in the role of the state and the party and the rights of individuals. The lawyer is widely used as adviser to government bureaus but has far less scope in representing individuals. Even in criminal cases the lawyer for the defense has been reported to have the advancement of the state's interest as his major responsibility rather than the defense of his client against the state.

International Tribunals.—There is no separate bar with the exclusive privilege to appear before international tribunals. There are organizations of persons interested in international law, some international in membership, as the International Law association; others national in membership, as the American Society of International Law. The International Court of Justice ("the world court") requires that an agent be designated by each nation in a case before it, and it permits the appearance of other persons as advocates to argue the case. The advocate is usually a citizen of the nation he represents, but this is not essential; at times an expert international lawyer from another nation is retained to present the case.

See also LEGAL EDUCATION.

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LEGAL TENDER: *see* PAYMENT.

LEGARÉ, HUGH SWINTON (1797–1843), U.S. lawyer and diplomatic official, attorney general under Pres. John Tyler and a leader in southern intellectual and literary life, was born in Charleston, S.C., Jan. 2, 1797. He studied at Moses Waddel's academy and graduated from South Carolina college in 1814. An unusually able classical scholar, who aspired to the life of the scholarly gentleman, Legaré spent the period 1814–17 in a concentrated study of law and in 1818 went to Europe, where he studied law and languages. He served in the state legislature in 1820–22 and 1824–30.

Legaré and a number of other Charlestonians, including the botanist and scholar Stephen Elliott, Sr., established the *Southern Review* (1828–32), a literary journal of considerable distinction. Legaré was a principal contributor to and, at times, editor of the *Review;* his articles show critical ability and an erudition probably not surpassed by any contemporary American scholar.

Legaré was a conservative who feared democracy, but he opposed John C. Calhoun and the nullification group. In 1830 he was appointed attorney general of the state, and in 1832 he was made chargé d'affaires to Belgium. He returned to Charleston in 1836 and was elected to congress as a Union Democrat. During the heated controversies of the period he lost support and was defeated in the election of 1838. As a Whig, he supported William Henry Harrison and John Tyler in 1840, and Tyler made him attorney general in 1841. His profound knowledge of civil and international law made him an especially valuable cabinet member. When Secretary of State Daniel Webster resigned in May 1843, Legaré became secretary ad interim. He died in Boston, June 20, 1843.

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LEGASPI, a municipality in Albay province, southeastern Luzon, Phil., near an inlet on the west shore of the gulf of Albay, about 200 mi. S.E. of Manila. It was named after Miguel López de Legazpi, conquistador and first Spanish governor-general of the Philippines. Formerly a chartered city, comprising the municipalities of Legaspi and Daraga, it was reconverted to two municipalities in the late 1950s. Legaspi lies at the base of the active 7,943 ft. Mt. Mayon, the world's most perfect volcanic cone. The town was severely damaged and 1,200 people killed during the most serious eruption, in 1815; slight damage occurred during the 1947 eruption. The municipality had a population of 41,117 in 1948 scattered in 19 *barrios* (villages) and the *poblacion* (admin-

istrative centre). The population was 60,593 in 1960. The port at Legaspi offers deep water and excellent protection but has poor wharfage and other facilities. It functions as an export centre for copra and abacá (Manila hemp). Legaspi is the southernmost point on the Manila railroad and also has highway connections to all parts of Luzon. (R. E. He.)

LEGATE, BARTHOLOMEW (*c.* 1575–1612), English fanatic and the last person burned in London for his religious opinions, was born in Essex and became a dealer in cloth. About the beginning of the 17th century he became a preacher among a sect called the "Seekers," and appears to have held unorthodox opinions about the divinity of Jesus Christ. Together with his brother Thomas he was put in prison for heresy in 1611. Thomas died in Newgate jail, London, but Bartholomew's imprisonment was not rigorous. James I argued with him, and on several occasions he was brought before the consistory court of London, but without any definite result. Eventually Legate was tried before a full consistory court in Feb. 1612 and found guilty of heresy. He was burned to death at Smithfield on March 18, 1612.

See T. Fuller, *Church History of Britain* (1655); S. R. Gardiner, *History of England,* vol. ii (1904).

LEGATE, in its broad signification, means that person who is sent (Latin *legare,* "to send") by another for some representative office; the title is now generally confined to the highest class of the representatives of the pope. Canon law recognizes three sorts of legate: (1) the *legatus a latere;* (2) the legate with the title of nuncio (*q.v.*) or internuncio; and (3) the apostolic delegate. A legate *a latere* is a cardinal bearing this title and representing the pope as his alter ego, with such powers as may be given him. Nuncios and internuncios are sent to countries having diplomatic relations with the Holy See; their office is to promote these friendly relations and to observe and report to the pope on the state of the church. Legates with the title of apostolic delegate are sent to countries that do not have diplomatic relations with the Holy See; their office is almost purely supervisory and they have special delegated faculties for ecclesiastical affairs. In the earlier centuries other sorts of papal legates existed, as, for example, *legati nati,* prelates who were perpetually empowered with special jurisdiction over other bishops; *legati dati* or *missi,* special envoys sent by the pope on a special temporary mission—to preside at a solemn ceremony, to meet an emperor or a king visiting Rome, to rule a province of the pontifical states, etc. *See* also Vicar. (P. Li.)

LEGENDRE, ADRIEN MARIE (1752–1833), French mathematician distinguished for his work on elliptic integrals, the theory of numbers, the attractions of ellipsoids and the method of least squares, was born in Paris on Sept. 18, 1752. He was educated at the Collège Mazarin, and was appointed professor of mathematics in the École Militaire at an early age, but resigned in 1780. In 1795 he was elected professor in the École Normale. Although he was, from time to time, appointed to several minor government positions, he was never offered offices commensurate with his ability because his colleague Laplace disliked him. He died in Paris on Jan. 10, 1833.

Legendre's researches on elliptic integrals (*see* Elliptic Functions) extended over more than 40 years. He took up the subject in 1786 where L. Euler, J. Landen and J. L. Lagrange had left it, and for some time was the only mathematician to cultivate this new branch of analysis. The results of his labours were almost entirely neglected by his contemporaries, but his *Traité des fonctions elliptiques* had scarcely appeared in 1827 when the discoveries which were independently made by the two young and as yet unknown mathematicians N. H. Abel and K. G. J. Jacobi placed the subject on a new basis and revolutionized it completely. Nevertheless, Legendre contributed much that was of value and it was he who discovered the three canonical forms of integral. Moreover, the readiness with which, at the age of 76, he welcomed researches that quite overshadowed his own does the highest honour to him.

To Legendre is due the theorem known as the law of quadratic reciprocity, the most important general result in the science of numbers discovered since the time of Pierre de Fermat, and called by C. Gauss the "gem of arithmetic." Legendre published his own researches and those of his predecessors in the theory of numbers in a systematic form in two large volumes under the title *Théorie des nombres* (1830). (*See* Numbers, Theory of: *Quadratic Residues.*)

One of the problems he studied at an early age was the attraction of spheroids. In the first of his four great memoirs on this subject, published in 1783, he introduced the celebrated function which has been named after him. In 1806 appeared Legendre's *Nouvelles Méthodes pour la détermination des orbites des comètes* which is significant as containing the first published suggestion of the method of least squares. Legendre also made important contributions to geodesy and was widely known for his *Eléments de géômétrie,* a modern rival to Euclid. In it he gave a simple proof that π is irrational, and forecast that it was not the root of any algebraic equation of finite degree with rational coefficients. *See* also Fermat's Last Theorem; Polynomial.

See Élie de Beaumont, "Memoir de Legendre," trans. by C. A. Alexander in *Smithsonian Report* (1867). (G. J. Ww.)

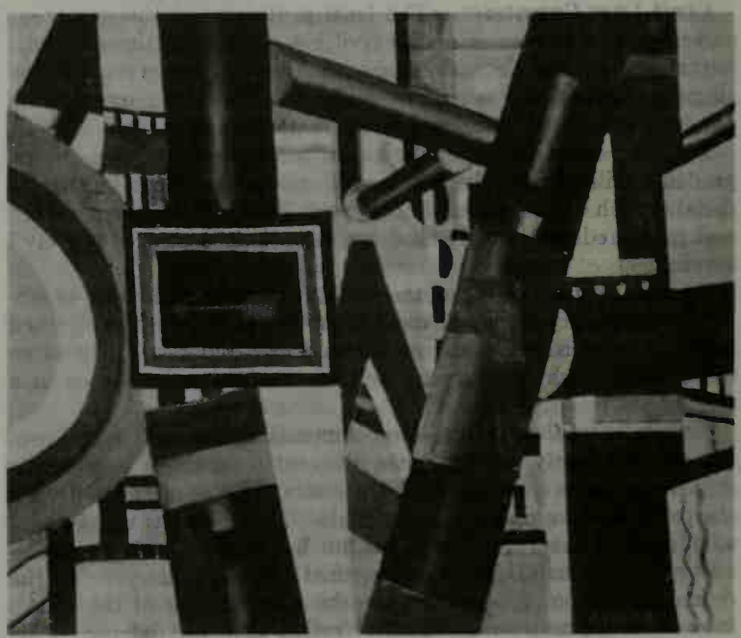
LEGENDRE COEFFICIENT AND FUNCTION: *see* Spherical Harmonics; Functions, Special.

LÉGER, FERNAND (1881–1955), French painter identified with "machine art," was born in Argentan, Normandy, on Feb. 4, 1881. He was first trained as an architect. Moving to Paris, he turned to painting and by 1910 began to show the influence of Cubism, as in his abstract "Nudes in the Forest." Sometimes called a Tubist rather than a Cubist because mechanistic tubes appeared frequently in his work, Léger had already painted some of his best-known masterpieces by 1919. Chief among these were "The Disks" and "The City."

As a rule Léger painted in series, developing his final composition after numerous variations on a theme. He tended to mechanize the human being, as he glorified modern machinery. Repudiating all romanticism, he said, "For me the human figure . . . has no more importance than keys or bicycles." He also said, "I have used the machine as others have used the nude or still life. . . ."

Though Léger was deeply influenced by the machine age and mass production, his work was also affected by Byzantine mosaics and the paintings of Poussin, David, Cézanne and the Douanier Rousseau. Using brilliant flat colour he concentrated on familiar objects, often magnified, usually isolated and monumental. For him disciplined order was combined with boldness of vision. Both painter and ceramist, he was also a teacher and designer of stained-glass windows, mosaics and theatrical scenery.

The United States, where he lived during World War II, interested Léger immensely. He loved Negro jazz and the excitement



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"FOLLOW THE ARROW," FERNAND LÉGER, 1919, OIL ON CANVAS. IN THE ART INSTITUTE OF CHICAGO

of American city life. In describing the country's "unbelievable vitality," he claimed he had painted better in America than ever before. Léger died on Aug. 17, 1955, at Gif-sur-Yvette. *See* also PAINTING: *Cubism.*

See Katherine Kuh, *Léger* (1953); André Verdet, *Fernand Léger,* with bibliography (1955). (K. W. KH.)

LEGERDEMAIN: *see* CONJURING.

LEGHORN (It. LIVORNO; Fr. LIVOURNE), a city on the Mediterranean coast of central Italy, in the Tuscany region, the capital of Livorno province, is located 95 km. (59 mi.) W.S.W. of Florence by road. Pop. (1961) 165,536 (commune). The city is on the western edge of a cultivated plain, shut in from the east and south by a circle of low hills, the Leghorn mountains (Monti Livornesi).

Modern Leghorn is built around the 17th-century Medicean town; it suffered great damage in World War II but was reconstructed according to the original general plan. The Medicean town is polygonal in shape, bordered by *fossi* (canals connected with the sea). Its axis is the arcaded Via Grande. From the vast Piazza della Repubblica—onto which face the bastions of the dismantled Fortezza Nuova (1590)—it goes in a straight line to the Medicean gate, near the old harbour. At about mid-point the Via Grande widens into the square of the same name, the site of the cathedral (1595; entirely reconstructed, 1954), of mediocre artistic value, and the imposing and very modern Palazzo Grande. At the back the Palazzo Grande opens onto the Piazza del Municipio, where there are a number of public buildings. At the Medicean gate stands the monument of the Four Moors (*I Quattro Mori*), four colossal statues in bronze (P. Tacca, 1623–24), above which rises a marble statue of Ferdinand I (G. Bandini, 1595). On the north side of the harbour is the imposing structure of the Fortezza Vecchia ("Old Fort"; Antonio da Sangallo the Younger, 1525). A bridge joins the town to the Medicean port, which is next to the modern and wider industrial port. Among the other points of interest are the old Protestant cemetery in the Via Verdi, burial place of Tobias Smollett, the 18th-century English novelist; the villa in the Via del Fagiano where Shelley stayed in 1819; and the villa at the foot of Montenero where Byron stayed in 1822.

A great scenic attraction is the avenue (Viale Italia) which runs south along the seacoast to the village of Ardenza and (under a different name) on to Antignano. The civic aquarium, the Italian Naval academy and a race track are located along the avenue, which also has numerous bathing places and beautiful terraces down to the sea.

Leghorn is served by the Genoa-Pisa-Rome rail line, a trunk line, numerous main roads, an airport (S. Giusto, 11 mi. N.) and the port, which has regular service to points on the Mediterranean and beyond. The commercial activities of the port are extensive. Among the imports are crude mineral oils, coal, cereals, phosphates and fertilizers, silica sand and metal minerals. Principal exports are mineral and derived oils, marble, plate glass, wines, tomato preserves, olive oil, sodium carbonate and sodium hydrate, and copper and its alloys.

Leghorn has a large shipyard, where both military and merchant vessels are built, and several smaller yards for ship repair. Other industries are factories producing mechanical precision tools, reinforced cement tubes, electric conductors, ceramic insulators and bricks; glassworks; a large cement works; and various chemical industries, including the processing of raw olive oil.

Originating as a humble village, Leghorn first began to assume importance when, by a gift of the Countess Matilda of Tuscany to the Pisan church, it passed into the power of Pisa (1103). Sold to the Visconti (1399), it passed to the Genoese (1407), who acquired it for 26,000 golden florins. In 1421, for almost four times that price, it was bought by the Florentines, who coveted an outlet to the sea, and thus came under the dominion of the Medici family (*q.v.*). Ferdinand I de' Medici, grand duke of Tuscany from 1587 to 1609, can be considered the true founder of Leghorn; he built a new harbour, gave asylum to many refugees —Roman Catholics from England, Jews from Spain and Portugal, and others—and launched the town as a commercial and industrial centre. Among the princes of Habsburg-Lorraine, who succeeded the Medicean dynasty (*see* TUSCANY: *History*), the last, Leopold II (1797–1870), is of particular importance; he enlarged the town, gave privileges to foreign merchants and had the great curved breakwater built to protect the ports from the open sea. After the plebiscite of March 1860 Leghorn, with the rest of Tuscany, joined Italy.

LIVORNO province (pop. [1961] 313,599, area 1,220 sq.km. [471 sq.mi.]) includes, in addition to Leghorn city, ten mainland communes and five islands: Gorgona, Capraia, Elba, Pianosa and Monte Cristo. Other important centres in the province are Rosignano Solvay, with a large factory producing soda and derivatives; Cecina, an agricultural centre, with brick and sugar factories; Piombino, an ironworking centre and port for Elba; Portoferraio, chief town on the island of Elba; and Rio Marina, with the most important iron mine of the island. (Ao. R.)

LEGION, a military term that has been used for various different types of organizations since ancient times. In early Rome, the legion was the levy of citizens marching out en masse to war (Lat. *legio*), like the citizen-army of any other primitive state. As Rome came to need more than one army at once and warfare grew more complex, *legio* came to denote a unit of 4,000 to 6,000 heavy infantry supported by a cavalry contingent and light infantry armed with darts, slings and other missile weapons. In a broader sense, however, the term "legion" came to denote the military system that enabled Rome to conquer and rule the ancient world. (*See* ARMY; INFANTRY; TACTICS: *Tactics of the Ancient World.*)

Under the Republic the legion was distinguished for its tactical flexibility as compared with the phalanxes of Greece and Macedonia or the massed formations of Persian and Egyptian arms. Roman citizens and auxiliaries from conquered Italian states were organized into separate legions. The object lessons taught by Hannibal led to an increase of cavalry and missile weapons, and during the civil wars the legionary became a professional soldier rather than a citizen-soldier. Citizens and auxiliaries now mingled in the ranks, both being attracted less by patriotism than by the expectations of donatives, land grants and other material rewards. Each legion had its own proud traditions, and the 10th Legion won renown as the favourite unit of Julius Caesar.

The 28 legions during the early years of the empire were increased in response to the growing menace of mounted barbarian incursions along the frontier, and the proportion of cavalry to heavy infantry rose. More emphasis was placed upon missile weapons, and by the 4th century A.D., according to Vegetius, each legion had an "artillery" arm equipped with engines of war (*q.v.*).

Machiavelli advocated the revival of a legion adapted to weapons of gunpowder during the Renaissance, and in the 18th century Marshal Saxe adopted a modern legionary formation which became the tactical ancestor of the modern division. During the American Revolution the term "legion" was applied to several flying columns of mixed infantry and dragoons supported by light artillery, such as those commanded on the British side by Lieut. Col. Banastre Tarleton and on the American side by Count Kazimierz Pulaski.

In modern times the term has been employed for organizations of an unusual or exceptional character, such as a corps of foreign volunteers or mercenaries. Perhaps the earliest examples of this were the provincial legions formed in France by Francis I. Napoleon, in accordance with this precedent, employed the word to designate the second-line formations which he maintained in France and which supplied the Grande Armée with drafts. The term "foreign legion" is often used for irregular volunteer corps of foreign sympathizers raised by states at war, often by smaller states fighting for independence.

Unlike most foreign legions the "British Legion" raised in Great Britain and commanded by Sir George de Lacy Evans was a regularly enlisted and paid force.

The most famous example in the 20th century of the term "legion" as applied to a special branch of the military service is found in France's *Légion Étrangère,* made up of foreign volunteers commanded by French officers. The presence of a few men of title or fugitives from justice in the ranks created an aura of ro-

mance, but in actual fact most of the Legionnaires were simply motivated by a fondness for military life. They saw action in France's colonial wars, and their reputation as fighters was upheld in World War II. Rallying to De Gaulle, they gave a good account of themselves in Africa, Italy, France and Germany. Their organization and traditions continued almost unchanged after 1945. Indeed, many of the regiments retained their prewar designations while fighting guerrilla campaigns in Indo-China and Algeria.

The term has also served to denote peacetime organizations such as the American Legion or the British Legion (*qq.v.*), composed of ex-servicemen. (LN. MS.)

LEGISLATION. The term legislation means the preparing and enacting of laws, but for the purposes of this article it refers only to acts of state legislatures or of the congress of the United States; in other contexts it is sometimes used to apply to municipal ordinances and to the rules and regulations of administrative agencies passed in the exercise of delegated legislative functions. (For an account of legislation in Great Britain, *see* STATUTE LAW.) Legislation involves not only action by a legislative body, however, but also participation by the executive. Concurrence by the executive is required to make legislation effective except where his exercise of the veto power is overridden by a sufficient majority of each house of the legislature. Moreover, the role of the executive involves far more than mere acquiescence or dissent. As the principal officer of state and as a political leader he participates extensively in the formulation of governmental policy and often in the actual preparation of legislation.

In the United States the subject of legislation is complicated by the federal character of the nation. Each state possesses lawmaking power effective within its boundaries. The national government, within the scope of its constitutional powers, may pass legislation effective throughout the nation. Thus, conflicts may arise between a state and the national government. These conflicts are resolved by the courts. The constitution, treaties and laws of the United States are the supreme law of the land, and state statutes passed in contravention of them are unenforceable. Both state and federal courts are obliged to refuse to enforce a state statute contravening federal constitutional or statutory law. Furthermore, the supreme court of the United States may review state legislation and decide whether or not it conflicts with the constitution of the United States or with legislation passed by congress. The supreme court of the United States is the final arbiter with respect to federal legislation and as to state laws insofar as their conflict with federal power is concerned. State legislation also must comply with the provisions of state constitutions. Final decision with respect to such compliance is vested in the state courts. (*See* CONSTITUTION AND CONSTITUTIONAL LAW.)

The courts have the power not only to determine the constitutionality of legislation but also to decide what legislation means and how it fits into the whole structure of the law. Law in the United States, as in all nations sharing the Anglo-U.S. legal tradition, is derived largely from judicial precedents established in earlier cases. The body of precedents is known as the common law (*q.v.*). Legislation in the states sometimes changes the common-law rules. Through the interpretation of such legislation, the courts often may either restrict or extend its application. Thus in a very real sense the courts may be regarded as a part of the legislative process.

The relation of courts to legislation is involved also in another peculiar American problem. This relates to the extent to which courts will take "judicial notice" of statute law. When such notice is taken, it is unnecessary for a litigant to prove what the law is. All courts must take judicial notice of the federal laws and the statutes of the state in which suit is brought. However, there are different rules regarding the extent to which the courts will take notice of the legislation of other states. In some states statutes require the courts to take notice of such laws, while in others they must be specially pleaded or proved or else the courts will assume that the law of the other state is identical with either the decisional or statutory law of the state where the trial takes place. After 1936, however, most states solved the problem by adopting the Uniform Judicial Notice of Foreign Law act. This law requires courts to take judicial notice of the common and statute law of other states but not of other countries.

The Legislative Process.—The process by which statutes are enacted is an important aspect of the study of legislation. In the states this process is controlled largely by constitutional provisions. Aside from restrictions on the subject matter of legislation, such as those forbidding the enactment of laws depriving any person of life, liberty or property without due process of law, there are constitutional limitations on the form and effect of legislation. These vary somewhat from state to state. Typical provisions are those limiting the authority of the legislature to pass local or special laws, requiring a single bill to be confined to one subject expressed in its title and providing that, except in an emergency, no law shall be effective until a specified number of days after its enactment.

In some states by constitutional provision and in others by statute or resolution, procedural requirements governing the passage of legislation are prescribed. In the main these are designed to prevent hasty and secret legislation. Examples of such provisions are the requirement that bills be read three times in each house, that the vote on final passage be entered in the journal, and that the enrolled bill be signed by the presiding officer of each house before presentation to the governor. The effect of noncompliance with these provisions varies among the states depending on the attitude of the courts as to how noncompliance may be shown. In some states and in the case of the federal government, it is held that the existence of a properly executed enrolled bill is conclusive evidence of compliance with all procedural requirements. In others, the journals of the respective houses may be consulted, and in still others the courts may receive testimony regarding the method of passage. Where noncompliance can be shown it renders the bill void.

No discussion of legislative procedure would be complete without reference to the committee system. Both in congress and in the state legislatures, procedural rules require that proposed legislation be referred to a committee for study and recommendation. It is generally recognized that the most important work of a modern legislative body is done in committee. This is true partly because the sheer bulk of legislation prevents individual members from considering each measure at length and partly because much legislation is highly complex and technical in nature and thus requires consideration by experts. Membership on an influential committee is highly prized by legislators in view of the importance of the function performed by committees. In order to promote efficiency and to make committee membership more meaningful, there has been a tendency to reduce the number of standing committees in state legislatures. This has also been the case in congress. In 1946 the number of standing committees in the house was reduced from 48 to 19 and in the senate from 33 to 15. Another development is the creation of technical staffs to serve the committees by collecting information, performing research and preparing legislation.

The Legislative Product.—Legislation is expressed in different forms. Usually legislative measures are referred to as acts or joint or concurrent resolutions of both houses of the legislature. As has been pointed out, no matter what these measures are called, they must be approved by the executive or passed over his veto in order to have legal effect. In some instances, one house or both may pass resolutions that may have some significance even though not submitted to the executive. Ordinarily, these measures involve the internal management of the legislature, such as the creation of committees, providing for legislative employees or instituting an investigation. Treaties of the national government have the force of statutes and stand on a parity with them. States may not make treaties, but with the consent of congress (and, where no national interest is involved, without it) may enter into compacts that have the effect of statutes. Compacts have been used to deal with problems requiring regional treatment but not nation-wide control.

The province of legislation in what was originally at least a common-law legal system is worthy of consideration. Legislation

is useful in providing a framework for governmental action in fields that are either entirely new or that were not considered by the common law to be within the province of governmental action. The control of atomic energy is an example of the first area and the social security program of the second. Another field of legislative activity is found in connection with instances where it has become necessary to cope with situations with which the common law did not deal successfully. Perhaps the most obvious example has to do with workmen's compensation. The old law of master and servant developed by the English courts prior to the Industrial Revolution did not effectively solve the problems created by industrialization. It became necessary to enact legislation that in effect removed the defenses previously available to the employer and substituted the principle of liability without fault. These, of course, are but a few examples of the exceedingly broad area occupied by legislation in a complex society.

The wide scope of legislative activity and the fact that there are so many legislative bodies in the United States created an immense mass of legislation. In the more populous states and in the federal congress, thousands of bills are introduced during each legislative session. Adequate consideration of the measures is hampered by the fact that most states have biennial rather than annual legislative sessions, and in many the length of the session is limited by the constitution. Special sessions may be called by the executive, but this device has not been very effective. In 1954 the Committee on American Legislatures of the American Political Science association recommended the substitution of regular annual legislative sessions for states with large populations. It also recommended the elimination of limitations on the length of legislative sessions.

The vast bulk of legislation has created difficulties in terms of keeping abreast of legislative developments. In the case of congress, and to some extent in the states, private agencies have supplied their clients with periodic reports on the status of legislation in particular areas. In New York the *Legislative Annual* has collected and preserved primary source material dealing with the legislation of that state. An index to state legislation was originated in 1928 by the Library of Congress. Occasional revisions of the laws are made by each state and by the federal government, but not in accordance with any definite schedule. In spite of these sources of information, there remains a heavy burden on anyone wishing to find all the legislation dealing with a particular topic.

Aids to Legislation.—The complexity of federal and state legislation has focused attention on the development of means to improve the quality of statutory law. Since legislative drafting requires special qualifications, the federal and many of the state governments provide specially trained counsel to prepare measures. Recognizing the need for such training, law schools offer courses that include legislative drafting and, in some instances, provide drafting services for public and private groups. In addition to technical problems of drafting, the substantive aspects of legislation are matters of concern. For example, under the Legislative Reorganization act of 1946, important committees of congress were provided with professional staffs to do research. In other instances, commissions aided by experts have prepared particular statutes such as codes of procedure, workmen's compensation laws and tax measures. Continuity of legislative policy has sometimes been attained through the device of the legislative council. In recognition of the need for constant scrutiny of legislation to keep the law abreast of current problems, the state of New York created a law revision commission in 1934, charged with the duty of continually revising the statutes. North Carolina is another state in which continuous statutory revision has been undertaken.

Uniform Laws.—Since each state as well as the national government has lawmaking power, it is not surprising that in many instances state and federal laws on the same subject have contained different and conflicting provisions. This has been especially undesirable in regard to commercial matters. Accordingly, there have been numerous attempts to secure uniform legislation. A movement to attain this end was initiated by the organization of the Commissioners on Uniform State Laws in 1892. Commissioners appointed by each state meet annually to frame legislation on subjects upon which uniformity is believed to be desirable and to recommend its enactment by state legislatures. As might be expected, their most successful achievements have been in the field of commercial law, although many other subjects have been dealt with. The Council of State Governments prepares legislation in areas of general interest, not necessarily for enactment in uniform style but for the purpose of suggesting models to guide particular state legislatures. Other efforts to promote uniformity have been made by private interest groups and public welfare organizations. The American Law institute has engaged in the preparation of model legislation in the fields of taxation and criminal law. The American Bar foundation, organized under the auspices of the American Bar association, has instituted research programs leading to the preparation of model legislation. Interpretation statutes on the British model were also enacted in some states, although they have been of doubtful value.

Codification.—On the European continent a movement toward the codification of all law gained considerable strength during the 19th century. In England the principal advocate of codification was Jeremy Bentham (*q.v.*), who regarded it as a remedy for what he considered to be the evils of the common law. Although his efforts gained little support in England, his views were supported to some extent in the United States. David Dudley Field (*q.v.*) of New York was perhaps the leading exponent of codification in the United States. In 1848 the so-called Field code was adopted in New York. This code attempted to recognize and simplify procedural law. A proposed codification of substantive law was not enacted. Perhaps due to the failure of New York to accept the latter code, the general codification movement was limited in the United States, although procedural codes were adopted in many other states. Even where codes were adopted, however, they did not produce the hoped-for results of simplification and clarity. This may have been due to the unwillingness of judges, trained in the common law and accustomed to relying primarily on earlier decisions, to treat codes as ultimate sources of law, as is done in countries that have adopted the civilian legal system. On the other hand, limited attempts to codify certain segments of the law met with more success. The restatements of the law by the American Law institute were somewhat analogous to codes and were undertaken for similar purposes but were not adopted as statutes.

Interpretation.—The culmination of the legislative process is found in the interpretation of legislation by the courts, since, unless compliance with the legislative will is automatic, it is at this point that legislation is given meaning and effect. Interpretation may be regarded as the process of attaching meaning to words. Although scholars have attempted to draw a distinction between interpretation and construction, the terms ordinarily are used interchangeably. The subject of statutory interpretation is extremely technical and is more properly discussed in a legal treatise. However, consideration of the way in which courts handle legislation is essential to a general understanding of the field.

The goal of statutory interpretation is ostensibly to discover and give effect to the intention of the legislature. Although there has been controversy over whether or not legislative intention actually exists, it is useful to suppose that legislation represents the collective will of the lawmaking body and that this will can be discovered by the courts. It then becomes important to consider the tools and materials used by judges in discovering what the intention of the legislature, in this sense, is. In this connection, one may distinguish between what may be called intrinsic guides and extrinsic aids to interpretation. The former involve the consideration of the statute itself, together with certain rules developed by the courts to assist them in the process of interpretation. Some are essentially rules of grammar such as would be used in discovering the meaning of any document. Others are rules or canons of construction that the courts have used in arriving at satisfactory results. For example, it is often said that the enumeration of a number of circumstances to which the statute applies indicates an intention to exclude all circumstances not enumerated. (*Expressio unius est exclusio alterius.*) Another instance is the rule of *ejusdem generis,* which, briefly stated, is

that where specific language is used (such as inn, restaurant, barber shop) followed by a general phrase (such as other place of accommodation), the general phrase will be interpreted to include only matters of the same kind. Thus, in the instance stated, the phrase would not include the office of a dentist. Still other canons are essentially statements of policy, such as "statutes in derogation of the common law are to be strictly construed," or "remedial statutes are to be liberally construed."

Extrinsic aids involve matters not found in the statute itself. The meaning of a statute may be determined from related laws. Particularly in the federal courts such materials as the historical background of the statute, committee reports, successive drafts of bills during the process of enactment, and, to some extent, legislative debates may be considered.

These aids and guides, however, are simply devices to assist the courts. Frequently the underlying consideration may be some economic, philosophical or social objective.

Occasionally courts will depart completely from the literal wording of a statute in order to avoid what appears to be an absurd or unjust result. They may exclude a particular situation from a statute that plainly includes it. On rare occasions, courts have also applied statutes to persons or situations that were not included in the law in order to supply an inadvertent omission. Strictly speaking, the court does not interpret the statute in either situation, but establishes its own rule on the basis of policy. *See* also AMERICAN LAW.

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Upon their introduction in congress, bills are numbered serially, by chamber of origin and by type (bill or simple, joint or concurrent resolution) and issued in printed form. The Library of Congress Legislative Reference service prepares a *Digest of Public General Bills* currently before congress. Upon passage, new public laws are separately printed. New public and private laws subsequently appear in the *United States Statutes at Large*, a cumulative, annotated edition of all U.S. statutes since the first congress. Much of U.S. public law has been codified in the *United States Code*. In the field of state legislation, the Library of Congress issues cumulative digests of new state laws.

(C. B. N.)

LEGISLATURE, the lawmaking assembly of a state or subdivision of a state. In federal systems the lawmaking bodies of both the central government and the member states or provinces are referred to as legislatures. City councils and the governing boards of other local government units exercise some lawmaking power but are not commonly called legislatures.

In the western world a legislature usually consists of a considerable number of men (and some women) who represent different sectors of the population, who maintain a measure of independence from the executive, and who make laws by a process of deliberating and voting. The legislators may sit in one chamber (unicameral) or in two (bicameral). When chosen by a broadly enfranchised electorate, the legislature is the political organ that gives a political system its democratic character.

The strength of any legislature largely depends on the vitality of democracy in the country concerned, and on the character and vigour of the party system. Great Britain, the Commonwealth countries and the United States tend toward a two-party (or three-party) division with an expectation, by no means always realized, that one party will control both the executive branch and a majority of the seats in the legislature. European countries tend to maintain multi-party systems, and government during much of the time in these countries is carried on by a coalition of parties. Experience in Latin-American countries ranges from strong legislative power maintained by well-organized political parties under vigorous leadership to situations where the executive calls the turn and legislators either quietly acquiesce or protest in vain.

The assemblies convened by authoritarian regimes fail to meet the tests of independence, capacity to issue authoritative decrees, and responsiveness to the general population. They are therefore not discussed in this entry, nor are the legislatures in states currently in transition to democracy, because their legislative institutions are still undergoing change.

Parliamentary and Presidential Systems.—Except for the compulsions imposed by the history of each nation, probably the most significant factor in fixing the character of a legislature is the relationship between legislative and executive power. In a parliamentary system, where the principal executive officers are drawn from the legislature and either resign their offices or dissolve the legislature when they lose its support, legislative power tends to become concentrated in one chamber. This is the case in Great Britain where the house of lords was successively deprived of authority in matters of great moment, where the elected house of commons is for all practical purposes now the British parliament, and where strategy in the commons is directed toward supporting or overthrowing the prime minister and his cabinet.

In presidential systems the popularly elected chief executive exerts influence on the legislators, but he cannot force them to make a choice between supporting him and bearing the risks and costs of an immediate campaign for re-election. Legislators of any party, therefore, may vote contrary to the party's instructions, knowing that their defection will neither hasten the day when they must face the electorate nor have any effect on how long the incumbent chief executive will stay in office.

Functions and Authority.—In modern democratic states, legislatures do the following things, subject in many instances to a suspensory or final veto by the chief executive: (1) the legislature alters and elaborates the body of civil and criminal law; (2) it enacts statutes that initiate and fix the character of major governmental undertakings such as the educational system, the highway system and the social security program; (3) it provides for the public revenue and distributes public money among the various purposes of government; (4) it creates the major departments of government and specifies the authority and the obligations of officers; (5) legislatures in parliamentary systems determine who will comprise the government of the day, and in presidential systems may participate in the selection and replacement of executive officials; (6) legislatures exercise different kinds and varying degrees of supervision over executive and administrative officials and serve as forums for public criticism of the government.

Legislatures vary in the stubbornness with which they cling to and guard their powers. Most jealously guarded is the power to determine how the public money shall be raised, how much shall be raised, and how it shall be distributed among the many activities and undertakings of the government. In English-speaking countries the legislature retains for its own determination the definition of crimes and specification of penalties. In general, the parliaments of Great Britain and of European countries have been more willing to permit the executive to fix the character of governmental programs, create offices, and alter administrative structure than have the U.S. congress and state legislatures.

Structure and Composition.—In most democracies, all legislators, whether they sit in one chamber or two, are elected at the polls. There are, however, notable exceptions, such as the hereditary British house of lords. All members of the Canadian senate, to cite another example, are designated by the prime minister, appointed by the governor general, and serve for life. The same practice is followed for the upper chamber in Quebec, the only Canadian province having a bicameral legislature. In the five Australian states that have bicameral parliaments, all but one of the upper chambers are elected at the polls; in New South Wales vacancies in the senate are filled by vote of the remaining senators and members of the house of representatives. In Switzerland and the Federal Republic of Germany (West Germany) members of one chamber are named by the governments of the several provinces, as was the case for the U.S. senate before 1913.

Electoral-representative systems vary greatly. In the United States, for example, two seats in the senate are allotted to each state regardless of population, but members of the house of representatives are apportioned to the states on the basis of population. House members are chosen in one-member districts created for this special purpose (except where a state is entitled to only one member of the house) and in principle laid out to be nearly equal in population. A wide range of practices controls the com-

position of U.S. state legislatures, both as to how counties may be divided or combined to form districts and as to the number of legislators who may be chosen from a district. One-member districts are the rule for the British house of commons and the central and provincial legislatures of the commonwealth countries.

Contemporary popularly chosen legislative assemblies vary enormously in size. The British house of commons (630 members) is the world's largest. The United States house of representatives (435 members) is fifth in size. Of 58 popularly chosen national assemblies in Europe and in North, Central and South America, 13 have 200 or more members, 15 have 100 to 199, and 30 have fewer than 100. The number of members in the elected chamber of the national parliament in Canada is 265, in Australia 124 and in unicameral New Zealand 80.

Representation.—Probably the most baffling problem in designing legislatures for democratic governments is that of providing for adequate representation of different interest groups among the population. In Europe the multi-party system provides a measure of correspondence between the major ethnic, religious and economic interests on the one hand and the programs of the several parties on the other. Some degree of representativeness can be achieved by assuring an equitable distribution of seats among the major parties. This result, proportional representation (*q.v.*), is secured by creating multi-member districts and adopting various arrangements for casting votes and counting votes, including the practice of voting for party candidate-lists rather than for individual candidates.

In English-speaking countries, where the one-member, geographically defined district prevails, equitable representation may be maintained only by continuous redrawing of district boundaries. Rapid population shifts, reluctance to disturb the organization for nomination and election of candidates, and unwillingness of those who redefine the districts to imperil their personal political security and to weaken the positions of their respective parties—all these factors combine to create a lag in reapportionment of legislative seats. Reapportionment accordingly failed to keep pace with the redistribution of the population in most of the U.S. states, and not infrequently a compulsion to respect county or municipal boundaries in drawing district lines made newly created districts far from equal in population.

In 1962 the U.S. supreme court in the case of *Baker* v. *Carr* (369 U.S. 186) ruled that the equitable distribution of population among legislative districts is a proper question for determination in court; it also made it clear that exceptional differences in population of districts may be declared unlawful and created a strong presumption that if offending legislatures do not equalize district populations the judges may do so themselves. Considerable reapportioning activity by state legislatures immediately followed the court's decision. Some observers felt that the prospect of judicial intervention in the making of districts might induce legislators in a number of states to authorize another officer or body to redistrict the state; this practice is followed in some states and has long been the means for redefining the districts from which members of the British house of commons are chosen.

Two years after the *Baker* v. *Carr* decision the supreme court ruled that both houses of state legislatures must be apportioned on the basis of population and that congressional districts within a state must be as nearly equal in population as practical. The court explicitly rejected the validity of "little federal systems" for state legislatures under which representatives in the upper house were chosen by counties or other geographical areas regardless of population. The decision was hailed as a victory for rapidly growing urban areas, where population was concentrated, over sparsely populated rural areas, and for the principle of "one man, one vote." *See* APPORTIONMENT, LEGISLATIVE; REPRESENTATION.

See also references under "Legislature" in the Index.

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LEGITIMACY. A child that is the issue of a father and mother lawfully married at the time of its birth is legitimate. Moreover, there is a strong presumption that a child born at any time after marriage was lawfully begotten by the husband. This rule may be rebutted by evidence that the husband did not have access to the mother at any time when in the course of nature the child may have been conceived. (As to children born out of lawful wedlock, *see* BASTARD; ILLEGITIMACY.)

The common law of England provided that a child once illegitimate could not be legitimated by the subsequent marriage of its parents. This was in contrast to most systems of law, including Roman law, Scots law and the law of the church. By the Legitimacy act of 1926 it was provided that when the unwed parents of an illegitimate person marry, the marriage shall render that person legitimate from the date of the marriage. The benefits of this act have been expanded by the Legitimacy act of 1959, by which a child born when either father or mother was married to a third person is legitimated by the subsequent marriage of its parents. The general rule in the United States is that legitimacy is presumed upon the establishment of the birth of a child in wedlock, but this presumption may be overcome by proof of the husband's impotency or absence during the natural course of pregnancy and birth, or satisfactory proof of the nonexistence of sexual intercourse. The severity of the common-law rule that the issue of an illegal or void marriage was illegitimate has been abated by statute. Legitimation by subsequent marriage is accepted in the United States, and a number of states permit legitimation in the absence of marriage by acknowledgment of paternity, or by judicial decree. Adoption (*q.v.*) is another widely employed method of legitimation both in the United States and in England. In both countries recent legislation has been directed at improving the status of the subsequently legitimated or adopted child with respect to rights of inheritance. *See* also CHILDREN, LAWS CONCERNING. (M. K. R.)

LEGITIMISTS, the name given in French history to those royalists who from 1830 onward supported the claims of the representative of the senior line of the house of Bourbon (*q.v.*) to be the lawful or legitimate king of France. They were opposed not only to republicans but also to other monarchist factions: to the royalist adherents of the house of Bourbon-Orléans, who at the July revolution of 1830 recognized Louis Philippe as "king of the French" (*see* ORLEANISTS); and to the Bonapartists, who favoured a restoration of the French empire. So long as the comte de Chambord, whom they recognized as Henry V of France, was alive, the Legitimist position was theoretically unassailable from the traditional point of view of French royalists. When the July monarchy (1830–48), the second republic (1848–52) and the second empire (1852–70) had all collapsed, there was some hope that the kingdom of France might be restored. These hopes came to nothing chiefly because the comte de Chambord's intransigence destroyed the possibility of a coalition between the Legitimists and the Orleanists, who stood for a constitutional and limited monarchy.

The comte de Chambord's death without offspring (1883) changed the situation, since the Orleanist pretender, Louis Philippe Albert, comte de Paris (the descendant of Louis XIV's brother), thereupon became the lawful claimant to the French succession in view of the renunciation by Louis XIV's grandson, Philip V of Spain, of his rights to it. A minority of Legitimists, known as the Spanish Whites (*Blancs d'Espagne*) preferred to override the renunciation and to recognize the Carlist pretender to Spain as rightful king of France (in accordance with the Salic law), but the majority rallied to the comte de Paris.

LEGNANO, a city of the Lombardy region, Italy, in the province of Milano, is located in the highest part of a plain on the banks of the Olona river, 27 km. (17 mi.) N.W. of Milan by rail. Pop. (1961) 43,787 (commune). The church of S. Magno, begun by Bramante, was completed in 1529 by Fra Giacomo da Lampugnano; it contains a large altarpiece by Bernardino Luini. The

13th-century archiepiscopal palace was built on land given by Charlemagne to the archbishops of Milan for use as a summer resort. Also of note are the Castello (11th century; reconstructed in the 16th century by the Visconti) and the monument of the battle of Legnano by E. Butti.

Legnano is on the Milan-Domodossola railway line and on the Milan-Varese-Arona motorway. Its well-developed industry includes metallurgical, machinery and milling plants and candle and soap factories. There is some trade in agricultural produce from the vicinity.

Legnano, the ancient Leunianum, was an unimportant settlement during classical times. In the 11th century it became the fortified castle of the bishops of Milan. It sided with the Lombard league during the struggles with the emperor Frederick Barbarossa, and on May 29, 1176, was the scene of a decisive defeat inflicted on the emperor by the Lombard confederate forces commanded by Alberto da Giussano. The victory inspired Verdi's opera *La Battaglia di Legnano* and Giosue Carducci's poem "Canzone di Legnano." Later the city followed the fortunes of Milan (*q.v.*). (M. T. A. N.)

LEGNICA (Ger. LIEGNITZ), a town of southwestern Poland in the Wroclaw *wojewodztwo* (province), is located on the Kaczawa river, 64 km. (40 mi.) W. of Wroclaw. Pop. (1960) 64,000. Despite considerable damage suffered by the town during World War II, many of its ancient buildings have been preserved; of particular interest is the mausoleum of the Piast dukes. Legnica has old industrial traditions. Linen was woven there in the 15th century and tapestries were made between the 16th and 18th centuries. Its modern industries include metalworking, clothing and food processing. A brass foundry was established after World War II. Situated in the Silesian plain, in the midst of a rich agricultural region, Legnica in the middle ages lay on an important trade route between eastern and western Europe and has maintained its position as a transportation centre. It was one of the oldest Silesian castles, mentioned in documents of the 12th century. At Legnica, on April 15, 1241, the Tatars defeated the Polish army under Henry the Pious, duke of Wroclaw, who fell in the battle. Legnica obtained town rights in 1252. From 1249 it was the capital of a duchy that rendered tribute to Bohemia in 1343. Following the death of the last Piast duke in 1675, it passed to the Habsburgs, who yielded it to Prussia in 1742. The town was returned to Poland in 1945. (T. K. W.)

LEGRENZI, GIOVANNI (1626–1690), Italian composer born at Clusone, near Bergamo, and baptized on Aug. 12, 1626. He was the son of a musician. After appointments at Bergamo and Ferrara, he settled in Venice, becoming in 1681 deputy musical director of St. Mark's; from 1685 until his death he was director, completely reorganizing the music there. He died in Venice on May 26, 1690. Unlike most of the leading Italian composers of the age—G. Carissimi, Alessandro Scarlatti, A. Corelli, A. Vivaldi, etc.—who concentrated on one or two kinds of music, Legrenzi was a versatile composer who wrote numerous Masses, motets, psalms, oratorios, operas and chamber works. He was not outstanding in any of these fields and is not on the level of the composers listed above; his instrumental music is the best known and probably the most rewarding. (N. Fo.)

LEGROS, ALPHONSE (1837–1911), French painter, etcher and medalist who taught at the Slade school, London, was born at Dijon in Burgundy on May 8, 1837. After attendance at the École des Beaux-Arts and a short apprenticeship with a decorator, Maitre Nicolardo, during 1850, Legros left Dijon for Paris in 1851, spending six months at Lyons, working in fresco under Beuchot in the chapel of Cardinal Bonald. In Paris he studied with C. Cambon, a scene painter, then with Lecoq de Boisbaudran in the company of I. Fantin-Latour, F. Bonvin and Regamey, and at the evening classes of the École des Beaux-Arts.

Legros first exhibited at the Salon of 1857 where his profile portrait of his father (Tours) attracted the attention of Champfleury; another portrait was rejected, but was shown by Bonvin in his studio. The "Angelus" (Salon, 1859) was singled out by Charles Baudelaire, and the "Ex Voto" (Dijon) attained an honourable mention in the Salon of 1861. At this time Legros was in intimate contact with painters such as James Whistler and Edouard Manet and seems to have been regarded as an important figure by the champions of the "new realism," Champfleury, Baudelaire and L. Duranty.

Encouraged by Whistler, Legros settled in London in 1863, taking out naturalization papers in 1881. He became teacher of etching at the South Kensington schools and was appointed Slade professor at University college, London, in 1876. His work at the Slade school (1876–92) is to be remembered for his insistence upon sound constructional drawing at a time when draftsmanship was at a low ebb in England. He died at Watford on Dec. 8, 1911.

Important collections of Legros' work, some including bronzes, etchings and drawings, are in Paris and London. Collections of etchings and drawings are in Boston, Mass., and Washington, D.C. Among his notable paintings are "Amende Honorable" and "Dead Christ" (Paris); and "Demoiselles du Mois de Marie," "The Tinker" and "Repas des Pauvres" (London).

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LEGUÍA Y SALCEDO, AUGUSTO BERNARDINO (1863–1932), Peruvian politician and businessman, was born in Lambayeque on Feb. 19, 1863. After a successful business career, he was appointed Peru's minister of finance, serving in that position from 1903 to 1908. He was elected president of Peru in 1908 and served until 1912. From 1913 to 1919 he lived in Europe, returning to campaign again for the presidency. Although elected to office, he could not assume the presidency until he had headed a revolt and had seized the government by a *coup d'etat* (July 4, 1919). Leguía then ruled Peru as a dictator until overthrown in 1930. Jailed for malfeasance in office, he died a prisoner in 1932. During his rule Leguía fostered economic development for Peru, but his greatest historical significance is that the harshness of his regime stimulated the creation of the Aprista party, a reformist movement whose activities following that period revolutionized Peru and influenced political developments in all parts of Latin America. (H. Kr.)

LEGUME (POD), a dry fruit formed from one carpel, splitting by both the front and the back suture into two similar pieces or valves. It characterizes such leguminous plants as the bean, pea, etc., and the name is often used for the plant as a whole.

See FRUIT; LEGUMINOSAE; *see* also references under "Legume" in the Index.

LEGUMINOSAE, the pea family of plants comprising approximately 600 genera and 13,000 species (thus second only to the Compositae in number of species), cosmopolitan in distribution at all altitudes, readily adaptive to various habitats and including many economically valuable members. It includes herbs, lianas, shrubs and trees. A few species are aquatic. The family is regularly divided into three subfamilies: Papilionoideae or sweet pea, Mimosoideae or sensitive plant and Caesalpinioideae or senna. A specific pod type of fruit, the legume, characterizes all three subfamilies. In English the noun legume may be used in two senses, the more comprehensive meaning being the leguminous plant as a whole; the more specific, one part of the plant, the fruit.

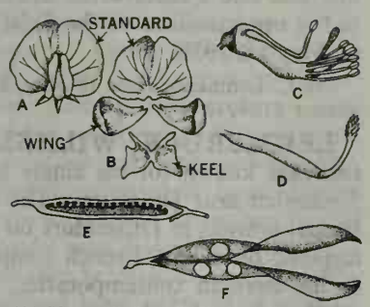
Economic Importance.—The legumes are economically important as food, medicinals, chemicals, forage, timber, etc. The seeds of bean, pea, soybean and lentil have been staple food for centuries. Some pods are edible; *e.g.*, the fruit of the carob tree is St. John's bread. The pod of the tamarind tree furnishes an acid pulp used in preserves and beverages. Chemicals and medicinals are invariably the product of trees or shrubs of the warmer climates: Indian senna is a cathartic from a species of *Cassia;* hematoxylin is a purple dye from the heartwood of the logwood tree, useful in staining tissues; gum arabic is from a species of *Acacia;* rotenone (an insecticide) from *Lonchocarpus;* gum tragacanth from the milk vetch; balsam of copaiba is an oleoresin from various species of *Copaifera;* true copal, the resinous exudates from various species of principally tropical African Caesalpinioideae, is useful in lacquers and varnishes; etc. Herbs, too, are occasionally chemically and medicinally important; *e.g.*, the indigo plant as a source of the blue dye; the licorice plant, whose root yields licorice. Forage plants

include many legumes almost exclusively belonging to the Papilionoideae, such as various species of lespedeza and clover, partridge pea, wild alfalfa, soybean, lotus, etc. All of these are abundant in temperate climates. Cajan bean and horse bean (*Canavalia*) are grown for forage in tropical areas. Timber trees are principally tropical; *e.g.*, the dalbergias, including rosewood and blackwood; a few acacias, *e.g.*, the blackwood of Australia; the purpleheart trees (*Peltogyne*), the wallabas (*Eperua*); ironwood (*Apuleia*) from South America. The false acacia or black locust of the more temperate climates is an exception.

Surprisingly few leguminous herbs are cultivated in gardens, with lupine, wild indigo, sweet pea and everlasting pea as examples of exceptions. Woody vines or lianas, such as wisteria, horse bean and butterfly pea, are treasured by gardeners. Well-known shrubs include broom, scotch broom (*Cytisus scoparius*), bladder senna, peacock flower, the *Amherstia nobilis*, a Burmese species considered by many to be the most attractive of all shrubs. The list of showy leguminous trees is impressive: the spectacular poinciana tree native to Madagascar, the coral tree, silk tree, Judas tree or redbud, Japanese pagoda tree, etc. A few species native in temperate climates are cultivated; *e.g.*, redbud.

The Flower.—The Leguminosae is closely allied with the rose family (Rosaceae), the two being grouped in the order Rosales. Individual blossoms of the Leguminosae usually have the complete complement of four whorls: the outermost calyx, usually green and cup shaped, occasionally persisting in fruit; the corolla of one to five often highly coloured petals; the male organs (stamens); and the centrally located female organ (pistil), from which the legume will form.

The subfamily Papilionoideae (often raised in status as a family, Papilionaceae) has relatively large flowers bearing a fancied resemblance to a butterfly (Lat. *papilio*, "butterfly"); *e.g.*, sweet pea. The two basal petals are united into a boat-shaped keel, the two lateral ones resembling wings, and the single superior petal the standard or vexillum, conspicuous and flaring. In the bud the standard lies outside the other petals. In the kidney bean the corolla is conspicuously twisted; clovers and sweet clovers have the standard much larger than the other petals; in the lead plant (*Amorpha*) the petals are solitary.



ADAPTED FROM G. LAWRENCE, "INTRODUCTION TO PLANT TAXONOMY"; REPRODUCED BY PERMISSION OF THE MACMILLAN CO.

CHARACTERS OF LATHYRUS LATIFOLIUS: (A) FLOWER, FACE VIEW; (B) COROLLA; (C) FLOWER, LESS PERIANTH; (D) PISTIL; (E) OVARY, VERTICAL SECTION; (F) LEGUME, DEHISCED

The stamens, arising near the base of the pistil, are regularly ten, the small pollen-bearing sacs (anthers) borne on slender stalks united (monadelphy) along much of their length as a delicate sheath investing the ovary. Occasionally the tenth stamen is free (diadelphy). In the sophoras, such as the Japanese pagoda tree, all the stamens are free. In all leguminous plants the central and solitary pistil has a slender compressed ovary surmounted by a more slender style with a simple or highly modified stigmatic surface. Many flowers are insect pollinated, and the floral mechanisms to allow pollen from the anthers to reach the stigmas of the pistils are intricate. In the peanut (groundnut) the stalk below the ovary elongates during fruit formation, forcing the legume beneath the soil.

In the Mimosoideae the petals do not overlap each other in the bud. Individual flowers are often pomponlike in appearance, with the outermost parts arranged in raylike fashion (radial symmetry), the stamens being numerous and elongate; *e.g.*, silk tree, acacia. In the Caesalpinioideae the flowers are usually bilaterally symmetrical with five petals. In the bud the standard is overlapped by the others.

The flowers of the legumes are rarely solitary (some species of *Astragalus* and *Swartzia*), but usually occur in clusters (inflorescences). The individual flowers regularly occur on stalks (pedicels) disposed along an axis, *e.g.*, lupine, or are compressed in dense

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PERENNIAL SWEET PEA (LATHYRUS LATIFOLIUS)

heads; *e.g.*, many Mimosoideae, clover, alfalfa, *Brownea*, etc. The inflorescences may terminate the shoot (prairie clover) or may arise laterally (locust). Pendent inflorescences are usually attractive, as in wisteria and laburnum.

The Fruit.—As in the case of the flowers the fruits are very important in distinguishing the kinds of leguminous plants. The fruit of legumes are narrowly oblong, splitting open uniformly to form two valves, the seeds being arranged in rows. There is great variation in size, shape, texture, external ornamentation, thickness, mode of splitting open (dehiscence), etc.

The pods of *Entada phaseoloidis* and yard-long bean, both tropical, may reach a metre in length. Minute flowers often form elongate fruits; the pinhead-size pistils of *Prioria* and of some species of *Dimorphandra* may form pods six inches or more in length. Striking shapes, such as orbicular (*Pterocarpus*), club shaped (balsam of Peru), coiled (alfalfa) and corkscrew shaped (*Prosopis*), are not unusual. The term loment is applied to those pods whose valves are constricted along their length as a series of joints, the whole somewhat beadlike in appearance; *e.g.*, tick trefoil, sophoras, some acacias, etc. Pods are occasionally four angled (*Inga*). Winged legumes are not uncommon (*Pterogyne*, sainfoin), while some pods may remain hairy (some lupines); in tick trefoil the hairs are hooked. The valves may be conspicuously warty (courbaril), spinose (*Tessmannia, Sindora*), pitted (sainfoin) or glandular (*Hoffmanseggia*). Resinous deposits are occasional (courbaril, copaiba). Some pods may remain paperlike in thickness (some vetches), while others may be thick walled and leathery (Kentucky coffee tree). Occasionally the outer part of the valves will break away from the inner portion (endocarp), the latter enclosing the seeds. Some fruits are indehiscent at maturity (peanut). The bulk of the wall may be pulpy (tamarind); if the wall is both fleshy and indehiscent (*Detarium* and some species of *Andira*), the fruits are drupaceous. Examples of colourful pods are those of the hyacinth bean, purple in colour, and those of black medick.

The vast majority of fruits dehisce with the valves separating evenly (garden pea) or occasionally twisting and curling (lotus). In the bladder senna these may open elastically, discharging the seeds in explosive fashion. The internal wall of the valves may be smooth or variously modified to form septa dividing the fruit into chambers or cells, usually with one seed per chamber (purging cassia). Occasionally pulpy material may envelop the seeds (Kentucky coffee tree).

Seeds are as valuable for diagnostic purposes as the valves enclosing them. Single-seeded pods are occasional (water locust, lespedeza). Seeds vary greatly in shape, size, texture and colour of the seed coat, food material (endosperm), etc. Oblong, kidney-shaped and round seeds are common. The similarity of the lens of the eye to the seed of the lentil prompted the animal anatomists to use the genus name *Lens* for this anatomical part. The seed covering or testa is often brilliantly coloured (*e.g.*, seeds of coral tree, some species of *Ormosia*). Seeds like the bean and the pea have very thin testae, while others (tamarind, carob tree) have very hard coats. The shape and position of the hilum, marking the point of attachment of the seed stalk (funicle), are important distinguishing features. The funicle may differentiate as an aril, in whole or in part covering the seed coat. The aril is often fleshy and spectacular in colour.

Leaves and Roots.—Simple leaves (*i.e.*, those with blades not divided into leaflets) are rare among leguminous plants (*e.g.*, redbud). Compound leaves are typical, with the leaflets often arising in fingerlike fashion from the leafstalk or petiole (digitately palmate); *e.g.*, cassia, black locust. In the Mimosoideae the leaf

axis is usually subdivided into branchlets bearing leaflets, *i.e.*, are twice pinnate; *e.g.*, sensitive brier, acacia. Bipinnate leaves also characterize a number of the groups of the Caesalpinioideae.

In the bauhinias (mostly vines) the leaves, while simple, are conspicuously two lobed above the middle of the blade; this influenced Linnaeus, the great Swedish taxonomist of the 18th century, to name the group in honour of the Bauhin brothers, famous herbalists of the previous century.

The leafstalk of leguminous plants has a pair of small leaflike organs (stipules) at the base; occasionally these are rather large (garden pea) or are reduced to thorns (*Robinia,* some acacias). Many of the acacias and cassias have obvious glands on the leaves, useful in diagnosing the species. A few groups (*Acacia, Tachigalia, Sclerolobium*) have petioles swollen as insect homes (myrmecodomatia), with ants as the principal inhabitants. In some acacias the hollowed-out thorns serve as ant homes. Climbing organs (tendrils) occasionally terminate the leaf axis (garden pea). *Mimosa* (*q.v.*) *pudica,* the sensitive plant of South America, has foliage remarkably responsive to touch, the pairs of leaflets often folding together and the entire leaf drooping. Sudden changes in water content of small organs (pulvini) at the base of the individual leaflets and the unit leaf account for this.

Throughout the daytime the leaves of many leguminous plants change position, *e.g.*, clover, alfalfa, bean, rain tree, etc., a response to differences in light intensity ("sleep movements"). The leaflets of the telegraph plant of tropical Asia may change position every few minutes. In certain acacias the petioles may be enlarged so as to resemble leaf blades (phyllodes), the true blades being reduced or absent.

In many leguminous plants, especially in arid regions, the roots penetrate the soil to considerable depths, being much longer than the shoots above. On the rootlets of leguminous plants are small swellings (nodules) containing nitrogen-fixing bacteria of the genus *Rhizobium*. The nitrogen-fixing bacteria live in beneficial association (symbiosis) with the root tissues. They take the free nitrogen from the air and fix it into complex nitrogenous compounds. The excess nitrogenous compounds elaborated by the bacteria are utilized by the green plant for growth. When these plants die and decay, the nitrogenous material in the nodules is made available to the soil.

Many farmers rotate such plants as clover or alfalfa with regular crop plants to avoid impoverishment of the soil. By the same token leguminous plants like soybean may be grown exclusively on the same site, serving not only to maintain a rich soil but also as crops useful for food, fodder, sources of oil, plastics, etc. Soybean, once grown exclusively in the orient, is grown extensively in the United States, especially in the midwestern states, and represents one of the most important U.S. crops. The role of industrial chemistry in the development of many soybean derivatives is a commercial saga almost without parallel. *See* articles on the different members of the family, as ACACIA; BEAN; CLOVER; LENTIL; etc. (J. D. DR.)

LEH, the capital of Ladakh (*q.v.*), is situated 4 mi. from the right bank of the upper Indus, about 160 mi. E. of Srinagar and 300 mi. S. of Yarkand, Sinkiang, and 11,500 ft. above sea level. Pop. (1961) 3,720. Leh and the southern part of Ladakh lie south of the cease-fire line of midnight Dec. 31, 1948, and are within the Indian sector of Kashmir; the northern part of Ladakh and Baltistan are in the sector held by Pakistan.

Leh is a centre of Buddhist monasteries and of the trade between India, Sinkiang and Tibet, being the meeting place of routes from Kashgar, Yarkand, Khotan and Lhasa. The two chief roads from India to Leh traverse the Zoji La pass (11,578 ft.) via Srinagar and the Kulu valley, respectively. From there also the Janglam trade route to Lhasa and China leads through the Mariam La pass into the valley of the Tsangpo (Brahmaputra). The old palace of the *gyalpo*, or king, is a large pile on a ridge overhanging the town. (K. S. AD.)

LEHÁR, FRANZ (1870–1948), Hungarian composer of operettas who achieved world-wide success with *Die lustige Witwe* (*The Merry Widow*). Born at Komárom on April 30, 1870, he entered the Prague conservatory in 1882 and later studied with Z. Fibich. Having been encouraged by Dvorak to follow a musical career, he assisted his father in conducting a military band. From 1890 he traveled in Austria as a bandmaster and in 1896 achieved his first success with his operetta *Kukuschka*, produced at Leipzig. In *The Merry Widow* (Vienna, Dec. 30, 1905), on a libretto by Viktor Léon and Leo Stein, he spontaneously created a new style of Viennese operetta, introducing waltz tunes and imitations of the Parisian cancan dances as well as a certain satirical element. Its success was such that two years later it was being played at Buenos Aires at five theatres simultaneously. Many other operettas followed, first given in Vienna but equally well known in England and the U.S. under their English titles, *The Man with Three Wives* (1908), *The Count of Luxembourg* (1909), *Gypsy Love* (1910) and *The Land of Smiles* (1923). Several of his works were filmed, including *The Merry Widow* and *The Land of Smiles*. He wrote a single grand opera, *Giuditta* (Vienna, 1934), which was less successful. He died at Bad Ischl, Austria, on Oct. 24, 1948.

See W. Macqueen-Pope and D. L. Murray, *Fortune's Favourite: The Life and Times of Franz Lehár* (1953).

LE HAVRE: *see* HAVRE, LE.

LEHMANN, LILLI (1848–1929), German operatic soprano and Lieder singer. Born at Würzburg on Nov. 24, 1848, she studied with her mother and made her debut in 1865 in Prague as the First Boy in Mozart's *Zauberflöte*. In 1870 she joined the Berlin opera, sang the Queen of the Night in *Die Zauberflöte* and other coloratura parts, and at the first Bayreuth festival in 1876 was coached by Wagner in the parts of the Woodbird, Helmwige and Woglinde. Later she undertook dramatic soprano roles and became the greatest Isolde of her day, singing in the first U.S. performance of *Tristan* (Dec. 1, 1886). She was an equally outstanding Fidelio (to the Florestan of her husband, Paul Kalisch), Norma and Donna Anna. On her return to Germany she gave memorable Lieder recitals, combining them with opera in 1891. She was also a remarkable Mozart singer, being active from 1905 in the organizations of the Salzburg festivals. She died in Berlin on May 16, 1929.

See L. Lehmann, *How to Sing,* 3rd ed., Eng. trans. by Clara Willenbücher (1949).

LEHMBRUCK, WILHELM (1881–1919), German sculptor, best known for his single nudes, was born Jan. 4, 1881, at Meiderich near Duisburg. The son of a miner, he went through the art schools in Düsseldorf on scholarships. Although formally inspired by recent French sculpture, his art, like that of many of his German contemporaries, was sensitive, intense and pessimistic. Lehmbruck alone, however, achieved a style that was monumental as well as tragic. Almost all his greatest works are simply posed, lean, angular, agonized. These he studied and restudied, sometimes making a sequence of variants. While living in Paris between 1910 and 1914 he created statues of melancholy, brooding girls. The statues of youths modeled in Berlin and Zürich, Switz., during World War I turn in upon themselves, tortured and despairing. He himself committed suicide in Berlin, March 25, 1919. Since his favourite materials were bronze and synthetic stone (a kind of concrete), his principal works exist in several casts. Among his works are: "Standing Woman" (1910), "Kneeling Woman" (1911), "The Overthrown" (1916), "Seated Youth" (1918). He also made portrait busts, paintings, etchings and lithographs. The Museum of Duisburg and the Museum of Modern Art in New York city contain the largest collections of his works.

COURTESY OF THE MUSEUM OF MODERN ART, MRS. JOHN D. ROCKEFELLER FUND

LEHMBRUCK'S "KNEELING WOMAN" (1911). CAST STONE, 69½ IN. HIGH. IN THE MUSEUM OF MODERN ART, NEW YORK CITY

BIBLIOGRAPHY.—Paul Westheim, *Wilhelm Lehmbruck,* 2nd ed. (1922); August Hoff, *Wilhelm Lehmbruck seine Sendung und seine Werke* (1936); Reihe Europäische Bildhauer, *Wilhelm Lehmbruck* (1957). (J. P. C.)

LEIBL, WILHELM (1844–1900), German portrait and subject painter, who has been called the first modern German realist, was born on Oct. 23, 1844, in Cologne, where his father was *Musikdirektor* of the cathedral. In 1861 he became the student of H. Becker and in 1864 entered the Munich academy, where his teachers were Strähuber and Anschütz. He then studied with Avon Ramberg (1866–68) and Piloty (1869). In 1869 he exhibited his first painting at the Munich exhibition. In the following year he gained the Paris gold medal with his "Portrait of Frau Gedon," painted in the manner of Rembrandt. Coming under the influence of Courbet, he then went to work in Paris, but the outbreak of the Franco-German War sent him home after nine months. From 1870 to 1873 he lived in Munich and afterward worked at small country places in Bavaria, settling at Berbling (1878–81), Aibling (1881–92) and Kutterling (1892–1900), where he led the life of a peasant and, in opposition to the prevailing style of romantic idealism, painted the scenes around him.

As Leibl grew older he ceased to imitate the Dutch masters and followed his own strong instinct for colour, reproducing what he saw with a bold, sure touch. His superb technique enabled him to paint liquidly and broadly and yet to do detail work of the utmost delicacy. Leibl also etched 19 plates. He died at Würzburg on Dec. 4, 1900.

LEIBNIZ, GOTTFRIED WILHELM (1646–1716), German philosopher, mathematician and man of affairs, one of the major systematic thinkers of modern times, important both as a metaphysician and as a logician and distinguished also for his independent invention of the differential and integral calculus, was born on July 1 (new style; June 21, old style), 1646, at Leipzig, where his father was professor of moral philosophy. Though the name Leibniz, Leibnitz or Lubeniecz was originally Slavonic, his ancestors were German and for three generations had been in the employment of the Saxon government. Young Leibniz was sent to the Nicolai school at Leipzig, but from 1652, when his father died, seems to have been for the most part his own teacher. From his father he had acquired a love of historical study. The German books at his command were soon read through, and with the help of two Latin books—the *Opus Chronologicum* of Sethus Calvisius and an illustrated edition of Livy—he learned Latin at the age of eight. Before he was 12 he could read Latin easily and had begun Greek; he had also remarkable facility in writing Latin verse. He next turned to the study of logic, attempting already to reform its doctrines and zealously reading the scholastics and some of the Protestant theologians.

At the age of 15, Leibniz entered the University of Leipzig as a law student. His first two years were devoted to philosophy under Jakob Thomasius, a Neo-Aristotelian, who is looked upon as having founded the scientific study of the history of philosophy in Germany. It was at this time, probably, that he first made acquaintance with the thinkers who had already revolutionized science and philosophy, Francis Bacon, Cardan, Campanella, Kepler, Galileo and Descartes; and he began to consider the difference between the old and new ways of regarding nature. He resolved to study mathematics. It was not, however, till the summer of 1663, which he spent at Jena under Erhard Weigel, that he obtained the instruction of a mathematician of repute. The next three years he devoted to legal studies, and in 1666 he applied for the degree of doctor of law, with a view to obtaining the post of assessor. Being refused because of his youth, he left his native town forever. At Altdorf—the university town of the free city of Nürnberg—his dissertation *De casibus perplexis* procured him the doctor's degree at once (Nov. 1666) and the immediate offer of a professor's chair, which, however, he declined, having, as he said, "very different things in view."

Leibniz, not yet 21 years of age, was already the author of several remarkable essays. In his bachelor's dissertation *De principio individui* (1663), he had defended the nominalistic doctrine that individuality is constituted by the whole entity or essence of a thing; his arithmetical tract *De complexionibus,* published in an extended form under the title *Dissertatio de arte combinatoria* (1666), was an essay toward his lifelong project of a reformed symbolism and method of thought; and besides these there were juridical essays, including the *Nova methodus docendae discendaeque jurisprudentiae,* written in the intervals of his journey from Leipzig to Altdorf. This last essay is remarkable, not only for the reconstruction that it attempted of the *Corpus Juris* but also as containing the first clear recognition of the importance of the historical method in law. Nürnberg was a centre of the Rosicrucians, and Leibniz, busying himself with the writings of the alchemists, soon gained such a knowledge of their tenets that he was supposed to be one of the secret brotherhood and was even elected their secretary.

Mainz and the Visit to France.—A more important result of his visit to Nürnberg was his acquaintance with Johann Christian von Boyneburg (1622–72), formerly first minister to the elector of Mainz and one of the most distinguished German statesmen of the day. By his advice Leibniz printed his *Nova methodus* in 1667, dedicated it to the elector and, going to Mainz, presented it to him in person. It was thus that Leibniz entered the service of the elector of Mainz, Johann Philipp von Schönborn, at first as an assistant in the revision of the statute book, afterward on more important work.

The policy of the elector, which the pen of Leibniz was now called upon to promote, was to maintain the security of Germany, threatened on the west by the aggressive power of France, on the east by that of Turkey. Thus in 1669, when the crown of Poland was vacant, it fell to Leibniz to support the claims of the German candidate, which he did in his first political writing, *Specimen demonstrationum politicarum pro eligendo rege Polonorum,* attempting, under the guise of a Catholic Polish nobleman, to show by mathematical demonstration that it was necessary in the interest of Poland that it should have the count palatine of Neuburg as its king. But neither the diplomatic skill of Boyneburg, who had been sent as plenipotentiary to the election at Warsaw, nor the arguments of Leibniz were successful, and a Pole was elected to fill the vacant throne.

A greater danger threatened Germany in the aggressions of Louis XIV. Though Holland was in immediate danger, the seizure of Lorraine in 1670 showed that Germany also was threatened. It was in this year that Leibniz wrote his memorandum on "public safety and the present state of affairs," in which he urged the formation of a new "Rhenish league" for the protection of Germany and contended that the states of Europe should employ their power, not against one another, but in the conquest of the non-Christian world, in which Egypt, "one of the best situated lands in the world," would fall to France. The plan was discussed with Boyneburg and obtained the approval of the elector. French relations with Turkey were at the time so strained as to make a breach likely, and at the close of 1671, when the Third Dutch War was imminent, Louis himself was approached by a letter from Boyneburg and a short memorial from the pen of Leibniz, who attempted to show that Holland itself, as a mercantile power trading with the east, might be best attacked through Egypt, while nothing would be easier for France or would more largely increase its power than the conquest of Egypt. On Feb. 12, 1672, a request came from the French secretary of state, Simon Arnauld de Pomponne (1618–99), that Leibniz should go to Paris. Louis seems still to have kept the matter in view, but never granted Leibniz the personal interview that he desired, while Pomponne wrote, "I have nothing against the plan of a holy war, but such plans, you know, since the days of St. Louis, have ceased to be the fashion." Not yet discouraged, Leibniz wrote a full account of his project for the king (*De expeditione Aegyptiaca . . . justa dissertatio*) and a summary of the same (*Consilium Aegyptiacum*) evidently intended for Boyneburg. But Boyneburg died in Dec. 1672, before the *Consilium* could be sent to him; nor did the former ever reach its destination. The French quarrel with the Turks was made up, and the plan of a French expedition to Egypt disappeared from practical politics till the time of Napoleon, who, on taking possession of Hanover in 1803, learned that the idea of

a French conquest of Egypt had been first put forward by a German philosopher.

Political duties, however, never made Leibniz lose sight of his philosophical and scientific interests. At Mainz he was still busied with the question of the relation between the old and new methods in philosophy. In a letter to Jakob Thomasius (1669) he contends that the mechanical explanation of nature by magnitude, figure and motion alone is not inconsistent with the doctrines of Aristotle's *Physics*, in which he finds more truth than in the *Meditations* of Descartes. Yet these qualities of bodies, he argues in 1668 (in an essay published without his knowledge in 1669 under the title *Confessio naturae contra atheistas*), require an incorporeal principle, or God, for their ultimate explanation. He also wrote at this time a defense of the doctrine of the Trinity against Andreas Wissowatius (1669), and an essay on philosophic style, introductory to an edition of the *Anti-barbarus* of Marius Nizolius (1670). Clearness and distinctness alone, he says, are what makes a philosophic style, and no language is better suited for this popular exposition than the German. In 1671 he issued a *Hypothesis physica nova*, in which, agreeing with Descartes that corporeal phenomena should be explained from motion, he carried out the mechanical explanation of nature by contending that the original of this motion is a fine ether, similar to light, or rather constituting it, which, penetrating all bodies in the direction of the earth's axis, produces the phenomena of gravity, elasticity, etc. The first part of the essay, on concrete motion, was dedicated to the Royal Society of London, the second, on abstract motion, to the Paris academy.

Leibniz therefore had other than political considerations in mind during his visit to France. In Paris he met Antoine Arnauld, Nicolas Malebranche and Christiaan Huygens. This was preeminently the period of his mathematical and scientific activity. Before leaving Mainz he was able to announce (in a letter to John Frederick, duke of Brunswick-Lüneburg) an imposing list of discoveries and plans for discoveries—arrived at by means of his new logical art, in natural philosophy, mathematics, mechanics, optics, hydrostatics, pneumatics and nautical science, not to speak of new ideas in law, theology and politics. Chief among these discoveries was that of a calculating machine for performing more complicated operations than that of Pascal—multiplying, dividing and extracting roots, as well as adding and subtracting. This machine was exhibited to the Académie des Sciences in Paris and to the Royal Society of London, and Leibniz was elected a fellow of the latter society in April 1673. He was made a foreign member of the Paris academy in 1700. He had gone to London as an attaché on a political mission from the elector of Mainz in Jan. 1673 and had there become personally acquainted with Heinrich Oldenburg, the secretary of the Royal society, with whom he had already corresponded, with Robert Boyle the chemist and with John Pell the mathematician. It is from this period that we must date the impulse that directed him anew to mathematics. By Pell he had been referred to Nicolaus Mercator's *Logarithmotechnia* as already containing some numerical observations which Leibniz had thought original on his own part. On his return to Paris (March 1673), he devoted himself to the study of higher geometry under Huygens, entering almost at once upon the series of investigations which culminated in his discovery of the differential and integral calculus (*see* CALCULUS, DIFFERENTIAL AND INTEGRAL).

The Hanoverian Service.—Shortly after his return to Paris, Leibniz ceased to be in the Mainz service any more than in name. In the same year, however, he entered the employment of the duke of Brunswick-Lüneburg, with whom he had been corresponding for some time. In 1676 he moved, at the duke's request, to Hanover, traveling by way of London and Holland. At The Hague he had several conversations with Spinoza, read the latter's manuscript *Ethica* and copied various passages from it.

For the remaining 40 years of his life Leibniz was in the service of the house of Brunswick, with his headquarters at Hanover, where he had charge of the ducal library. Much of his time, in consequence, was occupied in working to serve the political and dynastic ambitions of his patrons: as a beginning he published two pamphlets (1677) in support of their claim to be represented at the congress of Nijmegen. In addition, he was concerned with a scheme for the reunion of the Catholic and Protestant churches and, in 1686, wrote his *Systema theologicum* in an attempt to find common ground for them in the details of their creeds; but the project had soon to be abandoned. A further scheme of church union in which Leibniz was engaged, that between the Reformed and Lutheran churches, met with no better success.

Researches into the genealogy of the house of Brunswick involved Leibniz in a long period of travel (1687–90) in southern Germany and in Italy, in the course of which he was successful in establishing the ancestral connection between the ducal houses of Brunswick (Guelph or Welf) and of Modena (Este). His collection of historical documents enabled him not only to begin a voluminous series of histories of the house of Brunswick but also to publish materials for a code of international law (*Codex juris gentium diplomaticus*, 2 vol., 1693–1700).

Hanover (Brunswick-Lüneburg) was raised to the status of an electorate in 1692; and on the attainment of this long-pursued end the princes of Brunswick came to regard Leibniz' academic propaganda as being no longer of such great practical value. The electress Sophia, however, and her daughter Sophia Charlotte, electress of Brandenburg, continued to respect the philosopher; and in 1700, through Sophia Charlotte's influence, he was invited to Berlin. Then, on July 11, 1700, the Berlin academy was founded, in accordance with Leibniz' recommendations and with Leibniz as its first president. Sophia Charlotte's death (1705) was a great blow to Leibniz, and after 1711 his visits to Berlin ceased. From 1712 to 1714 he was in Vienna, where he had the rank of imperial privy councillor, as well as the title of Freiherr.

Controversy over priority in the discovery of the calculus (*see* NEWTON, SIR ISAAC) embittered Leibniz' closing years. He died in Hanover, neglected, on Nov. 14, 1716. His secretary, J. G. von Eckhart, was his only mourner; and an eyewitness of the funeral records that "he was buried more like a robber than what he really was, the ornament of his country" (*Memoirs of John Ker of Kersland*, 1726). In London and in Berlin likewise his death passed unnoticed.

Leibniz possessed a wonderful power of rapid and continuous work; even when traveling his time was employed in solving mathematical problems; and to the last he preserved the indomitable energy which has won him recognition as a man of almost universal attainments and almost universal genius. He is described as moderate in his habits, quick of temper but easily appeased, charitable in his judgments of others and tolerant of differences of opinion, though impatient of contradiction on small matters. He is also said to have been fond of money to the point of covetousness; he was certainly desirous of honour and felt keenly the neglect in which his last years were passed.

(W. R. So.; M. KE.)

PHILOSOPHY

With the exception of the *Dissertatio de arte combinatoria* of 1666, which is important for his logic, Leibniz' major philosophical works were composed in the years between 1685 and 1716. His system appears to have been completed in outline in 1686, when he wrote the *Discours de métaphysique* (unpublished till 1846); but he never published a full and systematic account of his doctrine. Of his more extensive works, the only one published separately in his lifetime was the *Essais de théodicée sur la bonté de Dieu, la liberté de l'homme, et l'origine du mal*, 2 vol. (1710), originally undertaken at the request of the electress Sophia Charlotte, who desired a reply to Pierre Bayle's opposition of faith and reason. He did, however, publish occasional articles in learned periodicals such as the *Acta Eruditorum* (Leipzig) and the *Journal des Savants* (Paris). For an understanding of his system, then, one must consult not only the writings published in his lifetime but also his letters to other philosophers (the correspondence with Samuel Clarke, belonging to the last two years of Leibniz' life, is particularly illuminating "on God, the soul, space and duration") and the major works published posthumously. These include the *Nouveaux essais sur l'entendement humain* (1704; first published 1765), *Principes de la nature et de la grâce, fondés en raison*

(1714; first published in *L'Europe savante,* 1718) and *La Monadologie,* which he wrote for Prince Eugene of Savoy (also 1714; first published in Latin, as *Principia philosophiae,* in the *Acta Eruditorum,* 1721).

The philosophy of Leibniz forms a highly complex but well-integrated system. The width of his interests and his temperamental inclination to accept rather than to reject the doctrines of his predecessors (this is noted by him in a letter to Gabriel Wagner of 1696) and to attempt to reconcile apparently opposing points of view make it possible to interpret the system in different ways. His central doctrines may be presented as arising from reflection on logical, scientific or purely metaphysical problems. It is useless to ask which of these interpretations represents the real or fundamental thought of Leibniz. To him the different aspects of his system appeared to be complementary, and his central theses seemed to derive support from all sources.

His philosophy may nevertheless be presented in the clearest and most elegant form as derived from logical premisses. He presents it in this way himself in the *Discours de métaphysique* of 1686 and in the letters to Antoine Arnauld written to defend it. In the *Discours* the system is virtually complete: only the name "monad," which plays an important part in his later writings, is missing. The same derivation is given extremely succinctly in an undated paper, *Primae veritates* (1st ed. by L. Couturat, *Opuscules et fragments inédits de Leibniz,* 1903, p. 518). In his published works Leibniz preferred a more popular approach, but each of them can be seen as an attempt to explain and to recommend to the public one side of the system presented in the *Discours.*

Leibniz derives the notion of substance, which is of central importance in his philosophy, from that of true predication (*Discours,* 8). In all true predication, he says, the predicate is expressly or virtually contained in the subject. Since the ultimate subject of predication is substance (a doctrine derived from Aristotle), "the nature of an individual substance is to have a notion so complete that it is sufficient to comprise and to allow us to deduce from it all the predicates of the subject to which this notion is attributed." In other words, the individual substance is a self-complete entity such that, given complete knowledge, all true propositions concerning it can be derived from the consideration of it alone, without any reference to other substances. Leibniz assumes that there is a plurality of such substances. He offers some argument for this in the paper *Considérations sur la doctrine d'un esprit universel* (written in 1702), but in general the assumption seems to have been uncritically taken over from the common-sense belief in the plurality of bodies and minds.

An ultimate substance must necessarily be simple, that is, without parts, for the properties of a composite will be determined by the properties of its parts, while the properties of a substance are determined by nothing but its own nature. It is with the notion of simple substance in this sense that Leibniz begins the argument of the *Monadologie* (1714), often regarded as the most complete summary of his system. From this he quickly derives the propositions that the monad is nonspatial (*Monadologie,* 3) and that it can be neither brought into being nor destroyed by natural means (*Monadologie,* 4–6). Each substance must differ from every other in quality, constantly change in quality and possess a variety of qualities at any given moment. It is necessary to assume these propositions in order to account for the variety and change observable in everyday life (*Monadologie,* 8–10). Although all these propositions are supported only by empirical evidence in this section of the *Monadologie,* the requirement that each substance must differ from every other may also be derived directly from the definition of substance given in the *Discours,* for since the nature of a substance is the sum of its predicates, two substances with identical predicates would be identical (the identity of indiscernibles). The qualities and modes of change of substances must be very different from what they are believed to be by common sense; for not only the sense-qualities, but also space, time and motion, which Descartes and Locke had called real and primary, are merely phenomenal (*De modo distinguendi phaenomena realia ab imaginariis*). They are, however, *phenomena bene fundata,* or "well-founded"; *i.e.,* they have real analogues in the monads themselves.

In order to have the properties ascribed to them, all monads must in reality partake of the nature of mind; for only in perception do we find the unity in variety essential to substance (*Monadologie,* 13–14). The elements of reality are thus spiritual atoms, mind or quasi minds. Since it would be absurd to suppose that the reality behind all natural phenomena is conscious mind, Leibniz thus arrives at the important concept of subconscious or unconscious mind (*Monadologie,* 19–21). This concept is developed in most detail in Leibniz' argument against Locke, *Nouveaux essais sur l'entendement humain.* In the introduction to this work various empirical and a priori arguments for the existence of unconscious perceptions are put forward.

What appears to us as matter is in reality an aggregate or mass of low-grade monads, having only rudimentary perceptions. Leibniz believed that this metaphysical view is strongly confirmed by what he regarded as a scientific discovery; viz., that the fundamental conservation law in physics is the conservation of energy and not, as Descartes had maintained, that of momentum (*Discours,* 17–18). Leibniz also argues against the Cartesians that, if the essence of body is taken to be extension, the phenomena of inertia cannot be explained. Every portion of matter is endowed with a certain amount of force, *vis viva.* This is the physical quantity mv^2 (the product of the mass and the square of the velocity; *see* ENERGY), in terms of which Leibniz expressed his conservation law, but which he also seems to identify with mental energy, thus connecting his physics with his metaphysics.

The laws of nature, including the conservation laws, are phenomenally true and may be used without error in the explanation of natural change. Such explanation is not incompatible with explanation in terms of final causes, but is complementary to it (*Discours,* 22). The laws of nature are those which must hold in a world having the greatest possible metaphysical perfection.

The notion of causation which is used in the expression of natural laws is not, however, metaphysically valid. Since the properties of a monad at any given moment belong to it in virtue of its own nature alone, no monad has any influence on any other. The monads are windowless (*Monadologie,* 7). Causation is the phenomenal analogue of the fact that the clarity of perception in one monad is increasing, while that of another is decreasing (*Discours,* 15; *Monadologie,* 50–52). Changes in all monads are correlated because it is the nature of a monad to reflect or to express the whole universe from its own point of view. Each monad is a living mirror of the whole universe (*Discours,* 14; *Monadologie,* 56). There is thus necessarily a "preestablished harmony" (*q.v.*) between the changes in all monads. Leibniz regards the theory of preestablished harmony as affording a solution of the mind-body problem (*see* DUALISM), raised in such an acute form by the Cartesian philosophy. This is argued in detail in the *Système nouveau de la nature et de la communication des substances,* which was published in the *Journal des Savants* in 1695 and followed by three explanations in reply to criticisms. The mind is a monad with relatively clear perceptions in close association with a group of monads with relatively obscure perceptions which form its body. Such a monad is called a soul or entelechy (*Monadologie,* 70). Leibniz also believes that every monad is an entelechy relative to some group of lower monads. Nature is organic throughout and infinitely divisible into organisms (*Monadologie,* 64). Leibniz was encouraged in this belief not only by his mathematical discoveries, which led him to suppose such a system abstractly possible, but also by the recent discovery of minute organisms by the use of the microscope, which seemed to confirm its actual existence.

The system of monads constitutes the best possible world and for this reason was chosen from among all other possible worlds to be actualized by God. Leibniz uses the traditional ontological and cosmological arguments for the existence of God (*Monadologie,* 39–45). In his hands the cosmological argument takes the form of an appeal to the "principle of sufficient reason," the second of the fundamental principles which he recognizes, the other being the "law of contradiction" (*Monadologie,* 31–32). On the dis-

tinction between these principles is founded that between truths of reason and truths of fact. Truths of reason are those which cannot be denied without self-contradiction. All truths concerning individual substances are, therefore, in principle truths of reason; but since there are many conceivable simple substances and combinations of simple substances, the fact that a particular combination exists cannot be a truth of reason. All existential truths are dependent on the principle of sufficient reason and are contingent. The sufficient reason for the existence of the actual world is the choice of God, who necessarily wills the best.

In his later works, especially in the correspondence with Samuel Clarke (*Fifth Letter*, 21), Leibniz derives the identity of indiscernibles from the principle of sufficient reason, arguing that if two substances differed merely numerically, God would have no reason for determining their relative positions. The principle of the identity of indiscernibles is in conformity with the view that this is the best of all possible worlds, for the metaphysically best is that which contains the maximum variety consistent with harmony (*Monadologie*, 58).

The notion of the metaphysically best is most fully explained in a paper of 1697, *De rerum originatione radicali* (published in 1840). This begins with an argument to the existence of God from the principle of sufficient reason, but nevertheless reveals in a striking way the difficulty which Leibniz has in fitting God into his system. He maintains that the existence of a series of contingent things demands something noncontingent as its sufficient reason. We cannot regard any event in the series as sufficiently explained by a preceding event, for that would likewise demand an explanation. The sufficient reason for the temporal lies therefore in the eternal; *i.e.*, in God. But why should the eternal give rise to the temporal at all? Leibniz answers that every possibility has a certain claim to, or nisus toward, existence. "Whence it follows that all possible things tend by equal right toward existence, according to their quantity of essence or reality, or according to the degree of perfection that they contain, for perfection is nothing else than quantity of essence." If this is so, it would seem that the best possible world would exist by its own right, forcing itself, as it were, into existence, without any necessity for choice by God. In order to avoid this, Leibniz would have to deny the necessary connection between perfection of essence and existence. He cannot do this, for the ontological argument, to which he adheres, also depends on this connection (*see* THEISM; also RATIONALISM). The only way out of the dilemma is to identify the best possible world in its totality with God, but this is the position of Spinoza, which Leibniz found intolerable.

Two other problems of a metaphysical-theological nature arise very acutely in the system of Leibniz: the problem of evil and that of free will. It is hard to reconcile the existence of evil with the doctrine that this is the best possible world; and the preestablished harmony seems inconsistent with the freedom of the will. Leibniz struggles with these problems in his longest published work, the *Essais de théodicée*. It was by this work of a semipopular character that Leibniz was best known in the 18th century, and it was against its doctrines that Voltaire leveled his satire in *Candide*. In spite of much ingenuity, it cannot be said that Leibniz succeeds in solving his problems. The account of freedom which logically fits his system resembles that given by Spinoza, by whom he may have been influenced. Freedom is a relative notion, and a substance is free in proportion to its activity; *i.e.*, in proportion to the clarity of its perceptions. This account, however, gives no real meaning to the freedom of choice which Leibniz wishes to allow to human beings.

In spite of his theory that variation among the monads is continuous from the lowest to the highest (letter to Pierre Varignon, 1702), Leibniz accords a special status to human souls (*Discours*, 34–36; *Monadologie*, 29). They alone are self-conscious and aware of the truths of reason and of God. It is therefore their duty to worship God and consciously to further his purpose of metaphysical perfection. In this way Leibniz reconciles his philosophy with the Christian religion and with ordinary ethical thinking.

In theory of knowledge, Leibniz is committed by his metaphysics to the doctrine of innate ideas, which he defends against Locke (*Nouveaux essais*, book i). Since all that happens to a monad springs from its own nature, all a man's thoughts are inherent in him, waiting to be developed. Thus, in a sense, all ideas are innate. Nevertheless some ideas, for instance those of number and of substance, which are involved in all thinking, are innate in a special sense, being ideas of the mind's own properties; and it is legitimate to think of other ideas as empirical, insofar as experience provides the occasion for our becoming conscious of them. The ideas of all spatial and sensory qualities involve the confusion which is inevitable in the created monad. Sensation is in fact confused thinking. An intellect quite free from confusion, such as belongs only to God, would not be aware of sensory properties.

To it all knowledge would be a priori, and the whole history of the world could be deduced from the facts concerning a single monad. Human beings, however, must take as primary the facts of their own perception together with abstract, a priori truths such as those of logic and mathematics. Their generalizations concerning the actual world will of necessity be only probable. For this reason Leibniz urged the importance of the development of the logic of probability, then in its infancy.

In his account of ideas, Leibniz exhibits a marked advance over Descartes. In the paper *Quid sit idea* (written *c.* 1678), he points out that to have an idea of something is to express it; *i.e.*, as the context shows, to represent it symbolically in some way. Further, in the paper *De cognitione, veritate et ideis* (in the *Acta Eruditorum* of 1684), he makes a number of distinctions which had not been made by Descartes, in spite of his free use of the term "clear and distinct idea." Ideas, says Leibniz, are either clear or obscure. An obscure idea is one which does not suffice for the certain recognition of that which it represents, while a clear idea gives the possibility of such recognition. Clear ideas are further either distinct or confused. They are distinct when the person possessing them is able to enumerate separately the marks which enable him to recognize the thing represented; otherwise, they are confused. Distinct ideas again are either adequate or inadequate. Adequate ideas depend upon complete analysis and are probably not possessed by human beings, but our ideas of numbers approach most closely to the ideal. Distinct ideas may also be classified as either symbolic or intuitive. They are necessarily symbolic for human beings when they are so complex that it is impossible to grasp all the parts in a single act of consciousness. We must then use symbols as in algebra. Leibniz points out that, because we must think symbolically, we are in danger of falling into hidden contradiction. The symbol "greatest number" represents nothing, for the ideas represented by the component symbols are incompatible. He therefore insists on the distinction between real and nominal definitions. A real definition must make clear the possibility of its object. Not any conjunction of meaningful words will yield a real definition. This consideration leads Leibniz, in spite of his early approval of nominalism, to reject the extreme nominalism or conventionalism of Hobbes. Truths may depend upon definitions, but they are not therefore arbitrary, for definitions are not arbitrary.

In pure logic, Leibniz anticipated many of the developments of later mathematical logicians. In particular he presented several versions of a calculus similar to George Boole's algebra. In his interpretation of his logical calculi, however, he was hindered by his adherence to the subject-predicate logic central to his metaphysics and so failed to appreciate the importance of the logic of relations. (For a more detailed account of Leibniz' logic *see* LOGIC, HISTORY OF.)

His interest in abstract logical calculi was partly due to the fact that he saw them as sketches for the syntax of the ideal language (*lingua characteristica universalis*), the development of which was one of his most cherished schemes. In this language each simple idea was to be represented by a single symbol, and the rules for combination were to be so simple and clear that it would be possible to decide mechanically which combinations were possible and which not. Disputed questions could thus be determined by calculation.

Linked with the project of the ideal language was that of the universal encyclopaedia, which would contain a summary of all human knowledge, systematically arranged. These projects are unfortunately interdependent, it being impossible to devise the language until the encyclopaedia is completed and impossible to express the facts of the encyclopaedia with complete clarity until the language is devised. Yet, although it is now known that Leibniz' ideals are unrealizable, they have in modified form inspired much later intellectual endeavour, especially the attempts of Gottlob Frege, A. N. Whitehead and Bertrand Russell to develop a system of mathematical logic as the grammar of all science.

See also references under "Leibniz, Gottfried Wilhelm" in the Index.

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LEICESTER, EARLS OF. Although the Saxon, Edwin, grandson of Leofric, earl of Mercia, is sometimes wrongly called earl of Leicester (pronounced Lester), this English title was first created for the Beaumont family. ROBERT DE BEAUMONT (d. 1118), earl of Meulan, probably held the earldom as a subsidiary title and his son ROBERT (1104–68) was the first to style himself earl of Leicester in 1119. He gained considerably by the disruption of Stephen's reign and was justiciar under Henry II. ROBERT (d. 1190), 3rd earl, maintained his influence and power despite his support for the rebellion of Henry, the young king, in 1173. With the 3rd earl the earls of Leicester became hereditary stewards of England until 1399. The earldom reverted to the crown on the death in 1204 of ROBERT, 4th and last Beaumont earl of Leicester.

King John revived the title in 1205 or 1206 for SIMON DE MONTFORT (*c.* 1170–1218) (*see* MONTFORT), nephew and heir of the last Beaumont earl, but deprived Montfort of the title in 1207. The title was regranted in 1231 to SIMON DE MONTFORT (*q.v.; c.* 1208–65), who later led the opposition to Henry III. The title lapsed on Montfort's death at the battle of Evesham (1265). Henry III then gave the earldom to his son EDMUND, earl of Lancaster, and the title remained a subsidiary to that of Lancaster until both were merged in the crown with the accession of Henry of Bolingbroke as Henry IV in 1399.

Elizabeth I granted the earldom in 1564 to her favourite, LORD ROBERT DUDLEY (*c.* 1532–88) (*see* LEICESTER, ROBERT DUDLEY, Earl of), on whose death the title was dormant until it was revived in 1618 for ROBERT SIDNEY (1563–1626), nephew of the previous earl (*see* LEICESTER, ROBERT SIDNEY, 1st Earl of). ROBERT SIDNEY (1595–1677), 2nd earl, was born on Dec. 1, 1595, and was educated at Christ Church, Oxford. After serving in the army in the Netherlands during his father's governorship of Flushing and entering parliament as member for Wilton in 1614, he was admitted to Gray's Inn in 1618. He was given command of an English regiment in the Dutch service in 1616; having succeeded his father as earl of Leicester in 1626, he was employed on diplomatic business in Denmark in 1632 and in France from 1636 to 1641. He was then appointed lord lieutenant of Ireland in place of the earl of Strafford, but he waited in vain for instructions from the king, and in 1643 he was compelled by the king to resign the office to the earl of Ormonde without having set foot in Ireland; he then retired into private life. The younger children of the king were for a time committed to his care at Penshurst in 1649, where he himself died on Nov. 2, 1677. Leicester's eldest son, PHILIP (1619–98), 3rd earl, known for the greater part of his life as Lord Lisle, served as lieutenant general in Ireland under the earl of Ormonde; he strongly favoured the parliamentary cause, and in 1646 he was appointed lord lieutenant of Ireland by the parliament. Named one of Charles I's judges, he refused to take part in the trial; but he afterward served in Oliver Cromwell's council of state and sat in the protector's house of lords. Lisle stood high in Cromwell's favour but nevertheless obtained a pardon at the Restoration. He succeeded his father as earl of Leicester in 1677 and died in London on March 6, 1698. On the death of JOCELYN (1692–1743), 7th earl of this line, the earldom lapsed despite the dubious claims to succession of a certain John Sidney.

After a brief recreation in 1744 for THOMAS COKE (1697–1759), Lord Lovel, who died childless, the title was not revived until GEORGE TOWNSHEND (1755–1811), Lord de Ferrars, was made earl of Leicester in 1784. On the death of his son GEORGE (1778–1855), 2nd earl, the title again became extinct.

Another earldom of Leicester was created in 1837 for THOMAS WILLIAM COKE (1754–1842) (*see* LEICESTER OF HOLKHAM, THOMAS WILLIAM COKE, Earl of), descendant of Thomas Coke. To distinguish this title from that held by the Townshends it was styled as the earldom of Leicester of Holkham. THOMAS (1908–) succeeded as 5th earl in 1949.

LEICESTER, ROBERT DUDLEY, EARL OF (1532 or 1533–1588), favourite of Elizabeth I, was the fifth son of John Dudley, duke of Northumberland (*q.v.*), and was born on June 24, 1532 or 1533. In 1549 he married Amy Robsart. He was sent to the Tower of London in 1553 and attainted after his father's conspiracy to place Lady Jane Grey, his sister-in-law, on the throne. Eventually, however, he was released, served with the English forces in France in 1557 and was restored in blood in March 1558. With the accession of Elizabeth I, who had known him at Edward VI's court, his fortunes soared rapidly. He at once became master of the horse and in April 1559 a privy councilor and knight of the Garter. A tall, handsome, affable man, of great ambition and considerable ability, he soon won the queen's affection as well as her favour. His pretensions aroused bitter jealousy at court; and the all-too-opportune death of his wife, who, as a coroner's jury found, fell downstairs and broke her neck at Cumnor place in Berkshire in Sept. 1560, spread his unpopularity still more widely. For, although it seems probable that Amy's death was in fact due to accident or suicide, rumour had already anticipated it as a thing that would remove an obstacle to his marriage with Elizabeth.

For a time it seemed likely to have this effect, and the queen even allowed him to sound the Spanish ambassador about Catholic support for the match. Yet, though Dudley appealed powerfully to the woman and the Boleyn in Elizabeth, she was too much of a queen and a Tudor not to realize that Amy Robsart was an

even greater obstacle dead than alive. Possibly his importunities hastened this realization. Certainly, although the queen's favour did not diminish, the prospect of their marriage gradually receded, and in 1564 Elizabeth even suggested Dudley as a husband for Mary Stuart. It was probably to further this project that in Sept. 1564 she created him earl of Leicester. He did not yet entirely lose hope and now began to seek Puritan support, if not for his own marriage, at least to spoil the chances of his rival, the Austrian archduke Charles. Possibly his support in 1569–70 for the intrigue against Sir William Cecil (later Lord Burghley) and for the marriage of the duke of Norfolk to Mary was his last effort in this direction.

At all events, in 1571 he seems to have contracted himself to the dowager Lady Sheffield, and he secretly went through a form of marriage with her in 1573. Four or five years later he cast her off, to marry Lettice Knollys, widow of Walter Devereux, earl of Essex—again secretly and once again to the accompaniment of unpleasant rumours about her former husband's death. Meantime, he continued high in the queen's favour, and in 1575 he entertained her and her court with great magnificence and much pageantry at Kenilworth castle. He was settling down, too, as leader, or perhaps figurehead, of that section of opinion which, in opposition to the more cautious policies of Lord Burghley and the earl of Sussex, favoured vigorous action against Spain abroad and against the Roman Catholics at home. He strongly favoured the French alliance and intervention on behalf of William of Orange in the Netherlands in 1572. He was a shareholder in Sir Francis Drake's voyage of 1577–80. He did his best, however, to thwart the proposed match between Francis, duc d'Anjou, and Elizabeth and suffered a temporary disgrace when his secret marriage to Essex' widow was revealed to the queen by Anjou's agent in 1579. Yet when the French match was tacitly shelved, Elizabeth chose Leicester to escort Anjou to Antwerp to be invested with the government of the Netherlands (Feb. 1581), an office which Leicester was suspected of coveting for himself.

As England drew nearer to war with Spain in the 1580s, men of militant views rallied round Leicester. At home he pressed in council and through his supporters in the house of commons for sterner measures against the Catholics, and in 1584 he inaugurated the association for the defense of the queen against conspirators. His zeal drew upon him the famous attack, supposed to be the work of the Jesuit Robert Parsons, known as *Leicester's Commonwealth* (1584). This was suppressed by letters of the privy council, which declared that the charges against the earl were to the queen's certain knowledge untrue. As historical evidence it is, indeed, almost valueless, but it has been widely read and was the ultimate source of Sir Walter Scott's account of Amy Robsart in his novel *Kenilworth*.

In 1585 Elizabeth agreed to send the United Provinces 6,000 troops to assist their revolt against Spain. The general of these troops was to be an English nobleman who was also to share executive authority with the provinces' council of state. For this post she chose Leicester. As a general, he did not distinguish himself, although in the summer campaign of 1586, in which Sir Philip Sidney (*q.v.*) was killed, he at least strengthened temporarily the provinces' vulnerable eastward defenses along the Ijssel. As a politician, his blunders brought the provinces into the gravest danger. He first allowed the states-general to thrust upon him an authority far wider than the queen, anxious not to commit herself too deeply, had intended him to enjoy. Soon afterward he quarreled with the states as well and began to build up a faction of his own. The confusion was increased by his return to England at the end of 1586 and was worse confounded by his supporters' unsuccessful efforts to seize power when he came back in the following summer. When he was finally recalled at the close of 1587, the provinces seemed almost on the verge of civil war and dissolution. Nevertheless, the queen in 1588 appointed him lieutenant general of the army mustered at Tilbury against the Armada and was even considering his appointment as lieutenant general of England and Ireland. However, on Sept. 4, while on his way to Kenilworth, he died at his house at Cornbury in Oxfordshire.

He was a considerable patron of learned men and (despite his support of the Puritans) of the drama also, keeping a company of actors headed by James Burbage.

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LEICESTER, ROBERT SIDNEY, 1ST EARL OF (1563–1626), soldier and diplomat, was the second son of Sir Henry Sidney (*q.v.*) and was born at Penshurst, Kent, on Nov. 19, 1563. He was educated at Christ Church, Oxford, afterward traveling on the continent for several years between 1578 and 1583. In 1585 he was elected member of parliament for Glamorganshire; and in the same year he went with his elder brother Sir Philip Sidney (*q.v.*) to the Netherlands, where he served (1586–87) in the war against Spain under his uncle Robert Dudley, earl of Leicester, and was knighted in 1586. He was sent on a mission to Scotland in the autumn of 1588 and was appointed governor of Flushing in 1589. He returned to the Netherlands to take up this post in 1590 and during the next two years saw much active service with Maurice of Nassau and Sir Francis Vere. After a mission to France in 1593–94, he again spent much of his time in the Netherlands until 1603, distinguishing himself at the battle of Turnhout (1598). On the accession of James I, he returned to England. James raised him at once to the peerage as Baron Sidney of Penshurst, and he was appointed chamberlain to the queen consort. In 1605 he was created Viscount Lisle, and in 1618 earl of Leicester, the latter title having become extinct in 1588 on the death of his uncle, whose property he had inherited. Leicester was a man of taste and a patron of literature, whose cultured life at his country seat, Penshurst, was celebrated in verse by Ben Jonson. He died at Penshurst on July 13, 1626. (R. B. WM.)

LEICESTER, a city, county borough and the county town of Leicestershire, Eng., is situated in the Midlands plain on the river Soar, a southern tributary of the Trent, 98 mi. N.N.W. of London, 25 mi. S. of Nottingham and 39 mi. N.E. of Birmingham by road. Pop. (1961) 273,298.

The focal centre of the city is the clock tower from which four main shopping thoroughfares radiate. There is an inner ring road about midway between the centre and the boundary; to divert traffic, a central ring road encircling the centre at a radius of about a quarter of a mile was under construction in the 1960s. Leicester is on the Grand Union canal. Much redevelopment has taken place near the city centre, and several multistoried office blocks have been erected. Half a mile from the centre an estate of flats and maisonettes has replaced the drab houses which were the legacy of the Industrial Revolution. In the south of the city is a modern concert hall named after a 13th-century benefactor, Simon de Montfort, earl of Leicester. Nearby is Leicester university, chartered 1957, formerly University college, founded in 1918; the building was completed 1921. The Guildhall, the Newarke gateway to the castle, and Trinity hospital all date from the 14th century; and Wyggeston school from the 16th. St. Martin's church (Early English and Perpendicular) became the cathedral in 1926 when the diocese of Leicester was constituted. John Wycliffe preached in the Norman church of St. Mary de Castro.

Leicester has a City Museum and Art gallery, which houses Roman antiquities, paintings and the city's archives. There are two smaller museums: Belgrave hall with 17th- to 19th-century period rooms, and the Newarke houses where the social and industrial history of the city is displayed. Of its public parks, the Abbey park in the north (about 100 ac. with a lake and the abbey ruins) is known for its annual show, and Victoria park in the south contains the Memorial arch by Sir Edwin Lutyens.

Leicester is served by the Midland and Eastern regions of British railways and has two principal stations. An extension of the motorway to Yorkshire will skirt the western boundary of the city after 1965. The nearest air services are from Birmingham airport, 35 mi. S.W.

The oldest big industry is hosiery and knitwear, while in the 19th century the manufacture of boots and shoes became estab-

lished. The presence of these staple industries led to the introduction of light engineering, which now employs the largest labour force in the city. Leicester is also a centre of education with technical and art schools as well as the university. It is a quarter sessions borough and has a separate commission of the peace. It returns four members to parliament.

On an Iron Age settlement by the river Soar, crossed there by the Fosse way, the Romans established the tribal capital Ratae Coritanorum covering 90 ac. All that remains are several pavements, the Jewry wall and part of a public building now enclosed in a public garden. Under the Mercian kings the town was the seat of a bishop and later became one of the five "burhs" of the Danelaw (*q.v.*). At the time of Domesday book there were 322 houses and 65 burgesses. The castle was later held by Simon de Montfort, whose charter survives, and by John of Gaunt; the castle was dismantled by Charles I in 1645, but a few ruins remain and part is incorporated in the assize hall. Richard III was buried in Leicester in 1485 after the battle of Bosworth Field, and Cardinal Wolsey came to the abbey (founded 1143) to die in 1530. A charter of incorporation was granted by Elizabeth I in 1589. By the 18th century Leicester had become a centre of the hosiery industry and non-conformity. In 1832 the Leicester and Swannington railway joined the town with the Leicestershire coal field, and rapid industrial development resulted. The 19th century saw the population of Leicester increase from 17,000 to 210,000, and in 1888 it became a county borough. In 1919 the former rank and title of City of Leicester were restored, and in 1928 the city's chief magistrate was designated lord mayor.

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(G. C. OG.)

LEICESTER OF HOLKHAM, THOMAS WILLIAM COKE, EARL OF (1754–1842), English agriculturist who revolutionized British farming by the introduction of improved methods on his Norfolk estate, was the eldest son of Wenman Roberts, who assumed the name of Coke in 1750. He was born on May 6, 1754, and was Whig member of parliament for Norfolk, 1776–84, 1790–1807, 1807–32; and for Derby, Feb.–April 1807. He was the youngest member when he first entered parliament, the oldest when he retired. He was offered a peerage seven times, under six different prime ministers. He is best remembered, however, as a famous agriculturist. Inheriting his father's estates at Holkham and elsewhere in 1776, he was largely instrumental in transforming the agriculture of his county, introducing the greatly improved methods of arable farming and cattle breeding associated with the names of Jethro Tull, Lord Townshend and Robert Bakewell. Under his direction the rental of the Holkham estate is said to have increased from £2,200 to over £20,000 a year (but he spent over £500,000 on electioneering). In 1837 he was created earl of Leicester of Holkham. By his second wife, whom he married in 1822, when he was 68, he had five sons and a daughter. He died at Longford hall, Derbyshire, on June 30, 1842. Thomas William, the eldest son (1822–1909), succeeded to the earldom.

See A. M. W. Stirling, *Coke of Norfolk and His Friends,* new ed. (1912).

(A. AL.)

LEICESTERSHIRE, a midland county of England, is bounded north by Nottinghamshire, east by Lincolnshire and Rutland, southeast by Northamptonshire, southwest by Warwickshire and northwest by Derbyshire, also touching Staffordshire on the west. The area of the geographical county is 832.1 sq.mi.; of the administrative county 805.6 sq.mi.

Physical Features.—Though ranging above mean sea level from about 90 ft. ordnance survey datum (O.D.) in the north to 912 ft. at Bardon hill, Leicestershire lies mostly between 200 and 400 ft. The fairly broad valley of the river Soar, carrying most of the county's drainage north to the Trent, roughly divides the low plateau of the west, interrupted by a higher area, from a generally higher eastern half.

Charnwood forest, northwest of Leicester, comprises several exhumed northwest to southeast ridges of Pre-Cambrian grits, slates and tuffs, with later Pre-Cambrian granitic and dioritic intrusions, chiefly in the south. Bare, rugged, tor-like eminences rise from tracts of rough grass, heath, bracken and woodland on the thin, sandy acid soils of the ridges, which are separated by smoother cultivated valleys. Westward, Charnwood overlooks the Leicestershire coal field, where Carboniferous rocks form relatively high ground in the north, but are buried in the south. The northwest to southeast Ashby anticline, denuded of productive Coal Measures, separates the eastern mining area from that mainly in Derbyshire. The soils of the Carboniferous, varying from sandy to cold clay loam, are comparatively poor but support mixed farming.

Apart from small outcrops of Carboniferous Limestone, Millstone Grit and Bunter Sandstone in the northwest, and of syenite southwest of Leicester (at Croft, Enderby and Narborough) Keuper Marl forms the remainder of western Leicestershire, but the landforms and soils of this undulating lower country are increasingly modified southward as a mantle of glacial drift becomes thicker and more continuous. The stiff chocolate-red loams of the Keuper give way on drift to soils varying from rather acid clays to friable sandy loams, the latter mainly southwest of Leicester.

East of the Soar and the narrow Keuper belt that borders its right bank, the simple scarp and vale landscape typical of the Jurassic rocks is much complicated by local folding and erosive leveling, both dating from the Tertiary period, and by an extensive glacial drift cover. The Jurassics, characteristically dipping gently east or southeast, include two important resistant bands among the predominant clays and shales. In the north an iron-rich sandstone, the Middle Lias Marlstone bed, caps the Belvoir ridge whose steep scarp, up to 500 ft. high, looks northwest over the vale of Belvoir formed in Lower Lias shales. Bare of drift, the vale has heavy acid soils mainly under moderately good grass. The Marlstone plateau's soils, where not drift-derived, are free-draining, red-brown, brashy loams used for mixed farming. Minor east-west folding is responsible for a sharp westward salient of the escarpment along a syncline through Holwell, and south of it, along an anticlinal axis, a deep embayment through which the Wreake flows west past Melton Mowbray to the Soar. Close behind the Marlstone scarp in the northeast runs a lower scarp of Inferior Oolite capped by Lincolnshire Limestone, but south of the Wreake the intervening outcrop of Upper Lias shales widens and extends into Rutland in the vale of Catmose. Between this vale and Leicester is the highest part of eastern Leicestershire, lowering southward to the Welland valley round Market Harborough. West of Market Harborough is the undulating Soar-Avon-Welland watershed area of southern Leicestershire.

Glacial drift, thicker, more extensive and usually heavier in eastern and southern than in western and northwestern Leicestershire, derives from two distinct glaciations. The younger drift, the Chalky Boulder Clay, is the less acidic and yields heavy, neutral clay loam soils that are the basis of the grass farming of eastern Leicestershire and which, together with Lias clay soils, carry celebrated fatting pastures, especially round Market Harborough. The surface forms of both boulder clays have been smoothed by prolonged erosion. Though removed from most valleys, drift remains thick on interfluves, and in the Wolds between the lower Soar and the vale of Belvoir forms a great conical dump with a radial drainage system. Bordering the alluvial pastures of the Soar and Wreake valley floors there are fragmented, level, well-drained terraces of gravel laid down by these rivers in the later Pleistocene.

Leicestershire's mean annual rainfall, increasing from about 23 in. in the larger valleys to 29 in. in the higher areas, is well distributed through the year. The mean annual temperature is approximately 9° C. (48° F.): mean daily maxima vary from 21° C. (70° F.) in July to 7° C. (45° F.) in January, and mean daily minima from 11° C. (52° F.) in July to 1° C. (34° F.) in February. There are 200–205 days with rain, 15–20 days with snow, 90–100 days with ground frost and 30–35% of possible sunshine in an average year.

This climate will support deciduous forest, particularly damp oakwood, on the widespread clay loam soils, but woods and heath cover less than one-fortieth of Leicestershire, and forest is nearly all planted. Even Charnwood forest (*q.v.*), the most wooded area, was bare sheepwalk in 1800, after repeated deforestation. Its mixed plantations dating from 1830–40 are set in bracken and heath marking former sessile oakwood, and pine or oak-birch woodland respectively. There are oak-fir plantations on the Belvoir ridge, a few large woods in the southeast, and others between Coleorton and Staunton Harold: otherwise woods are small and scattered, either surrounding country seats, or, especially in the east, forming coppices or fox coverts dating from the mid-17th century onward. But profuse hedgerow timber, especially in the tall hawthorn hedges of eastern Leicestershire, indicate potentialities, and many ash and some Wych elm trees occur with the ubiquitous oak on the Lias and boulder clays. The fox (the county emblem) is the characteristic wild animal, hunted by famous packs including the Fernie, Cottesmore, Quorn and Belvoir. The National trust owns 82 ac. of Charnwood. (F. A. Ba.)

History.—Neolithic implements of flint and other stone have been found on the north of Charnwood forest, round Leicester and Mountsorrel, and at Osbaston in the southwest. There is some evidence of Bronze Age settlements in south Leicestershire and also on Beacon hill in Charnwood forest, apparently an important early defensive site. At the Roman invasion the region was sparsely populated by the Coritani. Except for Leicester, where the Roman centre (Jewry Wall) has been extensively excavated and laid out for permanent preservation, evidence for Roman settlement is not abundant. Leicester is situated on the Fosse way, a crossroad traversing the county northward from Venonae (High Cross), where it cuts Watling street which forms the southwestern boundary of the shire. There are a few minor settlements along both these Roman routes.

The district was invaded by the Angles in the 6th century and by the Danes in the 9th. The fusion of these two peoples determined the chief characteristics of the area which is now Leicestershire. The Angles, advancing by the Trent, the Soar and the Welland, reached the district in the second half of the 6th century. From 653 Leicestershire was part of the kingdom of Mercia. In 737 Leicester became the permanent see of the bishop for the Middle Anglian diocese; it remained so until the second half of the 9th century when the district was subjugated by the Danes. In 877 Leicester became one of the five Danish boroughs but in 918 the Danish army at Leicester submitted to Aethelflaed, the "Lady of the Mercians," and the region developed into a shire in much the same way as did others under the house of Wessex. However, the Danish occupation was more than a military occupation, and the social structure of the county was profoundly modified by the swelling of the ranks of the Anglo-Saxon freemen (ceorls) with Danish freemen or sokemen, the extent of whose settlement is borne out by the many Scandinavian placenames. The Norman conquest produced great changes and the Domesday survey reveals that the large Leicestershire estates of English earls were taken over by Norman landholders, only a few being retained by Englishmen as undertenants.

With the monastic revival of the 12th century, religious houses were founded in Leicestershire at Garendon (Cistercian) in 1133; Croxton-Kerrial (Premonstratensian), *c.* 1154; houses of Augustinian canons at Leicester in 1143; Launde, *c.* 1125; Breedon, 1122; Ulverscroft, *c.* 1153; Owston, *c.* 1161; Charley, *c.* 1190; Bradley, between 1220 and 1234; and Kirby Bellars, *c.* 1360. Benedictine nuns were established at Langley in the mid-12th century and Augustinian nuns at Gracedieu between 1235 and 1241. Remains exist at Ulverscroft and Gracedieu. Other noteworthy medieval ecclesiastical buildings are the churches at Ashby-de-la-Zouch, Hinckley, Leicester, Loughborough, Lutterworth, Market Bosworth, Market Harborough, Melton Mowbray and Stoke Golding.

Leicestershire was not deeply implicated in the anarchy of Stephen's reign but was involved in the revolt against Henry II and in the civil struggles of the 13th century culminating in the triumph and then defeat of Simon de Montfort, earl of Leicester, in 1264–65. The battle that finally ended the dynastic struggle of the 15th century and established the Tudors on the throne was fought at Bosworth in 1485. In the Civil War of the 17th century the county was divided between parliamentary and royalist supporters. Leicester was sacked by the royalists in 1645, and the Civil War ended in Leicestershire with the destruction of Ashby castle, the seat and stronghold of the Hastings family, later in the same year. The struggles of these centuries are recalled by the ruins of the castles at Ashby-de-la-Zouch and Kirby Muxloe, both built by William, Lord Hastings, at the close of the Wars of the Roses, and by the remains of the mansion built by Thomas Grey, marquis of Dorset, *c.* 1500 in Bradgate park.

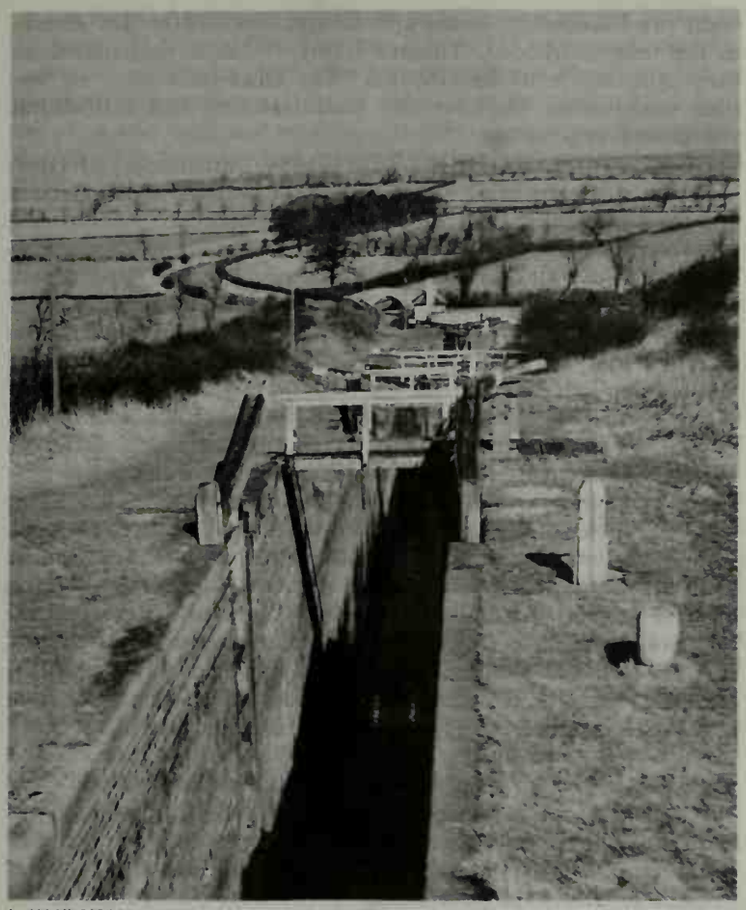
The fall of Ashby castle also marked the end of the political influence of the Hastings family, earls of Huntingdon, in the county. They were replaced by the Manners of Belvoir castle, the dukes of Rutland, who had strongly supported them in the royalist cause in the Civil War. For another two centuries the political life of the county continued to be dominated by the aristocracy in accordance with their family divisions until the extension of the franchise and the introduction of the secret ballot in the second half of the 19th century.

Population and Administration.—In 1961 the population of the administrative county was 408,898, and of the county borough of Leicester, 273,470. Within the ancient shire of Leicester there are one county borough, the City of Leicester (*q.v.*); one municipal borough, Loughborough (*q.v.*; 38,638); 9 urban districts (including Ashby-de-la-Zouch, Hinckley, Melton Mowbray [*qq.v.*] and Wigston); 9 rural districts; and 227 civil parishes. The ancient subdivisions of the county were the hundreds of Framland, Gartree, Guthlaxton, East Goscote, West Goscote and Sparkenhoe. For police purposes the administrative county forms a part of the Leicestershire and Rutland Police authority, and, similarly, there are joint fire and probation services. Leicestershire is in the Midland assize circuit and has one court of quarter sessions and nine petty sessional divisions. The county borough of Leicester, which is also the county town, has a separate commission of the peace. In 1290 the county returned two members to parliament; under the Reform act of 1832 it was divided into two, each division returning two members, and since 1885 it has been divided into four: Melton, Loughborough, Bosworth and Harborough, each returning one member. The parliamentary borough of Leicester after 1948 returned four members. One of its divisions (Southeast) was extended in 1955 to include the Oadby urban district within the administrative county.

Ecclesiastically, Leicestershire formed an archdeaconry within the diocese of Lincoln from 1092 until its transference to Peterborough in 1837. In 1926 the county was constituted the diocese of Leicester when this ancient see, which had disappeared at the time of the Scandinavian invasions, was restored.

Agriculture.—The soil is loamy and affords rich pasture for cattle and sheep, especially east of the Soar, while grain crops are grown chiefly on the lighter soil of the west. At the beginning of the 14th century sheep were already being kept in considerable numbers and their wool was rated at a high value. During World War II much land was plowed for the first time since its enclosure, but after the war it tended to revert to pasture. Dairy farming is extensively carried on in the Melton Mowbray area, particularly in the vale of Belvoir, and Stilton cheese, first made at Quenby, is a famous product. Leicestershire is well known for the scientific breeding of Leicester sheep by Robert Bakewell (*q.v.*) at Dishley grange near Loughborough.

Industries.—Coal mining goes back to the late 13th century, but it is confined to a relatively small area in the west round Coalville (*q.v.*), Coleorton and Moira. Quarrying, practised in the Roman period, also revived in the 13th and 14th centuries. Slate pits flourished from about 1343 until 1877 when Swithland slates could no longer compete successfully with slates from Wales. Limestone was quarried at Barrow upon Soar as early as 1396 and workings were also developed at Breedon-on-the-Hill, Barrow hill and Cloud hill by the end of the 18th century. Quarrying of hard stone, begun at Mountsorrel, was extended in



J. ALLAN CASH

FOXTON LOCKS, GRAND UNION CANAL, IN LEICESTERSHIRE

the first half of the 19th century to Bardon Hill, Stoney Stanton, Croft, Enderby, Huncote and Forest Rock. Leicestershire setts (granite paving-blocks) were widely used for road making in the Midlands and Yorkshire, and the Mountsorrel sett makers carried their skill to other parts of England and Wales and to the United States. Ironstone workings were developed during the late 19th century in the northeast of the county and blast furnaces (closed in 1963) were established at Holwell and Asfordby.

Apart from mining and quarrying, hosiery is the staple manufacture of the county; framework knitting was introduced into Leicestershire at Hinckley about 1640. The application of mechanical power to the frames in the second half of the 19th century did not destroy completely the domestic and rural character of the manufacture. Smaller factories were established in the larger villages and "outdoor work" done in the home remained a feature of the industry. Other industries are footwear, engineering and bell founding, for which Loughborough is well known.

Communications.—By 1814 Leicestershire was linked with the main inland waterways connecting London with the north, constructed in the second half of the 18th century. The principal canals are the former Soar navigation, Leicester navigation, the Union canal and the Grand Union canal which connect the Trent river through Loughborough, Leicester and Market Harborough with the Grand Junction canal. The Ashby-de-la-Zouch canal, now closed, connected the mining areas of the west with Coventry.

The Midland region main railway line from London to Derby and the north serves Market Harborough, Leicester and Loughborough. Branches radiate from Leicester to Melton Mowbray and to the mining district of the west and northwest. The main London to Nottingham line of the Eastern region passes through Lutterworth, Leicester and Loughborough. Main roads from all directions converge on Leicester, and the M 1 motorway was to be extended through the west of the county in the 1960s.

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LEIDEN (LEYDEN), a city of South Holland province, the Netherlands, is located 16 km. (10 mi.) N.E. of The Hague by road. The Oude Rijn (Old Rhine) river joins the Mare and Nieuwe Rijn (New Rhine) in the city, which is crossed by several channels. Pop. (1962 est.) 97,409 (mun.). Following World War II there was considerable development of the outlying residential areas, but the old town remained the centre of the city's activities. Among its notable buildings are the Gemeenlandshuis van Rijnland (1596; partly restored, 1878), the weigh house (1658; restored 1957–58) and the so-called city timber house (Stadstimmerhuis; 1612). The 16th-century town hall was destroyed by fire in 1929 except for parts of the façade; these were later restored and the whole was rebuilt on a larger scale. The Pilgrim Fathers house, dedicated in 1957, contains reproductions of documents concerning the stay of the Pilgrims in Leiden, from 1609 until they sailed for America in 1620. A memorial to their pastor, John Robinson, is in the Pieterskerk. Other churches of interest include the 14th-century Gothic church of St. Pancras or Hooglandse Kerk and the Roman Catholic Lodewijkskerk, originally a chapel for pilgrims to the shrine of St. James of Compostela in Spain. Partially destroyed when the explosion of a ship loaded with gunpowder wrecked much of the town, it was rebuilt in 1809.

Among the city's cultural institutions, the Thysian library occupies a Renaissance building of 1655. The municipal museum, founded in 1869, is housed in the old Lakenhal or cloth hall (1640). It contains local antiquities as well as a collection of paintings and other art objects. Leiden was a centre of the Dutch artistic Renaissance and Rembrandt, Jan van Goyen, Jan Steen, Gabriel Metsu and Gerard Dou(w) were natives of the town.

The University of Leiden was founded in 1575 by William of Orange. Originally located in the convent of St. Barbara, the university was moved in 1581 to the convent of the White Nuns, the site of which it still occupies. Within half a century of its founding, such scholars as Scaliger, Hugo Grotius, Arminius and Daniel Heinsius had established Leiden as an internationally famous centre of learning, and its position was maintained by such men as the philosopher Frans Hemsterhuis and Hermann Boerhaave, who was largely responsible for Leiden's reputation for the study of medicine. Closed in 1940 by the Germans, the university was reopened after the war. Institutions connected with it include the Royal Institute of Linguistics and Anthropology; the Rijksmuseum van Oudheden (prehistory of the Netherlands and antiquities); the national museum of ethnology of Asia (including India, China, Japan and Indonesia), Oceania, near east, Africa, America and Australia; the botanical gardens (founded in 1587) and the observatory. The Kamerlingh Onnes laboratory is especially noted for low-temperature research.

Historically, Leiden's industrial prosperity was based on the cloth trades. The weaving establishments (mainly broadcloth) at the end of the 15th century were very important, and after the expulsion of the Spanish, Leiden cloth, Leiden baise and Leiden camlet were familiar terms throughout Europe. These industries afterward declined and at the beginning of the 19th century baise manufacture was given up altogether. During the 19th century the city suffered a period of economic depression, but its prosperity revived with the coming of industrialization. Modern Leiden's chief industries are based on metallurgy, the graphic arts, building materials and food processing. Its cheese and cattle markets are among the largest in the Netherlands. Bulb-growing farms are located in the sand dunes to the west of the city. Nearby are the popular seaside resorts of Noordwijk and Katwijk.

Although Leiden is known to have been very ancient, the name of Lugdunum Batavorum sometimes applied to it is not of Roman origin but was given to it by Janus Douza in his *Nova Poemata* (1575) and revived by students in the 18th century. The city is first mentioned in a list, dated 922, of holdings of the diocese of Utrecht. In 1266 its town rights were confirmed and enlarged. Until 1420 it was governed by a burgrave who was the representative of the court of Holland. The most celebrated event in its history is the siege by the Spaniards in 1574. Besieged from May until October, the city was only relieved by the

cutting of the dikes, flooding the city and enabling ships to carry provisions to the townspeople. (A. J. V.)

LEIDY, JOSEPH (1823–1891), U.S. anatomist, parasitologist and paleontologist who performed pioneer research on U.S. fossil deposits, was born at Philadelphia, Pa., on Sept. 9, 1823. After receiving an early education in private schools, he entered the University of Pennsylvania, Philadelphia, and in 1844 graduated in medicine. He soon after became librarian and a curator at the Academy of Natural Sciences of Philadelphia, and in 1847 was made chairman of the board of curators, which position he held for a period of 44 years. In 1853 he was appointed professor of anatomy at the University of Pennsylvania, holding that position until his death and becoming director of the biological department in 1884. In addition to these duties he was professor of natural history at Swarthmore college, Swarthmore, Pa., from 1871.

Leidy won distinction as an anatomist especially in the field of comparative anatomy. His *Elementary Treatise on Human Anatomy* (1861; rev. and enl., 1889) was for many years the classic American textbook on the subject. His *Researches Into the Comparative Anatomy of the Liver* (1848) was the first thorough study of that organ. Leidy spent much time in microscopical study of the lower forms of life. His book *A Flora and Fauna Within Living Animals* (1853) was the first important study of the parasites of the alimentary canal. Leidy's discovery of *Trichina spiralis* in pork led to Karl G. F. R. Leuckart's discovery of the cause and mode of preventing trichinosis in man. He also became the chief American authority of his time on protozoa. His *Fresh Water Rhizopods of North America* (1879) remained a standard work. This, and many others of his books, are illustrated by his own drawings, noted for their accuracy, especially in microscopical studies. His *Synopsis of Entozoa* described and named more than 100 new species.

It was as a vertebrate paleontologist, however, that Leidy won his chief fame. Before his time there were only a few scattered papers on the subject in America, and the discovery of new fossil deposits in the western states offered him an unparalleled opportunity to lay the foundation of American paleontology, his knowledge of comparative anatomy being his chief aid in the work. His *Ancient Fauna of Nebraska* (1854) was the most important contribution to the subject in America up to that time. He followed this with monographs on the extinct sloth tribe, the extinct ox, horse, etc., and in 1865 published *Cretaceous Reptiles of the United States.* All the fossils of the Ferdinand V. Hayden expedition in the Rocky mountains were given to Leidy for determination, the results appearing in a study on extinct Mammalia of Dakota and Nebraska (*Journal,* Academy of Natural Sciences of Philadelphia, 1869), which contained many species and genera unknown to science and others hitherto not known to have existed on the American continent. The book is described by H. F. Osborn as "with the possible exception of Cope's *Tertiary Vertebrates,* the most important paleontological work which America has produced." The discovery of Eocene material in Wyoming and Oregon beds, geologically older than the Nebraska and Dakota beds, provided the material for Leidy's last major paleontological work, *Contributions to the Extinct Vertebrate Fauna of the Western Territories* (1873). His death occurred at Philadelphia on April 30, 1891.

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LEIF ERICSSON: *see* ERIC the Red.

LEIGH, a market town and municipal borough (1899) of Lancashire, Eng., is located 13 mi. W. of Manchester and 21 mi. E.N.E. of Liverpool by road and served by the Bridgewater and Leeds canal and the Liverpool canal. Pop. (1961) 46,153. The ancient parish church of St. Mary the Virgin was, with the exception of the tower, rebuilt in 1873. The grammar school dates from pre-Elizabethan times and several fine old houses remain in the neighbourhood. Thomas Highs of Leigh constructed an early spinning jenny in 1763–64. The chief industries are textiles, coal mining, electric cable manufacturing and agricultural and general engineering.

LEIGHTON, ROBERT (1611–1684), archbishop of Glasgow who strove to bring about agreement between Episcopalians and Presbyterians in Scotland, was born probably in London. He was the eldest son of Alexander Leighton, who wrote *Zion's Plea Against Prelacy* and was severely punished by Laud. Robert was educated at Edinburgh university, where he took his M.A. in 1631. He then spent several years in France, where he came into contact with the Jansenists and was greatly attracted by their piety. He was also influenced by the *De imitatione Christi* of Thomas à Kempis. In 1641 he was ordained Presbyterian minister of Newbattle, Midlothian, and in 1643 signed the covenant. Early in 1653 he was appointed principal of Edinburgh university and professor of divinity. When, in 1661, episcopacy was once more restored to Scotland, Leighton was consecrated bishop of Dunblane. The episcopacy he envisaged was that modified form which had been suggested by Archbishop James Ussher and to which Richard Baxter and many of the best of the English Nonconformists would have readily given their adherence. The unconciliatory attitude adopted by Charles II and the government, however, rendered Leighton's endeavours for a comprehensive church in Scotland an impossibility. He soon lost all hope of being able to build up the church, and his work, as he confessed to Gilbert Burnet, "seemed to him a fighting against God." He did what he could, governing his diocese with the utmost mildness and endeavouring to persuade the Presbyterian clergy to come to an "accommodation" with the Episcopalians. After a hopeless struggle to induce the government to cease the persecution of the covenanters, he went up to London in 1665 to resign his bishopric, but was induced by Charles to retain it. In 1669 Leighton again went to London on behalf of the covenanters, and in 1670 he reluctantly agreed to accept the archbishopric of Glasgow. He now redoubled his efforts for conciliation between Presbyterians and the episcopacy but had no success. He was little suited to the part he had to play in Scotland, preferring a life of meditation. He resigned the archbishopric in 1674 and retired to Sussex, where he spent his happiest years. He died suddenly in London on June 25, 1684.

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LEIGHTON BUZZARD, a market town and urban district of Bedfordshire, Eng., lies in the Ouzel valley 20 mi. S.W. of Bedford by road. Pop. (1961) 11,649. The Market cross in the central square dates from 1330. The splendid Early English church of All Saints is of iron sandstone; it has a central tower and spire and contains medieval woodwork. The town is served by the Grand Union canal and the main line of the London Midland region of British railways. There is a variety of light industry as well as large-scale quarrying of sand and the manufacture of concrete tiles and bricks. (D. L. O.)

LEIGHTON OF STRETTON, FREDERIC LEIGHTON, BARON (1830–1896), English academic painter of immense prestige in his own time, was born on Dec. 3, 1830, at Scarborough, Yorkshire. After an education in many European cities, his artistic studies began at the Accademia in Florence under G. Bezzuoli and C. Servolini; he then came under J. Becker at the Staedelsches Institut, Frankfurt am Main (1846–48). In 1848 he studied at Brussels and in 1849 in Paris, where he copied in the Louvre. Returning to Frankfurt at the age of 19, he became a pupil of Eduard Steinle, whose instruction he came to value above that of his other teachers. After painting "The Plague of Florence" to Boccaccio's description, he left for Rome late in 1852. There his social talents won him the friendship of (among others) Thackeray, George Sand, Robert Browning, the painters J. L. Gérôme and A. W. Bouguereau and John Gibson, the English neoclassical sculptor. Leighton's painting "Cimabue's Madonna,"

at the Royal Academy's exhibition in 1855, was bought by Queen Victoria. It marked the entry into England of a new cosmopolitan academic manner in which grandeur of scale and forms of Phidian and high Renaissance extraction are used to embody subject matter of an anecdotic and superficial nature. Leighton came to London in 1858 to enjoy this triumph but did not settle there until 1860.

He was a steady exhibitor at the Royal Academy from 1860 to 1866, showing his "Paolo and Francesca" and "Dante at Verona." He was made associate of the Academy in 1864. In 1866 he painted "The Wise and Foolish Virgins" in Lyndhurst church, Hampshire; in 1868 he visited Egypt; and in 1869 he exhibited "Electra at the Tomb of Agamemnon," and was made a royal academician. In 1870 he was influential in starting the important series of winter exhibitions of old-master paintings at the Royal Academy. In 1873 he revisited the east and collected titles for the Arabian hall at his house in Kensington (now a memorial museum). In 1876 and 1878 respectively the "Daphnephoria" and the "Nausicaa" appeared, while in 1877 Leighton made a new departure in exhibiting the sculpture "Athlete Struggling With Python." In 1878 he was elected president of the Royal Academy, was knighted and began the large wall paintings in spirit fresco in the south court of the Victoria and Albert museum, London. In 1886 he was made a baronet, in 1890 he painted the famous "Bath of Psyche," and on Jan. 24, 1896, was made a baron, being the first English painter to be so honoured; but he died the next day at his Kensington home. Twelve of his works, including the "Psyche" and the "Athlete Struggling With Python," are in the Tate gallery, London.

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LEININGEN, a village in the Palatinate (the modern Altleiningen, between Worms and Kaiserslautern) from which two great German houses of princes and counts derive their names.

The House of Saarbrücken.—When Frederick, last of the original counts of Leiningen, died in 1220, his nephew Frederick, second son of his sister Lukharde's marriage to Simon II of Saarbrücken, inherited the countship of Leiningen, to which he added that of Dagsburg in 1234. In 1317–18 his descendants Frederick V and Jofried divided a considerable inheritance, founding the lines of Leiningen-Dagsburg and Leiningen-Hartenburg. The senior line acquired the title of landgrave in Alsace in 1328 and princely rank in 1444, but Hesso, its last male, died in 1467. Though Hesso's sister retained much of the inheritance (*see* below), part of Leiningen and Dagsburg then passed to Emich VII, of the Hartenburg line, who moreover had in 1466 married the heiress of Aspremont in Lorraine. In 1560 another partition was made, resulting in the line of Leiningen-Dagsburg-Hartenburg (Evangelicals), which received princely rank in 1779, and the line of Leiningen-Falkenburg (Catholics), subdivided from 1740 between Guntersblum and Heidesheim branches of counts. Having lost all its possessions west of the Rhine to France in 1801, the princely line was in 1803 compensated with a new principality of Leiningen, comprising Amorbach, Miltenberg, Bischofsheim, Hardheim, Boxberg, Mosbach, etc.; but this was mediatized under Baden in 1806. At the same time the Guntersblum and Heidesheim counts, compensated with Billigheim and Neudenau in 1803, were also mediatized under Baden. Part of the principality, however, went to Bavaria in 1816.

Prince Charles of Leiningen (1804–56), who was a half brother of Queen Victoria of Great Britain through his mother Victoria of Saxe-Coburg, worked for German unification under Prussian leadership. From Aug. 5 to Sept. 5, 1848, he was head of the ministry of the *Reich* during the national assembly at Frankfurt.

The House of Westerburg.—Reinhard IV, lord of Westerburg, grandson of Hesso's sister Margaret, was in 1475 confirmed as count of Leiningen-Westerburg and landgrave in Alsace. His descendants were divided from 1705 into Altleiningen and Neuleiningen branches, the former receiving Ilbenstadt in 1803 before mediatization under Hesse in 1806.

LEINO, EINO (pseudonym of ARMAS EINO LEOPOLD LÖNNBOHM) (1878–1926), Finnish poet and one of the greatest names in Finnish poetry, was born on July 6, 1878, at Paltamo in northern Finland. He studied at Helsinki university and worked for a long time as a journalist, principally as a literary and dramatic critic on the liberal newspapers *Päivälehti* and *Helsingin Sanomat.* He translated into Finnish a number of world classics including Dante's *Divina Commedia.*

In his first collection of poems, *Maaliskuun lauluja* (1896), Leino's mood was gay and his style free and melodic; he was influenced by J. L. Runeberg, Heinrich Heine and Finnish folk songs. But gradually his mood darkened and resulted in Nietzschean hostility, poems of confession and solitude, critical patriotic poems about the period of Russian oppression, desolate ballad themes and mythical motifs. The latter dominate *Helkavirsiä* (1903–16), Leino's main work, in which he revives the metre and spirit of folklore. He was a prolific writer and as well as *Talvi-yö* (1905) and *Halla* (1908), in which the poet expresses his "tragic optimism," and a historical poem *Simo Hurtta* (1904–19), he wrote plays, collected in *Naamioita* (1905–11), journalistic contemporary novels, animal fables and essays. His work is uneven, but his best poems are among the finest Finnish lyrics and his newspaper articles show shrewd judgment and brilliant style. Leino died at Nuppulinna near Helsinki on Jan. 10, 1926.

See *Kootut teokset* ("Complete Works"), 16 vol. (1926–30); L. Onerva, *Eino Leino,* 2 vol. (1932). (K. L. K. L.)

LEINSTER (LAIGIN), one of the five ancient kingdoms of Ireland, was bounded on the north by the peninsula of Howth and the river Liffey and on the west by the Slieve Bloom mountains. In its present form it has incorporated the ancient midland kingdom of Mide (Meath), which extended "from the Shannon to the (Irish) sea." It was only after a long struggle that the boundary with Munster became fixed, about the year A.D. 400. Thereafter, the leading feature in its history is the tenacious and bitter assertion of its independence against the Uí Néill, the line of high-kings, whose capital was Tara. The battles of Dún Bolg (598) and Almu, the hill of Allen (722), were won by the Leinstermen, but on the whole the kings of Ireland succeeded in their claim to hegemony. From the 5th century to 1042 almost all the kings of Leinster came from the northern part of the kingdom. Murchad, who died as king in 727, was the ancestor of three septs who shared the throne, in a remarkable manner, until the year 1000. They were represented then by the families of O'Byrne, O'Toole and MacGillamocholmóg (later FitzDermot). In 1042 the kingship of Leinster passed to the Mac Murrough family of Carlow and Wexford. Dermot Mac Murrough, king of Leinster, figures prominently in the story of the Norman invasion. His daughter Eva married Richard de Clare, 2nd earl of Pembroke, better known as Strongbow, the first great leader of the invading army. Leinster was granted (1171) to Strongbow by Henry II. Isabel, daughter of Strongbow and Eva, married William Marshal, earl of Pembroke. The male line in this family failed and the succession, in English law, passed (1245) to the earl's five daughters. Leinster was divided between these and the various estates were transmitted to their heirs. In the southern counties the Irish chieftains recovered and Domnall Mac Murrough assumed the title "king of Leinster" in 1327. In the second half of the 15th century, the earls of Kildare were not merely the most prominent nobles in Leinster but virtually the rulers of the country. The execution of Thomas, the 10th earl (*see* FITZGERALD, LORD THOMAS), and his five uncles in the tower of London, in 1537, brought to an end the exercise of feudal semi-independence within the province.

(J. J. RY.)

LEIPOLDT, CHRISTIAAN FREDERICK LOUIS (1880–1947), South African poet, novelist, playwright, doctor and medical writer, one of the first notable Afrikaner lyric poets, who made many and varied contributions to Afrikaans literature. He was born at Worcester, Cape Colony, on Dec. 28, 1880, and was educated by his father, a German missionary. In 1897 he took up journalism and during the South African War was correspondent for various Dutch, Flemish, American and English newspapers. He was appointed special reporter to the circuit court that tried

the "Cape Rebels," the few Cape Dutch who had risen against the British in 1901, and recorded the sentences of disenfranchisement and imprisonment passed on them. This experience led to his writing *Oom Gert Vertel, en Ander Digte* (1911; "Uncle Gert Tells a Story, and Other Poems"), the title poem of which was the most complete poetic expression of the Afrikaner feeling of loss at the outcome of the war—a beautiful poem of great strength, which immediately became a classic.

Leipoldt then traveled in Europe as a free-lance journalist, finally becoming a medical student at Guy's hospital, where he edited *The Hospital*. He qualified in 1907 but later went to Berlin, Graz and the United States to specialize in orthopedics. He returned to England, where he became a fellow of the Royal College of Surgeons and was appointed to a children's hospital. In 1911 he resigned and traveled extensively in the far east as a ship's doctor. Poems of this period are embodied in *Uit Drie Wêreld-Dele* (1923; "From Three Continents"). Returning to England in 1912, he became a school doctor but was appointed chief medical inspector of schools in the Transvaal in 1914 and in Cape Province in 1919. He was made editor of the *South African Medical Journal* in 1916 and in 1939 permanent secretary of the South African Medical association. After his retirement in 1940, he devoted himself to journalism. He died on April 12, 1947, in Cape Town.

His was a very versatile, picturesque and active talent. A lonely man and a confirmed bachelor, he loved South Africa, and especially the veld. Two of his best-known volumes of poetry are *Dingaansdag* (1920; "Dingaan's Day") and *Skoonheidstroos* (1932; "The Consolation of Beauty"), and his plays *Die Heks* (1923; "The Witch") and *Die Laaste Aand* (1930; "The Last Evening") are of outstanding merit. *Jan van Riebeeck* (1936) is a biography of the first commander at the Cape, and *Bushveld Doctor* (1937) an autobiography in English. In all he wrote about 40 original volumes, translated a few popular novels and has detective stories, short stories, popular science readers, children's books, psychoanalytical novels, two books on gastronomy and one on Cape wines to his credit.

See J. Kromhout, *Leipoldt as Digter* (1954). (A. J. Ce.)

LEIPZIG, a city of Germany which following partition of the nation after World War II became capital of Leipzig *Bezirk* (district) in the German Democratic Republic, lies 390 ft. above sea level in a plain, just above the junction of the Pleisse, Parthe and Elster rivers, which flow in various branches round the town. It is 182 km. (113 mi.) S.W. of Berlin by rail. Leipzig *Stadtkreis* (urban district), consists of the old inner city and the peripheral suburbs. Pop. (1962 est.) 585,258.

The old town was badly damaged during World War II. The main business streets converge on the market square, whose east side is occupied by the old Rathaus (1558). South of the market square is a labyrinth of narrow streets linked by covered courtyards and alleys, with extensive warehouses and cellars. Near the Rathaus is Auerbach's *Keller*, the wine vault immortalized in Goethe's *Faust;* it contains a series of 16th-century murals depicting the legend on which the play is based. Nearby is the picturesque Königshaus (1705), the palace of the Saxon monarchs in Leipzig. In the southwestern corner of the inner town lay the Pleissenburg citadel, where Luther in 1519 held his momentous disputation. Only its round tower survives, the site of the remaining part having been occupied by the new Rathaus (1899–1905). Upon the Karl Marx-Platz (formerly Augustusplatz) is the main building of the university and the university church, or Paulinerkirche (founded in 1229 but mostly dating from about 1500, with modern restorations). It has a curiously grooved cloister. The largest church in the inner town is the Thomaskirche, with a high-pitched roof dating from 1496, and memorable for its association with J. S. Bach, whose tomb it has contained since the remains were removed from the Johanniskirche in 1950. Bach was organist at the Johanniskirche, now demolished, which stood farther to the east.

Opposite the Thomaskirche is the Reformation monument, with bronze statues of Luther and Melanchthon. The important Leipzig concerts were held in the new Gewandhaus, or Cloth hall (1880–84), the old Gewandhaus having been devoted to use as a market hall between the fairs. Outside the university library stands a monument to the composer Felix Mendelssohn. Immediately to the east of the school of arts is the building which was formerly the supreme court of the German republic, the *Reichsgericht*. It now houses the Georgi Dimitrov museum and some collections from other of the city's museums. Few of the fine baroque buildings of late 17th-century date escaped destruction in World War II, when the book-trade quarter in the east of the city was largely destroyed.

The University of Leipzig, founded in 1409 by a secession of German students from Prague, was until World War II one of the largest in Germany. After the war it became the largest in the German Democratic Republic, and in 1952 was renamed Karl Marx university. As a musical centre Leipzig became known all over the world for its associations with Bach, for its excellent conservatorium and for the concerts given annually in the Gewandhaus. (After World War II the concerts were performed in the congress hall of the zoological gardens.) The new Leipzig opera house on Karl Marx-Platz was opened in 1960. The prominence of the publishing industry attracted numerous authors and made Leipzig a literary centre of importance. Hundreds of newspapers were published there, and the city was distinguished for its cosmopolitan spirit.

Commerce.—The importance of Leipzig as a commercial town is mainly derived from its great fairs, which annually attract merchants from all parts of Europe and from Asia. The most important fairs are held at Easter and in September and are said to have been founded as markets about 1170. By the 19th century, wares that could be safely purchased by sample appeared at the fairs in steadily diminishing quantities, while others, such as hides, furs and leather, which require actual examination, showed an increase. After World War II the Leipzig fairs lost much of their importance although the Communist government of the German Democratic Republic tried to restore their old fame by emphasizing their part in fostering east-west trade.

Before World War II the primacy of Leipzig in the book, music publishing and printing trades was unchallenged, with more than 400 publishing firms. Only about 10% of these concerns survived under the Communist regime, whose state publishing activities became concentrated largely in eastern Berlin. Remaining industries include the production of iron and steel; electrical, mining, printing and agricultural machinery; chemicals, plastics and paper; textiles; and toys and musical instruments. The chief industrial quarters lie west of the Elster and in the eastern suburbs.

Leipzig lies at the hub of a railway network with lines radiating to all the chief German cities and is also linked with the Berlin-Munich *Autobahn*, but its importance as a communications centre was much reduced by the partition of Germany. The airport 8 mi. N.W. at Schkeuditz is shared with Halle.

History.—Leipzig owes its origin to a Slavonic (Lusatian) settlement between the Elster and the Pleisse, which was in existence before the year 1000; its old name Lipsk (Leypczik) was derived from the Slavonic word *lipa*, "a lime tree." There was later a German settlement near this spot, probably around a castle erected early in the 10th century by the German king Henry the Fowler. The district was part of the mark of Merseburg, and the bishops of Merseburg were the lords of extensive areas around the settlements. In the 11th century Leipzig is mentioned as a fortified place and in the 12th it came into the possession of the margrave of Meissen, being granted some municipal privileges by the margrave, Otto the Rich, before 1190. Its favourable situation in the middle of a plain intersected by the principal highways of central Europe, together with the fostering care of its rulers, caused Leipzig to become an important commercial town. Powers of self-government were acquired by the council (*Rat*) of the town, the importance of which was enhanced during the 15th century by several grants of privileges from the emperors. When Saxony was divided in 1485, Leipzig fell to the Albertine, or ducal branch of the family, whose head, Duke George, gave new rights to the burghers. The city accepted the Reformation in 1539.

During the Thirty Years' War Leipzig suffered five sieges and on four occasions was occupied by hostile troops, being retained

by the Swedes as security for the payment of an indemnity from 1642 to 1650. After 1650 its fortifications were strengthened; its finances were put on a better footing; and its trade, especially with England, began again to prosper, important steps being taken with regard to its organization. Toward the end of the 17th century the publishing trade increased rapidly, partly because the severity of the censorship at Frankfurt am Main caused many booksellers to remove to Leipzig. After 1825 it became the general headquarters of the German book trade.

The immediate neighbourhood of Leipzig has been the scene of several battles, two of which are of more than ordinary importance. These are the battles of Breitenfeld, fought on Sept. 17, 1631, between the Swedes, under Gustavus II Adolphus, and the imperialists; and the great battle of Leipzig, known in Germany as the *Völkerschlacht* (Battle of the Nations). (*See* LEIPZIG, BATTLE OF.)

In the German revolution which followed the end of World War I, Leipzig was the scene of much bloodshed. Further disturbances took place during the revolutionary agitation which recurred in the spring of 1920.

Toward the middle of the 18th century, Leipzig was the seat of the most influential body of literary men in Germany, over whom Johann Christoph Gottsched, like his English contemporary, Samuel Johnson, exercised a kind of literary dictatorship. Then, if ever, Leipzig deserved the epithet of a "Paris in miniature" (*Klein-Paris*) assigned to it by Goethe in his *Faust*. The young Gotthold Lessing produced his first play in the Leipzig theatre, and the university counts Goethe, F. G. Klopstock, Jean Richter, J. G. Fichte and F. W. J. von Schelling among its alumni. J. C. F. von Schiller and C. F. Gellert also resided for a time in Leipzig, and Bach and Mendelssohn filled musical posts there. Eminent natives of the town included the philosopher Gottfried Leibniz and the composer Richard Wagner.

Because of its importance as a railway centre, Leipzig was heavily bombed by the R.A.F. and the U.S.A.A.F. in 1943–44. About a quarter of its buildings were destroyed. It was taken on April 9, 1945, by the U.S. 1st army but later was handed over to Soviet forces. Although after World War II the eastern German government resided in eastern Berlin, Leipzig was the most lively city of the German Democratic Republic and its most important economic and cultural centre.

LEIPZIG BEZIRK was formed in 1952 from parts of the former *Länder* (states) of Saxony, Saxony-Anhalt and Thuringia. Pop. (1964) 1,511,487. Area 1,916 sq.mi. It consists of the *Stadtkreis* of Leipzig and 12 *Landkreise* (rural districts). The district extends southwest from the Elbe river at Torgau and is predominantly flat and fertile; the southeast is occupied by the dissected foothills of the Mittelgebirge range. In the southwest around Altenburg lignite is mined. Delitzsch, Eilenburg and Torgau are the other principal towns.

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LEIPZIG, BATTLE OF (1813), also called the BATTLE OF THE NATIONS, fought on Oct. 16, 18 and 19, 1813, around Leipzig in Saxony. It ended with the decisive defeat of the French by the allied armies, comprising Austrian, Prussian, Russian and Swedish forces, which obliged Napoleon to withdraw his field army from the German theatre and greatly compromised his chances of defending the frontiers of France early in the following year. For an account of the situation preceding the battle and of the weaknesses—largely due to political considerations—of Napoleon's strategic position *see* NAPOLEONIC WARS.

Operating with fewer forces than the allies, but on interior lines, Napoleon had intended to pursue Blücher's Prussians and Bernadotte's Swedes to the northeast of Leipzig, when the approach of Schwarzenberg's army of Bohemia from the south caused him to change his plans. He arrived at Leipzig on Oct. 14. Against the allied forces of 320,000 converging on the city he had only 190,000 men, for a further 28,000 still remained at Dresden and 37,000 at Hamburg. The faulty co-ordination of the allies' operations, the slowness of their movements and the considerable distance that remained between them still offered Napoleon a chance of defeating Schwarzenberg before assistance reached him. Blücher, determined to close in on the north of Leipzig as Schwarzenberg came up from the south, set off alone 15 mi. ahead of Bernadotte, who did not arrive at Leipzig until Oct. 18.

Schwarzenberg's position on the Elster and Pleisse rivers south of Leipzig would have exposed him to defeat had Napoleon been able to concentrate his forces against the army of Bohemia on Oct. 14. Early on Oct. 16, however, Napoleon was still waiting for the arrival of Macdonald, who had reached Taucha on the previous night. Schwarzenberg opened his attack at 9 A.M. on Oct. 16 on the heights of Wachau, where Napoleon had intended to bring Marmont's corps from the north of the city to join Macdonald in turning the allied right flank. Napoleon had proposed to pierce the enemy front at Güldengossa with massed cavalry charges which would be succeeded by the advance of his infantry columns as Macdonald and Marmont carried their turning movement toward the allied centre. Marmont, however, was prevented from joining Napoleon to the south of the city that morning because the appearance of Blücher's vanguard obliged him to halt and fight desperately at Möckern. Ney, whom Napoleon had placed in command of the operations in the north, instructed Bertrand to take over Marmont's role in the southeast, but Bertrand's corps was detained en route by the need to oppose the enemy's attacks toward the vital bridge at Lindenau—the sole French line of retreat. It was not far short of 2 P.M. when Napoleon resigned himself to forgoing reinforcements for Macdonald and ordered Murat's cavalry, more than 10,000 strong, to attack the allies' centre, while Macdonald went forward on their left. Murat's charge met with immediate success, the allies losing 26 guns to him; but when it became necessary to supervise the prompt advance of the supporting infantry to secure and extend the cavalry's gains, Napoleon already had left Wachau to examine Marmont's front at Möckern. The allies brought up reinforcements and forced Murat back to the 84-gun battery that Napoleon had formed between Wachau and Lieberwolkwitz to assist the French assault; on the left and right the French were driven out of the positions which they had taken. The allies made limited attacks on Oct. 17, when Napoleon should have seized his last opportunity to retreat in good order.

The lull on Oct. 17 allowed Hieronymus von Colloredo's Austrians, Bernadotte and also Bennigsen's Russians to close up the allied army, whose strength now stood at almost 300,000 men. In the early hours of Oct. 18 the French shortened their perimeter, the allied cannonade beginning several hours after dawn. The allies advanced en masse in the early afternoon, when the fighting became heavy along the entire front. By nightfall the French still retained their positions southeast of Leipzig, but elsewhere they had fallen back to the outskirts of the city, and Napoleon issued orders for his army's retreat to the west, where his line of retreat was open and the river crossings secured by Bertrand. At 2 A.M. on Oct. 19 the French began their withdrawal, leaving behind them a rear guard 30,000 strong to defend Leipzig. Five hours later the allies resumed the offensive. Not long after midday the premature demolition of the bridge at Lindenau cut off the escape of the remaining elements of the French rear guard, whose desperate defense of the city ended in their capitulation early that afternoon.

The allies had lost about 55,000 men. French killed and wounded have been estimated at 38,000, but the desertions, captured and sick in hospital brought French total losses to about 60,000, to which must be added 325 guns and enormous quantities of matériel. (J. H. N.)

LEIRIA, a city in Beira Litoral province, Port., capital of Leiria district, is located on the Liz river, 64 km. (40 mi.) S.S.W.

of Coimbra. Pop. (1960) 8,587. The principal buildings are the ruined citadel, which dates from the 12th–14th centuries, and the cathedral, erected in 1571 but modernized in the 18th century. The city is an episcopal see and an agricultural trade centre. Leiria, the Roman Colippo, was taken from the Moors in 1135 by Alfonso I. The first Portuguese printing press was established there in 1466. Leiria district, which is divided between the provinces of Beira Litoral and Estremadura, has an area of 3,434 sq.km. (1,326 sq.mi.) and a population (1960) of 400,275. It contains Portugal's largest pine forest. Alcobaça (*q.v.*) is noted for its abbey. Peniche and Nazaré are picturesque fishing villages. There is a glass industry at Marinha Grande.

LEISEWITZ, JOHANN ANTON (1752–1806), German dramatist, was born at Hanover on May 9, 1752. After studying law, he entered the Brunswick administrative service in 1777 and rose to high administrative positions before his death in Brunswick on Sept. 10, 1806. His literary work, which is confined to the years 1774–76, is always coupled with the *Sturm und Drang*, though he had no personal contacts with Goethe, Herder and the rest. *Die Pfandung* and *Der Besuch um Mitternacht* are short dramatic sketches, sharply critical of social injustice, but his most memorable work is the play *Julius von Tarent* (1776), which postulates a fundamental conflict between the political state and the heart. Its influence is to be traced in Schiller's early plays.

Leisewitz's *Schriften* were published in 1838, his *Briefe* in 1906 and his *Tagebücher*, two volumes, in 1916–20.

See R. Pascal, *The German Sturm und Drang* (1953). (Ro. P.)

LEISHMANIASIS (LEISHMANIOSIS) is the name applied to a group of infections of man and certain animals caused by parasitic microorganisms of the genus *Leishmania*. Certain of these infections are manifested as debilitating or disfiguring diseases of man and dogs and are of considerable local importance in various parts of the world. The parasites are found in the skin or in the deep organs, or both, and their distribution in the host determines the nature of the clinical signs and symptoms.

Discovery of the microorganism in the visceral disease by Sir William Leishman in 1900 (independently reported by Leishman and Charles Donovan in 1903) and in the cutaneous disease by P. F. Borovsky in 1898 (redescribed and named by J. H. Wright in 1903) established the parasitic nature of the infections and the similarity of the agents producing them. The parasite is unusual in that it lives within the phagocytic cells of the lymphoid-macrophage system of the vertebrate host. Since these phagocytic cells are part of the host's mechanism of defense against invading organisms, the capacity to live in such an intracellular location affords the *Leishmania* unique protection against these host defenses.

The *Leishmania* are flagellated protozoa of the family Trypanosomidae. Three species of *Leishmania* infecting man are recognized: *L. donovani*, in the deep organ or visceral infections; *L. tropica*, for the old world skin disease; and *L. braziliensis*, for the American cutaneous affliction.

Nature of Infections.—Visceral leishmaniasis, also known as kala azar, is an insidious, chronic disease characterized by fever, reduction in white blood cell numbers, mild anemia, wasting, gross enlargement of the liver and especially of the spleen and derangement of amounts and kinds of serum proteins. Symptoms appear two or more months after infection and gradually become more intense; death occurs in one to two years in 95% of the untreated cases. Death often occurs as a result of a secondary infection, such as pneumonia, developing in the debilitated patient, and the clinical picture often is complicated by nutritional deficiencies or other diseases.

Major focuses of kala azar are known in India, northern China, East Pakistan and parts of middle Asia, the entire Mediterranean littoral and parts of the middle east, Kenya and Sudan, Brazil, Paraguay and Venezuela.

One or more slowly healing ulcers on exposed parts of the body characterize leishmaniasis of the skin. Moist- or dry-type ulcers are produced by different strains of *L. tropica*. American leishmaniasis usually produces a skin ulcer earlier than does the old world type, and is further distinguished by its tendency to produce secondary lesions of the mucocutaneous surfaces, especially of the nose, mouth and pharynx. The old world variety, often called oriental sore, is known all around the Mediterranean, in central and northeast Africa and in west and south Asia. American cutaneous leishmaniasis has been reported from every country in Central and South America except Chile.

The close affinity of all the leishmanial infections is evidenced by the variability of their invasiveness. *L. tropica* occasionally invades the deeper organs, and *L. donovani* sometimes produces not only what is called post-kala azar skin leishmaniasis but also nasopharyngeal lesions.

A durable immunity follows recovery from infection with a particular kind of leishmaniasis. This was long recognized in some of the oriental sore areas, where infection often was induced artificially on covered parts of the body to avoid the disfigurement of natural infections on the exposed skin areas.

Transmission.—All varieties of leishmaniasis are transmitted by small, bloodsucking sand flies of the genus *Phlebotomus*, the species of fly involved differing with the geographic area and the type or types of leishmaniasis found in the area.

The leishmanial parasites exist in two forms: a round or oval Leishman-Donovan body, which lives and multiplies in the phagocytic cells of the vertebrate host; and an elongate, motile, flagellated organism, called a leptomonad, found in the alimentary tract of the sand fly. The Leishman-Donovan bodies, taken in with the meal of the fly, develop into leptomonads in the stomach of the fly and multiply there. Finally, migration of the leptomonads forward into the mouth parts of the fly occurs, from which the leptomonads enter the wound made at the next feeding to initiate a new infection.

Epidemiology.—Few generalizations can be made about the natural history of leishmaniasis. Except for the kala azar of India, Sudan and Russian Turkistan, it does not assume epidemic proportions. Except for Indian and some middle east kala azar in which man himself is the reservoir, it is transmitted to man from infections in animal reservoirs. Some of the reservoirs of visceral leishmaniasis are dogs (China, Mediterranean), jackals (Turkistan) and wild dogs (Brazil); of cutaneous leishmaniasis, dogs (Mediterranean), gerbils and ground squirrels (Turkistan) or rain forest rodents (Central and South America). Although often rural, urban transmission is known in some areas. The visceral disease, chiefly a disease of young adults in India, in the Mediterranean is predominantly an infection in children under five. The cutaneous infection is an occupational hazard among the chicle workers of the rain forests of the Americas and the caravaneers of the steppes of middle Asia.

Treatment and Control.—Effective treatment of the visceral infections is accomplished by intramuscular or intravenous injections of certain pentavalent organic antimonials (*e.g.*, sodium antimony gluconate and ethylstibamine) or aromatic diamidines (pentamidine isethionate and stilbamidine isethionate). The disease in India seems to be most easily cured, though drug resistance to the antimonials has been reported, while that observed in Sudan is much more resistant to treatment. The skin lesions, in addition, also respond to certain other local treatment, though the mucocutaneous involvements of late American leishmaniasis require the most vigorous treatment regimens.

Prevention of access of flies to infected reservoirs or of infected flies to susceptible human beings leads to control. Thus, sprays of residual insecticides, such as DDT, applied to habitations where transmission occurs indoors, or mass reduction of infected gerbils or dogs, have led to effective control in particular areas.

Leishmaniasis of other animals is known (lizards, guinea pigs) but has no known relationship to human infection. *See* also PARASITOLOGY.

See David L. Belding, *Textbook of Clinical Parasitology*, 2nd ed. (1952); George W. Hunter III, William W. Frye and J. Clyde Swartzwelder, *A Manual of Tropical Medicine*, 3rd ed. (1960). (L. A. S.)

LEISLER, JACOB (1640–1691), American political agitator who seized the government of the colony of New York in 1689, was born in Frankfurt am Main, Ger., in 1640. He went to New Netherland in 1660 as a soldier in the service of the Dutch West India company, married a wealthy widow, and successfully en-

gaged in trade. He continued to live in the colony after it passed to English control in 1664 and was renamed New York. Early in 1689 news of the Glorious Revolution and the accession of William and Mary reached the colonies from England. In Massachusetts, Gov. Edmund Andros (governor of the Dominion of New England, which included New York) was deposed and imprisoned. Six weeks later, on May 31, Leisler led a revolt against Andros' deputy in New York, Lt. Gov. Francis Nicholson. The fort at New York was seized, and Nicholson fled to England. Supported by the small farmers and city workers, Leisler set himself at the head of a revolutionary government that appointed him commander in chief. Under the authority of a letter from the home government addressed to Nicholson, or in his absence to "such as for the time being take care for preserving the peace and administering the laws of His Majesty's province of New York," he assumed the title of lieutenant governor in Dec. 1689, appointed a council, and took charge of the government of the entire province. He summoned the first intercolonial congress in America, which met in New York, May 1, 1690, to plan concerted action against the French and the Indians.

Although proclaiming loyalty to William and Mary, Leisler refused to recognize the authority of Maj. Richard Ingoldsby, who arrived with English soldiers in Jan. 1691. Leisler's refusal to relinquish command of the fort was followed by the outbreak of fighting in March, shortly before the arrival of Col. Henry Sloughter, who had been commissioned governor of the province. Although they surrendered the fort to Sloughter, Leisler and his chief lieutenants were charged with treason. In a trial in which personal and political enmities figured prominently, Leisler and his son-in-law, Jacob Milborne, who had many powerful colonial opponents, were convicted; they were hanged in May 1691. Parliament reversed the attainder in 1695 and restored their confiscated estates to the heirs. There has been much controversy among historians with regard both to the facts and to the significance of Leisler's brief career as ruler of New York.

See J. R. Reich, *Leisler's Rebellion: a Study of Democracy in New York, 1664–1720* (1953); Edward Channing, *A History of the United States,* vol. ii (1905–25). (N. E. Cu.)

LEITH, CHARLES KENNETH (1875–1956), U.S. geologist, educator and governmental adviser on economic and political aspects of minerals, was born in Trempealeau, Wis., on Jan. 20, 1875. Educated at the University of Wisconsin he received a Ph.D. in 1901, and continued at the university as assistant professor (1902–03) and professor (1903–45), and as chairman of the geology department. Early field work and writing on Lake Superior Precambrian geology led to a lifetime consulting career, especially concerning iron ores. His writings included textbooks on structural, metamorphic and economic geology.

Leith's association with the U.S. government as minerals adviser during World War I led to his growing concern over the importance of establishing sound national and international policies regarding mineral development, conservation and trade, and the last 20 years of his life were devoted largely to this field, including service as minerals adviser to many government agencies. He died in Madison, Wis., on Sept. 13; 1956. (R. J. Lu.)

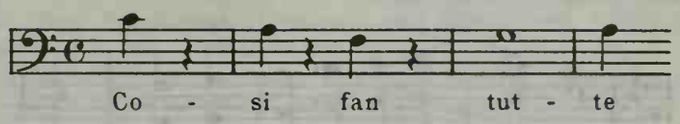
LEITMOTIV ("leading motif"), a musical term for a type of recurring theme. The term was first used in connection with Wagner's later works. It was invented not by him but by the writers who first analyzed his music dramas. The meaning of the word is inexact as applied to the "representative themes" that are the outstanding characteristic of Wagner's later dramatic and quasi-symphonic style, and the sense in which these themes are said to be "leading" never has been defined properly.

The designation has, however, become useful for a particular technical procedure in musical composition. Its intended significance is universally understood, and it therefore may be accepted for current use in musical terminology.

Although Wagner did not originate the use of the *Leitmotiv* any more than he invented the term, he brought it to its logical conclusion, not because of any superiority to great composers who worked before his time, but because he found in the course of his development as a creative artist that it was the natural expression of his particular genius. Such close thematic workmanship as is found in his work, from the *Ring* onward (with *Tristan* and *Die Meistersinger* interrupting the tetralogy), does not necessarily suggest the greatest power of invention. In a sense, in fact, it obviates invention to a great extent, substituting thematic development for the constant devising of new ideas. But if Wagner's recurring motifs call for comparatively little further effort of invention, they do demand gifts of the highest order in the way of logical and skilful contrivance, as well as the keenest intelligence in making the themes work, not only in a symphonic way that is musically satisfying, but at the same time so as to enrich the dramatic happenings with constant references called for by the words and action.

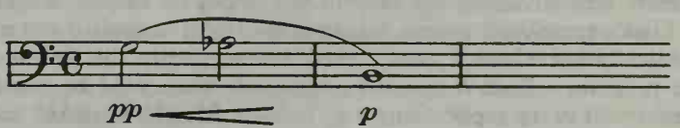
It is Wagner's awareness of such suggestions, and his subtlety in weaving them into his musical fabric to awaken in the listener's mind all kinds of extramusical ideas relevant to the dramatic events, that make him the greatest exponent of the *Leitmotiv* system. Nothing was done by any later composer to expand or improve upon his procedure. Richard Strauss, for instance, makes elaborate use of it, but on the whole with less close reference to the dramatic action and more often as material for purely musical development. It is in his symphonic poems rather than his operas that his use of *Leitmotiv* is most dramatic, for the simple reason that there is no stage action to carry on the plot.

The *Leitmotiv* has two distinct dramatic functions, which may operate separately or together: one is allusion, the other transformation. Both go back a good way beyond Wagner. Mozart's,



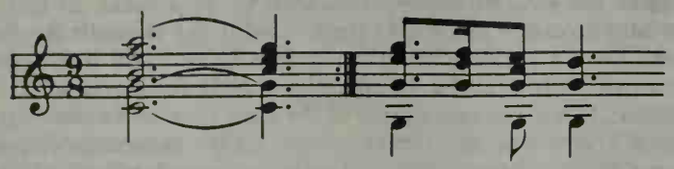
for example, is allusive, but appears in a rudimentary form, as a motto rather than a *Leitmotiv,* somewhat like Alfred de Musset's play titles (*Il ne faut jurer de rien,* etc.). Another good early example of such allusive use occurs in Weber's opera *Der Freischütz* at the moment when Max hesitates to descend into the wolves' glen and the orchestra urges him on derisively with an echo of the mocking chorus that had teased him in the first act. But Weber also used the *Leitmotiv* symphonically to some extent in *Euryanthe,* where Sir Donald Tovey finds no fewer than 13 motifs which are transformed or developed. Transformation is also found early in Hector Berlioz' *Symphonie fantastique* and *Harold en Italie;* in the former work the *idée fixe,* as he calls it, appears in different forms, first like the poet's thought of his beloved as an ideal and lastly in a nightmarish distortion, where he fancies her taking part in the witches' Sabbath. But in a sense this is still a motto, like the "fate" motif in each movement of Tschaikovsky's Fifth Symphony, and indeed it has not yet become an entirely organic part of the musical structure, as is proved by the fact that the "March to the Scaffold" was taken from an earlier work and the *idée fixe* simply inserted into it like a patch of foreign material.

In Wagner allusion and transformation are both used in rich abundance, either separately or in combination. Purely allusive, for instance, is the death theme in *Tristan und Isolde:*

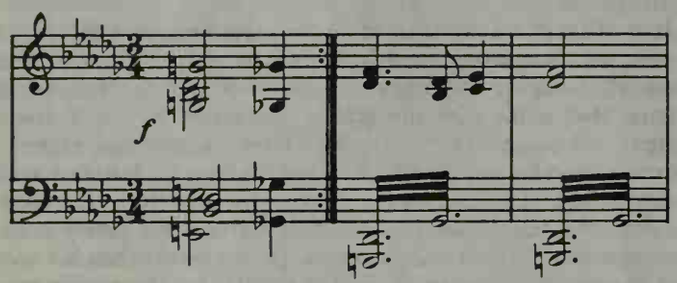


which tells us that a character is thinking of death or that a situation suggests it, but does not undergo development, although it can be used simultaneously with other material, like a symphonic theme. The most familiar example of Wagnerian transformation —too familiar to quote in music type—is the horn call in the second act of *Siegfried,* which later, in *Götterdämmerung,* turned from 6–8 into 4–4 time, becomes the theme for the matured and heroic Siegfried and, further modified in rhythm and enriched in texture, forms the basis for the great orchestral threnody after

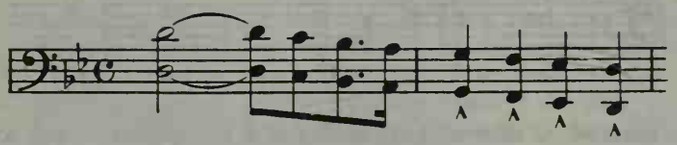
his death. To quote a less obvious example, here is the Rhine maidens' joyful song about the as yet unravished treasure in *Rheingold:*



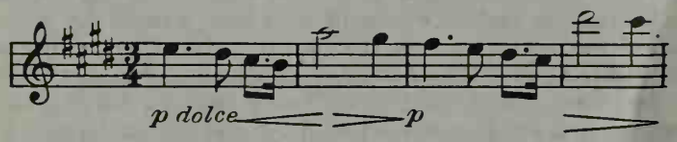
and here the new form of the theme representing the evil power the gold has acquired in the hands of Alberich:



Wagner contrives endless ingenuities both of allusion and of transformation, not to speak of symphonic development; on the other hand it is possible for commentators to see connections where none may have been intended, as between the theme of Wotan's spear throughout the *Ring:*



and that of Brünnhilde's self-justification in the third act of *Die Walküre:*



Strauss's transformations are more often than not musical developments rather than dramatic references. Allusions he often uses with quite as much subtlety as Wagner, as for example where the Princess in *Der Rosenkavalier* tells Ochs that she has a headache, while the theme of her love for Octavian in the orchestra apprises us that it is really a heartache from which she suffers. Other followers of Wagner, however, have done less than nothing to improve on his methods, partly because he left them little to do and partly because they happened to be composers of much smaller stature. On the whole the *Leitmotiv* never again showed the same flexibility and power after him.

Wagner's great original contribution to the use of *Leitmotiv* is that of allusion; transformation was not his invention, for it is already well advanced not only in the works by Berlioz but also in Liszt's symphonic poems, where musically it is applied too mechanically but where it does a good deal to clarify the outline of the program. Post-Wagnerian composers, too, could be unduly mechanical in its application; *e.g.,* Nikolai Rimski-Korsakov and, on a lower level, Gustave Charpentier.

Claude Debussy, on the other hand, used the principle in the most purely musical manner of which it is capable, and never, as he said maliciously but not altogether unjustifiably of Wagner's method, to make the characters on the stage present their visiting cards, as it were. This does happen in Wagner's work, but there is very much more in it than that.

In some other later composers there is much less; but, like Bizet or Puccini, for instance, they can be very effective when they do use representative themes. However, Puccini and others often do little more than indulge in sentimental reminiscence, which it must be admitted can be very moving if it is used with the mastery of Verdi, who was fond of recalling past happiness during a final tragic situation by means of a melody associated with it earlier.

With lesser masters, or those who are not masters at all, this device degenerates into the naïve one of the "theme song," which is not a modern invention except for its name, for a good example is a song as early as "Home, Sweet Home" in H. R. Bishop's *Clari* (1823), where, moreover, we already find rhythmic transformation. (E. W. Bm.)

LEITRIM (Contae Liathdroma), a county of the Republic of Ireland in the province of Connaught, covers 589 sq.mi. In 1956 it had a population of 37,056, 10% less than in 1951. There was a further decline of 10% to 33,470 in 1961.

The county extends from the lowlands near the upper Shannon to the coast on Donegal bay, a distance of about 50 mi. The southern part of the county is a lowland, floored by Carboniferous Limestone and covered by glacial drifts in the form of drumlins or ridges of drift, most of which are used as farmland. Between these ridges there are peat bogs and many small lakes. The southern boundary of the county with Longford and the eastern boundary with Cavan run through broken country of this type, but the western boundary follows the Shannon, which there broadens out into loughs Bofin and Boderg, though these are not actually within Leitrim. The river is navigable and boats ascend to Carrick-on-Shannon (*q.v.*), the county town.

At Drumshanbo, close to Lough Allen, the scene changes to a series of plateaus mainly from 1,400 to 1,800 ft. high. These plateaus are formed of Carboniferous rocks, varied from shales and sandstones to limestones. There are relics of past ironworking in the south and some coal seams, which are mined for a power station. On the hillsides beside Lough Allen there are many traces of past mining; coal was formerly sent by the light railway from Arigna (County Roscommon) to Drumshanbo and Ballinamore, but this line was closed in 1959. The plateaus are split up by a number of deep valleys, in one of which Lough Allen covers about 14 sq.mi. at 164 ft. above sea level. Of these valleys, perhaps the most striking is that of the Bonet river which rises in Glenade, flows away from the sea past Manorhamilton and finally enters Lough Gill, near Sligo. From Manorhamilton a fine deep valley, Glencar, opens westward to the lowlands north of Sligo.

Leitrim formed part of the ancient kingdom of Breifne, the country of the O'Rourkes. In 1152 Dermot Mac Murrough (*q.v.*) abducted the wife of Tiernan O'Rourke (O Ruairc). Dermot was driven out of Ireland in 1166 and appealed for English aid, and the Norman-Welsh invasion of Ireland began. In 1171 O'Rourke paid homage to Henry II and was subsequently murdered. In 1580 Sir Brian O'Rourke of Leitrim sheltered 1,000 Spaniards from the Armada, for which he was driven from the country and executed in 1591. The newly shired Leitrim lost its identity through land confiscation and the introduction of a new landlord class.

From a maximum of 155,297 in 1841, the population of Leitrim has constantly declined. In 1961, 5,973 persons (18% of the population) were in towns and villages of which the largest is Carrick-on-Shannon (pop. 1,497). Others include Manorhamilton (920), Mohill (905), Ballinamore (793) and Drumshanbo (565).

A county council meets at Carrick-on-Shannon and the county is united with Sligo under one county manager. It is united with Sligo for electoral purposes also, and the two counties return five members to *dáil éireann.* There are no urban districts or town commissioners in Leitrim.

In 1891 several parts of the county ranked as "congested districts" because of their poverty, but the reduction of population made possible the union of farms into larger holdings. A number of old demesnes have been divided up into farms, the majority less than 30 ac. Much of the land is poor with pasture as the main use. In the uplands there are sheep as well as cattle, but in the southern part cattle are the main stock. A few creameries have been established; potatoes and oats are the principal crops. The towns are merely small market centres, with few industries

except for a small electric fittings works at Carrick, a button factory at Manorhamilton and a jam factory at Drumshanbo.

See T. M. O'Flynn, *History of Leitrim* (1937).

(T. W. Fr.; Hu. S.)

LEIX (Laois), a county of the province of Leinster in the Republic of Ireland, sometimes spelled Laoighis, is bounded on the east by the Barrow and consists mainly of the upper Nore valley and the upper Barrow.

Within the county are the greater part of the Slieve Bloom, a range of mountains reaching 1,734 ft. in Arderin, and the northern part of the Castlecomer plateau, a coal field with a limited supply of anthracite. To the north lies the county of Offaly. The county town is Portlaoise (*q.v.;* Port Laoise, Port Laoighise, formerly Maryborough). Area 664 sq.mi. Pop. (1961) 45,069.

Most of the county is lowland, 300–400 ft. above sea level, between the Slieve Bloom and the Castlecomer plateau. The former is a range made up of Old Red Sandstone with inliers of earlier, Silurian rocks, aligned from southwest to northeast like other mountain ranges in the south of the Irish central lowland. The Castlecomer plateau is of Carboniferous rocks, standing up in ridges more than 1,000 ft. high on its edges but falling to a central basin around Castlecomer in County Kilkenny. On the level lowlands there is a mixture of bogs and ground moraine, with some eskers (gravel ridges), but much of the bog has been cleared for agriculture and more than four-fifths of the county is improved land.

Leix was part of an ancient kingdom of Ossory in the country of the O'Mores. In the 13th century it fell to Roger Mortimer, a Marcher from Herefordshire. Early in the 14th century another Roger Mortimer forced the O'Mores into submission but about 1340, under Lysagh O'More, they reasserted themselves. Under Edward VI, Leix and Offaly were annexed to the crown, which claimed title by descent from the Mortimers. Under Mary I an elaborate plantation scheme for colonizing Leix and Offaly was put into operation and the area was shired in 1556 as Queen's county and King's county, called after Mary and her consort, Philip of Spain. The natives were required to vacate two-thirds of the area. For half a century they resisted fiercely, the area being reduced to submission only in the reign of James I after the general reconquest of Gaelic Ireland. Even then the spirit of resistance did not die out but contributed to making Rory O'More one of the chiefs of the 1641 rising.

More than one-third of the population is in towns and villages, of which Portlaoise (pop. [1961] 3,133) and Portarlington date back to the 16th century. Portarlington, a long straggling town of 2,720 persons (of whom 863 are in County Offaly), still has some fine 18th-century houses. Mountmellick (2,677) retains the atmosphere of a coaching town but Abbeyleix (1,118) was rebuilt in the early 19th century.

A county council meets at Portlaoise and the county is under the same manager as Offaly. It is also united with Offaly for purposes of parliamentary representation, the two counties together electing five members to *dáil éireann.* There is no urban district in the county, but Portlaoise and Mountmellick are administered by town commissioners.

Agriculturally, Leix is divided mainly into medium-sized farms of about 70–80 ac. and by Irish standards a considerable proportion of the land is given to crops. Of the total land surface, approximately three-fifths is permanent pasture, one-fifth bog and one-fifth crops; about one-tenth of the land is used for wheat and barley with a few thousand acres annually of sugar beet for the factory at Carlow. The farming is mixed with cattle grazing for ultimate sale as one source of income. There is sheep rearing in the Slieve Bloom. In these mountains there are also forestry plantations. There is woodworking industry at Portarlington, a bacon factory at Mountmellick and flour milling and a woolen industry at Portlaoise.

A branch of the Grand canal was built through Portarlington to Mountmellick in the early 19th century, and the county was well provided with coach services. The main line to Cork from Dublin passes through Portarlington and Portlaoise; at Portarlington there is a junction line to Athlone through Tullamore and Clara. Much of the ordinary passenger and freight traffic is handled by bus and truck services in conjunction with the railways.

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(T. W. Fr.; Hu. S.)

LE JEUNE, CLAUDE (*c.* 1527–1600), a leading French composer of vocal music. Born in Valenciennes, Flanders, he had gone to Paris by 1564. He was choirmaster to François d'Anjou, brother of Henry III, from about 1579 to 1584. He died in Paris in 1600, a Huguenot under the protection of Henry IV. Le Jeune's most original compositions are his *musique mesurée,* in which he set French verse written according to the rules of classical prosody, working in collaboration with the poet Jean Antoine de Baïf.

See H. Expert (ed.), *Les Maîtres Musiciens de la Renaissance française,* vol. xi–xiv, xvi, xx–xxii (1900–06). (B. L. Tr.)

LEJEUNE, LOUIS FRANÇOIS, Baron (1775–1848), French general, painter and lithographer who was chiefly responsible for the introduction into France of lithography as an artistic medium, was born Feb. 3, 1775, probably at Strasbourg. From 1789 to 1791 Lejeune studied art under Valenciennes. He took part in many of the Napoleonic campaigns, and his vigorous battle pictures, executed mainly from sketches and studies made on the battlefield, enjoyed a great vogue; many were engraved by J. J. Coiny and E. Bovinet. The German campaign of 1806 brought him to Munich, where he visited the workshop of Aloys Senefelder (*q.v.*), the inventor of lithography. Fascinated by the possibilities of the new method, Lejeune then and there drew on the stone his famous "Cosaque," and immediately pulled 100 proofs of it, one of which he later submitted to Napoleon.

Lejeune also painted many landscapes and portraits. In 1837 he became director of the École des Beaux-Arts and curator of the museum at Toulouse, where he died on Feb. 29, 1848.

LEKAIN (Henri Louis Cain) (1729–1778), French actor, whom Voltaire regarded as the greatest tragedian of his time, was born in Paris on March 31, 1729. After having been coached by Voltaire, Lekain made his debut at the Comédie Française in 1750. He scored his greatest successes in plays by Voltaire, notably as Genghis Khan in *L'Orphelin de la Chine* and in the title role of *Tancrède.* In 1759 Lekain drew up plans for a Royal School of Dramatic Art. He developed a strong interest in the reform of theatrical costume, discarding the traditional heroic paraphernalia when playing Oreste in Racine's *Andromaque* and adopting a pseudo-Grecian costume. As a disciple of Voltaire he campaigned successfully for the banishment of spectators from the stage of the Comédie Française. He died in Paris on Feb. 8, 1778, and his *Mémoires* were published in 1801. (A. M. N.)

LEKEU, GUILLAUME (1870–1894) Belgian composer who was a follower of César Franck. Born at Heusy, near Verviers, Jan. 20, 1870, he first learned music from the organist of his native village. Later, while at school at Poitiers, he made an intensive study of the quartets of Beethoven. In 1888 he took his degree in philosophy at the University of Paris and then studied music there with Gaston Vallin. He visited Bayreuth in 1889, and on his return was a pupil of César Franck for about a year. Deeply affected by Franck's death in 1890, he was guided in his studies by Franck's pupil, Vincent d'Indy. In 1891 he wrote a piano sonata and a piano trio and won the second Belgian Prix de Rome with his cantata, *Andromède,* a scene of which, arranged for voice, piano and string quartet, he conducted in Brussels in 1892. As a result of this performance, the famous Belgian violinist Eugène Ysaÿe commissioned him to write a piano and violin sonata, performed by Ysaÿe at Brussels on March 7, 1893. In the same year Ysaÿe conducted his *Fantaisie symphonique* on two folk songs of Anjou.

Lekeu died at the age of 24 from typhoid, contracted from contaminated sherbet, on Jan. 21, 1894, at Angers. He left many works that remained either undiscovered or unpublished, including two early quartets, a suite for cello and orchestra, a symphonic study on the subject of *Hamlet,* and *Epithalame* for strings, trombones and organ. His cello sonata and piano quartet were completed by Vincent d'Indy.

Though Lekeu's technical accomplishment was uneven, he gave proof, particularly in the piano and violin sonata and the *Fantaisie symphonique*, of an original style which he had evolved from his studies of the works of Beethoven and Franck. He also had a sensitive literary gift, seen in a long series of letters to his parents, and in a set of poems, notably his "Invocation à Mallarmé."

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LELAND, CHARLES GODFREY (1824–1903), U.S. author and journalist known for his popular humorous verse in dialect, was born at Philadelphia, Pa., Aug. 15, 1824, and graduated at Princeton in 1845. He was in Paris during the revolution of 1848, and took an active part in it. He then returned to Philadelphia, and after being admitted to the bar in 1851, devoted himself to writing and to editorial work on various papers and magazines in Philadelphia, New York city and Boston. He served in the Union army for a brief time, prospected for oil and then returned to journalism. In 1868 he became known as the humorous author of *Hans Breitmann's Party*, which was followed by other volumes of the same kind, collected in 1871, with the title of *Hans Breitmann's Ballads*. These pioneer dialect poems, burlesquing the German American, at once became popular and resulted in his being given a master's degree from Harvard, largely at the instance of James Russell Lowell. In 1869 he went to Europe, and till 1880 was occupied with literary work. After returning to Philadelphia for six years, he again lived in Europe, generally at Florence, where he died March 20, 1903.

Though his humorous verses were most attractive to the public, Leland was a serious student of folklore, particularly of the gypsies.

His numerous publications include *Poetry and Mystery of Dreams* (1855), *Meister Karl's Sketchbook* (1855), *Sunshine in Thought* (1863), *Egyptian Sketchbook* (1873), *Abraham Lincoln* (1879), *The Minor Arts* (1880), *Algonquin Legends of New England* (1884), *Hans Breitmann in Tyrol* (1894).

See his *Memoirs* (1893), and *Charles Godfrey Leland* by his niece Elizabeth R. Pennell (1906), who also wrote a memoir for the 1914 edition of the *Hans Breitmann Ballads*.

LELAND, JOHN (*c.* 1506–1552), English antiquary, was born in London and educated at St. Paul's school and Christ's college, Cambridge, later studying at All Souls college, Oxford, and in Paris. He took holy orders and by 1530 was chaplain and librarian to King Henry VIII; the special position of king's antiquary was created for him in 1533 and he was authorized to search cathedral and monastic libraries for manuscripts of historical interest. Probably from 1534 and certainly from 1536 to 1542 he was engaged on an antiquarian tour of England and Wales. He supported Henry VIII's church policy and was rewarded with the rectory of Haseley in Oxfordshire, a canonry at King's college (afterward Christ Church), Oxford, and a prebend at Salisbury. But he resided mainly in London, where he was certified insane in March 1550, and where he died on April 18, 1552.

After the conclusion of his tour Leland presented to the king as a "newe yeares gyfte" (1545) a plan of his proposed works. He intended to provide a topographical account of the British Isles and the adjacent islands, and to add a description of the nobility and of the royal palaces. Illness and death intervened, however, before these works were prepared. After passing through various hands, the bulk of Leland's manuscripts was deposited (1632) in the Bodleian library at Oxford. They had in the meantime been freely drawn upon by other antiquaries, notably by John Bale, William Camden, William Harrison, Raphael Holinshed and Sir William Dugdale.

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LELANTINE WAR, between the Greek cities of Chalcis and Eretria in the late 8th century B.C. These cities were close neighbours on the island of Euboea, the plain of Lelanton, which gave its name to the war, lying between them. Their wealth and power in this early period are increasingly evident. They jointly founded Cumae in Italy, the first of the Greek colonies in the west (*c.* 750), probably for the sake of trade in metal with Etruria rather than for agricultural settlement like most of the later colonies. Recent study of their pottery makes it likely that they also took the lead at Poseidium (Al Mina), the 8th-century Greek trading colony at the mouth of the Orontes river, a key point on the easiest route between Greece and Mesopotamia. An early "oracle" calls Chalcidian warriors the finest in Greece.

These early colonies were joint enterprises, and Strabo states that the two cities were normally friendly, so that references to "the" early fight between them are probably all to the same war. Its scope and importance are shown by Thucydides' remark (i, 15), in the course of his argument on the small scale of fighting before the Peloponnesian War, that the Greek world was more completely split into two alliances by the early war between Chalcis and Eretria than on any other occasion. Various references suggest that the fighting took place somewhere in the last third of the 8th century, and that Samos, Corinth, Thessaly and perhaps Erythrae joined Chalcis, while Miletus, Megara, perhaps Chios, took the Eretrian side; the first Messenian War (*see* SPARTA) may be connected with this struggle, with Sparta on the Chalcidian side. Plutarch tells the story of a battle in Euboea in which Thessalian cavalry (or cavalry from the Chalcidian colonies in the north) gave Chalcis the victory. Otherwise only events farther afield are recorded; in the west Corinthians displaced Eretrian colonists from Corcyra (Corfu) and Chalcidians expelled Megarians from Leontini in Sicily. It seems unlikely that these alliances were formed simply to dispute possession of the Lelantine plain; friction in the colonial area and even trade rivalry were among the causes of the strife, though later Greek wars were seldom fought for commercial reasons.

The war appears to have consisted of a series of loosely connected contests all over the Greek world, with no decisive overall result. In the west, Chalcis held both sides of the Straits of Messina and colonized the richest agricultural sites in Sicily, while the pottery of Corinth predominates on western sites for a long time. But in the east Chalcis' ally Samos suffered eclipse, while Miletus prospered and founded many colonies in the 7th century, and Megara colonized the best sites of the Bosporus. In Euboea itself, in spite of Chalcis' victory, Eretria was later the larger and more prosperous city. But the military ascendancy in mainland Greece passed to Argos, then to Sparta, while commercially Corinth and Aegina, and later Athens, outstripped the cities of Euboea, which never again were so prominent as they had been in the 8th century. (A. As.)

LELEGES, an ancient Aegean people mentioned by Homer in the *Iliad* (xx, 96; xxi, 86 ff.) as at Pedasus in the Troad. Herodotus (i, 171) says that Leleges was the "former name" of the Carians (non-Greeks of southwestern Asia Minor) "when they inhabited the islands . . . and manned the navy" of King Minos; Athenaeus (vi, 271) quotes a writer from Caria, Philip of Theangela, as saying that in his day they were a helot (*i.e.*, serf) race in Caria. Later writers (Strabo, 321 ff., quoting Aristotle and a Hesiodic poem; Pausanias, iii, 1, i, etc.) make them also the aborigines of peninsular Greece; and place-names (those ending in -sos, -sa, -nthos, -nda) do indeed show that a common pre-Hellenic language once was spoken from Greece to Caria. (A. R. BU.)

LELEWEL, JOACHIM (1786–1861), Polish historian, geographer and numismatist, a patriot of austere character and a scholar of great literary activity, was born in Warsaw on March 22, 1786. He studied at the University of Wilno (Vilnius) between 1804 and 1808 and returned there as acting professor of history in 1815. In 1818 he was appointed librarian at the public library in Warsaw but in 1821 was back in Wilno. In 1824 he was dismissed from his professorship by the Russian governor for exercising a harmful political influence on the students. Back in War-

saw, he devoted himself to historical research and in 1829 entered politics as a deputy to the *sejm*. In 1830, upon outbreak of the insurrection, in which he was instrumental, he was elected chairman of the left-wing Patriotic society and later became a member of the government. His behaviour in both capacities was marked by hesitation. After the collapse of the insurrection in 1831, he emigrated to Paris but, expelled first from Paris, at the Russian request, and later from France, moved to Brussels.

Lelewel's life after 1848 was devoted to learning. The range of his interests was prodigious and included genealogy, heraldry, geography, numismatics and bibliography. His *Numismatique du moyen âge* (1835) and *Géographie du moyen âge,* five volumes (1852–57), are of fundamental importance, but it is his contributions to historical method, the history of historiography and Polish social history that make Lelewel the most original of all Polish historians, as well as one of the most erudite and productive. His works on Polish history were published in 18 volumes (1846–68); of a new edition (1957–), volumes i, iii, vi–viii had appeared by 1964. His treatment of the subject, however, was distorted by a tendency to idealize Poland's past and to assign to Poland a special role for the future. He died in Paris on May 29, 1861. His works in German and French translation include *Histoire de Pologne* (1844).

See M. H. Serejski, *Joachim Lelewel* (1953). (L. R. Lr.)

LELY, SIR PETER (Pieter van der Faes) (1618–1680), Dutch-English portrait painter of the Flemish school, was born in Westphalia, the son of J. van der Faes, probably a Dutch mercenary. The origin of the name Lely is uncertain. He went to England with William of Orange in April 1641, painted that prince and his bride, the princess royal, and gained the court patronage, also painting Charles I and James, duke of York. He was a buyer at the sale of the king's pictures (1649–53) and about 1651 petitioned parliament for the mural decoration of Whitehall.

He prospered during the Commonwealth, and even more at the Restoration. In 1661 he received a pension of £200 a year, "as formerly to Van Dyck." Pepys' *Diary* shows in what great state he lived, and Charles Beale's "Diaries," in the British museum, throw light on his studio practice. By his "reputed wife," Ursula, he had three children, of whom John and Anne survived him. He was knighted in Jan. 1680 and died in London the same year, being buried at St. Paul's, Covent Garden, in December.

Some of Lely's early portraits have passed as Van Dycks. During the Commonwealth he adopted a severe, puritanical style, while his Restoration portraits of women catered to the sensual temper of the court. But simultaneously he painted the "Admirals" at Greenwich, the best of them rugged and severe. Toward the end his work gained in breadth and freedom.

Lely was a connoisseur with a fine collection, and a good draftsman and colourist.

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LE MAÇON (or Le Masson), **ROBERT** (*c.* 1365–1443), chancellor of France, a leading counselor of King Charles VII and a supporter of Joan of Arc, was born at Château-du-Loir, in Anjou. Ennobled in 1401, he became a counselor (1407) of Louis II, duc d'Anjou and titular king of Naples, and went in his train to the French court. He became chancellor to Queen Isabella in 1414 and one of the commissaries responsible for the coinage. He was appointed chancellor to the duc de Touraine, the future Charles VII, in 1416 and soon afterward bought for 4,000 *livres* the lordship of Trèves in Anjou. When Paris was surprised by the Burgundians in May 1418, he helped Charles (now dauphin) to escape; consequently John the Fearless, duke of Burgundy, named him as guilty of sedition and disturbing the peace. He seems to have been with Charles at Montereau (Sept. 10, 1419) when John was murdered. He gave up his functions as chancellor in 1422 but remained a member of the council until 1436, taking part in an embassy to the duke of Brittany in 1425, which led to the treaty of Saumur. He was arrested through the enmity of Pierre de Giac, who was in high favour with Charles, in Aug. 1426; despite Charles's pleas in his favour he had to pay 1,000 gold *écus* to regain his freedom. He was present at the interviews between Charles and Joan of Arc at Chinon (March 1429) and at Loches (May). When the royal army encountered resistance at Troyes (July 1429) on its march toward Reims, Le Maçon urged that Joan's advice should be followed as to whether or not the attack should be continued.

Le Maçon was among the many whose loans swelled the royal treasury. He married first Jeanne Cochon and, on her death, Jeanne de Mortemer; but he died, without issue, on Jan. 28, 1443, and was buried in the church at Trèves.

See C. Bourcier, "Robert Lemaçon," *Revue historique, littéraire et archéologique de l'Anjou,* vol. x (1873). (Y. M. L.)

LE MAIRE DE BELGES, JEAN (1473?–1525?), Flemish poet, historian and pamphleteer, writing in French, who was the last of the rhetoricians and the chief forerunner, both in style and in thought, of the Renaissance humanists in France and Flanders. He was born at or near Bavai, Hainaut, about 1473. He led a wandering life in the service of various princes, and was often at the court of Margaret of Austria, regent of the Netherlands, acting as her librarian at Malines.

An innovator of wide intellectual curiosity, Le Maire had a sense of literary beauty which set his works apart from those of his contemporaries. Most of his poems are occasional pieces in memory of some prince. His two *Épitres de l'amant vert* (1505) are full of metrical innovations and foreshadow the light verse of Clément Marot. His *Concorde des deux langages* (*c.* 1513; modern ed. 1947) attempts to reconcile the influence of the Italian Renaissance with French tradition.

His most extensive work is a poetical legendary romance in prose, *Illustrations de Gaule et singularités de Troie* (1510–13), showing exuberant imagination and a modern appreciation of classical antiquity. Another prose work, *Différence des schismes et des conciles* (1511), is written with a polemical vigour which was to be surpassed and amplified by the Reformation pamphleteers of the 16th century. Le Maire's work is of genuinely high quality and deserves to be better known.

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LEMAITRE, (FRANÇOIS ÉLIE) JULES (1853–1914), French writer and critic who represented pure French taste at a time when literature was exposed to the experiments of the decadents and Symbolists. He was born at Vennecy (Loiret) on April 27, 1853, and after studying at the École Normale, became a schoolmaster. His first essay, on Renan, was published in the *Revue Bleue* in 1884; it showed his independence of mind and lively style and was the beginning of a long career as theatrical and literary critic. His critical essays from the *Journal des Débats* were collected in *Les Contemporains* (vol. 1–7, 1885–99; vol. 8, 1918) and *Impressions de Théâtre* (vol. 1–10, 1888–98; vol. 11, 1920). Lemaitre was an enemy of critical dogmatism and critical system; like his contemporary Anatole France (*q.v.*), he envisaged criticism as an exercise of personal impression and judgment controlled by knowledge and taste. His essays, although inevitably dated, remain readable, not only as valuable documents on the writing of his time but for their wit, wide knowledge and lack of pedantry. His most penetrating and authoritative works are his lectures on Racine (1908), Rousseau (1907) and Fénélon (1910). Of his plays, *Révoltée* (1889), *La Massière* (1904) and *Les Rois* (1893) had moderate success; and his stories. *Serenus* (1886) and *En marge des vieux livres* (1905–07) deserve to be remembered. He died at Tavers (Loiret), on Aug. 4, 1914.

See M. Harry, *La vie de Jules Lemaitre* (1946). (Ém. H.)

LE MANS: *see* Mans, Le.

LEMAY, CURTIS EMERSON (1906–), U.S. air force officer, noted as a strategic bombardment commander, was born in Columbus, O., on Nov. 15, 1906. LeMay entered the U.S. air corps in 1928 and advanced to the position of bombardment group commander in 1942. Flying with the 8th air force from England in 1942–44, eventually as a bombardment division com-

mander, he became known for his development of advanced bomber tactics, including pattern bombing and the combat box formation. After commanding B-29s in India and China during 1944, LeMay took over the 21st bomber command in the Marianas in Jan. 1945 and inaugurated the low-level bombing tactics which burned out Japanese cities. He was selected to head the U.S. strategic air command in Oct. 1948, and promoted to the rank of general in Oct. 1951. In 1957 LeMay was named vice-chief of staff and in 1961 chief of staff of the U.S. air force. He retired in 1965 (A. Gc.)

LEMERCIER, (LOUIS JEAN) NÉPOMUCÈNE (1771–1840), French poet and dramatist, one of the last to uphold classical tragedy against romanticism, was born in Paris, April 21, 1771. An accident caused lifelong partial paralysis which he faced with considerable courage. He made a precocious literary debut, attempting a comedy at nine, and having his first tragedy, *Méléagre*, produced at the Comédie Française before he was 16. His *Tartufe révolutionnaire* (1795) created a *succès de scandale* and was quickly suppressed because of its bold political allusions. The orthodox tragedy *Agamemnon* (1797) was probably Lemercier's most celebrated play. *Pinto* (1800), a historical comedy treating the Portuguese revolution of 1640, was original in attempting to divest historical events of poetic ornament and the high seriousness of tragedy, thus foreshadowing Eugène Scribe's unheroic approach. The more experimental attitude was also shown in *Christophe Colomb, "comédie shakespirienne"* (1809) and *Richard III et Jeanne Shore* (1824), imitated from Shakespeare and Rowe. Lemercier had no sympathy with the romantics, however, and in the Académie Française, to which he was elected in 1810, he consistently opposed them, refusing his vote to Hugo. The most successful of his later plays was *Frédégonde et Brunehaut* (1821), a "regular" tragedy in which he claimed to portray, from early French history, a modern equivalent of the Atreides theme. Most of his plays were helped by the acting of François Talma. Lemercier also wrote a number of philosophical epic poems, and *La Panhypocrisiade* (cantos 1–16, 1819; cantos 17–20, 1832), a romantic fantasia on 16th-century French history.

Once an admirer and intimate of Napoleon, Lemercier, a republican idealist, refused to compromise with the empire, of which he was an outspoken critic, and lost favour. He remained independent after the Restoration, opposing intolerance and censorship, and died in Paris on June 7, 1840, long out of favour as a writer but universally esteemed as a man.

See G. Vauthier, *Essai sur la vie et les oeuvres de N. Lemercier* (1886). (W. D. Hh.)

LEMMA, in mathematics, is a theorem offered to show the validity of another theorem (*see* Porisms). For related terms *see* also Axiom; Hypothesis; Postulate; Theorem.

LEMMING, a small rodent of the bleak tundra of the far north temperate and polar regions, noted for its regular fluctuation in population and its periodic migrations. While all members of the tribe Lemmini, family Cricetidae, show a three-to-four-year cycle of abundance and a tendency to migrate at peak population, species of *Lemmus* have been the objects of most study. Especially dramatic are the occasional mass marches of the Norway lemming (*L. lemmus*) that often end in the sea.

Lemmings range in size from 4 to 7 in. including the stump of tail. They are grayish to buff below, shading to grayish- or reddish-brown above; some species have a dark back stripe. Lemmings subsist entirely on the roots and shoots of plants. They live in crevices among rocks or in short burrows under vegetation, and construct a network of tunnels under snow cover during winter. Lemmings are prolific to the point of breeding from spring to fall and, in favourable years, even in winter. Three to nine young are born after a 20–22 day gestation period.

BY COURTESY OF WALT DISNEY PRODUCTIONS

COLLARED LEMMINGS (DICROSTONYX GROENLANDICUS) IN SUMMER COAT

During normal periods lemmings make short annual spring migrations in search of food and shelter, and every three or four years they may move in detectable waves away from centres of denser population. The well-known armies of lemmings that devastate the countryside and sink in the sea occur infrequently, locally, and only in geographic areas, such as Scandinavia, where the mountains —the usual habitat of the Norway lemming—are close to the sea. Usually after several years of high breeding capacity and low mortality, Norway lemmings may begin to move in greater numbers, at first erratically and under cover of darkness and later in bold groups that may travel in daylight. Wherever barriers block their easy passage they tend to crowd in rising numbers till a kind of panic reaction drives them over the obstacles and they continue on in larger bands, frequently down valleys. Behavioural changes intensify and the lemmings show more than their usual pugnacity, offering fight to animals they ordinarily would avoid. Although many die during migration—perishing by predation, starvation, and accident—some reach the sea and plunge in, swimming until exhausted, acting under the same blind impulse that had forced them to cross smaller bodies of water with safety.

The sudden emergence of hordes of migrating lemmings is not fully understood. Among the factors in the population eruption are: natural increase in numbers after the last migration and subsequent population "crash," reduction in predators (who succumbed after the lemming decline), and optimal breeding conditions (especially in the preceding winter). The mass migrations appear to flow in part from changes in food supply or quality and stressful conditions (crowding, competition, warmer than usual temperatures, etc.) that lead to hormonal changes and alteration of behaviour.

The American species are not so remarkable in their population fluctuations and movements. Both the black-footed (*Lemmus nigripes*) and brown (*L. trimucronatus*) lemmings range over the north central and northwestern areas of Canada and in Alaska. The collared lemmings extend eastward somewhat, the typical species (*Dicrostonyx groenlandicus*) ranging as far as the eastern coast of Greenland; two other species, the St. Lawrence Island form (*D. exsul*) and the Labrador form (*D. hudsonius*) are more restricted. Southernmost in range are the southern bog lemming (*Synaptomys cooperi*), with the northern bog lemming (*S. borealis*) ranging from Labrador through Alaska. The American lemmings live like the Scandinavian species. They inhabit the tundra and have been found emigrating even on Arctic ice 30 mi. from land.

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LEMNA: *see* Duckweed.

LEMNISCATE: *see* Curves, Special.

LEMNOS (Limnos), a Greek island of Lesvos *nomos* (department), mainly composed of volcanic rock, is located in the north of the Aegean sea. Area 184 sq.mi.; pop. (1961) 21,808. It is mountainous, with sheep pasture and very fertile valleys. No forests remain and all wood is brought from Thasos or the mainland. There are mulberries and other fruit crops but no olives. The population is Greek, formerly with a Turkish minority which was exchanged for Greek refugees in 1921–28.

The chief town is Kastron (pop. 3,460) on the west coast, with an excellent harbour; it has a Genoese castle and is the seat of the metropolitan (bishop) of Lemnos and the neighbouring island of Ayios Evstratios (St. Eustratius). Moudhros on the south coast is located at the head of a spacious landlocked bay of value as a naval base. Homer writes as if there were one town in the island called Lemnos, but historically this is incorrect. There were

two towns, Myrina (now Kastron) and Hephaestia, so called because of the legend that associated Hephaestus (*q.v.*) with the island. The latter was the chief town; its coins have been found in considerable number, the types being sometimes the Athenian goddess Athena and her owl, sometimes native religious symbols, the caps of Castor and Pollux, Apollo, etc. Few coins of Myrina are known. They belong to the period of Attic occupation and bear Athenian types.

Lemnos was celebrated in ancient times for its medicinal earth *Lemnia sphragis,* "Lemnian seal," sometimes called *terra sigillata,* these names being derived from the stamp impressed on each piece. Also called Lemnian bole, it was considered to be a cure for festering wounds and snake bites, and in the 16th century for the plague. Attested in the middle ages, its use was well known throughout Europe from the 16th century onward. The earth was dug ceremonially once a year (in the Christian era on Aug. 6, the feast of the Transfiguration) from a mound near Hephaestia on the east coast, a ceremony observed by Galen (*q.v.*) and other travelers after him.

Excavations on the island have been conducted by the Italian school. At Poliochni in the east a large Early Bronze Age settlement has been explored and has already yielded an important hoard of gold objects which invite comparison with Anatolian work. There is nothing of the Mycenaean period. Near the ancient town of Hephaestia an extensive cemetery of the 8th–6th centuries has been excavated. This could have belonged to the Tyrseni, who were said to have occupied the island and were of the stock thought to have migrated west, to Etruria. Moreover, an inscribed stele, from near Kaminia in the east, seems to betray affinities with the Etruscan language. But it is not easy to reconcile the varying testimonies about Pelasgians, Tyrseni and others with each other, or with the remains.

Toward the end of the 6th century the island was conquered by Otanes, one of the generals of the Persian king Darius, but was soon reconquered by Miltiades, the tyrant of the Thracian Chersonese. Miltiades afterward returned to Athens, and Lemnos remained an Athenian possession, secured, but for a short period of Spartan intervention (404–393 B.C.), by a cleruchy (*q.v.*) until Philip II of Macedonia acquired it. The 5th-century cemetery excavated near Hephaestia belonged to the Athenian settlers. The Romans declared Lemnos free in 197 B.C. but gave it over in 166 to Athens, which retained nominal possession until the whole of Greece was made a Roman province. After the division of the empire, Lemnos passed under the Byzantine emperors; it shared in the vicissitudes of the eastern provinces, being alternately in the power of Greeks, Italians and Turks, till finally the Turkish sultans became supreme in the Aegean. In 1476 the Venetians successfully defended Kotchinos against a Turkish siege, but in 1657 Kastron was captured by the Turks from the Venetians after a siege of 63 days. Kastron was again besieged by the Russians in 1770. It was used by the Turks, as by the Romans, as a place of banishment, and was seized by the Greeks in 1913. *See* GREECE: *Modern History.*

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LEMON (*Citrus limon*), a small tree or spreading bush and its fruit; it was considered by Linnaeus as a variety of the citron (*Citrus medica*). The origin of the lemon is not certain. It should probably be considered as a "satellite" species of the citron, though it may ultimately prove to be of hybrid origin, perhaps having the citron and lime for parent species.

History.—The lemon seems to have been unknown to the ancient Greeks and Romans and to have been introduced into Spain and the north African countries some time between the years A.D. 1000 and 1200. At about this same time, it was further distributed through Europe by the crusaders, after they found the fruit growing in Palestine. In 1494 the fruit was being cultivated in the Azores and shipped largely to England. In China the lemon is found only as a plant of relatively recent introduction and is very rare even in the southern provinces, where other citrus are grown. It is also rare in India. As a cultivated tree, the lemon is now grown throughout the Mediterranean countries. It is extensively grown in the southwestern United States, in Italy and in Spain and is grown to a limited extent in almost all tropical and subtropical countries.

Plant Characteristics.—Unlike the orange, which forms a close head of deep-green foliage, the lemon forms a spreading bush or a small tree, 10 to 20 ft. high if not pruned. The leaves of the lemon are paler and more scattered than those of the orange; the young leaves, when one-eighth to one-quarter grown, have a decidedly reddish tint, later turning green. The foregoing description is typical of the Eureka lemon variety and others similar to it, such as the Villafranca; the various selections of the Lisbon lemon varieties grow more like an orange or grapefruit, so far as size of leaves and density of foliage are concerned. The young branches of the lemon are angular, and in some varieties, such as the Lisbon, there are sharp thorns at the axils of the leaves. The flowers possess a sweet odour comparable to that of the orange; they are rather large, solitary or in small clusters in the axils of the leaves; reddish-tinted in the bud; petals white above and reddish-purple below.

The Fruit and Its Composition.—The fruit is oval with a broad, low, apical nipple and eight to ten segments; an outer rind or peel, yellow when ripe and rather thick in some varieties, is prominently glandular-dotted; seeds are small, ovoid, pointed, sometimes few or none; pulp is decidedly acid. The white spongy inner part of the peel, called the mesocarp or albedo, is nearly tasteless and is the chief source of the commercial grades of pectin.

Volatile oils are contained in the oil glands of the outer lemon peel (flavedo); these consist largely of limonene (terpene) in amounts ranging from 85% to 95%, with corresponding percentages (15% to 5%) of aldehydes and esters. The aldehydes and esters are largely responsible for the flavour and odour of the citrus oils. The white spongy inner part of the peel, the mesocarp (albedo), consists of cellulose, hemicellulose, lignin, pectin, pentosans, sugars, glycoside, bitter substances and mineral matter. One of the glycosides is hesperidin. The pulp of the lemon is made up of soluble solids, in solution in the juice, and of insoluble solids consisting of segment and juice-cell walls. Soluble solids are largely sugars or acids. The predominant acid is citric, which may amount to 5% or more on the fresh weight basis of the juice, but small quantities of malic acid have been reported. Lemon juice is rich in vitamin C and contains smaller amounts of the B vitamins (B_1, B_2 and niacin).

SUNKIST PHOTO

LEMON (CITRUS LIMON)

Varieties.—The cultivated lemon varieties are of mixed parentage and do not come true to seed. Lemon trees for commercial planting are therefore usually propagated by budding the desired variety on seedlings of other citrus species, such as the sweet orange (*Citrus sinensis*), grapefruit (*C. paradisi*), mandarin orange (*C. reticulata*), sour orange (*C. aurantium*) or the intrageneric hybrid Sampson tangelo (*C. paradisi* crossed with *C. reticulata*).

Seedlings of any of these species are superior to lemon seedlings as rootstocks because they are more uniform, and the ultimate orchard trees are less susceptible to the various crown- and root-rot diseases (see *Diseases,* below). The first four rootstock species are listed in the order of their increasing relative resistance to crown-rot diseases; the Sampson tangelo is nearly as resistant as the sour orange.

The two chief varieties of lemons grown in California are the Lisbon, a variety introduced from Australia; and the Eureka, a variety originated from a seedling tree grown in California. Many of the orchards planted after 1922 are of selected strains of the

Eureka, a precocious, practically thornless tree, smaller and less vigorous than the Lisbon. The fruit is almost seedless and keeps especially well under average storage conditions.

H. J. Webber (1943) enumerated 21 varieties of lemons, and there are many others cultivated in the Mediterranean countries. The numerous varieties include those with pink pulp, those with variegated foliage and those so low in acid that they have a sweet or insipid flavour; otherwise, the varieties are typical of the species *Citrus limon*.

Cultivation.—The total heat requirement of the lemon is lower than that of the orange, and the relatively cool, equitable climatic zones of the coastal portions of Italy and California are therefore especially favourable for successful cultivation of this fruit.

Lemon trees are commonly grown in orchards, with the trees 15 to 25 ft. apart, the spacing depending upon the varieties and the cultural conditions. Although all citrus trees are susceptible to injury by extreme cold—temperatures ranging from 25° to 20° F. (−4° to −7° C.), or below—the lemon tree, after the lime, is the most tender; and even in areas relatively frost-free it is necessary to provide wind machines and orchard heaters for use during cold winter nights (*see* ORANGE). In Italy, protection against frost damage is accomplished by laying grass or straw mats over a permanent framework of poles; these act as a cover for the trees in winter. The trees are grown on soils which are relatively fertile; in order to produce large commercial crops, larger applications of fertilizers are made than are customary with many agricultural crops.

Harvesting.—Lemon trees bloom throughout the year, unless unfavourable extremes of temperature delay the blossoms. Fruit is picked from six to ten times a year, the number of pickings depending upon the marketable size of fruit or the state of maturity. Full-sized fruit, for commercial purposes, is about two inches in diameter. The best-keeping and best-quality fruit is that which reaches a desirable size while still green and is then picked and cured at a temperature of 57° to 60° F. (14° to 16° C.) and a relative humidity of 85% until the peel is clear-yellow. Good sound fruit may be kept three months or more in storage without loss of quality or commercial value. An application of the plant growth regulator 2,4-D increases storage life to as much as six months by delaying aging; the button (calyx end receptacle) is kept green and thus resistant to *Alternaria* black rot (see *Fungus Diseases*, below).

Great care is taken in picking and handling the fruit to prevent bruising or breaking of the peel by thorn pricks, stem punctures or fingernail cuts. The pickers commonly wear cloth gloves and clip the lemon stems very close to the fruit by means of small clippers. Careful handling is essential to prevent loss of fruit in storage and transit by fungus diseases.

Young lemon trees reach a bearing age very quickly; some fruit is usually produced during the third year after planting of trees in the orchard, and commercial crops may be expected during the fifth year. The mature lemon tree produces a remarkably large number of fruits; an unusual bearer may produce as many as 7,000 fruits in one year, but the average, satisfactory orchard yield is about 20% of this amount.

Packing.—In the United States, lemons are commonly packed in fibreboard cartons holding 40 lb. of fruit each. (Production figures, however, are often based upon boxes of 76 lb. each, used internationally.) The fruit is graded in the packing house for size, quality and degree of maturity. The grades, which depend on maturity, are based on the colour of the fruit: green, light green, silver and tree-ripe (yellow). Fruit of the last-mentioned grade is fully ripe and must be packed and sold at once or used for processing. The other grades are held in storage until they become a uniform lemon-yellow colour. In packing, fruits of the same size are placed in the cartons. The number of lemons packed per carton may range from 105 to 245; the medium-sized commercial lemon is 2.1 in. in diameter and packs 150 per carton. Lemons of the most desirable sizes and of the best quality are sold in the fresh-fruit market; the remainder of the crop is used in the manufacture of such products as citric acid and pectin. The proportion sold in the fresh-fruit market depends upon supply and demand.

LEMON PESTS AND DISEASES

Pests.—Pests common to other species of citrus are also troublesome on lemons. In California, among the most important of these are the following: four species of common scale insects, red scale (*Aonidiella auranti*), black scale (*Saissetia oleae*), yellow scale (*Aonidiella citrina*) and purple scale (*Lepidosaphes becki*); four species of mealybugs (*Pseudococcus gahani, P. citri, P. longispinus* and *P. maritimus*); the citrus thrips (*Scirtothrips citri*); and two species of mites, the citrus red mite or red spider (*Paratetranychus citri*) and the citrus bud mite (*Eriophyes sheldoni*). Some of these pests may be reasonably well controlled, at least below the level of economic harm, by their natural enemies. The citrophilus mealybug (*Pseudococcus gahani*), for example, has been well controlled in California since 1931 by parasites introduced from Australia. Most of these insect or mite pests, however, are controlled by spraying or dusting with poisonous materials. Some of these pests, or related species, and certain others are generally distributed throughout the lemon-growing districts of the world; their control is one of the largest items in the cost of producing lemons. (For more details on control of pests, *see* ORANGE.)

Fungus Diseases.—Numerous fungus diseases are troublesome to the growth of the lemon tree and in the production and storage of the fruit. Of these diseases, most serious to the tree is brown-rot gummosis (foot rot) caused by any of a number of fungi (*Phytophthora* species). This disease affects the crown of the tree just below the surface of the ground and a few inches above it. Dark, water-soaked-appearing areas, from which gum sometimes exudes and beneath which the cambium layer is brown and dead, are characteristic of this disease. If the spread is not prevented by tree surgery, the tree may be killed. The same organisms cause decay of the fruit before it is picked and when it is in storage, unless precautions are taken. Such decay is characterized by a dull-brown appearance of the fruit, which soon becomes soft and worthless. Spray mixtures in which copper is the lethal element are commonly used to control brown rot in the orchard. The spread of this disease, and of such diseases as green mold (*Penicillium digitatum*), blue mold (*P. italicum*), black rot (*Alternaria citri*) and others is often prevented by thorough cleaning of the fruit with soap and hot water and then dipping it in cool or warm solutions containing copper, sodium carbonate or other fungicides.

Other treatments to reduce decay during storage, transit and marketing consist of spraying; impregnating tissue wrappers, crate liners or cartons with fungicidal and bactericidal solutions; or fumigating with various gases in special enclosures.

Virus Diseases.—It has been discovered that there are hosts of virus infections among citrus trees generally. Many of them are symptomless, and the trees, appearing to be perfectly healthy, may survive for many years. On the other hand, sudden and unaccountable wilting and drying of foliage may indicate more serious virus infections such as tristeza (quick decline) and the psorosis complex—a group of closely related virus diseases which attack primarily fruit and immature foliage.

Many of the virus diseases are transmitted mechanically during grafting operations and as a result of direct contact with diseased trees; some, however, are carried by insect vectors. Quarantines have been somewhat effective as a means of control, but far more important measures appear to be the use of resistant varieties and the destruction of the carrier insects where these have been shown to be responsible. (L. D. B.; W. B. Sr.)

Nonparasitic Diseases (Physiological Diseases).—Lemons are also subject to injury due to chilling; *e.g.*, albedo browning, pitting, watery breakdown and scald. These disorders as well as the fungus diseases mentioned earlier are aggravated by storage of lemons at 32° F. in poorly ventilated spaces. Held at 58° F. in well-ventilated enclosures until ready to ship, clean lemons often escape these disorders.

LEMON PRODUCTION AND USE

Production.—World production of lemons, in the mid-1960s, averaged about 1,641,000 long tons a year, a considerable increase over the prewar annual average of 773,000 tons. Of this total

about 568,000 tons of fruit were exported, the rest being consumed in the producing countries. The United States and Italy are the leading producers, and in most years these two countries provide approximately two-thirds of the total world output. Other countries where lemons are produced commercially include Spain, Greece, Turkey, Argentina, Lebanon, Chile, Brazil, Israel, Australia, Tunisia, Algeria, South Africa, Cyprus, Portugal and Morocco.

The United States' lemon crop is produced almost exclusively in California and production is now double that of the prewar period. In the mid-1960s there were approximately 44,000 ac. under lemon cultivation, about one-fifth of the area not yet bearing commercial crops. (D. E. KA.)

Production in the United States is centred in seven counties of southern California. The lemon districts are mainly within 1 to 40 mi. of the ocean. Lemons do not thrive so well as oranges and grapefruit in inland desert regions, where extremes of temperature and wide daily ranges of temperature are commonly experienced. Florida has not developed an important lemon-producing area, apparently because of the presence of certain diseases which thrive there and because of the difficulty of curing the fruit properly in the very humid climate.

Fresh Lemons.—A considerable portion of lemon production has been used for processing, but more than 50% of the crop is usually shipped to the fresh-fruit market, the amount depending on volume of crop and marketing conditions. The per capita consumption of lemons has not increased so greatly as has that of oranges and grapefruit. The principal factors influencing lemon consumption are price, maximum summer temperatures, the prevalence of colds and the buying power of the public. The influence of summer temperatures upon the use of lemons is brought out by the fact that 50% or more of the lemons shipped from California are picked in the late winter and early spring and then forwarded during the four months May to August, inclusive. The ultimate use of most of this fruit is in lemonade and other beverages.

Lemon Juice Products.—The commonest method of preserving lemon juice for medicinal or domestic use is to concentrate the juice at a ratio of 3:1 to 6:1, depending upon the total solids present in the original juice and upon the intended use. Defective fruits that do not come up to high standards of soundness are not usable for juice purposes but are used for making products such as pectin, citric acid, etc. The washing of the fruit is the first step in the extraction of the juice. The fruit then enters the automatic reaming machines, where it is cut in halves which are picked up by rubber caps for extraction of the juice by reaming. Such reaming machines may have a capacity of as much as 100 gal. of juice an hour. The yield of juice under factory conditions may be from 70 to 95 gal. per 2,000 lb. of fruit. The juice is repeatedly screened to remove all seeds, remaining segment walls and pulp. The high vitamin C content is preserved by quickly passing the juice into a tank maintained under a vacuum. The juice is left in the tank for about 30 min., and the rapid loss of vitamin C by oxidation is thus prevented. The juice is then flash-pasteurized at 200° F. (93° C.) for one minute, to kill microorganisms present; it is immediately chilled and temporarily held in a tank until passed to the vacuum concentrating tank, where the water is evaporated off. The important constituent, as regards final concentration, is the acid. Normal California lemon juice contains more natural acid than sugar. The total soluble solids, including the acids, sugars and other constituents, compose on the average 9% of the fresh weight of the juice. The concentrated juice is from 30% to 50% soluble solids. The final step is the addition of some preservative. To the juice exported to the British commonwealth, sulfur dioxide is added (500 parts per 1,000,000). Some juice concentrate is preserved and held in refrigerators, and some is stored as frozen concentrate. To illustrate the saving in shipping space, an average carload of 120 barrels (50 gal. each) of concentrated juice would be equivalent to about 28 carloads of fresh fruit.

Lemon juice is also processed into powdered form. This powdered juice is not pure lemon juice but is a combination of dried lemon juice and corn-sugar sirup. The mixed juice and sirup are sprayed into a desiccating chamber containing hot dehumidified air and are dried to a powder almost instantly. A later process of drying citrus juice using a high vacuum at low temperature gives a product that is puffy and light with a minimum change in the taste and flavour of the original juice. Other constituents are added; these include ascorbic acid or vitamin C, citric acid and sugar. This combination powder is used in baked and other food products and sometimes constitutes a part of the rations of the army and navy of the United States.

Lemon juice and also lime juice were for many years the most important food materials used on shipboard as a preventive of scurvy; their value is now known to be due to their high content of vitamin C. As early as 1867, by the Merchant Shipping act of that year, every British ship going to countries where lemon or lime juice could not be obtained was required to take enough to give 1 oz. to every member of the crew daily.

Other Lemon Products.—Among the important by-products resulting from the processing of lemons, after removal of the juice, are citric acid, citrate of lime, lemon oil and pectin. Expression of the oil is an important industry in Sicily. The oil finds use in perfumes, soap and flavouring extracts. Citric acid is used in beverage manufacturing, and lemon juice concentrated to 30% citric acid is considered by many to be a superior substitute. Pectin has long been an important material for making fruit jellies; it has also been used in medicine in the treatment of intestinal disorders, as an antihemorrhagic, as a plasma extender and for other purposes. *See* also ORANGE.

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(L. D. B.; W. B. SR.)

LEMONNIER, (ANTOINE LOUIS) CAMILLE (1844–1913), hailed during his lifetime as *le maréchal* of Belgian letters, was one of the outstanding personalities of the 19th-century French literary renaissance in Belgium. Born at Ixelles, Brussels, on March 24, 1844, Lemonnier led a life of considerable activity as novelist, writer of short stories, and art critic. First a journalist, he quickly became known as an art critic. The defeat of the French Army at Sedan inspired his first novel, *Les Charniers* (1871). In 1873 he began work on *Un Mâle,* published in 1881, one of his most outstanding works. In the Paris journal *Gil Blas,* he published, in 1888, a story which led to his prosecution for an offense against public morals. After a sensational lawsuit, which ended in his being fined, he settled finally in Belgium, where he wrote prolifically until his death at Ixelles, June 13. 1913.

Lemonnier's first outstanding novel, *Un Mâle,* shows the influence of the naturalists. Like *Happe-Chair* and several of his other novels, it is a work of great violence, describing characters of unbridled instincts and passions against a background at once savage and luxuriant—the forest. Later, in the work of his middle period, he ceased to follow the path taken by Émile Zola and turned to psychological analysis, condemning the conservative tendencies of the bourgeois. Finally, he returned to naturalism. His style had gained in subtlety without losing its force, and many consider *Le Petit Homme de Dieu,* a late naturalist novel, his masterpiece.

To modern taste, Lemonnier's works seem somewhat dated, partly because his prose, overweighted by a consciously learned vocabulary, is pretentious and heavy. In spite of his frequent word-coinages and laboured effects based on ultraelaborate research, however, many of his novels are still worth reading for their

psychological insight, their feeling for nature, and their faithful descriptions of the Flemish countryside, particularly its rich colouring. (J.-E.-M.-G. D.; X.)

LEMOYNE, JEAN BAPTISTE (1704–1778), French sculptor, the pupil of his father, Jean Louis Lemoyne, and of Robert Le Lorrain, was born in Paris in 1704. Although J. B. Lemoyne carried out large decorative sculptures, such as the fountain of Neptune at Versailles, his chief importance is as a portrait sculptor. Appointed sculptor to Louis XV, Lemoyne executed many likenesses of the king, either as large sculptures—the vanished statues of the royal squares at Bordeaux (1743) and at Rennes (1745)—or as busts. Indeed, he produced portrait busts of much of the society of his day: of military leaders (Marshals Saxe and d'Harcourt), of writers (Fontenelle, 1745; Voltaire, 1748; Montesquieu, 1760) and of many women, notably actresses (Mlle Clairon; Mlle Dangeville, 1760), but also of Mme de Pompadour and of Marie Antoinette as dauphine. Lemoyne died in Paris on May 25, 1778. (P. Ln.)

LEMPIRA, small department in southwestern Honduras, bordering El Salvador. Its area is 1,656 sq.mi., and the population (1961) was 111,546, of which 79% was rural; Gracias, the departmental capital and largest town, had only 1,854 persons in 1961. Because the department has no all-weather highways, the people in the rural areas and in many small villages in the high mountain valleys must depend upon pack and cart transportation. Less than 35% of the area of the department is in farms, and only 20% of this is cultivated. Among the leading products of Lempira are wheat, poultry, harvested forage grasses, and hogs. (C. F. J.)

LEMUR, a term applied in a wide sense to all the more primitive members of the mammalian order Primates, but more strictly given to the numerous species found on Madagascar. The related Asiatic forms are referred to as lorises, while the close African representatives comprise the pottos and galagos (or bush babies). The Asiatic tarsiers are intermediate in structure between the lemurs proper and the monkeys.

All the lemurlike animals have a naked moist tip to the muzzle; the nostrils are slitlike and situated within the naked area; the lower front teeth are directed forward and are comblike; the second toe of the foot is provided with a clawlike nail, the remaining digits bearing ordinary flat nails.

Typical lemurs (family Lemuridae) have large eyes, beautifully coloured, thick woolly coats, usually long bushy tails and long hind limbs. Most species are diurnal but some are nocturnal. They are largely arboreal and, though chiefly vegetarian, also eat insects, eggs and smaller reptiles. The smallest lemurlike forms are the mouse or dwarf lemurs (*Microcebus*); the largest the indris (*Indri*).

FOX PHOTOS

RING-TAILED LEMUR (LEMUR CATTA) WITH YOUNG

The well-known, cat-sized ring-tailed lemur (*Lemur catta*) is a diurnal rock dweller. In the black lemur (*L. macaco*) the male only is black, the female being reddish brown; both sexes bear ear tufts. Related are the more nocturnal gentle lemurs (*Hapalemur*), with shorter face and smaller ears, and the smaller sportive lemurs (*Lepilemur*).

Lemurs have a distinct breeding season; the single young clings to its parent for many months before leading an independent existence.

Although now limited in their distribution, lemurs were, during the Eocene period, widespread over Europe and North America, at that time connected by a land bridge. With the emergence of the monkeys, the lemurs were forced into the sanctuaries they now inhabit.

See Primates: *Primitive Primates (Prosimii)*: *Lemurs; see* also references under "Lemur" in the Index. (W. C. O. H.)

LEMURIA, the mythical continent alleged to have occupied the mid-Pacific into historic time and then to have sunk, leaving virtually no land above the ocean surface. The Easter Island script and the great stone statues there (*see* Easter Island) were used to support the idea. Polynesian legends, language, domestic plants and a host of other material, however, point to very early and long-continued voyaging across the Pacific. These voyages are fully competent to explain the mid-Pacific cultures and the similarities on the two sides of the Pacific. (G. F. Ca.)

LENA, a river of Siberia, U.S.S.R., has a length of 2,653 mi. and a drainage basin of 936,000 sq.mi. and is one of the longest rivers in the world. It rises a few miles west of Lake Baikal, on the western slopes of the Baikal mountains, at 5,942 ft. It first flows west between high, rocky cliffs with innumerable rapids, to Kachuga at the head of high-water navigation. At Kachuga it turns north to Ust-Kut at the head of permanent navigation, its valley retaining the character of the highest reaches. From Ust-Kut to Yakutsk its general direction is east-northeasterly. In this middle section the Lena receives some of its largest tributaries, the Kirenga (356 mi.), Vitim (1,133 mi.) and Olekma (814 mi.). Above the Olekma confluence the width is up to 1¼ mi.; the banks are steep, often cliffs, and there are several narrows, with widths down to 200 yd. Below the Olekma for 300 mi. are high limestone cliffs, but the river then widens to 2–2½ mi. through a broad flood plain, often swampy, with many old courses and cutoffs of the river, and the channel is often braided, with many islands. Near Yakutsk the Lena makes a great sweeping bend to the north and receives its two largest tributaries, the Aldan (1,393 mi.) on the right and the Vilyui (1,513 mi.) on the left. Thereafter the river flows in a generally northerly direction in a flood plain up to 20 mi. wide, across which wind its many arms. There are three sets of river terraces and occasional rocky outcrops on the left bank. Near Bulun, on the lowest reaches the valley narrows as higher ground closes in, and the Lena enters the Laptev sea by an extensive delta, covering about 11,500 sq.mi.

The volume of water carried by the Lena is enormous, the average discharge being 547,378 cu.ft. per second, with a recorded maximum (at Kyusyur, opposite Bulun, in June) of 4,237,771 cu.ft. per second. The period of ice formation is lengthy (15 to 26 days) but the breakup takes place rapidly (4 to 8 days). Freeze-up is markedly longer in the lower course, late October to early June, as against early or mid-November to early May in the upper reaches. This causes great ice jams in spring and extensive flooding. Despite the long freeze-up, navigation is of great importance, as the river forms the only significant means of communication for much of its basin. Sand bars at the delta prevent the entry of seagoing ships and transshipment takes place at Tiksi, east of the delta. Principal river ports are Yakutsk and Ust-Kut. A railway from Ust-Kut and highways from Kachuga, Ust-Kut and Yakutsk link the river to the Trans-Siberian railway. Most of the basin is in virgin taiga forest, giving way to tundra in the far north, and only thinly inhabited by Yakuts. There is some agriculture along the middle reaches. Minerals are important, especially gold south of the middle Lena and salt and diamonds along the Vilyui, and there are considerable potentialities for coal mining. The huge hydroelectric power potential of the river remains as yet entirely undeveloped. (R. A. F.)

LE NAIN, the name of three brothers, French painters whose scenes of peasant life have a realism unique in 17th-century French painting. Antoine (*c.* 1588–1648), Louis (*c.* 1593–1648), and Mathieu (1607–1677) Le Nain were born at Laon and studied there for a time with a foreign artist, probably Netherlandish. Their early careers are obscure, but Antoine was recorded as a master painter in Paris in 1629, and by 1630 the three brothers had established a common workshop there. They remained unmarried and are traditionally said to have worked in harmony, often collaborating on the same picture. In 1648, the year when all three brothers were received into the newly founded French Academy, Antoine died on May 25 and Louis on May 23; Mathieu lived on in Paris until April 20, 1677. The "Le Nain problem" is complicated by the fact that no work later than 1648 is dated and no signed work bears an initial. Present-day evaluation of the individual

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"THE PEASANT FAMILY" BY LOUIS LE NAIN, 1642; IN THE LOUVRE, PARIS

personalities is therefore based on what is traditionally known of each brother and the establishment of three main stylistic groups.

The most archaic group is associated with Antoine, whose paintings, mostly of small format and often on copper, show strong Flemish influence, are gay in colour, and include portraits and genre scenes of naive charm. It is Louis Le Nain, painter of religious as well as genre scenes, who emerges as the genius of the family. His realism held an appeal for artists such as Courbet and Millet, and "The Forge" was one of the most admired and most frequently copied paintings in the Louvre in the 19th century. Domestic scenes of peasant life, mostly in the Louvre, depict humble people with human dignity in a manner worthy of Velázquez, but with a classical composure that is characteristically French. Louis may have visited Rome, and his subdued palette, like his style, owes something to Roman realism. The most enigmatic of the brothers is Mathieu, who became *peintre ordinaire* to the city of Paris in 1633, excelled in large compositions and in portraiture, and bore the title of *chevalier*. He was prosperous and left a large workshop, where the number of portraits and religious works suggests the use of assistants. The "Corps de garde" of 1643 is regarded as his masterpiece, but the rediscovery of three religious paintings (published by J. Thuillier in 1958 as by him) suggests a possible extension of the personality and throws additional light on one of the least-known aspects of the "Le Nain problem."

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LENARD, PHILIPP EDUARD ANTON (1862–1947), German physicist whose researches on cathode rays led to his receiving the Nobel prize for physics in 1905, was born on June 7, 1862, at Pozsony (Bratislava), Czech. He was educated in the universities of Budapest, Vienna, Berlin and Heidelberg, his teachers including H. L. F. von Helmholtz, G. H. Quincke and R. W. Bunsen. After becoming *Privatdozent* in the University of Bonn in 1893 and assistant to Heinrich Hertz, he was professor of physics successively in Breslau (1894), Aachen (1895), Heidelberg (1896), Kiel (1898) and again in Heidelberg (1907–31). He was also director of the Radiological institute at Heidelberg from 1909.

Lenard's extensive researches in physics included studies of ultraviolet light, the photoelectric effect, the electrical conductivity of flames, phosphorescence and, above all, cathode rays. He showed that phosphorescence in such substances as calcium sulfide after exposure to sunlight was due to the presence of metallic impurities, the light causing emission of electrons from these impurities and the return of the electrons producing the phosphorescence. In his experiments on cathode rays he had applied Hertz's discovery that they passed through thin leaves of metal, and he had constructed a cathode-ray tube with an aluminum "window." The rays passed out to the external air. Using a phosphorescent screen, he showed that the phosphorescence decreased as the screen was retracted, ceased at a distance of eight centimetres; that the absorbing power of substances depended on their density and not on their chemical nature; and that absorption decreased with increasing velocity of the rays. In similar experiments he showed that the photoelectric effect in metals was caused by the release of cathode rays through the action of ultraviolet light on the metals. Lenard's publications include *Über Kathodenstrahlen* (1906) and *Deutsche Physik,* four volumes (1936–37). He died on May 20, 1947.

See E. S. Barr, "Anniversaries in 1962 . . . ," *Amer. J. Phys.,* vol. 30 (1962). (D. McK.)

LENAU, NIKOLAUS (pseudonym of NIKOLAUS FRANZ NIEMBSCH VON STREHLENAU) (1802–1850), Austrian poet of German origin, was born at Csatad, near Temesvar, Hungary, Aug. 15, 1802. His father died when he was five, and his mother allowed him to indulge his musical gifts and early passion for wandering. Later his restless intellect was stimulated rather than satisfied by his studies of philosophy, medicine and law at Vienna and Bratislava, and he never entered a profession, a legacy in 1830 enabling him to devote himself to literature and poetry. After his mother died in 1829, Lenau found a second home in Stuttgart, where his friendship with the Swabian poets (Gustav Schwab, Ludwig Uhland, Karl Mayer, Justinius Kerner and others) helped to counteract the depression engendered by his mother's death and a disillusioning love affair. He dedicated his first volume of *Gedichte* (1832) to Gustav Schwab, but, chafing under political tyranny and a press censorship which compelled him to publish under a pen name, he decided to emigrate to America. He landed in Baltimore, Md., in October 1832. After less than a year, bitterly disillusioned by the materialism of a country labouring, as he wrote in a letter, under the curse of being bereft of nightingales and other singing birds, he returned to Europe. His poems had made him famous, and his life might have entered a happier phase had it not been for his tormenting and finally disastrous passion for the wife of a friend. After an attack of paralysis in September 1844, the poet sank into insanity, dying in an asylum near Vienna, Aug. 22, 1850.

Lenau's fame rests mainly on his shorter lyrical poems. His *Schilflieder* (1832) and the *Waldlieder* (1844) are his most perfect lyrics, and his balladlike poems, such as "Der Postillion" and "Die drei Zigeuner," rank with the best of their kind. He wrote in the tradition of romantic pessimism, and although his genius was essentially lyrical and subjective, there is cosmic resonance in his *Faust* (1836; augmented ed., 1840) in which the final statement transcends personal issues. *Savonarola* (1837), brilliant in parts, is the weakest of his longer works and represents an ultimately unsuccessful effort to solve his metaphysical doubts by Christian mysticism. In his masterpiece, *Die Albigenser* (1842), he produced a tragic, yet heroic and hopeful, philosophy of history, the 12th-century crusade against the Albigenses prophetically prefiguring modern ideological warfare. *Don Juan* (1844), although not completed, inspired Richard Strauss's version (1888). Lenau's longer works deserve more notice than has generally been shown them; but his exquisite lyrics have thrown them into the shade, and Goethe's *Faust* has deflected attention from Lenau's tragic answer.

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LENBACH, FRANZ VON (1836–1904), German portrait painter who helped prepare the way for the realistic movement in Germany, was born at Schrobenhausen in Bavaria, on Dec. 13,

1836. At a time when idealized and effeminate portraits were the fashion, he succeeded in becoming the most favoured portrait painter in Germany by his powerful interpretations of men of strong character. Among his sitters were the greatest men of his time; his portraits of Bismarck, of whom he made about 80 pictures, are famous. He also painted the emperor William I, Richard Wagner. Franz Liszt, Helmholtz and Gladstone.

Lenbach was the son of a mason, and because he was intended to follow his father's trade he was sent to school at Landsberg (1852), and then to the polytechnic school at Augsburg. However when he had seen the galleries of Augsburg and Munich, he obtained his father's permission to become an artist. Lenbach's earliest teachers were A. Sikkinger and J. B. Hofner. He then worked for a short time in the studio of Gräfle, after which he devoted much time to copying. He was already accomplished in technique when he became the pupil of Piloty (1857). In 1858 he accompanied Piloty to Italy. A few interesting works remain as the outcome of this first journey. They were painted from nature and often attacked for their "trivial realism." Lenbach returned to Munich (1862) but was soon appointed professor at the academy at Weimar. Shortly afterward he made the acquaintance of Count Schack who commissioned a great number of copies for his collection. Lenbach returned to Italy and there copied many famous pictures (1863–66). He set out in 1867 for Spain where he copied pictures by Velázquez in the Prado as well as landscapes in the museums of Granada and the Alhambra (1868). The remaining years of his life were spent between Munich, Vienna and Berlin, with visits to Egypt and Rome. Lenbach once estimated his total work at about 4,000 pieces. He died in Munich, May 6, 1904.

LENCA Indians, in the 16th century, extended throughout eastern El Salvador, highland Honduras, and possibly the islands of Fonseca gulf. But by the 20th century they had been reduced to northeastern El Salvador and southwestern Honduras. Archaeologically they are known for fortified hilltops and cave burials often with painted petroglyphs on the walls.

Separate Lenca communities in the 1960s show marked variation in physical type, speech, and social and economic organization, but are bound together by the custom of *guancasco* or agreement ceremonies. Lenca culture is associated with Central America, evidencing both northern and southern traits. They are much influenced by the surrounding Ladino (mestizo) cultures.

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(D. Z. S.)

LENCLOS, NINON DE, properly ANNE DE LANCLOS (1620–1705), French courtesan, was born in Paris, the third child of Henry de Lanclos, sieur de La Douardière. Her father, a gentleman of epicurean and skeptical principles and a virtuoso amateur lutanist, killed Louis de Chabans in 1632 and had to leave France. Ninon had no prospect of marriage and, after two love affairs and an attempted renunciation of the world, followed the example of her friend Marion de Lorme (*q.v.*). Mercenary only as far as necessity required, she got two indifferent gentlemen to pay jointly for her upkeep and then began the career of free love that made her first reputation. From the princes and noblemen attending her receptions she would choose one to be her lover for the duration of her caprice, after which she would relegate him to the level of ordinary friendship.

Among her lovers were: Gaspard de Coligny, marquis d'Andelot, and Louis de Bourbon, duc d'Enghien, both disappointing; Pierre de Villars, whom she pursued to Lyons (where she had difficulty in repelling the archbishop); the marquis de Sévigné; Antoine Rambouillet; Louis de Mornay, marquis de Villarceaux, whom she loved for three years (1652–55), bearing him a son and breaking with her paymasters; and Charles de Sévigné, the marquis' son, her last (1671). Her intellectual admirers, on the other hand, included not only prominent skeptics such as Saint-Évremond (*q.v.*; a lifelong friend and correspondent) but also notorious *libertins* who boldly used their atheistic and antinomian doctrines to justify scandalous lives.

It was largely her irreligious attitude that incurred her persecution by the Compagnie du Saint Sacrement. In 1651 she deflected Anne of Austria's sentence that she retire to a convent by impudently stipulating that it be a convent of Cordeliers; but in 1656 she was incarcerated first in the Madelonnettes in Paris and then, when sympathizers threatened to free her, at Lagny. From Lagny Queen Christina of Sweden, after a visit, secured her liberation.

Her book, *La Coquette vangée* (1659), was a counterblast to Félix de Juvenel's *Portrait de la coquette.* Her friend Molière's *Tartufe* may be modeled on the abbé de Pons, whose attentions she rejected. Her long friendship with Scarron led to her being protected by Mme de Maintenon; and on her retirement from love after 1671 (with 7,000 livres a year), her receptions became not only extremely fashionable but also highly respectable. In later life François Arouet *père* managed her private business, and her will assigned 1,000 fr. to buy books for the young Voltaire (not, as he thought, 2,000).

She died on Oct. 17, 1705.

Voltaire's famous letter on her, the source of many later biographies, is full of inaccuracy. *See* Emile Magne, *Ninon de Lanclos,* definitive edition (1948).

(J. G. R.-S.)

L'ENFANT, PIERRE CHARLES (1754–1825), French-U.S. engineer and architect, who designed the basic plan for Washington, D.C., was born in Paris on Aug. 2, 1754. He studied art under his father at the Academie Royale de Peinture et de Sculpture from 1771 until he enlisted in 1776 as a volunteer in the American Revolutionary army. He was commissioned lieutenant of engineers, and in 1778 was made captain. At Charleston, S.C., L'Enfant was captured by the British and not exchanged until 1782. In recognition of his services congress promoted him to major of engineers in 1783.

The medal and diploma of the Society of the Cincinnati, an association of former Revolutionary officers, were designed by L'Enfant, and upon returning to Paris he helped organize the French branch of the society. L'Enfant came again to America in 1784 and settled in New York. There, in addition to small architectural jobs, he renovated the old city hall for the U.S. congress as Federal hall (1787). For this, his first major architectural essay, he added star decorations to the Doric order in honour of his adopted country.

When congress decided to build a federal city on the Potomac, President Washington hired L'Enfant in 1791 to prepare a plan for it. The plan devised was a brilliant combination of mall, broad avenues, parks and squares, using to advantage the uneven ground and preparing adequately for future transportation needs. Secretary of State Thomas Jefferson provided L'Enfant with maps of various European cities, but instead of copying any L'Enfant took ideas from several. The influence of planning at Versailles appears, and there are close resemblances to the London plans of Sir Christopher Wren and John Evelyn. L'Enfant said himself that "the plan should be drawn on such a scale as to leave room for that aggrandisement and embellishment which the increase of the wealth of the Nation will permit it to pursue at any period however remote."

Washington was forced to dismiss L'Enfant in 1792 for his obstinacy in defying the commissioners of the city, and particularly for his highhanded procedure in removing the house of Daniel Carroll, an influential Washington resident, to make way for an avenue. Nevertheless, his plan of the city was generally followed. L'Enfant later attempted to obtain $95,500 as payment for his services.

Congress gave him what it thought to be proper, the sum of about $3,800.

In his old age L'Enfant lived with friends at "Green Hill," an estate in Prince Georges county, Md., where he died penniless on June 14, 1825. In 1909 his body was removed to Arlington National cemetery where a suitable monument was erected to him by congress.

See Elizabeth S. Kite, *L'Enfant and Washington, 1791–1792* (1929); H. P. Caemmerer, *The Life of Pierre Charles L'Enfant* (1950).

(P. F. N.)

THE GRANGER COLLECTION

LENIN ADDRESSING A MAY DAY RALLY IN RED SQUARE, MOSCOW, IN 1918

LENIN, the name[1] in history of VLADIMIR ILYICH ULYANOV (1870–1924), the founder of Bolshevik communism and by far the greatest single driving force behind the Soviet revolution of Oct.–Nov. 1917, was born on April 22 (new style; April 10, old style), 1870, at Simbirsk (later renamed Ulyanovsk), on the Volga. His father, Ilya Nikolaevich Ulyanov, was a schoolmaster who rose to the position of director of schools for the whole Simbirsk *guberniya;* his mother was a doctor's daughter. The boy attended the local school that was directed by Fedor Kerenski, father of Aleksandr Kerenski (*q.v.*).

Vladimir Ilyich's elder brother Aleksandr, while a university student, joined a group aiming to revive the practices of the Populist organization Narodnaya Volya (*see* NARODNIKI), took part in a plot to assassinate Alexander III and was executed (1887). This is believed to have turned young Vladimir's mind to revolution. Vladimir, however, eventually turned to Marxism as his guide, not to Populist doctrines. He entered Kazan university as a law student in 1887, but in December of the same year was expelled from the university (and, for about a year, from Kazan itself as well) for taking part in a student gathering. He finally got his degree in law in 1891 from St. Petersburg university, as an external student. Between 1887 and the autumn of 1893 he lived in various places, all on or near his native Volga. By the time he moved to St. Petersburg in 1893 he had become an authority on Marxism.

Marxism as Applied to Russia.—Russian Marxism grew and gathered strength in a struggle against Populism, and it was natural that Lenin's first work of importance, *Who are these "Friends of the People"?* (1894; circulated in hectographed copies), should have been directed against the Populists. The concluding paragraphs of that work well show what Marxism then meant to Lenin in application to Russia:

> It is to the working class that the Social-Democrats will give their whole attention and all their energy. When its advanced representatives have appropriated the ideas of scientific socialism, the idea of the historic mission of the Russian worker, when those ideas have received wide circulation, and when strong organizations have been created among the workers, then the Russian worker, having put himself at the head of all the democratic elements, will overthrow absolutism and lead the Russian proletariat (side by side with the proletarians of all countries) by the straight road of open political struggle to a victorious communist revolution.

Implied in this statement is the admission that, in the language of those days, the expected Russian revolution would not be the final socialist, or social, revolution that would abolish capitalism and the division of society into classes, but only a political, or bourgeois, revolution, necessarily to be followed by an indefinite period of capitalism in economics and of bourgeois democracy in politics. On the other hand, there is the claim that in the bourgeois revolution the proletariat should act as a separate class, through organizations of its own; and, moreover, that it should act as the leader of all the democratic elements in the country. That was Marxism for Russia as at that time interpreted, in particular, by G. V. Plekhanov, the most prominent figure among the few Russian *émigrés,* all ex-Populists, who in 1883 had established themselves in Geneva as the Liberation of Labour group to teach Marxism to Russian revolutionaries.

In 1895 Lenin went abroad for a period in the summer (May 7–Sept. 19) to establish contacts with this group and to learn something at first hand about European socialism. On returning to Russia he took part in organizing, in St. Petersburg, the Union for the Struggle for the Liberation of the Working Class (similar organizations had appeared or were appearing in various industrial centres in Russia); but on the night of Dec. 20–21 he was arrested. After about 14 months in prison, he was in 1897 exiled to the village of Shushenskoe in the Yenisei *guberniya* of Siberia for three years. There he was joined by Nadezhda Krupskaya, whom he had first met on revolutionary work in St. Petersburg at the beginning of 1894; and on July 22, 1898, they were married. During his period of exile Lenin wrote *The Development of Capitalism in Russia,* published in 1899.

The Minsk Congress and the Economists.—In March 1898, while Lenin was in Siberia (where he managed to maintain close connections with his associates both in Russia and abroad), members of various Russian Marxist organizations, meeting in Minsk, proclaimed the formation of the Russian Social-Democratic Workers' party (R.S.D.W.P.) and elected a central committee which soon issued a manifesto substantially in the spirit of the teachings of the Liberation of Labour group. Lenin approved of this, but other developments in Russia were disquieting. There was a tendency growing up among the Social-Democrats, particularly the younger ones, to concentrate on helping the working class to fight for immediate improvements in its conditions of life. Because of this emphasis on economics they were contemptuously nicknamed "Economists" by their opponents. They favoured turning their backs, at least for the time being, on the aim which Lenin, in accord with the Liberation of Labour group, wished to impose at once—namely, that of organizing themselves as a political party with the object of putting the working class at the head of the people's onslaught on the autocracy, at the same time training and equipping it for the further onslaught on the very foundations of bourgeois society.

The Minsk congress, which had been organized in great secrecy by the elder elements in the movement, met with little enthusiasm from the "peripheral" workers when they learned about it. When

[1]At the end of 1901 V. I. Ulyanov assumed the pseudonym N. Lenin (sometimes arbitrarily interpreted as standing for Nikolai Lenin). As he became more and more of a public figure, identified under this pseudonym, variants such as V. I. Lenin and V. I. Ulyanov Lenin also came into use.

the central committee elected by the congress was wiped out by arrests, no attempt was made to rebuild it.

In his exile Lenin raised the alarm (*A Protest by the Russian Social-Democrats,* Aug.–Sept. 1899, and *A Backward Trend in Russian Social-Democracy,* later in the same year). The new tendencies were the more hateful to him as he saw in them the influence of the "revisionists" of Marxism—Eduard Bernstein and others in Germany and the so-called "Legal Marxists" in Russia who because of their criticism of the doctrine were allowed to publish openly there. Having completed his term of exile (Feb. 10, 1900), he settled for some time in Pskov (not far from St. Petersburg, which was still forbidden to him). There he applied himself to the double task of bringing the movement back to its political groove, which to him meant bringing it back to true Marxism, and of building up a strong, strictly centralized party capable of taking charge of it.

In his schemes he gave a place of prominence to a newspaper for which he chose the name *Iskra* ("The Spark"). It was to be published abroad but circulated in Russia. On July 29, 1900, he left Russia for more than five years, going first to Switzerland, then to Germany, London, Paris and then back to Switzerland. The first copy of *Iskra* appeared in Dec. 1900 in Munich. From then onward, through *Iskra* and outside it, Lenin devoted almost superhuman energy, with attention to the smallest detail, to the work of gathering around himself all who seemed suitable for the future party. He also endeavoured to convert to his views (which then, to all appearances, were shared by all his colleagues on the editorial board of *Iskra:* L. Martov, A. N. Potresov, G. V. Plekhanov, P. B. Akselrod and V. I. Zasulich) the largest possible number of "committees" (as Marxist organizations such as the Unions for the Struggle were now called) in Russia.

An important document of the period is Lenin's pamphlet *What Is to be Done?,* composed in the winter of 1901–02. Against the Economists' belief that, so long as enough was done to rouse the workers to fight for better living conditions, socialism might be left to take care of itself, Lenin maintained that socialism was not at all something natural to a worker:

> The history of all countries witnesses that left to itself the working class may rise only to the idea of trade-unionism; *i.e.,* to the conviction of the necessity to combine into unions, to fight the employers, to demand from the government the passing of the laws necessary for the workers, and so on. As to socialism, its teachings grew out of those philosophical, historical, economic theories which were the province of educated representatives of the propertied classes.

Against the Economists' argument that it would be better to allow workers' organizations to develop democratically from below, Lenin put forward the idea of a party of professional revolutionaries, all completely under the orders of their central committee and bound together by military discipline. Only such a party, he argued, could prove a match for the police and beat them at their own game. Paraphrasing Archimedes, he declared, half jokingly, half in earnest, that with such a party one could turn the whole of Russia upside down.

The Second Party Congress: Bolsheviks and Mensheviks.—The second congress of the R.S.D.W.P. (July 30–Aug. 23, 1903) met in Brussels and in London. When the majority of the delegates professed themselves to be Iskraists it seemed as if Lenin's efforts had not been in vain; and the program and statutes which the congress adopted for the party had Lenin's full approval except for one point. However, during the congress it became clear that not all the Iskraists, indeed not even all his colleagues on the board of *Iskra,* were on Lenin's side in everything. The first clash occurred on the question of the right to claim party membership. Martov and with him the majority of the congress were willing to accord that right to everyone "accepting the program of the party, supporting it financially and giving it regular personal succour under the guidance of one of its organizations." Instead of "giving regular personal succour" etc., Lenin wished to stipulate "taking part by personal work in one of the party's organizations."

That first clash was met by both sides with comparative calm. But things took a grimmer turn at the election of the central committee and of the editorial board of *Iskra,* which had meanwhile been declared the official organ of the party. As some non-Iskraists had already left the congress in protest, Lenin and his supporters were on this occasion in the majority, and they did not hesitate to make full use of it. From then onward Lenin and his supporters came to be known as "Bolsheviks" ("those of the majority") and his opponents within the party as "Mensheviks" ("those of the minority"). Thus the rift within the R.S.D.W.P. started, almost simultaneously with its formation. That for a long time the rift did not seem fatal to those concerned can be seen from their numerous attempts to patch it up. That it was fatal has been proved by their failure. (*See* BOLSHEVIKS.)

In retrospect, the main cause for the split seems reasonably clear. It was the contradictory nature of the formula as it had come to all the Iskraists from the Liberation of Labour group: a bourgeois revolution under proletarian hegemony. It was as if the two sides to the breach divided the formula between themselves, each choosing the half most suitable to its innermost inclinations. Lenin took for his guidance that half of the formula which demanded that in the bourgeois revolution leadership should belong to the proletariat. In practice, that could mean to him only one thing—working for seizure of power by his party; and to that end he directed all his energies. Moreover, as his numerous writings of that time testify (in particular *What Is to be Done?*), he was from the very beginning planning to establish the twofold dictatorship of his party over the proletariat (if necessary, "from without") and of his central committee over the party. On the other hand the Mensheviks, believing in the bourgeois character of the expected revolution, devised their tactics in accordance with that belief, even to the extent of being ready to leave leadership in it to the bourgeoisie.

So absolute was the Mensheviks' conviction that the revolution could have no other end than bourgeois domination that they half seriously suggested that Lenin, with his concentration on the fight against the autocracy, might after all turn out to be not a Marxist socialist but a bourgeois revolutionist.

The Approach to the Peasantry.—A landmark in the history of Lenin's political strategy was his new appreciation, about the beginning of 1905, of the possible use that might be made of the Russian peasantry in the interests of revolution. As a Marxist, he could only mock at the Populist belief that the Russian peasant was a born socialist and the village commune a socialist organization. Rather, as a Marxist, he was bound to look on the Russian peasant as a petty bourgeois, a greater obstacle to socialism than a big landowner. But about 1905 he came to see the sterility of such an attitude to the peasantry. He appreciated how, by promising them the lands of the landlords, he could enroll the peasants as a class on the side of revolution; and a revolution based on the confiscation of those lands promised much greater possibilities than one limited to the abolition of autocracy in favour of representative government.

Having despaired of getting the party united on his conditions, Lenin organized in April–May 1905, in London, a congress of his own Bolsheviks (the 3rd congress of the R.S.D.W.P. in Bolshevik numeration). One of the resolutions of the congress promised the peasantry support in all its revolutionary endeavours, up to the confiscation of the lands of the landlords (there had been no such promise in the party program of 1903). Another resolution put on record that Russia was on the eve of an armed uprising against the autocracy and urged the proletariat to prepare itself to lead it. A further resolution called for the early formation in Russia of a provisional revolutionary government to direct the revolution and admitted that, in certain circumstances, with the condition of remaining under the strict control of the party, representatives of the party might join that government. Who the other members of such a government were to be was not specified in the resolution, but from Lenin's writings of that time it is clear that they were expected to be chiefly peasants.

Soon, however, Lenin began to claim that his party should not merely join the revolutionary government but rather guide and control it. For the combination of the proletariat with the peasantry, to the complete exclusion of the *bourgeoisie* proper, under a government controlled by the proletariat, Lenin coined the term

"the revolutionary-democratic dictatorship of the proletariat and the peasantry" (a term sometimes, misleadingly, shortened into "democratic dictatorship"). The adjective "democratic" was to characterize not the dictatorship while it remained in being, but its final objective: namely, that of leading Russia to a constituent assembly and to bourgeois democracy (not yet to the dictatorship of the proletariat and socialism). In that way Lenin avoided, or tried to avoid, the reproach of departing from Marxism in the matter of the sequence of social formations. But the immediate aim was stated by Lenin with complete clearness: seizure of power by a government controlled by his party, as can be seen in his *Social-Democracy and the Provisional Revolutionary Government* (March–April 1905) and *Two Tactics for Social-Democracy in a Democratic Revolution* (June–July, 1905).

The Revolution of 1905 and World War I.—The Russian revolution of 1905 fell short of Lenin's expectations and failed to offer him the opportunity for giving effect to his scheme for a revolution in Russia. He arrived in St. Petersburg about Nov. 20, 1905, and spent some time there, but lived for the next two years mostly in Finland, journeying to Stockholm for the so-called Unity congress of the R.S.D.W.P. (April 23–May 8, 1906) and to London for the fifth congress (May 13–June 1, 1907). In Dec. 1907, however, he had to start a second period of life in emigration (Switzerland, Paris, Austria, Switzerland, Austria, Switzerland) which ended only with the revolution of Feb.–March 1917. This second emigration was psychologically much more difficult to Lenin than the first one. He had to fight not only the Mensheviks but also various deviations, philosophical as well as political, within the ranks of his own Bolsheviks. He broke completely with the Mensheviks in Jan. 1912 by organizing in Prague a purely Bolshevik conference which elected a purely Bolshevik central committee. In March 1918 he was to cause his party to drop the very name R.S.D.W.P. and to assume the style of "Russian Communist Party," with the addition of the word "Bolsheviks" in parentheses.

When World War I started, in 1914, the readiness of the various socialist parties, members of the Second International, to make a truce with their own bourgeoisie in the interests of national defense was treated by Lenin as a betrayal of international socialism. Accordingly he supported the left-wing socialists' conferences at Zimmerwald (Sept. 1915) and at Kienthal (April 1916) insofar as they opposed such a truce. Eventually, moreover, the foundation of the Comintern under his auspices in 1919 was a consequence of his disappointment in the Second International in 1914 (*see* INTERNATIONAL, THE). For Russia he continued to preach immediate revolution, even at the risk of defeat by Germany. His *Imperialism, the Highest Stage of Capitalism,* written as a continuation of Marx's *Das Kapital,* was published in Petrograd in mid-1917.

Lenin in 1917.—When the revolution of Feb.–March 1917 broke out in Russia, Lenin was in Switzerland. Unable to return to Russia without crossing enemy territory, he availed himself of the facilities provided by the Germans to travel, together with other Russian socialists, across Germany in a sealed train to the Baltic. Then, having passed through Sweden and Finland, he arrived in Petrograd on April 16, 1917. This time he found in Russia all the conditions for which he had been looking since 1905. In May 1906 (*see* his *Report on the Unity Congress*) he had twice explained that what he really wished to see was not the confiscation of the lands of the landlords in the interests of the peasantry as a result of legislation to that effect, but the seizure of the land by the peasantry, which might later, perhaps, be sanctioned by law: only a rush for land by the peasantry in its scores of millions regardless of any law could shake the Russian state profoundly enough to allow him to seize power with a hope of retaining it.

In 1917 the peasantry did indeed rush for land regardless of law; and moreover there was the war, with millions of peasants in the trenches who could not be expected to stay there when in their native villages the estates of the landlords were being seized. The shock to the system was bound to be so much the greater. It was only then that Lenin came out with the idea of a soviet constitution—better, he declared, than anything so far known even to the most advanced countries, a constitution based on seizures by mob rather than on laws previously adopted by some central authority (*On Dual Authority,* April 1917). A fantastic theory, presumably applicable to the whole world, was put forward to serve a temporary need: to encourage the peasantry in its rush for land and to silence those who advised it to wait for the passing of a land reform by the constituent assembly.

Simultaneously Lenin replaced his slogan "a revolutionary-democratic dictatorship of the proletariat and the peasantry" by the more extreme one: "the dictatorship of the proletariat." At first, the change was met by the majority of his own followers with amazement and with something like a revolt; but their reaction proved, not Lenin's inconsistency, but the inability of his nearest followers to understand the natural implications of his fundamental policies. Lenin might fail, as he had failed in 1905, to establish his revolutionary-democratic dictatorship of the proletariat and the peasantry, which presumably was to lead Russia to bourgeois democracy. But under his control the two kinds of dictatorship were bound to prove identical. He always knew the truth that "the fundamental question of every revolution is the question of power in the state"; and seizure of power in the state was his avowed aim under one slogan as under the other. Moreover, in *Social-Democracy and the Provisional Revolutionary Government* (1905) he had made it clear that the ending of the provisional revolutionary government in bourgeois democracy was not the only possibility envisaged by him: another one was its holding out until the social revolution in the west. In 1917 dictatorship of the proletariat meant to him just such holding out. Lenin generally was not afraid of ambiguities and even contradictions when they seemed to him politically useful.

After the disturbances at the beginning of July (O.S.) 1917, the provisional Russian government ordered Lenin's arrest, and he went into hiding. From his hiding place he continued to write, to guide his party and, from the middle of October, to goad it into an immediate armed uprising. Finally, not without difficulties, he won it to his side and the government headed by Aleksandr Kerenski was overthrown. Lenin emerged from hiding on Nov. 7 to become the chairman of the new Soviet government (the Council of People's Commissars, or Sovnarkom), formally elected to this position by the second congress of soviets, which was then in session.

Lenin in Power.—The history of Lenin's remaining years of life is the history of the final achievement of the Russian Revolution (*q.v.*), culminating in the emergence of the U.S.S.R. For other aspects of his influence *see* COMMUNISM; COMMUNIST PARTIES; DIALECTICAL MATERIALISM; MARXISM. In judging him as a ruler, two points must be taken into consideration.

In the first place, Lenin firmly believed on the one hand that only force could produce serious social change (the statement "Not a single problem of the class struggle has ever been solved in history except by violence," which occurs in his *Report to the Third*

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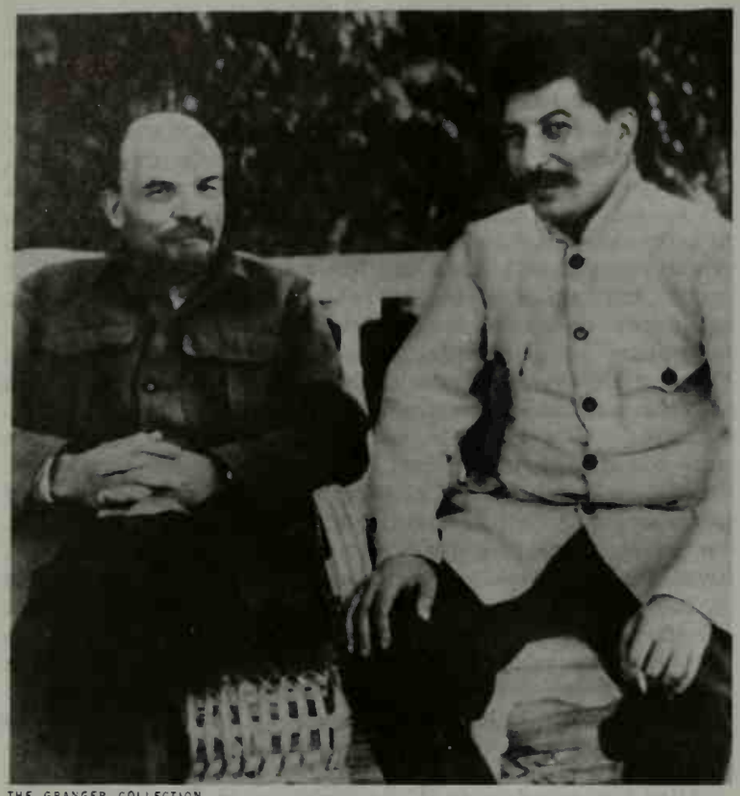
LENIN AND HIS WIFE, NADEZHDA KRUPSKAYA, AT THEIR VILLA IN GORKI, IN 1922



THE GRANGER COLLECTION

LENIN AND JOSEPH STALIN AT LENIN'S VILLA IN GORKI, IN 1923

All-Russian Congress of Soviets, Jan. 24, 1918, is echoed many times throughout his writings); and on the other hand that by force almost any desired change could be effected. Dictatorship he defined in the sense of power based neither on law nor on elections but on violence directly applied (*see* for instance *An Epidemic of Confidence,* June 1917, and *For the History of the Question of Dictatorship,* Oct. 1920). The very word "dictatorship" appears to have attracted him: no regime, one might say, no aspect of social life, seemed to Lenin worthy of his attention unless he could discern dictatorship in it. In praise and encouragement of terror he was second to none: "We have just learnt in the Central Committee," he wrote to G. E. Zinoviev on June 26, 1918, "that the *workers* in Petrograd wished to react to the assassination of V. Volodarski by mass terror and that you . . . stopped them. I decisively protest. . . . This is im-pos-sible! . . . One ought to encourage the vigour and the wholesale character of the terror against the counter-revolutionists, this especially in Petrograd whose example is decisive"; there are many similar passages.

A lawyer by education, Lenin was blind to law as an instrument of social organization. In the historical conflict between government through law (general norms) and government by discretion, through man directly operating on man, he was on the side of government by men. He legislated on a vast scale, but without himself recognizing in his laws the element that alone makes an order a law, its binding force on all concerned. P. I. Stuchka, a high legal dignitary under him, declared that, to Lenin, "the program of the party and the revolutionary decrees were things of the same kind, both binding and not binding, according to circumstances and the course of development" (*13 Let Borby,* 1931).

Secondly, at least at the beginning, the whole venture of the revolution was regarded by Lenin as something temporary, to last only until the social revolution in the west should relieve mankind from any constitutional problems. Even to Lenin there could be no justification for his self-appointed party's dictatorship over scores of millions other than the belief that it was only engaged on some surgical operation, or that the regime was "in transition"; after that, the whole problem of government was expected to disappear. In the constitution of the Russian Soviet Federated Socialist Republic (R.S.F.S.R.) of July 1918 the belief in the speedy disappearance—via dictatorship—of all government on earth was given the force of a law.

As a ruler Lenin could not avoid compromises. Before the October–November revolution he had threatened the whole imperialist world, and Germany especially, with a "revolutionary war" if and when he should come into power, unless they gave up their evil designs. After his successful revolution, arguing now that in the interests of world revolution there was nothing more important than the preservation of the newly born Soviet state, he accepted from the Germans, against opposition in his own party, the humiliating peace of Brest-Litovsk (March 1918). In economics, Lenin quite soon after the October revolution moved in the direction of integral socialism, up to the complete abolition of markets, of exchange and of money ("War Communism" in the later classification); but early in 1921 he had to start a retreat under the "New Economic policy," which allowed the peasants to sell their surplus in the open market and, at the same time, brought reversion to an economy based on money and partly on exchange.

Symptoms of a serious illness (sclerosis of the cerebral arteries), not to mention the effects of the wounds sustained when Fanny Kaplan shot him Aug. 30, 1918, began to appear in Lenin at the end of 1921. On May 26, 1922, he had his first stroke. On Oct. 2 he again started attending his office, but only intermittently and for short hours. On Dec. 16 he had a second stroke and became paralyzed in the right arm and leg. He died on Jan. 21, 1924, at 6:50 P.M., at Gorki near Moscow.

On Lenin as a person the testimony of his great collaborator Leon Trotski is not without interest:

> Lenin's outward appearance was distinguished by simplicity and strength. He was below the middle height, with the plebeian features of the Slavonic type of face, brightened by piercing eyes; and his powerful forehead and still more powerful head gave him a marked distinction. He was tireless in work to an unparalleled degree. He put the same exemplary conscientiousness into reading lectures in a small workmen's club in Zurich and into organizing the first Socialist State in the world. He appreciated and loved to the full science, art and culture, but he never forgot that as yet these things are the property of a small minority. His way of life in the Kremlin was little different from his life as an *émigré* abroad. The simplicity of his habits was due to the fact that intellectual work and intense struggle not only absorbed his interests but also gave him intense satisfaction.

See RUSSIAN REVOLUTION; UNION OF SOVIET SOCIALIST REPUBLICS; *see* also references under "Lenin" in the Index.

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LENINABAD, a town in the Tadzhik Soviet Socialist Republic of the U.S.S.R., is situated on the Syr-Darya river where it emerges from the Fergana valley.

It was called Khojent (or Khodzhent) until 1936. Pop. (1959) 77,465. Leninabad is one of the oldest towns in central Asia. It was captured (*c.* 329 B.C.) by Alexander III the Great who built the Alexandria Eskhata fortress there. It was plundered by the Arabs (711) and by Genghis Khan (1220). Annexed by the Kokand khanate in the early 19th century, it finally fell to the Russians in 1866. It was the administrative centre of the former Leninabad *oblast* that was abolished in March 1962. Leninabad is a centre of the ancient applied decorative arts of the Tadzhiks, including ceramics, wood carving, metal chasing and embroidery. The town contains one of the largest silk combines in the Soviet Union as well as cotton-spinning factories, and meat and milk processing works. There are teachers' training colleges, medical and musical training institutes, co-operative and textile technical training schools, a theatre and a museum. (G. E. WR.)

LENINGRAD, an *oblast* in the Russian Soviet Federated Socialist Republic of the U.S.S.R., was formed in 1927 and covers an area of 33,166 sq.mi. It includes all the Karelian isthmus (Karelski Peresheyek) and the southern shore of the Gulf of Finland as far west as Narva, and extends eastward along the southern shore of Lake Ladoga and the Svir river as far as Lake Onega.

Physical Features.—The relief of the *oblast* falls into five regions: (1) The Karelian isthmus, between the Gulf of Finland and Lake Ladoga, consisting of ancient crystalline rocks in the north and Cambrian series in the centre and south. The surface is made up of long, winding, morainic hills, generally orientated northwest-southeast and separated by hollows with lakes and swamps. (2) The level, swampy, coastal plain of the Gulf of Finland. (3) The Izhora upland, which rises from the coastal plain in a steep scarp of Silurian rocks, known as the *glint,* and falls gently southward to the swampy valley of the Luga. (4) The extensive lowlands in the centre of the *oblast* along the river Neva, the southern shore of Lake Ladoga and along the Volkhov and the other smaller rivers which flow into the lake. (5) The uplands in the extreme east, formed by terminal moraines deposited on a scarp of Carboniferous rocks. These uplands, the Megorskaya Gryada, or Vepsovskaya Vozvyshennost, in the north, and the Tikhvinskaya Gryada in the south form the northern end of the Valdai hills.

The whole *oblast* was greatly affected by the final glaciation of Russia, and deposits of boulder clay and morainic material in the form of drumlins and eskers cover the entire surface, often to considerable thickness. Innumerable lakes and widespread swamps occupy the depressions of the relief. The main rivers are the Svir, linking Lake Onega to Lake Ladoga; the Neva, linking Lake Ladoga to the Gulf of Finland; the Volkhov, Syas and Pasha, flowing into Ladoga; the Luga, flowing into the Baltic sea; and the Narva, linking Chudskoye Ozero (Lake Peipus) to the Baltic.

The proximity of the Baltic and the activity of Atlantic depressions make the climate of the *oblast* less cold, but damper and more variable, than that of most of European Russia. Leningrad has a January average temperature of −8° C. (18° F.) and a July average of 18° C. (63° F.). Rainfall varies from about 18–19 in. a year in the lowlands to 25 in. on higher ground, with a marked summer maximum. There is considerable variation from year to year, the maximum and minimum recorded at Pavlovsk being 30 and 17 in. Foggy weather is a common occurrence. Freeze-up of rivers is usually from the end of November to April, but it is shorter near the sea and longer on the great lakes. The natural vegetation of the *oblast* is forest (about half the surface area), swamp and meadow, along the river flood plains. The forest in the north, east and centre is taiga, dominated by spruce, pine and birch. In the west there is mixed forest, with oak joining the other species. Alder and aspen are widespread in wetter areas. Swamp includes both sphagnum bog and "lowland" marsh of grasses and sedges. Many swamp areas have been drained, especially round Leningrad, and converted to pasture or arable land. Soils are usually podsols, with sod podsols common in the west.

Population.—The population (principally Russian) of Leningrad *oblast* was 4,566,187 (1959), the majority living in Leningrad city and the dormitories of Kolpino, Petrodvorets, Pavlovsk, Pushkin and Sestroretsk, which come under the Leningrad town council. Their combined population was 3,321,196, while the total urban population of the *oblast* numbered 3,536,071, or 77%. The only large town outside the conurbation is Vyborg, formerly the Finnish Viipuri (51,088). Of local importance among the 32 towns and 57 urban districts are Kingisepp and Slantsy in the west, Luga in the south, Volkhov and Tikhvin in the centre and Priozersk on Lake Ladoga.

Economy.—The economy is dominated by Leningrad city and its satellites, and much of the *oblast* industry serves the main conurbation. Power for Leningrad is supplied by a hydroelectric plant at Volkhov, two stations on the Svir river, two on the Vuoksa river in the Karelian isthmus, and the Narva plant. Peat-cutting for peat-burning power stations is widespread, especially round Mga, Gatchina and Tosno on the city outskirts and Boksitogorsk. In the west, round Slantsy, oil shales are an important source of fuel in the form of gas, which is piped to Leningrad. Other minerals are bauxite, mined near the town of Boksitogorsk, fire clays, glass sands, limestone for cement and building stone and pyrites. Timber working is highly developed, especially on the Karelian isthmus, along the Svir and on the eastern uplands. In the immediate neighbourhood of Leningrad timber-cutting is now prohibited. The main timber-processing centres are Syasstroi, Svetogorsk, Priozersk and Sovetski, all making pulp and paper; Vyborg (crates); Lodeinoye Pole (prefabricated houses); Somino, Lyuban and Ust-Izhora (veneer). Oil shales and timber are the bases for chemical industries in Slantsy, Gatchina and Tikhvin. Along the shores of the Gulf of Finland and Lake Ladoga fishing is important, with Vyborg and Primorsk the main centres.

Agriculture also serves chiefly the town population. The widespread natural pastures form the basis for intensive dairying. Many pigs are kept, and poultry farming is carried on everywhere. The arable land is dominated by market gardening (particularly potatoes and cabbage) and fodder crops. In the north and east the proportion of arable land falls sharply, and vegetables are of less importance than rye and oats.

Communications, both within the *oblast* and with other parts of the Soviet Union, are excellent. There is a good network of suburban railways round Leningrad city and many long-distance lines radiating from it, to Helsinki, Murmansk, Vologda and Perm, Yaroslavl, Moscow, Novgorod, Minsk, Warsaw and Tallinn. A deep-water seaway follows the Neva, Lake Ladoga, the Svir and Lake Onega, whence the White sea–Baltic canal leads to the White sea. Smaller craft can use the Volkhov. Two lateral canals flank the southern shore of Lake Ladoga, giving protection from the frequent storms on the lake. Many lesser rivers are used for timber rafting. (R. A. F.)

LENINGRAD (1703–1914 ST. PETERSBURG, called PETROGRAD until 1924) is the second city of the U.S.S.R. in size and cultural importance and the largest industrial centre. From 1712 to 1918 the capital of Russia, it is now the administrative centre of Leningrad *oblast.* Leningrad is on the Neva delta at the head of the Gulf of Finland, 400 mi. N.W. of Moscow.

The site of the city is low and swampy, and since its foundation drainage has been an essential preliminary to construction. Floods are frequent, almost annual, occurrences and at times have been catastrophic. The highest on record was that of June 1924 which inundated the greater part of Leningrad. The climate is continental, much modified by marine influences which cause winter temperatures to be warmer (January average −8° C. [18° F.]) and summers cooler (July average 18° C. [63° F.]). Conditions are damp, usually with a high relative humidity, although the rainfall is only 18.8 in. a year. The Neva begins to freeze normally about mid-November, and the ice is solid by the start of December. Breakup begins in mid-April and is over by the end of the month. Icebreakers are used to prolong the navigation season. Because of Leningrad's northerly latitude, during June the long hours of daylight cause the well-known "white nights."

History.—The Neva delta and the area round the head of the Gulf of Finland, formerly known as Ingermanland (*q.v.*) or Ingria was, from the 9th century on, part of the lands of Novgorod. Subsequently they passed to the grand dukes of Muscovy. In 1617, however, the Swedes annexed Ingria and established fortresses along the Neva. During the Northern War Peter I the Great constructed a fleet on the Svir river and launched an attack on Noteburg—later Shlisselburg, now Petrokrepost—where the Neva flows out of Lake Ladoga. In 1703 Noteburg fell to Peter, and shortly afterward he captured the Swedish fortress of Nienshants on the lower Neva, thus gaining control of the delta and the head of the gulf. Just over a fortnight after the fall of Nienshants (Nyenschanz), Peter began building the Peter and Paul fortress on the right bank of the Great Neva. In the spring of the following year the fortress of Kronstadt was established on the island of Kotlin in the Gulf of Finland, and the Admiralty shipyard was founded across the Neva from the Peter and Paul fortress. In 1706 the first warship was launched. Peter began the building of a new city round the fortress and shipyard to serve as his "window on Europe." Work proceeded rapidly, and in 1712 the capital was transferred there from Moscow, although it was not until 1721 that the treaty of Nystad formally ceded sovereignty of the area to Russia. Architects, craftsmen and artisans from all over Russia and from many foreign countries were brought to work in the new town. In 1727 the first floating bridge across the Neva was constructed. Measures were taken by Peter to curtail traffic through the port of Archangel, which

forced almost all Russia's overseas trade to pass through St. Petersburg. Shipbuilding of warships and merchantmen grew steadily and armaments works were established to supply guns to the fleet. Before the end of the 18th century, papermaking and printing, food, clothing and footwear industries had developed. A china factory was established as early as the 1740s. By 1765 the population numbered 150,300 and by 1800 it had reached 220,200, of whom more than a third were in the armed forces or the administration.

Leningrad was the scene of the ill-fated Decembrist insurrection of 1825, organized mainly by a group of aristocratic officers whose ideals included a liberal constitution and the abolition of serfdom.

The 19th century witnessed very great growth of industry in St. Petersburg. Communications and trade were encouraged by the opening of navigation on the Mariinski and Tikhvin canal systems (in 1810 and 1811 respectively), which linked the capital with the Volga and which replaced the old and inadequate Vyshni Volochek system started by Peter the Great. In 1813 the first Russian steamship was built in St. Petersburg. In 1838 the first railway in Russia was constructed from the city to Tsarskoe Selo (now Pushkin). Four years later work started on the railway to Moscow. In particular the cotton textile and metalworking industries flourished. By the 1840s more than 60% of Russian imports were entering by St. Petersburg, but the increasing size of vessels necessitated transshipment at Kronstadt. In 1885 a channel was dredged to give access to the port. City growth and industrialization were greatly stimulated by the emancipation of the serfs in 1861, which allowed far greater mobility of labour. From 539,400 inhabitants in 1864 the population rose to 1,439,000 in 1900, largely by migration from rural areas. In 1910 only 32% of the population had been born in the city. With the development of metalworking and engineering as the primary industries of St. Petersburg, there grew up a skilled labour force, relatively alert politically. Strikes and industrial unrest culminated in 1905 in troops firing on a procession of demonstrators marching to the Winter palace and so setting off the 1905 revolution.

By 1914 the population had risen to 2,100,000. Of the half million workers 242,600 were factory employees, working in plants of much larger size than was usual in Russia and thus in a better position to organize themselves. The Putilov armaments works alone employed about 13,000. Then came the outbreak of World War I and the change of the city's name to Petrograd. Wartime privations and military setbacks added to the discontent of the workers at their very low standard of living. On March 9 (old style; March 22, new style), 1917, disorders broke out as a result of food shortage. Authority was slow to act and lost all control. By March 12 (O.S.; 25, N.S.) the city was in complete chaos and the Petrograd Soviet of Workers' and Soldiers' Deputies had been formed. The emperor was prevented from entering the city, and on March 14 he abdicated. On April 3 (O.S.; 16, N.S.) Lenin returned to Petrograd from Switzerland and set about organizing the overthrow of the provisional government. A Communist rising in July was suppressed, but on Oct. 25 (O.S.; Nov. 7, N.S.) Communist-led workers and sailors stormed the Winter palace, ousting the provisional government and establishing Lenin and the Communist party in power. The cruiser "Avrora" of the Baltic fleet, which bombarded the palace, remains berthed in the Neva as a museum piece. The Russian Revolution of 1917, which changed the course of history, was in large measure the work of the Petrograd proletariat and the sailors from Kronstadt. Two years later the sailors rose in revolt against Lenin, but the rising was put down with great severity.

In March 1918 the capital was moved back to Moscow. The period of the Revolution and the subsequent civil war brought the industry of Petrograd almost to a standstill. The population fell to 722,000 in 1920. Many died of hunger. In 1924, after Lenin's death, the city was renamed Leningrad. Gradually, under the New Economic policy, the economy began to recover, but rapid development came with the five-year plans, the first of which began in 1928. By 1939 Leningrad was responsible for 11% of all Soviet industrial output. Then came World War II, and the German invasion of 1941 speedily reached the outskirts of Leningrad, while Finnish armies advanced from the north. Many industries were evacuated to the east. By Aug. 1941 the city was invested and the siege lasted for 900 days, until Jan. 1944. The first winter of 1941–42 was one of desperate hardship for the inhabitants and garrison, and many thousands died of starvation. The only route for supplies was across the ice of Lake Ladoga. Later an oil pipeline and electric cables were laid on the lake bed. Much of the city was destroyed by air and artillery bombardment. After the war the fourth five-year plan was devoted to reconstruction of the "Hero City," and by 1950 industry had largely regained, or even surpassed, prewar levels, and historic buildings were restored with great care. (R. A. F.)

Architecture.—Leningrad is among the most beautiful cities in the world. It combines severe and stately architecture with planned squares, wide avenues and straight streets, and many parks and gardens. The smooth surface of the Neva river with its branches and canals is framed by the gray and pink granite embankments, with more than 360 bridges.

The Peter and Paul fortress, rebuilt in 1703–87, is situated on the small Zayachi Island at the point where the Little Neva separates, to the north, from the main river. Not far from this point, on the southern (or left) bank of the Great Neva, stands the Admiralty building, originally a dockyard and a fortress, entirely rebuilt in 1727–38 by I. K. Korobov and in 1806–23 by Andreyan Zakharov. From the Admiralty radiate three avenues constituting, with the Neva embankments, the basic plan of the city centre. The Nevski Prospekt, 2.5 mi. long, running eastward toward Aleksandr Nevski square, is the chief avenue, Maiorov Prospekt runs southward and Dzerzhinski Prospekt southeast.

After the transfer of the Russian capital from Moscow to St. Petersburg, there began the construction of many large buildings. At the beginning of the 18th century were built: the 12 *collegia* (ministries) on Vasilevski Island, by Domenico Tresini and Mikhail Zemtsov (which now form the Leningrad university); the cathedral of the Peter and Paul fortress (the burial place of all the Russian emperors since Peter I, except Peter II); the summer residence of Peter I; and the *Kunstkamera*. These buildings are distinguished for their simple appearance, clarity of plan and restrained use of raised decoration.

In the mid-18th century, in the time of Peter I's immediate successors, Bartolomeo Rastrelli (1700–71) built a number of palaces in the Russian baroque style, the most notable being the imperial Winter palace (Zimni Dvorets), on the left bank of the

CAMERA PRESS—PIX FROM PUBLIX

ST. ISAAC'S CATHEDRAL IN LENINGRAD (COMPLETED 1858), NOW USED AS A MUSEUM

Great Neva, and the Stroganov and Vorontsov palaces. By him was begun the building of the Smolny monastery group in the eastern part of the city, completed by Vasili Stasov. Savva Chevakinski built the Nikolski military-naval cathedral and other buildings. Characteristics of these grandiose structures were splendour and solemnity and richness of form and decor.

In the second half of the 18th century, Russian classicism, leaning toward clarity and simplicity, predominated. In the transitional period Aleksandr Kokorinov and Jean Baptiste de la Motte erected the Academy of Arts (on Vasilevski Island), Ivan Starov the Trinity cathedral in the Aleksandr Nevski abbey, and Antonio Rinaldi the Marble palace, all of which preserve the baroque influence. In the last quarter of the century stately buildings were erected in pure classical style: the Taurida palace (which from 1906 to 1917 housed the Duma, or parliament), by Starov; the Academy of Sciences, and the Smolny institute, a school for well-born girls where Lenin established his headquarters in Nov. 1917, by Giacomo Quarenghi.

At the beginning of the 19th century more spacious groups and monumental buildings in the Russian classical style were erected. Thomas de Tomon built the beautiful Stock Exchange on Vasilevski Island; Andrei Voronikhin the Kazan cathedral, with a square framed with a colonnade; Carlo Rossi the Yelagin palace, the Mikhailovski palace (now the Russian museum) and the General Staff building, with a large triumphal arch; at the same time Stasov erected the Narva Triumphal gates. The grandiose St. Isaac's cathedral, erected according to Auguste Monferrand's design, took almost four decades to complete. Monumental sculpture took on great significance in the city and was placed in many squares, streets and parks. The best-known examples are the monument to Peter I—the "Bronze Horseman," the subject of a poem by Pushkin—by Étienne Maurice Falconet, that to Suvorov by Mikhail Kozlovski, and the four horse tamers group by Peter Klodt on the Anichkov bridge over the Fontanka canal.

In the second half of the 19th century an eclectic and dry officiality predominated in the architecture of the centre of St. Petersburg. At the beginning of the 20th century, modern currents in architecture became widespread. These were opposed by the works of several prominent architects (Ivan Fomin, Vladimir Shchuko and Lev Ilyin) who based their works on the classical heritage. After the Revolution and the civil war, especially in the 1930s, extensive building was carried out in the interest of the growing population both in the old parts of the city and in the new area round it. Apart from living accommodations, new administrative buildings were put up. A huge Kirov stadium on Krestovski Island was also built. All new construction was carried out according to a general plan of development. A number of historic palaces and parks of the imperialist era are to be found in the suburbs of Leningrad, at Pushkin, Petrodvorets, Lomonosov (Oranienbaum), Pavlovsk and Gatchina. After 1917 these palaces became museums open to the public. (V. A. K.)

Cultural Institutions.—Leningrad is second only to Moscow as a cultural and educational centre. It is the traditional home of the Russian ballet. There are 13 theatres, including the world famous Kirov (formerly Mariinski) Opera and Ballet, the Little Opera and Pushkin dramatic theatres. Many newspapers and journals and more than 24,000,000 books annually are published there. The Academy of Sciences has its large library there, together with its Botanical, Forestry and Zoological institutes. These, and the Pulkovo observatory, the Geological institute and the Institute of Plant Cultivation, are numbered among the more than 180 scientific research institutions. The A. A. Zhdanov State university was founded in 1819, but older still are the Academy of Art (1757), the Mining institute (1774) and the Military Medical academy (1798). In all there are about 650 schools and 40 higher educational foundations. Many learned societies, such as the Geographical, Chemical, Physical and Medical societies, maintain their headquarters there. The Saltykov-Shchedrin public library (1795) is one of the largest in the world, with about 12,000,000 volumes. There are 48 museums, notably the Russian museum (1895), displaying only Russian art, and the Hermitage (founded by Catherine the Great), where the collection of art of all countries and periods is considered one of the finest in the world.

Population and Administration.—The population of Leningrad by the 1959 census was 2,899,955 or 3,321,196 including the dormitory towns of Kolpino, Petrodvorets (formerly Peterhof), Pavlovsk, Pushkin, and Sestroretsk, which come under the Leningrad city council. The 1959 figures, however, were still below the pre-war (1939) totals of 3,015,000 for the city and 3,385,000 for the conurbation. There is now an officially imposed limit on the size of Leningrad, and a permit is required for permanent residence. The city is divided administratively into 16 districts. The main historic, central quarters are the Admiralty side (Admiralteiskaya Storona) on the left, main bank of the Great Neva, Vasilevski Island between the Great and Little Neva, the Petrograd side between the Little Neva and Great Neva, and the Vyborg side on the right main bank.

Industry.—Leningrad has nearly 4,000 state and co-operative industrial undertakings, covering a wide range of products and responsible for 6% of all Soviet industrial output. The foremost industry is engineering, including shipbuilding (the atomic icebreaker "Lenin" was built there), armaments, electrical engineering (turbines, generators, compressors, electric motors, transformers, television and radio sets and equipment), machine tools, textile and mining machinery and rolling stock. The chemical industry, in the second position, produces plastics, artificial thread, synthetic rubber, industrial acids, superphosphate fertilizers, paints and pharmaceutical goods. The textile industry manufactures cottons, woolens, knitwear and artificial fabrics. Leningrad is the largest centre of the printing industry of the U.S.S.R. Brewing, flour milling and other food processing, tobacco making, timber working and the manufacture of footwear, leather goods, musical instruments and chinaware are also carried on. The industrial hinterland of the city includes all the Soviet Union for the distribution of its products, and a wide area supplies its needs for fuel and raw materials. Coal comes largely from Vorkuta, gas by pipeline from the oil-shale fields of Estonia and the western part of Leningrad *oblast*, electricity from peat-burning power stations round the city and hydroelectric stations on the Volkhov, Svir, Narva and Vuoka. Some steel is made in Leningrad, but most comes from the Cherepovets plant on the Rybinsk reservoir. A natural gas pipeline was constructed after 1961 from the Dashava gas field in the western Ukraine and another from Stavropol in the north Caucasus.

Communications.—Apart from suburban lines, Leningrad has ten trunk railways radiating out, giving direct links to Helsinki, Sortavala, Murmansk via Petrozavodsk; Perm and the Urals via Vologda, Yaroslavl and the Volga region; Moscow, Novgorod, Minsk and Kiev via Vitebsk; Warsaw and Riga via Pskov and Tallinn. The city has an electric subway (begun in 1946). The Neva takes seagoing ships and forms a route to the White Sea and Northern Sea route by way of Lake Ladoga, the Svir river, Lake Onega and the White sea-Baltic canal. The Volga-Baltic waterway (*q.v.*) gives access for seagoing craft to the Volga system and so by the Volga-Don canal to the Black sea. Leningrad is the largest port of the Soviet Union. The main harbour is in the southwest of the city, on the shores of the Gulf of Finland. It is protected by breakwaters and reached by dredged channel from Kronstadt. While the port is open, there are regular passenger services to the Scandinavian countries and Great Britain.

See also references under "Leningrad" in the Index.

(R. A. F.)

LENINOGORSK (Ridder until 1941), a town in the East-Kazakhstan *oblast* of the Kazakh Soviet Socialist Republic, U.S.S.R., is situated in the southwest Altai mountains on the upper course of the Ulba river, 50 mi. N.E. of Ust-Kamenogorsk. Pop. (1959) 66,812. It is the terminus of the branch line from Lokot on the Turksib railway. An important centre of the metallurgical industry, it has mining and forestry technical training colleges and a medical training institute. Ore deposits include zinc, lead, copper, silver and gold; rare metals have been exploited since 1784. (G. E. Wr.)

LENINSK-KUZNETSKI, formerly KOLCHUGINO and LENINO until 1925, a town of Kemerovo *oblast* of the Russian Soviet Federated Socialist Republic, U.S.S.R., stands on the right bank of the Inya river, a tributary of the Ob, 45 mi. S. of Kemerovo city. Pop. (1959) 132,156. In 1912 a French company started coal mining there. From the 1930s the town developed rapidly to become the second coal-mining centre of the Kuznetsk basin (*q.v.*), or Kuzbass. Many of the pits are located in the town itself. Other industries are linked with mining: coal-chemical production and the manufacture of mining machinery. There are also electric lamp making and timber industries. The town is on the Kuzbass railway, near its junction with a line to Novosibirsk. (R. A. F.)

LENKORAN, a town and port in the Azerbaijan Soviet Socialist Republic, U.S.S.R., lies on the shore of the Caspian sea, 35 km. (22 mi.) N. of the Iranian frontier and 120 mi. S.S.W. of Baku. Pop. (1959) 25,000. The town gives its name to the Lenkoran lowland (Lenkoranskaya Nizmennost), the coastal strip between the Talysh mountains (Talyshinskiye Gory) and the Caspian. The lowland has one of the mildest climates of the U.S.S.R., with January average temperatures 2°–4° C. (36°–40° F.) and only 14 days of snow a year. Most of the annual rainfall of 30–45 in. comes in winter. Summers are dry and hot and water is preserved in artificial basins or *istili.* This old irrigation system is the basis for extensive rice growing. After the Revolution many tea plantations were established and other subtropical crops introduced: citrus fruits, figs, tung trees (for vegetable oil), Japanese persimmon, eucalyptus and bamboo. Of the livestock kept zebu cattle are the most important.

The town of Lenkoran is first mentioned in the 17th century. In the 18th century it was the capital of the Talysh khanate, a vassal state of Persia. In 1813 the town passed to Russia, after several earlier occupations by Russian troops. In 1828 Russia acquired the rest of the lowland. Modern Lenkoran has industries processing the products of the area: tea packing, canning, timber-working and brick making. There is an agricultural experimental station, a seismological station and a branch of the Scientific Research Institute of Plantations. Road and rail link Lenkoran with Baku, and with Astara on the Iranian frontier. (R. A. F.)

LENNEP, JACOB VAN (1802–1868), Dutch poet and novelist who was influential in creating a trend toward national rather than universal romanticism, was born in Amsterdam on March 24, 1802. Although he wrote poetry, plays and short stories, he is remembered primarily for his novels, the first of which, *De Pleegzoon* (1833; Eng. trans., *The Adopted Son,* 1847), was one of the earliest historical novels in Dutch. Here and in his later works there is a psychological and stylistic weakness which is far less evident in *Ferdinand Huyck* (1840; Eng. trans., *The Count of Talavera,* 1880), a tale of great charm and ingenuity told with a humour and realism reminiscent of Henry Fielding. His *Klaasje Zevenster* (1865), an attempt at a modern novel on the French model, was a failure. He made his name as a scholar by editing Joost van den Vondel's works in 12 volumes (1850–69). He died at Oosterbeek on Aug. 25, 1868.

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LENNGREN, ANNA MARIA (née MALMSTEDT) (1754–1817), Swedish poet whose neoclassical satires and pastoral idyls show a balance of moderation characteristic of the Gustavian period and are still read for their gaiety and elegance, was born at Uppsala on June 18, 1754. Educated by her father, a lecturer at Uppsala university, she began to publish poetry when she was 18. She married Carl Lenngren (1750–1827), founder, with J. H. Kellgren, and, later, editor, of the influential *Stockholmsposten,* in 1780, and thereafter contributed anonymously to it. Her best work was written in the 1790s. Her most famous idyls are *Den glada fasten* ("The Merry Festival," 1796) and *Pojkerna* ("The Boys," 1797). Of her satires, *Portraitena* (1796) and *Grefvinnans besök* ("The Countess's Visit," 1800) are particularly outstanding. Although, as she says, she was "seldom far from home," she combined clear-sighted knowledge of the world with kindly tolerance of its foibles. Her poetry is classical in form, and remarkable for its restraint and purity of style and diction. She died in Stockholm on March 8, 1817. Her *Skaldeförsök* ("Poetical Exercises") were collected in 1819. A critical edition of her *Samlade Skrifter,* by T. Hjelmqvist and K. Warburg, appeared in three volumes (1916–26).

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LENNOX, EARLS AND DUKES OF. The origin of the first earls of Lennox is obscure, since they were descended either from the Celtic Murdac, or from the Saxon Arkil who is said to have fled to Scotland from Northumbria after the Conquest. The existence of ALWYN (*c.* 1130–*c.* 1180), 1st earl, is known only through two later charters and a Gaelic poem. The earls of Lennox rapidly rose to political prominence; MALDOUEN, 3rd earl, witnessed a charter between Alexander II and Henry III in 1237; MALCOLM (d. *c.* 1291), 4th earl, was a supporter of Margaret, the maid of Norway and MALCOLM (d. 1333), 5th earl, supported Robert I the Bruce and died at the battle of Halidon hill on July 19, 1333. On the death of DONALD (d. *c.* 1364), 6th earl, the title passed to his daughter MARGARET who resigned the title in 1385 in favour of her son DUNCAN (*c.* 1345–1425), 8th earl, who was one of the nobles executed by James I in 1425. After a period of rival claims the title was finally confirmed in 1488 to SIR JOHN STEWART of Darnley (d. 1495), great-grandson of the 8th earl. His grandson, JOHN (d. 1526), 3rd earl of this line, a supporter of the regent Arran, was murdered by Sir John Hamilton in 1526. MATTHEW (1516–71), 4th earl, married Margaret Douglas (*see* LENNOX, MARGARET DOUGLAS, Countess of), was appointed regent of Scotland in 1570 and was killed at Stirling in 1571 when the earl of Huntly attacked the parliament there. The regent's son, Henry, Lord Darnley (*q.v.*), married Mary Stuart and was father of James VI of Scotland (James I of Great Britain). The title then reverted to James VI who granted the earldom in 1572 to his paternal uncle CHARLES (*c.* 1556–76), only surviving son of the 4th earl, and whose daughter was Arabella Stuart (*q.v.*). The king regranted the earldom in 1578 to ROBERT (*c.* 1517–86), second son of the 3rd earl, who resigned the title in 1580 in favour of the earldom of March.

The Lennox earldom was given in 1580 to ESMÉ (*c.* 1542–83), grandson of the 3rd earl, and in 1581 he was created duke of Lennox. His son LUDOVIC (1574–1624), 2nd duke, was given the dukedom of Richmond in 1623 and on his death was succeeded in his Scottish titles by his brother ESMÉ (1579–1624), 3rd duke, who already held the earldom of March (*see* MARCH, EARLS OF). JAMES (1612–55), 4th duke, a fervent royalist, was created duke of Richmond in 1641 and fought at Naseby in 1645. The titles passed in 1660 to CHARLES (*c.* 1639–72), Lord Stuart of Newbury and earl of Lichfield, ambassador extraordinary to Denmark, who was drowned at Elsinore in 1672. The dukedoms of Lennox and Richmond were then bestowed by Charles II in 1675 on CHARLES LENNOX (1672–1723), his illegitimate son by the duchess of Portsmouth. Thereafter the Lennox titles were held by the dukes of Richmond (*see* RICHMOND, EARLS AND DUKES OF).

LENNOX, CHARLOTTE (1720–1804), English writer whose novel, *The Female Quixote* (1752) was highly praised by Dr. Johnson, Fielding and Richardson. She was born in New York, where her father, James Ramsay, long thought to have been governor, was probably an army officer. She went to London in 1735, married a Mr. Lennox in 1748, and had success with her first novel, *The Life of Harriot Stuart* (1751). Dr. Johnson may have helped her with *Shakespeare Illustrated . . .* (1753–54), a study of source material. Her comedy, *The Sisters* (1769), was unsuccessful. She died in poverty in Westminster, London, on Jan. 4, 1804.

See M. R. Small, *Charlotte Ramsay Lennox* (1935); G. H. Maynadier, *The First American Novelist?* (1940); A. T. Hazen, *Johnson's Prefaces and Dedications* (1937).

LENNOX, MARGARET DOUGLAS, Countess of (1515–78), prominent intriguer at the time of Elizabeth I, was the daughter of Archibald Douglas, 6th earl of Angus, and Margaret Tudor, daughter of Henry VII of England and widow of James IV of Scotland. She was born at Harbottle castle, Northumberland, on Oct. 8, 1515. Because of her nearness to the English crown, Lady Margaret Douglas was brought up chiefly at the English court in close association with Princess Mary (afterward Queen Mary), who remained her fast friend throughout life. She was high in Henry VIII's favour, but was twice disgraced for her attachments to Lord Thomas Howard in 1536, and to Sir Charles Howard, brother of Queen Catherine Howard, in 1541. She married in 1544 a Scottish exile, Matthew Stewart (1516–71), 4th earl of Lennox who in default of the royal line claimed the next succession to the Scottish throne and who was regent of Scotland in 1570–71. On Elizabeth I's accession Lady Lennox retired to Yorkshire, where her home at Temple Newsam became a centre for Catholic intrigue. She determined to secure the succession to both thrones for her family and by a series of successful maneuvers she married her son Henry Stewart, Lord Darnley (*q.v.*), to Mary Stuart.

Lady Lennox was sent to the Tower of London in 1566, but after the murder of Darnley in 1567 she was released. She was at first loud in her denunciations of Mary, but was eventually reconciled with her daughter-in-law. Lady Lennox was sent to the Tower together with Lady Shrewsbury in 1574 because of the marriage of her son Charles, earl of Lennox, to Elizabeth Cavendish, daughter of the earl of Shrewsbury, and was pardoned only after Lennox' death in 1577. Lady Lennox died on March 7, 1578, in great poverty, but her life was successful in its main purpose, for her grandson James became James VI of Scotland and afterward James I of England. (J. Im.)

LENORMAND, HENRI RENÉ (1882–1951), French dramatist, chief of the playwrights concerned with subconscious motivation who flourished between World Wars I and II, was born on May 3, 1882, in Paris. He was regarded as a Freudian but maintained that his plays were based on emotional conflicts and not on any intellectual design, and illustrated neither Freud's nor Einstein's theories (see *Le Temps est un songe,* 1919). In *Mixture* (1927) Lenormand demonstrated objectively his conviction that egoistic impulses motivate all altruistic actions, a theory that had remained implicit in *À l'Ombre du mal* (1924), *Le Mangeur de rêves* (1922; Eng. trans. 1928), etc. His *Confessions d'un auteur dramatique,* two volumes (1949–53), denounce the "completely analyzable Cartesian hero" and emphasize the complexity of human feelings. He was original in setting man in the context of nature as it is known to scientists and geographers and insisting on climatic conditions as forces molding human beings. His best play, *Le Simoun* (1920), depicts the demoralizing influence of the tropics on a European. He died in Paris on Feb. 16, 1951.

See P. Blanchart, *Le Théâtre de H. R. Lenormand* (1947); S. Radine, *Anouilh, Lenormand, Sala Crou* (1951). (D. Ks.)

LENORMANT, FRANÇOIS (1837–1883), French Assyriologist, archaeologist and historian, was born in Paris on Jan. 17, 1837. In 1856 he won the numismatic prize of the Académie des Inscriptions and three years later he accompanied his father Charles Lenormant, a distinguished archaeologist, to Greece. In 1862 François Lenormant became underlibrarian of the French institute. In 1874 he was appointed professor of archaeology at the Bibliothèque Nationale and the next year he and Baron J. J. A. M. de Witte founded the *Gazette archéologique.* He died in Paris on Dec. 9, 1883. Lenormant was a man of wide scholarship. He was particularly interested in the civilizations of the Mediterranean and traveled in Italy, Greece, Syria and other countries. As early as 1867 he turned his attention to Assyria and was one of the first to recognize in the cuneiform inscriptions the existence of a Semitic language now known as Akkadian. Among his best-known works are *Les Origines de l'histoire d'après la Bible* (1880–82, Eng. trans. 1883); *Manuel d'histoire ancienne de l'Orient* (1868, Eng. trans. 1869–70); *Les Sciences occultes en Asie* (1874–75, Eng. trans. 1878).

LE NÔTRE, ANDRÉ (1613–1700), French landscape gardener, often considered the greatest of landscape architects, was born in Paris on March 12, 1613. His father was head gardener of the Tuileries for Louis XIII. Le Nôtre entered the painter Simon Vouet's studio where he studied the laws of perspective and of optics. He also became initiated in the principles of architecture. In 1637 he succeeded his father and redesigned the Tuileries gardens, where his genius for expansive vistas first became evident. He continued the main avenue, later called the Champs-Élysées, as far as the eye could see. In 1656 Nicolas Fouquet invited him to design the grounds of the château of Vaux-le-Vicomte, where he suited his layout to the natural relief of the ground. His feeling for landscape art caused him to extend from the parterres great blocks of trees contracting progressively to accentuate the perspective and related them to superb fountains, waterworks and statuary, obtaining the maximum reflection by attention to water levels. Louis XIV was so delighted with the result that he put him in charge of planning the gardens at Versailles, where the grounds covered more than 15,000 ac. Versailles was Le Nôtre's masterpiece. He transformed a muddy swamp into a park with magnificent vistas enhancing the architecture of the palace. His monumental style reflected and increased the splendour of Louis XIV's court, through a hierarchy of values instead of symmetry.

Le Nôtre was invited to Italy and to England, where he is said to have been responsible for St. James's park, London, and the park at Greenwich. His pupils worked in Germany, Austria and Spain, and the style he created became dominant throughout Europe. A century later, in the United States, the plan of the federal capital, Washington, by Pierre Charles L'Enfant, was influenced by that of Versailles.

Le Nôtre designed also the gardens of the Trianon, Saint-Cloud, Chantilly, Clagny and Meudon and the parks at St. Germain-en-Laye and Fontainebleau. He died in Paris on Sept. 15, 1700. *See* also Landscape Architecture.

See J. Guiffrey, *André Le Nôtre* (1912). (Fe. D.)

LENOX, JAMES (1800–1880), U.S. book collector and philanthropist, was born in New York city on Aug. 19, 1800. His father was a wealthy Scottish merchant from whom Lenox inherited several million dollars as well as valuable properties in New York city. A graduate of Columbia college (1818) and a member of the bar, he devoted the bulk of his life to collecting rare books, manuscripts and art objects and to public and private philanthropy. As a book collector he was a distinguished pioneer in the United States. His special interests were in Bibles, books about North and South America, early Americana, first person accounts of the great voyages of the age of discovery, and all editions of the works of John Bunyan, William Shakespeare and John Milton. The collection was originally intended for the use of scholars, but in 1870 was made available to the public. In 1895 the Lenox library (containing about 85,000 volumes), the Astor library and the Tilden foundation were consolidated to become the New York Public library. Lenox died in New York city on Feb. 17, 1880.

See Henry Stevens, *Recollections of James Lenox and the Formation of His Library* (1886).

LENS, a mining town of northern France, near the Belgian frontier and 21 km. (13 mi.) N.N.E. of Arras, in the *département* of Pas-de-Calais. Pop. (1962) 42,508. The surrounding district is especially important for coking coal, and Lens has large coking plants, producing important chemical by-products. Nearby in 1648 Louis II de Bourbon, prince de Condé, defeated the Spaniards. During World Wars I and II the town was destroyed. Lens is the chief urban centre of a conurbation of mining settlements, including Liévin, Bruay-en-Artois, Hénin-Liétard and other communes, whose aggregate population exceeds 250,000. (Ar. E. S.)

LENS, in optics, a device for forming an image, real or virtual, by the refraction of light. The simplest lens can be a piece of glass with spherical convex, concave or plane surfaces. The word is Latin for lentil, the resemblance of a convex lens to a lentil being obvious. The surfaces of a lens are sometimes made cylin-

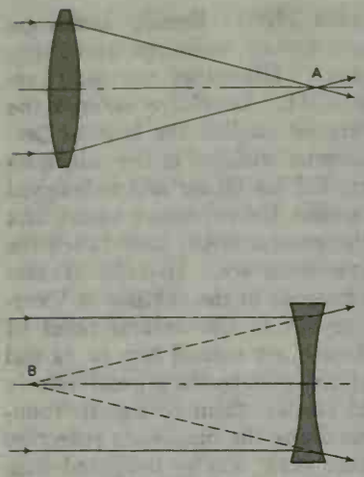

FIG. 1.—THE ACTION OF SIMPLE CONVEX (A) AND CONCAVE (B) LENSES

drical or aspheric if the application requires, but practically all lenses (except those in spectacles) have truly spherical surfaces. The term lens is often applied to such compound systems as telescope and microscope objectives and eyepieces. Among the lenses found in nature is the so-called crystalline lens of the eye, but even this is actually part of a compound optical system comprising the curved cornea, the aqueous humour, the iris and the crystalline lens situated immediately behind the iris (*see* EYE, HUMAN), which function together to form images on the retina.

Lenses have been known for thousands of years, if only in the crude form of a spherical bottle full of water used as a burning glass. Early use of eyeglasses with convex lenses in Europe during the 13th and 14th centuries was of particular benefit to old people. Indeed, the science of optics would be more than justified even if its only accomplishment were the extension of man's useful life by 20 or 30 years as a result of the invention of spectacles and magnifiers. When added to this are such devices as lighthouses, microscopes, telescopes, binoculars, cameras and motion-picture projectors, all of which depend on lenses for their action, the lens maker is seen truly as a benefactor of mankind.

The Action of a Lens.—The simplest forms are the well-known convex and concave lenses indicated in fig. 1. Here a parallel beam of light is shown entering the lens from the left; it is converged to a real image of the source at the focus A by the convex lens, and diverged as from a virtual image of the source at B by the concave lens.

Unfortunately, the image formed by a single lens is not good enough for precise work in such fields as astronomy, microscopy or photography. For these and many other exacting applications it is necessary to combine in one mount several lens elements, some of which may be convex or concave, some made of dense high-refractive or high-dispersive glass, while others are made of low-refractive or low-dispersive glass, the lenses being mounted at carefully calculated separations depending on the needs of the optical designer (*see* OPTICS). In this way, the various aberrations of a simple lens can be corrected, and an acceptably sharp image obtained. Sometimes two or more single elements are held together with a transparent cement that aids in mounting the lenses and prevents internal reflection at the adjacent lens surfaces.

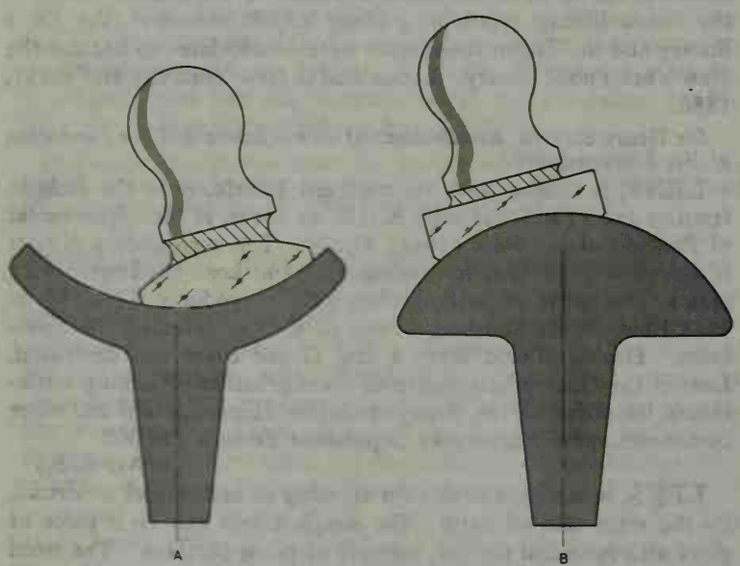

FIG. 2.—SIMPLE TOOLS FOR LENS GRINDING: (A) FOR A CONVEX SURFACE; (B) FOR A CONCAVE SURFACE

The components of a complicated objective must be mounted with the greatest care, not only to secure the specified separations between the elements but more importantly to ensure that all the lenses are properly centred; *i.e.*, the centres of curvature of all the lens surfaces should lie on a single straight line called the lens axis. Failure to meet this condition will yield a lens that fails to form a sharp image; a large part of the cost of a fine objective results from the difficulty of securing precise relative centring of the parts.

Lenses vary in size from large astronomical telescope objectives (the largest in the 1960s was that at Yerkes observatory, Williams Bay, Wis., 40 in. in diameter) down to the smallest microscope objectives in which a lens element as small as $\frac{1}{16}$ in. diameter is sometimes used. The largest astronomical telescopes, such as those at Mount Wilson and Palomar observatories, use a concave mirror in place of a lens, but the processes of grinding and polishing a telescope mirror are virtually the same as for a lens, and require even greater care in their execution. (*See* TELESCOPE; MICROSCOPE.)

The theory of the formation of images by lenses was studied by Sir Isaac Newton, Christiaan Huygens, René Descartes, Robert Smith, Thomas Young, Henry Coddington and particularly by C. F. Gauss (1777–1855), who introduced the concept of the focal length of a lens system. The systematic development of the theory of lens aberrations was initiated by L. P. Seidel (1821–96), and from his work has grown the science of lens design.

THE MANUFACTURE OF LENSES

G. B. della Porta in the second edition of his famous *Magia naturalis* (1589) described the process of lens grinding and polishing as it was carried out in his time, and indeed as it was performed until well into the 20th century with scarcely any modification. A piece of the desired type of glass is chipped around with a hammer or soft-jawed pliers to roughly the size and shape of the lens to be made. The surfaces are then ground, or more strictly lapped, to a spherical form in a cup-shaped iron tool of the correct radius of curvature if the lens is convex, or on a dome-shaped tool if concave, using wet sand (later coarse emery) as an abrasive (fig. 2). Successive stages of fine grinding follow, each using progressively finer emery powder on a smoother and more accurately formed tool. Then the lens is polished with wet jeweler's rouge (ferric oxide) on a metal tool coated with a layer of pitch or wax to act as a polisher. When both sides have been polished, the lens is ground around the edge to centre it and give it the correct diameter. In the 17th century at the time of Huygens it was customary to polish a lens on a dry bed of tripoli powder deposited in the bottom of the iron grinding tool; the discovery that wet jeweler's rouge could be used for this purpose must have ranked as a major advance.

Essentially the same processes are still used in small shops. Slabs of glass are often cut with a glass saw, or slitting disk, which is a thin soft-iron disk with small diamond chips embedded in its rim, used like a circular saw rotating at about 240 r.p.m. Thinner sheets of glass often are cut with a glass cutter, like window panes. Then the square blocks either are chipped to a rough round blank or, if a suitable furnace is available, often are heated to redness, rolled to a round shape like a ball of butter and pressed in a mold to the desired size and with approximately the desired surfaces.

Rough Grinding is still performed in the old way, carborundum often being substituted for coarse emery, but many shops use a curve generator equipped with diamond tools (fig. 3). This machine operates on the principle that any circular ring will fit perfectly on any spherical surface with a radius of curvature greater than the radius of the ring. A rotating diamond-edged, cup-shaped tool is mounted so that its axis of rotation intersects the axis of the lens at the centre of curvature, C, of the desired spherical surface. The diameter of the diamond tool must be somewhat greater than the semidiameter of the lens, and the obliquity of the tool axis must be adjusted so that the rim of the tool cuts across the centre of the lens being generated. As the tool and lens rotate about their respective axes, a spherical surface of the desired radius of curvature is generated on the lens. The

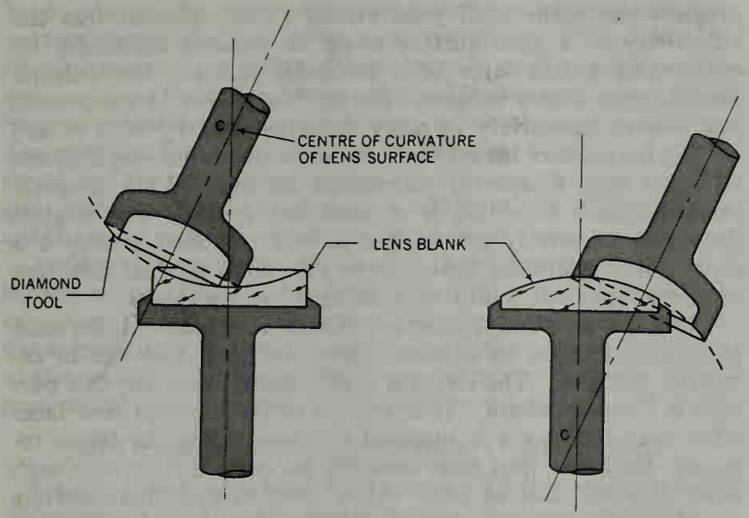

FIG. 3.—CROSS-SECTION VIEW OF A CURVE GENERATOR FOR CONCAVE (LEFT) AND CONVEX (RIGHT) SURFACES

diamond tool wears slightly, but this does not affect the radius of curvature of the surface if the rotation axes of tool and lens always intersect at the centre of curvature C.

Fine Grinding, or Smoothing, is done on an accurately formed spherical tool, using carefully graded emery flour as an abrasive. During the grinding process the emery is partially broken down into a mixture of smaller sizes; these must be separated before re-use by a process of elutriation using a slow stream of water, the particles being allowed to settle into a series of different grain sizes. Even a single larger emery grain present in fine grinding may severely scratch the lens, requiring a return to rough grinding for its removal.

Blocking.—Small lenses are usually mounted together for fine grinding and polishing on an iron block or body to economize grinding time and improve the accuracy of the surfaces. For less precise work, the lenses are sometimes blocked by mounting them in carefully bored recesses on the surface of an iron tool (fig. 4) with a thin hot cement. For more accurate work each rough-ground lens is backed up with a small button or mallet of pitch, and a number of lenses are set face down on the surface of the fine-grinding tool and held temporarily in place by wetting. A heated iron body is then pressed on the group of pitch buttons, which soften and adhere to the body. The whole is chilled with cold water, making an accurate block which is ready for fine grinding and polishing (fig. 5). Pitch blocking does not affect the thickness or centration of the lenses significantly, and these two features must be carefully controlled in the rough-grinding or curve-generation stage before the lenses are blocked.

Polishing is still performed in the classical manner, using a pitch-covered tool in place of the fine-grinding tool, the convex member (lens or polisher) being generally below, and the concave member above. The upper member is made to oscillate from side to side while the lower member rotates continuously about a vertical axis. The pitch lining of the polisher is preformed to the correct radius of curvature by pressing it while warm on the opposite-curved smoothing tool. For this reason lens tools are always made in pairs, one convex and one concave, the two members of a pair being fine ground on each other to ensure that they are spherical and match perfectly.

As a substitute for pitch, various waxes are sometimes used, or even wax-impregnated felt may be used for lower-grade lenses. F. Twyman has given recipes for various polishing compounds, one of which consists of pitch, 8 parts; rosin, 1 part; and beeswax, 1 part. For a wax rather than a pitch polisher he recommends beeswax, 14 parts; rosin, 8 parts; pitch, 1 part; plus a little tallow. However, the recipe must be varied greatly in hot and cold climates to maintain a satisfactory, slightly plastic condition. After the polisher has been molded to the correct radius of curvature, it is usually scored in a pattern of straight crosscuts or rings to provide a series of spaces to hold the wet polishing material.

The Nature of the Grinding and Polishing Processes has been the subject of much debate and experiment. It appears certain that in grinding (lapping) the sharp emery particles apply sufficient local pressure on the glass to chip out small pieces, resulting in the familiar ground glass appearance of a ground or smoothed lens. The polishing process is understood far less clearly. One school of opticians claims that polishing is similar to fine grinding except for the very minute size of the rouge particles; the other school claims that the rouge particles become embedded in the soft pitch and then exert a scraping or sandpapering action on the glass to wear away the high spots and eventually bring the whole surface to a common level. It is probable that there is also some plastic flow of the glass during polishing, tending to smear over and cover up the fine-grinding marks and narrow scratches. If a polished glass surface is lightly etched with hydrofluoric acid, many of the former scratches and other marks which had been polished away become visible again. Glass is a fluid of almost infinite viscosity, and because it is a fluid, some slight surface flow may well occur during polishing. A very well-polished surface scatters virtually no light, whereas ground glass is an efficient scatterer.

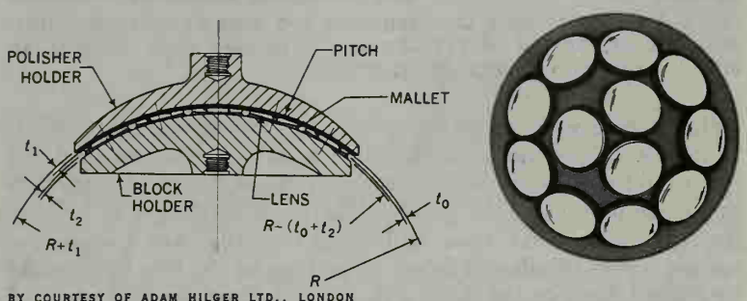

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FIG. 5.—MAKING A BLOCK OF LENSES

Left, a section through polisher, block holder, lenses and mallets; right, plan of the finished block. If R is the radius required for the polished surface, the radius of the polisher holder should be $R + t_1$ and that of the block holder $R - (t_0 + t_2)$, where t_0, t_1 and t_2 are respectively the thickness of the lens, the thickness of the polishing pitch and the thickness of the mallet

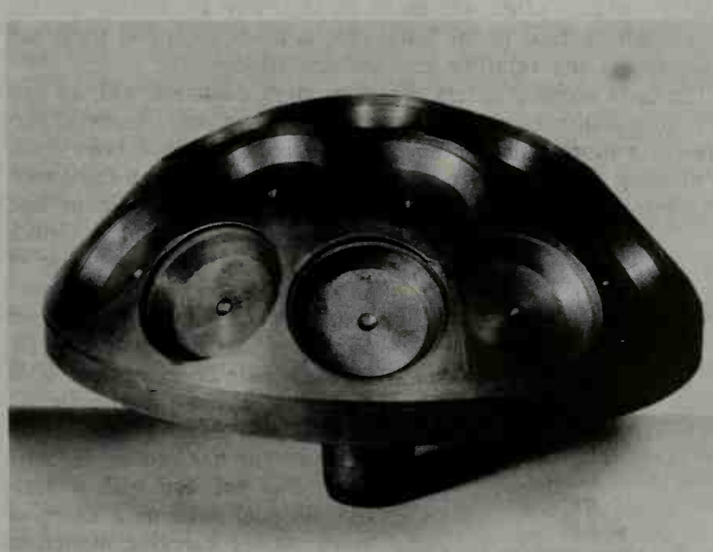


FIG. 4.—A RECESSED BLOCK TO HOLD SEVERAL LENSES DURING SMOOTHING AND POLISHING

Aluminum oxide has become popular as a substitute for emery in fine grinding, and the familiar rouge (ferric oxide) has been almost universally replaced by cerium and zirconium oxides, sometimes mixed with other materials, which polish much faster and are less likely to soil hands and clothing. At one time tin oxide (known as putty powder) was a popular polishing material, but it now is restricted to polishing some soft crystalline materials, for which it is particularly suitable.

Centring and Edging.—As an important step in the manufacture of a well-corrected objective, the centring process has been the subject of much experimentation and mechanical development. Until recent years, the polished lens was cemented to the end of a hollow chuck on a lathe spindle, and while the cement was still soft the reflected images of a nearby lamp formed by the two lens

FIG. 6.—A FOUR-SPINDLE LENS-CENTRING AND EDGE-GRINDING MACHINE. NOTE THE REFLECTION OF THE LETTER "T" IN LEFT LENS, USED AS AN AID IN CENTRING THE LENS ON ITS SPINDLE

surfaces were watched as the spindle was slowly rotated (fig. 6). If the reflections moved it indicated a lack of centring, and the lens would then be pushed sideways by the operator to neutralize the image motion. Finally, when the reflected images in both of the lens surfaces remained still while the lathe was turned, the cement would be allowed to set. The edge of the lens then would be ground down to the desired diameter, either on a flat piece of brass covered with wet emery powder, or by the use of a rotating emery wheel, or with a diamond-coated copper drum.

After about 1930 mechanical centring devices were developed which depend on clamping the lens between the polished rims of two similar coaxial steel tubes or cups. If the cups are perfectly coaxial, the optical axis of the lens must coincide with the mechanical axis of the cups, and it is a simple matter then to rotate the cups slowly while grinding the rim of the lens with a suitable grinding wheel.

Surface Coating.—Every polished glass surface reflects some incident light, the exact reflectivity depending on the obliquity of the light and the refractive index, n, of the glass. For normal incidence, Fresnel's formula gives the reflected fraction as:

$$R = \left(\frac{n-1}{n+1}\right)^2$$

This represents about 4% reflection for ordinary glass ($n = 1.5$), rising to 7½% for glass with n as high as 1.75. A complicated photographic objective thus partially acts as a mirror, reflecting a significant fraction of the incident light. This would not be too serious, however, except that the glass-air surfaces within the objective reflect some light. In its turn a fraction of this light is again partially reflected back into the camera where it eventually acts to fog the film. Furthermore, because the lens surfaces are spherical, they tend to form sharply focused reflected images of bright lights situated in or near the field of the camera, which often show up in the picture as ghosts or flare-spots. Any method for reducing the reflectivity of lens surfaces is therefore doubly useful, both to remove ghost images or stray light and to increase the amount of light transmitted by the lens.

As early as 1896 H. D. Taylor noticed that some old lenses with tarnished surfaces actually transmitted more light than newly polished lenses of the same type, and he tried to produce an artificial chemical tarnish. The effort was unsuccessful and little progress was made until John Strong (1936) showed that the reflectivity of a glass surface could be reduced drastically by evaporating a thin layer of a low-index material like calcium fluoride upon it in a vacuum. During World War II the process was studied extensively in many countries, and by 1945 it had become the practice to coat the surfaces of all but the very simplest of lenses with a layer of magnesium fluoride. When properly produced, such a coating is as hard and resistant as the glass itself, and effectively reduces the surface reflection to only 1% or 2% of the incident light. Even this small residual reflection can be reduced with multilayer coatings of various kinds.

Cementing.—Two or more lenses often are made with the same radius of curvature on adjacent surfaces so that they can be cemented together. The classical transparent cement for this purpose is Canada balsam. It is applied to the adjacent lens faces while hot; the excess is squeezed out by rubbing the lenses together; the lenses then most carefully are centred relative to each other and set aside to cool. After 1940 various thermosetting and thermoplastic materials replaced Canada balsam for this purpose, chiefly because lenses cemented with balsam may come apart at such very low temperatures as those in the arctic or at high altitudes. A common modern cement is butylmethacrylate, but many other polymers have been used for this purpose.

Lenses more than about three inches in diameter are not usually cemented because of the risk of distortion due to the unequal thermal expansions of crown and flint glass (*see* GLASS MANUFACTURE: *Properties*). Such lenses are either designed to have at least a small definite separation or, if they must be in close contact, they are prevented from actually touching by three little pieces of tinfoil equally spaced around the edge.

Mounting.—The various lens elements of a complete objective are mounted in metal cells to keep them together in correct relationship. The cell is provided with a carefully turned seat to hold each of the lenses, the lens being held in position either by a screw clamp ring (fig. 7), or by having the metal rim very thin so that it can be spun over the edge of the lens while the operator holds the lens in position. In some cases, the lens is held in its mount with a hard cement, a common example being the tiny front lens of a high-power microscope objective.

Lenses With Nonspherical Surfaces.—Spherical surfaces are almost universally employed in high-grade lenses because the sphere is the only geometrical form that can be generated automatically with great exactness. In the type of grinding and polishing where one part slides over a mating part in an irregular manner, with complete surface contact; no matter how irregular the surfaces are at the beginning they end up as perfect spheres. To generate a surface other than a sphere (a plane, of course, is a sphere of infinite radius) some form of line or point contact must be used between lens and polisher, and the tool must travel in a specified manner across the lens in grinding and polishing. Paraboloidal surfaces often are made in this way by resting on the glass a flat vertical metal blade that is made to travel back and forth across the rotating lens without tilting.

The term aspheric refers to a nonspherical surface with an axis of rotation coinciding with the axis of the system. Aspheric surfaces of a more general form than the parabola have been made by molding under pressure while the glass is hot enough to be soft, by sagging a sheet of glass by heat into a preformed mold, and by brute-force grinding. Grinding is done with a succession of progressively more accurate metal tools formed to the desired surface shape, the tool being rotated about its axis while it is forced against the glass with wet emery as a loose abrasive. In this case the fine-ground aspheric surface is polished with a flexible material such as a sheet of thick rubber carrying numerous small pitch pellets, pressure being applied from behind the rub-

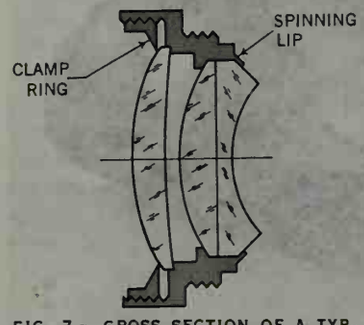


FIG. 7.—CROSS SECTION OF A TYPICAL MOUNT FOR A PHOTOGRAPHIC OBJECTIVE

ber by a bag of shot or by some other evenly applied force that does not tend to alter the form of the surface during polishing. Molded aspheric surfaces are commonly employed in condenser lenses; the more accurate forms have been embodied in the eyepieces of prism binoculars and in a few recent types of photographic objective. The reflecting telescope developed by Bernhard Voldemar Schmidt (*q.v.*) in 1931 has a spherical concave mirror and a thin aspheric glass plate to correct the aberration of the mirror. This plate is either sagged or hand polished to the desired form.

A cylindrical surface is atypical in that it can be polished by lapping a lens against a matching cylindrical tool of the opposite curvature. However, some means must be provided for keeping the cylinder axis of the lens exactly parallel to the cylinder axis of the polisher. If the lens were free to rotate, the surface very soon would become a sphere instead of a cylinder.

OPTICAL MATERIALS OTHER THAN GLASS

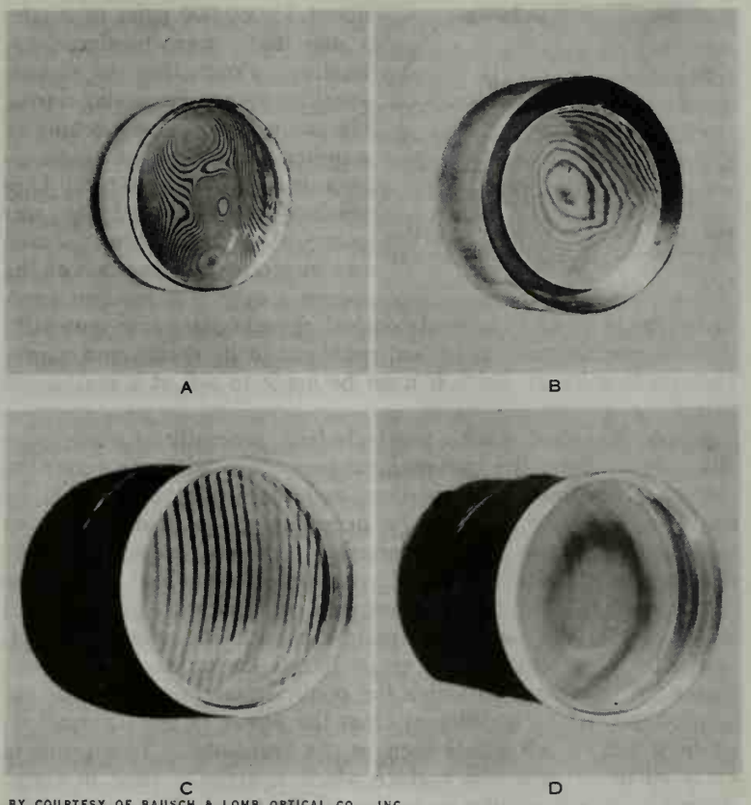
Liquids occasionally have been used to fill thin glass shells to make lenses, but this has many obvious disadvantages. Lenses of methylmethacrylate polymer (Lucite, Perspex, etc.) are satisfactory for many purposes, and are very inexpensive when molded by heat from a sheet of material, or by injection-molding in the liquid state. The reduction in weight when very large lenses are made of plastic materials instead of glass is sometimes a real advantage. Once the mold has been made, aspheric surfaces in plastic are just as easy to make as spherical surfaces.

By 1956, injection-molded plastic lenses were being used in increasing quantities for box cameras, and from 1959 into the mid-1960s triplet anastigmats with plastic components have been regularly manufactured (*see* PHOTOGRAPHY: *Photographic Lenses*). For these lenses, a suitable methylmethacrylate plastic is used instead of crown glass for the convex elements, and a high-dispersive plastic such as styrene replaces flint glass for concave elements. The low refractive index, undesirable physical properties and high temperature coefficients of plastic materials brought many problems to the camera designer. These were being overcome, however, and plastic anastigmats of high aperture and good quality were expected to become available in the near future.

Ordinary glass unfortunately is opaque to ultraviolet light, and such crystals as calcium fluoride, lithium fluoride or quartz are extensively used, especially for spectroscopy. For infrared, other crystalline materials such as rock salt, potassium iodide, thallium bromide-iodide, silver chloride, arsenic sulfide, silicon and germanium are used increasingly. These unusual materials present many problems to the optician, not the least being that most of them are opaque to visible light.

LENS TESTING

Single Lens Elements.—The surfaces of a lens are tested periodically during manufacture to ensure that they are spherical and of the correct radius of curvature. In the fine-grinding stage, this is done by pressing the lens against a thin brass plate gauge with one edge that has a circular outline of the desired radius, the gauge being held edgewise against the lens surface. By feeling the fit of the lens against the gauge, the operator can readily judge whether his lens is too strong or too weak, and can adjust the grinding process accordingly. The perfection of sphericity of a lens surface during polishing is tested with a polished glass plate of the desired but opposite radius of curvature; that is, a convex lens surface of 100-mm. radius is tested by pressing it gently against an accurate concave test plate of 100-mm. radius. If the contacting surfaces are truly spherical and of precisely the same radius of curvature, the thin air film between them will show a single shade of colour due to interference between the light beams reflected from the two faces of the air film, in the same way that light reflected by a soap bubble shows colours that depend on the thickness of the soap film. However, if the lens is irregular or of a slightly incorrect curvature, the air film will vary in thickness from point to point, resulting in a set of Newton's rings, which are bands or fringes of colour due to interference (fig. 8). If the rings are circular, then the lens surface has axial symmetry but not quite the correct radius of curvature; if the rings are elliptical or irregular, then the lens surface is nonspherical, and may need regrinding and repolishing if it departs too much from the desired form. Testing an aspheric surface is very much more difficult, as it is hard to make an aspheric test plate with a polished surface that is the precise reverse of the desired lens surface.



BY COURTESY OF BAUSCH & LOMB OPTICAL CO., INC.

FIG. 8.—TESTING AN OPTICAL SURFACE WITH THE AID OF A POLISHED GLASS TEST PLATE AND NEWTON'S RINGS

(A) Lens showing Newton's rings caused by two glass surfaces, one of which is not accurately polished, revealing colour fringes like contour lines. (B) Lens showing interference of light reflected from two surfaces not in perfect contact. Colour bands, as in soap bubble film, are shown. (C) Test glass applied to lens showing that it has a good surface. This is shown by tilting one glass slightly to introduce a prism of air, producing even interference bands as shown. (D) A pair of accurate test glasses superimposed, showing one interference band covering the entire lens area. The variation is less than 1/100,000 in. on the entire lens surface

Before assembly into its mount each lens element is also tested for thickness and centring, and for such defects in the glass as bubbles, striations and strain.

Complete Objectives.—A complete system such as a photographic objective is thoroughly tested after assembly, generally by examining microscopically the quality of the image of a distant point source of light ("star") formed by the lens. If the lens is well-designed and well-made, with all the separate elements perfectly centred relative to one another, and all the air spaces correctly established, then the image of a point source should be very small. Experienced inspectors are able to judge the quality of an objective from an examination of this image, both on the lens axis and at various obliquities corresponding to the field angle covered by the lens in the camera. Often the inspector is able to recommend small adjustments in the lens to improve such factors as the flatness of the field, or the sharpness of definition. The final test is to take actual photographs with the lens in a camera, the results of which are compared with the "star" images seen in laboratory tests. Other types of objective are tested differently; for instance, a microscope objective is tested by direct observation of a well-established critical test object, such as fine scratches in a film of silver deposited chemically on a plate of glass.

SPECTACLE LENSES

The manufacture of spectacle lenses has become an enormous industry. In the U.S. alone, during the late 1950s and early 1960s,

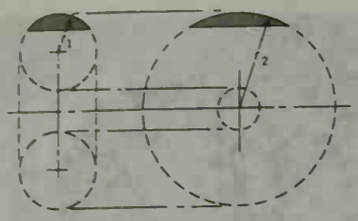


FIG. 9.—A TORIC SURFACE HAVING TWO PERPENDICULAR RADII, r_1 AND r_2

about 15,000,000 pairs of single-vision lenses were produced annually. Production of multifocal lenses was increasing during the same period, approaching in number the output of single-vision lenses. Of the total U.S. production, about 35% was spherical and 65% toric (used for correcting astigmatism of the wearer's eye). A modern spectacle lens is a precision-made optical element involving unusually difficult mechanical and optical problems in its design and manufacture, in spite of which it must be made to sell at a reasonable price.

A spherical single-vision spectacle lens, generally of a meniscus shape, is made by the conventional procedure, with the exception that the lens must be very thin, and the surfaces need not be nearly so accurate as would be necessary for a photographic or telescope objective. The outer rim of the lens, which must fit the spectacle frame, is ground on a wet stone wheel, the shape being controlled by a metal template rotating with the lens and rubbing against a fixed metal plate alongside the grinding wheel.

For the correction of the visual defect known as astigmatism, lenses must be made in which the power in one meridian, for example the vertical, is different from the power in the perpendicular meridian, which would then be the horizontal. This result is obtained by using a lens surface which is actually toric in form. A toric surface is similar to a slice off the tread of an automobile tire, the radius of curvature in one meridian being, for instance, $3\frac{1}{2}$ in., while in the other meridian it may be 14 in. (fig. 9). A convex toric surface can be generated by mounting a number of lens blanks around the rim of a wheel of the desired long-radius r_2, where they are ground with a rotating cylindrical diamond tool which is made to oscillate about an axis at the desired shorter radius r_1 (fig. 10). A corresponding mechanism is used to generate concave toric surfaces. Polishing is performed by oscillating a preformed and somewhat flexible felt polisher against the lens while it is slowly moved from side to side under the polisher.

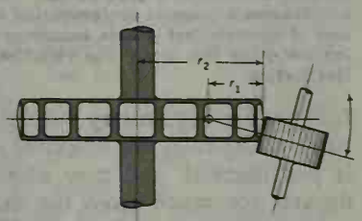


FIG. 10.—GENERATING A CONVEX TORIC SURFACE

Multifocal Lenses.—The basic idea of combining in one spectacle frame an upper half-lens suitable for distant vision, with a lower half-lens suitable for reading, is credited to Benjamin Franklin. Modern bifocal spectacle lenses are made either by polishing two different surfaces on the same side of a single lens blank (the one-piece construction), or by fusing a segment of high-refracting glass onto a facet polished on a low-refracting blank, a single spherical surface being then ground and polished across both pieces of glass (fig. 11). The additional lens power required for reading results from the higher refraction of the dense glass used to make the fused segment.

One-Piece Bifocals.—These were introduced in the early 1900s by Malcolm Bentzon and A. H. Emerson, Jr., in Great Britain. Two different coaxial spherical surfaces are generated with diamond curve-generators on the concave side of a large saucer-shaped blank, one generator being used to form the outer (distant vision) area, the other to form the inner (reading) area. Care must be taken in setting up the machine that there is no ledge remaining between the two areas. Polishing is performed on a similar machine, the diamond generators then being replaced by wax polishers (fig. 12). Last, the blank is cut across the middle, each half being used to make one spectacle lens of a pair.

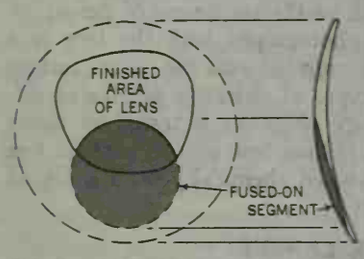
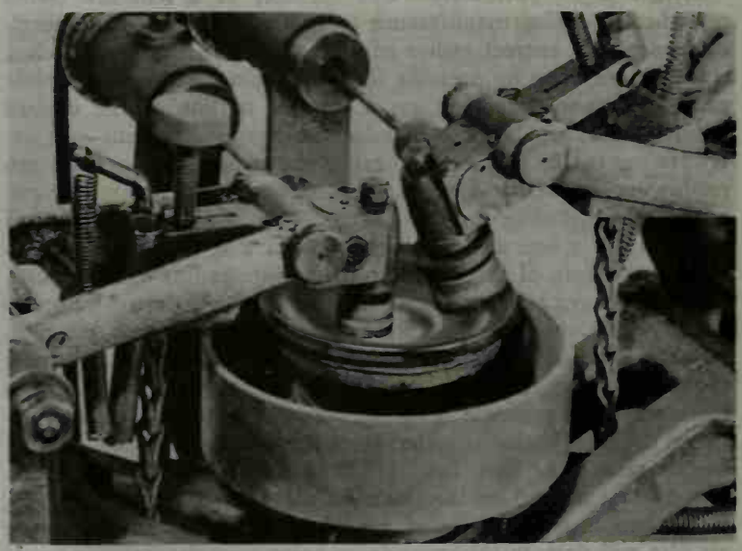


FIG. 11.—CONSTRUCTION OF A FUSED BIFOCAL LENS WITH CIRCULAR SEGMENT

Fused Bifocals.—Bifocal spectacles having a cemented segment of high-refracting glass were introduced in 1899 by J. L. Borsch of Philadelphia. About 10 years later he succeeded in actually fusing the segment to the main lens by heat; this practice is still followed in the 1960s. A blank of approximately the form of the finished lens has a spherical facet polished on the convex side, at the position of the desired reading segment. The radius of curvature chosen for this facet depends on the amount of lens power that is to be added for reading. If the segment is to be circular in shape, a disk of high-index glass, with the same thermal expansion as the main lens and a slightly lower melting point, is polished on the underside to the same radius of curvature as the facet. The disk is laid in place on the polished facet, supported by small bits of wire at its edge, and the lens and disk are heated together in a furnace until the disk softens and sinks onto the facet of the main lens, contact starting in the middle and slowly working outward to drive out all the air from between the lenses. After cooling and annealing, this compound blank is made into a spectacle lens by polishing suitable surfaces on both sides, care being taken in cutting the finished lens from this compound blank to ensure that the fused segment comes at the desired position.

In making a bifocal or trifocal segment with a flat top, a molded hollow support ring is first prepared, made from the same kind of glass as is used for the main lens, the hole in the ring having exactly the shape and size of the desired bifocal or trifocal segment. Into this support ring are placed the one or two pieces of high-refracting glass which are to compose the segment, and the parts are fused together in a furnace to make a rigid disk. This is then polished on the underside to match the facet which was previously polished on the main lens, and the whole assembly is fused to the main lens as if it were a single piece of glass. After grinding and polishing across the main lens and segment, only the one or two high-refracting portions remain visible because any portion of the outer support ring which may be left matches the main lens perfectly and appears to be a part of it (fig. 13). By using this technique, a bifocal and trifocal segment of any desired shape can be prepared, even though its outline is noncircular.

Contact Lenses.—During the early 20th century, a number of opticians attempted to grind and polish very thin shell-like lenses to fit closely over the cornea of the eye. A suitable fluid is used to fill the space between the eye and the lens, the lens being supported by a thin brim which closely fits and rests against the eyeball. Ground and polished glass contact lenses are, of course, very expensive and delicate; most modern contact lenses are molded in plastic material, and then formed by heat and pressure to the exact shape of the wearer's eye (*see* EYEGLASSES).



BY COURTESY OF BAUSCH & LOMB OPTICAL CO., INC.

FIG. 12.—TWO-SPINDLE MACHINE FOR POLISHING ONE-PIECE BIFOCAL LENS FOR SPECTACLES

FRESNEL LENSES

It occurred to Le Comte de Buffon (1748) that a lens could be greatly reduced in weight by dividing the continuous lens surface

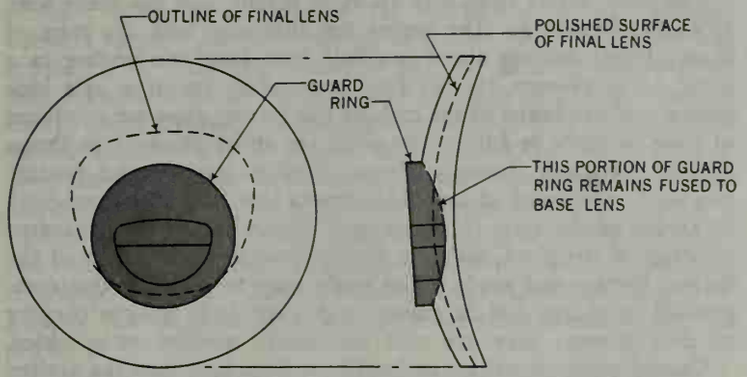


FIG. 13.—CONSTRUCTION OF A FUSED TRIFOCAL SPECTACLE BLANK WITH A FLAT-TOPPED SEGMENT

into a succession of concentric rings as indicated in fig. 14, the rings being assembled in correct relationship on a flat surface. This suggestion was adopted by A. J. Fresnel in 1820 in the construction of lighthouse lenses, which are so large that a single lens of normal type would be too thick and heavy to be constructed. Indeed, it would be almost impossible to make a solid glass disk of adequate size for a modern lighthouse, and the weight of such a thick lens would be prohibitive. The sections of a lighthouse lens are separately ground and polished from suitable curved glass bars, and assembled in metal frames to make up the complete lens.

A one-piece molded glass Fresnel lens is found to be very convenient for such devices as floodlights, spotlights, railroad and traffic signals and decorative lights in buildings. On shipboard, cylindrical Fresnel lenses often are used in lanterns to increase their visibility. After about 1945 a wide variety of thin Fresnel lenses were molded in plastic materials, the width of the rings being only a few thousandths of an inch. These are mainly used as field lenses with ground-glass screens in cameras and small projectors to increase the brightness of the outer parts of the screen.

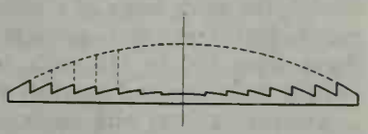


FIG. 14.—CROSS SECTION OF A FRESNEL LENS INDICATING ITS CONSTRUCTION

A close relative of the Fresnel lens is the molded lenticular lens forming the front of an automobile headlamp. Each little rectangular segment of these lenses is carefully designed to focus and deflect a portion of the light either down to the road, or to one side of the car, according to the plans of the designer.

See also references under "Lens" in the Index.

BIBLIOGRAPHY.—An excellent summary of the history of lenses, and the subject of lens manufacture, including spectacle lenses, is to be found in F. Twyman, *Prism and Lens Making,* 2nd ed. (1952). Reference may also be made to R. T. Glazebrook, *Dictionary of Applied Physics,* vol. 4, pp. 326–348, "Optical Parts, the Working of" (1923, reprinted 1950). Other useful references are W. Ewald, *Die Optische Werkstatt* (1930); C. Dévé, *Optical Workshop Principles* (1943); A. G. Ingalls (ed.), *Amateur Telescope Making,* 3 vol. (1933–53). (R. KE.)

LENT, the period of 40 days' penitential preparation for Easter (*q.v.*) in the church year. Its origins are to be found almost as early as apostolic times when a short period of fasting, of one or two days, preceded the festival. Tertullian, Irenaeus and Hippolytus bear witness to a two-day fast in the 3rd century. The earliest reference to *Tessarakoste* (Lat. *quadragesima,* "40th") as the name for Lent occurs in the 5th canon of the Council of Nicaea (325). The period of 40 days is obviously suggested by Christ's fast in the desert and may have been influenced by the fast prescribed for candidates preparing for baptism. The length of the fast differed from place to place, as the ecclesiastical historian Socrates (d. 450) observed, pointing out that in Rome only three weeks of fasting were observed, although it was everywhere called *Tessarakoste.* It is possible that the early church in Rome, while accepting the 40-day fast, did not prescribe its observance on all the 40 days but only on those of the fourth and sixth weeks. Since in the west fasting is forbidden on Sundays, when Lent lasted six weeks (42 days) it contained only 36 fast days; the number 40 was made up in the 7th century by the addition of 4 days before the first Sunday of Lent (*see* ASH WEDNESDAY). In the east where fasting is forbidden on both Saturday and Sunday, Lent lasts for eight weeks before Easter, beginning on a Monday. The second last Sunday in Lent is called Passion Sunday, and Palm Sunday (*q.v.*), which follows it, marks the beginning of Holy Week (*q.v.*).

Fasting rules in the early centuries were strict, as they still are in the Orthodox Eastern Church. One meal a day was allowed in the evening and meat, fish, eggs and butter were forbidden. Relaxation occurred in the west from the 8th–9th centuries onward by advancing the hour at which food could be taken. Since the one meal of the day could not be eaten until after the evening service (vespers), the time for this office was gradually advanced until by the 16th century it was held at midday in Lent, and a light meal was allowed in the evening. The strict law of fasting among Roman Catholics was everywhere dispensed during World War II and only Ash Wednesday and Good Friday (*q.v.*) are now usually kept as fast days in Lent. But the general emphasis on penitential practice remains.

The three leading themes of the Lenten liturgy—baptism, penance and the passion of Christ—are all very ancient. One of the purposes of Lent in the primitive church was the preparation of candidates for the solemn baptism of Easter night; most of the lessons in the proper Masses of Lent still reflect this by their references to water, raising from the dead and light. Candidates were enrolled as *electi* at the beginning of Lent and were taught the creed and the Lord's Prayer and instructed in the Gospels. This teaching took place specifically on the third, fourth and fifth Sundays and traces of it are to be found in the modern missal. Penance, apart from the general theme of preparation for Easter, is prominent in the Lenten liturgy because of the public reconciliation on Maundy Thursday (*q.v.;* 6th century onward) of the penitents who for serious sins were excluded from communion and directed to do penance. The public exclusion of the penitents took place on the first Monday in Lent and then, when the beginning of Lent was fixed for Ash Wednesday, on that day. Greater emphasis was given to the third theme, the passion of Christ, which runs all through the Lenten liturgy, with the decline of the catechumenate and the spread of the cult of the cross (7th century onward).

The same themes and practices are in general to be found in the liturgies of the Eastern churches. The Book of Common Prayer, too, prescribes the observance of Lent with fasting; it is now generally kept by Anglicans at least as a season when some penitential practice of a private nature is observed. Lent forms part of the Lutheran church year and there is some observance of the season in other Protestant churches. *See* also CHURCH YEAR.

BIBLIOGRAPHY.—H. Thurston, *Lent and Holy Week* (1904); W. J. O'Shea, *The Worship of the Church* (1957); L. Eisenhofer and J. Lechner, *The Liturgy of the Roman Rite* (1961). (L. C. S.)

LENTHALL, WILLIAM (1591–1662), English parliamentarian and speaker of the house of commons, where he played a notable part in the crises of the Long parliament, was the second son of William Lenthall of Lachford, Oxfordshire. He was born at Henley-on-Thames in June 1591, left Oxford without taking a degree in 1609 and was called to the bar of Lincoln's Inn where he became a bencher in 1633. He was elected for Woodstock to the parliaments of 1624 and April 1640, and in Nov. 1640 was chosen as speaker of the Long parliament. When on Jan. 4, 1642, Charles I entered the house of commons to seize five members, Lenthall behaved with great prudence and dignity. Having taken the speaker's chair and looked around in vain to discover the offending members, the king turned to Lenthall, and asked him "whether any of those persons were in the House, whether he saw any of them and where they were." Lenthall fell on his knees and replied, "May it please your Majesty, I have neither eyes to see nor tongue to speak in this place but as the House is pleased to direct me, whose servant I am here." On the outbreak of the

English Civil War Lenthall threw in his lot with the parliament.

He carried on his duties as speaker without interruption until 1647, when the struggle for power between parliament and army began. On July 26 a mob invaded the house of commons and obliged it to rescind the ordinance re-establishing the old parliamentary committee of militia; Lenthall was held in the chair by main force and compelled to put to the vote a resolution inviting the king to London. Threats of worse things came to Lenthall's ears, and, taking the mace with him, he left London on July 29 to join the army and Sir Thomas Fairfax. Returning to London with the army, he was installed again by Fairfax in the chair (Aug. 6), and all votes passed during his absence were annulled. Henceforth he supported the army party, but with a constant bias in favour of the king. His speakership continued until April 20, 1653, when the Long parliament was summarily expelled. Oliver Cromwell directed Col. Thomas Harrison, on the refusal of Lenthall to quit the chair, to pull him out, and Lenthall submitted to the show of force. He was speaker in the parliament of 1654, but was not re-elected to the chair in the parliament of 1656.

After the fall of Richard Cromwell, the army officers, deciding to recall the Rump parliament, assembled at Lenthall's house (May 6, 1659) to desire him to send out the writs. Lenthall made various excuses for not complying, but when the officers threatened to summon the parliament without his aid, he gave in. Lenthall was now restored to the speakership, and was temporarily made keeper of the new great seal (May 14). On Oct. 13 during the struggle between the two sections of the army, under Gen. John Lambert and Gen. George Monck, Lambert placed soldiers around the house and prevented the members from assembling. Lenthall's coach was stopped as he was entering Palace yard, the mace was seized and he was obliged to return. The army, however, soon returned to their allegiance to the parliament. On Dec. 24 they marched to Lenthall's house and submitted to him as speaker, and on the 29th he received the thanks of parliament.

Lenthall now turned his attention to bringing about the Restoration. He had been in communication with Monck for some time, and when Monck entered London with his army Lenthall met him in front of Somerset house. Nevertheless at the Restoration he was included (June 11, 1660) by the house of commons among the 20 persons excepted from the act of indemnity for penalties not extending to life. Monck's defense saved him, though he was declared incapable of holding any public office in the future. His last public act was a disgraceful one. Unmindful now of the privileges of parliament, he consented to appear as a witness against the regicide Thomas Scot, for words spoken in the house of commons while Lenthall was in the chair. It was probably after this that he was allowed to present himself at court. Lenthall died at Burford on Sept. 3, 1662. (R. B. Wm.; X.)

LENTICEL, a ventilating pore that appears as an elongated scar on the surface of a tree stem; it is a region of loosely arranged rounded cells that provides for gaseous exchange between the internal tissues and the external air after the formation of cork. The lenticels of the stem are usually found below the stomates, whose function of gaseous exchange they take up after the latter have been cast off with the epidermis.

See Plants and Plant Science: *Phellogen and Periderm.*

LENTIL (*Lens culinaris*), a small annual legume and its lens-shaped edible seed, which is one of the most ancient of cultivated foods. It belongs to the pea family (Leguminosae; *q.v.*), and like its relatives is rich in protein. Its origin is not known, but the lentil is widely cultivated throughout Europe, Asia and north Africa, though little grown in the western hemisphere. The seeds are used chiefly in soups, and the herbage is used as fodder for suckling ewes, calves and lambs, and is said also to increase the yield of milk from cows.

The lentil was probably one of the first plants brought under cultivation by mankind. They have been found in the lake dwellings of St. Peter's Island, Lake Biel, which are of the Bronze Age. The red pottage of lentils for which Esau sold his birthright (Gen. xxv, 30–34) was apparently made from the red Egyptian lentil. This lentil is cultivated in one or other variety in the middle east, north Africa and in Europe along the Mediterranean coast and as far north as Germany, the Netherlands and France. In Egypt, Syria and other eastern countries the parched seeds are sold in shops, and esteemed the best food to carry on long journeys.

The plant varies from 6 to 18 in. in height, and has many long ascending branches. The leaves are alternate, with six pairs of oblong-linear leaflets about one-half inch long and ending in a spine. The flowers, two to four in number, are of a pale blue colour, and are borne in the axils of the leaves; they are produced in June or early in July. The pods are about one-half to three-fourths inch long, broadly oblong, slightly inflated and contain two seeds, the shape of a doubly convex lens, and about one-sixth to three-eighths inch in diameter. There are many cultivated varieties of the plant, differing in size, hairiness and colour of the leaves, flowers and seeds. The seeds may be more or less compressed in shape, and in colour may vary from yellow or gray to dark brown; they are also sometimes mottled or speckled.

Considerable quantities of lentils are imported into the United States, where they are grown to only a limited extent in the Pacific northwest. In English commerce, French and Egyptian lentils are commonest. The former are usually sold entire, and are of an ash-gray colour externally and of a yellow tint within; the latter are usually sold like split peas, without the seed coat, and consist of the reddish-yellow cotyledons, which are smaller and rounder than those of the French lentil; the seed coat when present is of a dark brown colour.

The reddish variety of the lentil (*lentillon d'hiver*) is most esteemed in France on account of the superior flavour of its smaller seeds. It is sown in autumn either with a cereal crop or alone, and is cultivated chiefly in the north and east of France. The large or common variety, *lentille large blonde,* cultivated in Lorraine and at Gallardon (Eure-et-Loir), and largely in Germany, is the most productive. This kind has very small whitish flowers, two or rarely three on a footstalk, and the pods are generally one seeded, the seeds being of a whitish or cream colour, about three-eighths inch broad and one-eighth inch thick. A single plant produces from 100 to 150 pods, which are flattened, about three-fourths inch long and one-half inch broad.

Another variety, with seeds similar in form and colour to the last but of much smaller size, is known as the *lentillon de Mars.* It is sown in spring. This variety and the *lentille large* are both sometimes called the *lentille à la reine.* A small variety, *lentille verte du Puy,* cultivated chiefly in the *départements* of Haute-Loire and Cantal, is also grown as a vegetable and for forage. The Egyptian lentil was introduced into Great Britain in 1820. It has blue flowers. Another species of lentil, *Ervum monanthos,* is grown in France about Orléans and elsewhere under the name of *jarosse* and *jarande.* It is said to be one of the best kinds of green food to grow on a poor dry sandy soil; on calcareous soil it does not succeed so well. It is usually sown in autumn with rye or winter oats.

LENTULUS, the name of a Roman patrician family of the gens Cornelia. The word *Lentulitas* was coined by Cicero (*Ad fam.,* iii, 7, 5) to express the attributes of a pronounced aristocrat. The following members of the family deserve mention:

Publius Cornelius Lentulus, nicknamed Sura (d. 63 B.C.), a leading figure in the Catilinarian conspiracy (*see* Catiline). When accused by Sulla (to whom he had been quaestor in 81 B.C.) of having squandered public money, he refused to render any account, but insolently held out the calf of his leg (*sura*), on which boys were struck as punishment when they made mistakes in playing ball. He was praetor in 74, consul in 71. Although expelled from the senate with a number of others for immorality in 70, he was elected to a second praetorship for 63, when he joined Catiline. When Catiline left Rome after Cicero's first speech *In Catilinam,* Lentulus took his place as chief of the conspirators in the city. He planned to murder Cicero and set fire to Rome, but the plot failed because of his indiscretion in communicating it to the ambassadors of the Allobroges, then in Rome, in the hope of securing armed assistance. They betrayed him, and the conspirators were arrested and forced to confess. Lentulus was executed on Dec. 5, 63 B.C.

Publius Cornelius Lentulus (d. *c.* 48 B.C.), called Spinther

from his likeness to an actor of that name, supporter of Pompey. In 63 B.C., as curule aedile, he assisted Cicero in the suppression of the Catilinarian conspiracy. He was praetor in 60, and with Caesar's support got the province of Hither Spain in 59 and was consul in 57. He took a leading part in recalling Cicero from exile. From 56 to 53 Lentulus was governor of the province of Cilicia (with Cyprus). Although commissioned by the senate to restore Ptolemy XII Auletes to his kingdom, he was prevented by a Sibylline oracle. He was saluted as imperator, and he triumphed in 51. In spite of his indebtedness to Caesar, Lentulus joined the Pompeians in 49. Despite the generosity with which he was treated by Caesar after the capitulation of Corfinium, he again supported Pompey. After Pharsalus (48), Lentulus escaped to Rhodes, but subsequently fell into Caesar's hands and was put to death.

LUCIUS CORNELIUS LENTULUS, surnamed CRUS (d. 48 B.C.), member of the anti-Caesarian party. In 61 B.C. he was the chief accuser of P. Clodius (*q.v.*) in the affair of the festival of Bona Dea. When consul (49) he advised the rejection of all peace terms offered by Caesar, and threatened to act against him upon his own responsibility. When Caesar advanced he crossed to Asia, and later joined Pompey at Dyrrhachium with two legions. After Pharsalus he fled to Egypt, but he was put to death the day after Pompey's murder.

BIBLIOGRAPHY.—*Sura:* Dio Cassius, xxxvii, 30, xlvi, 20; Plutarch, *Cicero,* 17; Sallust, *Catiline;* Cicero; *In Catilinam,* iii, iv, *Pro Sulla,* 25. *Spinther:* Caesar, *Civil War,* i, 15–16, 21–23; iii, 102; Plutarch, *Pompey,* 49; Valerius Maximus, ix, 14, 4; many letters of Cicero, especially *Ad fam.,* i, 1–9. *Crus:* Caesar, *Civil War,* i, 4, iii, 104; Plutarch, *Pompey,* 80.

LENZ, JACOB MICHAEL REINHOLD (1751–1792), German poet and dramatist, who expresses in his work and life the tragic tensions in the *Sturm und Drang* (*see* GERMAN LITERATURE). He was born at Sesswegen, Livonia, on Jan. 12, 1751, and brought up at Dorpat (now Tartu, Estonia). He interrupted his theological studies at Königsberg (now Kaliningrad, U.S.S.R.) to accompany two noblemen to Strasbourg, where he met Goethe (1771). His best lyrics were now written (*Die Liebe auf dem Lande* and *Erstes geistliches Lied*). As one of the *Stürmer und Dränger,* he wrote many hasty plays, with a strange mixture of sentiment, social satire and farce, and in forms challenging all the proprieties (*Der Hofmeister,* 1774; *Die Soldaten,* 1776). His waywardness injured his works, as it alienated his friends, and he suffered a complete mental breakdown in 1777. Partially recovering at home, he tried to eke out a living in Moscow and died there in misery on May 24, 1792. Georg Büchner (*q.v.*) based his *Lenz* on the record of his breakdown made by J. F. Oberlin, the parson who sheltered him.

His *Gesammelte Schriften* were published in five volumes (1909–13) by F. Blei and his *Briefe* in two volumes (1918).

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LEO, the name of 13 popes.

ST. LEO I the Great (d. 461), pope from 440 to 461, is one of the greatest popes of Christian antiquity and a doctor of the Western Church (declared 1754). The exact date and place of his birth are not known, though an early tradition associates him with Tuscany. Even before his election to the papacy, Leo was active in the affairs of both church and empire and was well known to the outstanding personalities of both west and east. He succeeded Sixtus III and was consecrated on Sept. 29, 440. The 21 years of his pontificate saw the rapid disintegration of the empire in the west and the formation in the east of Christological differences which ultimately would divide Christendom. His distinguished pontificate was devoted to preserving the purity of the Christian faith, to securing the unity of the Western Church under the pope and to exalting the papacy in theory as well as in fact.

From the beginning of his pontificate Leo was active in the suppression of heresy, in which he saw the seeds of corruption and disunity. He acted vigorously against the Pelagians, the Manichaeans and the Priscillianists. In accord with the civil law of his day, he did not hesitate to seek and use the imperial power in the extirpation of heresy. The severe edict which Valentinian III issued against the Manichaeans in 445 is probably traceable to his influence. But the most significant achievement of Leo in the history of theology was not this negative suppression of heresy but his own positive formulation of Catholic doctrine. This is most clearly exemplified in the manner in which he handled the affair of Eutyches (*q.v.*) of Constantinople. Eutyches, the founder of Monophysitism, had been denounced for confounding the divine and human natures in Christ and had been excommunicated and deposed by Flavian, patriarch of Constantinople. Thereupon, Eutyches appealed to Leo, who, after examining the case, directed to Flavian in 449 his celebrated *Tome* (epist. 28), which is not only a rejection of Eutyches' teaching but also a clear, precise, systematic exposition of the Catholic doctrine of the incarnation and the union of the divine and human natures in Christ. The Council of Chalcedon (451), summoned to condemn the heresy of Eutyches, declared that Leo's *Tome* was a true expression of the Catholic faith and that Peter had truly spoken through Leo.

Leo's 432 extant letters and 96 sermons reflect his conception of the exalted position of the papacy in the whole church. He was a master exponent of the *principatus,* or primacy of jurisdiction, conferred on the Roman Church. The power of the keys was a personal commission granted by Christ to St. Peter alone, and passed on by St. Peter to his successors. The bishops depended on the pope for the exercise of their jurisdiction, but the pope alone possessed the plenitude of power. As he reminded the bishop of Thessalonica, "We have entrusted you . . . with our legatine office, in such a way that you have been called to a share of our solicitude, not to possess the plenitude of power." The obedience to the Roman see which he demanded of the bishops of the west, especially those of Arles (*see* HILARY, SAINT [of Arles]) and Vienne, is a concrete exemplification of his theology of the papacy. The skill with which he co-ordinated and summarized the doctrine of his predecessors made Leo the classical source on the papal primacy. His success in dealing with the Huns (452) and his qualified success with the Vandals (455) further enhanced the prestige of the Holy See in the temporal order and helped to place the leadership of the west in its hands. This great pope is perhaps the last Latin stylist of antiquity. His sermons, solemn, graceful, dignified, have the cadence of living Latin and are held in admiration by Latinists. He died Nov. 10, 461. His feast day is kept on April 11 in the west and Feb. 18 in the east.

(*See* also PAPACY: *The First Six Centuries;* COUNCIL: *Councils to the 9th Century.*) (R. E. MCN.)

ST. LEO II (d. 683), pope from 681 to 683, a Sicilian by birth, was elected *c.* Dec. 681 to succeed Agatho but was not consecrated until Aug. 17, 682. He wrote in approbation of the decision of the sixth ecumenical council (Constantinople, 680) and in condemnation of the Monothelite heresy and of Pope Honorius (*q.v.*) I, whom he regarded as one who "by unholy betrayal tried to overthrow the immaculate faith." In the Greek text of the letter to the emperor Constantine IV in which the phrase occurs the milder expression "allowed to be overthrown" is used; and there are other documents indicating that this formula should be regarded as expressing the true meaning of Leo. It was during Leo's pontificate that the dependence of the see of Ravenna upon that of Rome was settled by imperial edict. He died on July 3, 683, and his feast is observed on the anniversary.

ST. LEO III (d. 816), pope from 795 to 816, a native of Rome, was elected to succeed Adrian I on Dec. 26, 795, and consecrated next day. His first act was to send to Charlemagne, as *patricius,* the standard of Rome, together with the keys of the sepulchre of St. Peter and of the city. In the spring of 799, Leo was attacked while riding in a procession through the city; the object of his assailants, incited by supporters of Adrian I, was, by depriving him of his eyes and tongue, to disqualify him for the papal office. This barbarous intention was not executed, but Leo sought the help of Winichis, the Frankish duke of Spoleto. Having vainly requested the presence of Charlemagne in Rome, Leo crossed the Alps to meet him at Paderborn; the precise nature of the discussions that

took place is not known, but Leo was safely conducted back to Rome by a Frankish escort in Nov. 799. Charlemagne followed him thither next year and cited his enemies to appear; and on Dec. 23, 800, the pope appeared before the king and purged himself on oath of the charges brought against him. Whatever Leo had lost by this humiliation, he regained by his initiative two days later when, on Christmas day, he placed the imperial crown on Charlemagne's head. Taking advantage of a vacancy in the eastern empire, the pope raised the Frankish king from *patricius* of the Romans to universal emperor and, in so doing, established the legal precedent that the pope alone could confer the imperial crown. It is clear that this move had been prepared in advance, and it is significant that already in a document of April 798 the pope had substituted the regnal years of Charlemagne for those of the eastern emperor in the dating clause. (*See* further HOLY ROMAN EMPIRE: *Coronation of Charlemagne as Emperor.*) In 809, approached by the theologians of Charlemagne, Leo confirmed the dogmatic correctness of the *Filioque* clause introduced into the Nicene Creed, although, in the interests of peace with the Greeks, he urged that the creed should not be chanted in the public liturgy (*see* CREED: *Nicene Creed*). Leo died June 12, 816. His name was added to the Roman Martyrology in 1673; feast day June 12. For portrait *see* article PAPACY. (X.)

ST. LEO IV (d. 855), pope from 847 to 855, a Roman by birth but probably of Lombardic descent, succeeded Sergius II. To repair the damage done by the Saracens (846) and to protect the Vatican area from future attacks, he built and fortified the suburb on the right bank of the Tiber known on his account as "the Leonine city." At a Roman synod (850) he crowned the son of the emperor Lothair I co-emperor as Louis II. He enforced obedience to the Holy See against Anastasius Bibliothecarius (later antipope), Hincmar (*q.v.*) of Reims, John of Ravenna and Duke Nomenoe of Brittany who wanted independence from it. Leo died on July 17, 855, and his feast is celebrated on the anniversary.

LEO V, whose pontificate occurs in the darkest period of papal history, was pope for about two months in the summer of 903, succeeding Benedict IV. His origin, his life before his election, the acts of his pontificate, and the date and manner of his death are unknown. He was deposed by Christopher (*q.v.*), cardinal priest of St. Damasus, and died in retirement.

LEO VI, successor to John X, was pope during the latter part of 928. The date of his election is not known. The principal act of his pontificate was the regulation of the jurisdiction of the Dalmatian hierarchy. His reign lasted seven months and five days, so that he probably died in late 928 or early 929. He was buried in St. Peter's.

LEO VII (d. 939), pope from 936 to 939, was probably a Benedictine monk; he succeeded John XI in Jan. 936. Leo was acquainted with Odo of Cluny, whose arbitration he used to end the struggle in Italy between Hugo, king of Italy, and Alberic of Rome. He was active in the ecclesiastical reform of Henry I, the Fowler, and his son Otto. Leo died in July 939.

LEO VIII (d. 965), pope from 963 to 965, was a Roman. As a layman, he was elected pope (Dec. 963) through the influence of the emperor Otto I on the Roman synod which deposed John XII (Dec. 963). In Feb. 964 Leo himself was deposed by a synod over which John XII presided. On the death of John (May 964), Benedict V was chosen; but Otto compelled the acceptance of Leo (June 964). Some scholars regard him as an antipope from Dec. 963 to June 964. The Ottonian Privilege of 963 is based on an oath of fealty which Leo probably took at the time of his election. (*See* also OTTO I.) (R. E. McN.)

ST. LEO IX (Bruno) (1002–1054), pope from 1049 to 1054, was born at Egisheim in Alsace on June 21, 1002; through his father he was related to the emperor Conrad II. He was educated at Toul, where he became canon (1017) and then bishop (1026); he rendered political services to the emperors Conrad II and Henry III and zealously promoted the rule of the order of Cluny. On the death of Damasus II, Bruno, with the concurrence of the emperor and of the Roman delegates in Dec. 1048, was proposed as pope by an assembly at Worms; he stipulated, however, that he should proceed to Rome and be canonically elected by the voice of clergy and people. He arrived in pilgrim garb in Rome, and at his consecration (Feb. 12, 1049) assumed the name of Leo IX. At the Easter synod of 1049 the celibacy of the clergy (down to the rank of subdeacon) was anew enjoined, and Leo pronounced against every kind of simony. The rest of the year was spent in a progress through Italy, Germany and France. After presiding over a Pentecostal synod at Pavia, he joined the emperor Henry III in Saxony and accompanied him to Cologne and to Aachen. In October he held two more synods, one, for the French clergy, at Reims, the other, attended not only by Germans but also by representatives of the French and Italian clergy and of the eastern emperor, at Mainz; at both of these simony and violations of clerical celibacy were again the chief matters treated. Among other synods were those in Rome (at Easter, annually, 1050–53), at Sipontum in the Byzantine south of Italy (April 1050) and at Vercelli, where Berengar of Tours was condemned (Sept. 1050). In 1053, however, leading an armed expedition against the Normans of the south, Leo was defeated on the Fortore river on June 18 and taken captive to Benevento. Returning to Rome in the following March, he died on April 19 (his feast day), 1054.

The first year of Leo's pontificate was an *annus mirabilis* in which the papacy assumed the leadership of the movement for ecclesiastical reform. Leo gave a fresh stimulus to canonists to recover the *jus antiquum* of the church, and the important collection of 74 titles was a result. He brought with him to Rome a group of distinguished men, several of whom, like Humbert of Moyenmoutier and Hildebrand (later Pope Gregory VII), were to be the leaders of the next generation.

LEO X (Giovanni de' Medici) (1475–1521), pope from 1513 to 1521, was the second son of Lorenzo de' Medici, the Magnificent, and was born at Florence on Dec. 11, 1475. He received the tonsure at the age of seven and was soon loaded with rich benefices and preferments. Innocent VIII named him cardinal-deacon of Sta. Maria in Dominica in March 1489. He received a careful education at Lorenzo's court and from 1489 to 1491 studied theology and canon law at Pisa. After the expulsion of the Medici from Florence in Nov. 1494 he traveled in Germany, the Netherlands and France. Then in May 1500 he returned to Rome, where he devoted himself to art and literature. On the death of Piero de' Medici in 1503 Giovanni became head of his family.

Julius II died in Feb. 1513, and the conclave, after a stormy seven days' session, united on Cardinal de' Medici as the candidate of the younger cardinals (March 11). He was ordained to the priesthood on March 15, consecrated bishop on March 17 and enthroned with the name Leo X on March 19.

Many problems confronted Leo on his accession. He had to preserve the papal conquests which he had inherited from Alexander VI and Julius II; to minimize foreign influence in Italy; to put an end to the Pisan schism; and to settle the other troubles incident to the French invasion of 1512. Other outstanding problems were the restoration of the French church to Catholic unity and the settlement of the wranglings of the German humanists.

As Louis XII of France, in renewed alliance with Venice, was attempting to regain the duchy of Milan, the pope, after fruitless endeavours to maintain peace, joined the league of Mechlin on April 5, 1513, with the emperor Maximilian I, Ferdinand II of Spain and Henry VIII of England. The French and the Venetians were at first successful, but on June 6 the French were defeated at Novara; the Venetians continued the struggle until October. On Dec. 19 the fifth Lateran council ratified the peace with France and registered the conclusion of the Pisan schism.

While the council was planning a crusade and considering the reform of the clergy, a new crisis occurred between the pope and the king of France. Francis I, who had succeeded Louis XII, was intent on recovering Milan and Naples. Leo formed a new league with the emperor and Ferdinand II of Spain, and, to ensure English support, made Thomas Wolsey a cardinal. Francis entered Italy in August and won the battle of Marignano (*q.v.*). The pope in October signed an agreement binding him to withdraw his troops from Parma and Piacenza, on condition of French protection of the Medici in Florence.

During these two or three years of incessant intrigue and war-

fare the Lateran council was seriously hampered. Its three main objects, the peace of Christendom, the crusade and the reform of the church, demanded general agreement among the powers, which was lacking. Its most important achievements were the registration at its 11th session (Dec. 19, 1516) of the abolition of the Pragmatic Sanction of Bourges (1438) and the confirmation of the concordat between Leo X and Francis I, which was to regulate the relations between the French church and the Holy See until the Revolution. Leo closed the council on March 16, 1517.

Leo had practised nepotism from the beginning. In Aug. 1516 he succeeded in dispossessing Francesco Maria della Rovere of the duchy of Urbino and installing Leo's nephew Lorenzo in his place. Francesco Maria, however, returned with an army in Jan. 1517. Leo then appealed to Henry VIII of England for a subsidy, in return for which he entered the English league with Spain and the empire against France. The war of Urbino lasted until Sept. 1517 and ended with the triumph of Lorenzo; but it increased brigandage and anarchy in the States of the Church, hindered the preparations for a crusade and wrecked the papal finances. Leo meanwhile took advantage of a plot by certain cardinals to poison him: he executed one cardinal, imprisoned several others and made a radical change in the Sacred College; on July 3, 1517, he published the names of 31 new cardinals.

Leo meanwhile was planning a crusade to prevent the advance of the Turks. This came to nothing, and in 1521 Suleiman I the Magnificent captured the citadel of Belgrade.

Leo was disturbed throughout his pontificate by heresy and schism. In the dispute between Johann Reuchlin and Johann Pfefferkorn, he continually postponed making a decision until 1520, when relations between Rome and the German humanists had become so embittered that at last he gave his verdict against Reuchlin. (*See* REUCHLIN, JOHANN.) Of more consequence was the effect of the extensive grant of indulgences which Leo authorized to secure funds for the crusade and for the rebuilding of St. Peter's at Rome. Against the attendant abuses of these, Martin Luther published his 95 theses, which were the signal for widespread revolt against the church. After more than three years of fruitless negotiation and dispute, Leo formally excommunicated Luther.

That Leo did not proceed more actively against heresy and schism in northern Europe is partly explained by political complications and by his own preoccupation with schemes of papal and Medicean aggrandizement in Italy. The death of the emperor Maximilian in 1519 had seriously affected the situation. Leo allowed it to appear at first that he favoured the election of Francis I as emperor, while really working for the election of some minor German prince. He finally accepted Charles I of Spain as inevitable, and Charles's election (as Charles V) revealed Leo's desertion of his French alliance. Leo desired to unite Ferrara, Parma and Piacenza to the States of the Church. An attempt in Jan. 1520 to seize Ferrara failed, and in May 1521 a treaty of alliance against France was signed at Rome between pope and emperor. Milan and Genoa were to be restored as vassals of the empire, and Parma, Piacenza and Ferrara were to be given to the church. Charles took Florence and the Medici family under his protection and promised to punish all enemies of the Catholic faith. Leo agreed to invest Charles with Naples, to crown him emperor and to aid in a war against Venice. Henry VIII announced his adherence to the league in August. Francis I had already begun war with Charles of Navarre, and in Italy, too, the French made the first hostile movement (June 23, 1521). Leo lived to hear of the capture of Milan from the French and of the occupation by papal troops of the long-coveted provinces (Nov. 1521). He died of a sudden illness at midnight on Dec. 1–2, 1521.

Leo X was a patron of learning and made Rome the centre of European culture. While yet a cardinal, he had restored the church of Sta. Maria in Dominica after Raphael's designs; and as pope he built S. Giovanni on the Via Giulia after designs by Jacopo Sansovino and pressed forward the work on St. Peter's and the Vatican under Raphael and Agostino Chigi. Leo called John Lascaris to Rome to give instruction in Greek and established a Greek printing press from which the first Greek book printed in Rome appeared in 1515. He made Raphael custodian of the classical antiquities of Rome and the vicinity. Poets and literati were bishops, or papal scriptors or abbreviators, or in other papal employ. Leo's lavish expenditure exhausted within two years the savings of Julius II. To fill the treasury he created new offices and sold them, sold cardinals' hats and borrowed large sums.

In spite of his worldliness, Leo was exact in religious observance; but he failed to recognize the spiritual needs of his time and, especially, the need for reform within the church and the dangers which threatened the papal monarchy. He was zealous in establishing the political power of the Holy See; he made it unquestionably supreme in Italy; he successfully restored the papal power in France; and he secured a prominent place in the history of culture. (X.)

LEO XI (Alessandro de' Medici) (1535–1605), pope in 1605, was born at Florence on June 2, 1535, of a collateral branch of the Medici family. He was made bishop of Pistoia in 1573, archbishop of Florence in 1574 and cardinal in 1583. Elected to succeed Clement VIII on April 1, 1605, he died on the 27th of the same month. (E. A. R.)

LEO XII (Annibale Sermattei della Genga) (1760–1829), pope from 1823 to 1829, was born near Spoleto on Aug. 22, 1760. Educated at the Accademia dei Nobili Ecclesiastici at Rome, he was ordained priest in 1783 and soon afterward became private secretary to Pius VI, who in 1793 created him titular archbishop of Tyre and sent him to Lucerne as nuncio. In 1794 he was transferred to the nunciature at Cologne, and subsequently he was entrusted with missions to several German courts. In 1816 Pius VII created him cardinal and appointed him to the see of Sinigaglia (which he resigned in 1818); and in 1820 he was made vicar-general of Rome.

Della Genga was elected pope on Sept. 28, 1823, against the opposition of Austria. He was expected to reverse the conciliatory policy of Pius VII, but, meeting with determined opposition from the powers, his foreign policy in spite of his own inclination to severe measures began instead to follow the moderate lines laid down by Cardinal Ercole Consalvi (*q.v.*). He negotiated concordats advantageous to the papacy with Hanover (1824) and with the Netherlands (1827); and an agreement with the sultan over Armenia was finally concluded in 1829 just after his death. He condemned indifferentism in the encyclical *Ubi primum* (May 1824) and Freemasonry in the constitution *Quo graviora mala* (May 1825). After some hesitation lest the king of Spain be offended, formal recognition was granted to the reorganized diocesan arrangements in the now independent Latin-American republics (1827). In 1825 he revived the practice of holding jubilees, to the disapproval of Metternich. In the papal states he pursued a repressive policy while endeavouring, not altogether successfully, to reorganize the financial administration. He died on Feb. 10, 1829.

LEO XIII (Vincenzo Gioacchino Pecci) (1810–1903), pope from 1878 to 1903, was born at Carpineto on March 2, 1810. His family was Sienese in origin, and his father, Col. Lodovico Pecci, had served under Napoleon. He and his elder brother Giuseppe were educated by the Jesuits at Viterbo and in Rome. He was ordained priest on Dec. 31, 1837, and a few weeks later was made apostolic delegate of Benevento. In 1841 he was appointed delegate of Perugia, at that time a centre of antipapal secret societies. There he obtained a reputation as a social and municipal reformer. Appointed nuncio to Brussels in Jan. 1843, he was consecrated archbishop of Damiata *in partibus infidelium* on Feb. 19. During his three years' residence at Brussels he was occupied with the education controversy then raging, and he mediated between the Jesuits and the Catholic University of Louvain. In Jan. 1846 he was made bishop of Perugia, retaining his archiepiscopal rank. On Dec. 19, 1853, Pius IX made him cardinal priest of S. Crisogono. Throughout his 32-year episcopate in Italy, Pecci built and restored many churches, striving to elevate the intellectual as well as the spiritual tone of his clergy and showing in his pastoral letters an unusual regard for learning and for social reform.

His position in Italy was similar to that of F. Dupanloup in France; and, as but a moderate supporter of the policy enunciated in the *Syllabus* (*see* PIUS: *Piux IX: Ultramontanism*), he was not altogether *persona grata* to Pius IX. Yet he was resolute in his

protests against the loss of the pope's temporal power in 1870, the confiscation of the property of the religious orders and the law of civil marriage established by the Italian government. In 1877 Pius IX appointed him camerlengo of the Roman church, thus bringing him back to the Vatican.

The death of Pius IX (Feb. 7, 1878) occasioned the first papal election since the loss of the temporal power. Fearful of interference by the Italian government, the cardinals hastened to come to a decision, and it is not surprising that, at the third ballot on Feb. 20, they chose one so senior as Pecci, although he was almost unknown outside Italy. He was already almost 68 years old, but once again the man elected almost as *locum tenens* outlived his supporters, and a reign of 25 years permitted Leo XIII to impress indelibly upon the church his own conception of its role in society. Pius IX had subdued the protagonists of liberalism within the church; Leo XIII turned his attention to its supporters outside. There not mere denunciation was required but a positive answer to the moral problems raised by a new age. Theology had to be reconciled with science as faith had once had to be accommodated with reason. Not unnaturally Leo turned for his model to St. Thomas Aquinas. The new policy was outlined in one of the first of a long series of encyclicals, *Aeterni Patris* (Aug. 4, 1879), and developed through the establishment of an academy at Rome bearing the great schoolman's name.

Leo was not afraid of the consequences of learning, once scholastic discipline had been re-established. In his pontificate the Vatican archives and library were thrown open to research by qualified historians in the belief that the church would not suffer by the publication of documents. Leo was himself a man of literary taste and culture, familiar with the classics, a facile writer of Latin verses as well as of Ciceronian prose and, above all, anxious that the clergy should unite the humanities with their theological studies. He believed firmly in the value of education at all levels and while at Perugia had insisted to Pius IX that only by winning popular support through the establishment of Catholic education and a good Catholic press could the church hope to recover possession of the temporal states. He personally encouraged the study of astronomy and natural science at the Vatican and, in the encyclical *Providentissimus Deus* (Nov. 18, 1893), advocated critical and scholarly biblical studies.

Yet such measures as these constituted a long-term policy. Immediately Leo was confronted with hostile governments imbued with the secular philosophies that he desired so ardently to confound. The anticlerical movement in Germany, known as the *Kulturkampf*, was only one of many such movements aiming to restrict ecclesiastical authority, especially that of the religious orders, and to secularize education. In the main, Leo adopted conciliatory methods, and he achieved some notable successes. The Catholic Centre party in Germany proved the effectiveness of political action in support of the church, and in Nov. 1881 the Prussian government announced its decision to reappoint an envoy to the Vatican, with which diplomatic relations had been severed in 1874. Bismarck began to see in the Centre party a possible ally against socialism, and the worst of the anticlerical legislation was repealed in 1886 and in 1887. Similarly in Belgium the Catholics were returned to power by the elections of 1884 and were able to secure the effective resumption of diplomatic relations in 1885. Leo gave his approval to such political action by his characteristic method of issuing encyclicals. *Immortale Dei* (Nov. 1, 1885) still denounced democracy as incompatible with the authority of the church but also insisted that the church did not thus condemn absolutely that form of civil government: with proper safeguards it could be utilized by the church for its work as readily as any other. *Libertas Praestantissimum* (June 20, 1888) went further by asserting that personal freedom, though not private licence, was a legitimate political goal and one, moreover, which could be most successfully pursued through adherence to Catholic Christianity. Thus Leo hoped to reconcile the church with the predominant liberalism of his day.

Outside Italy itself, his task was perhaps most difficult in France, where the church was identified with the disintegrating royalist cause. Anticlericalism became a hallmark of the third republic after 1879: education became almost completely secular at all levels, divorce was widely granted by the state, and civil marriage became compulsory. But Leo was determined to be conciliatory and considered that the first step toward better relations must be a change of heart among the French clergy. In 1892 he appealed to them to offer due allegiance to the republic and to cease their exclusive attachment to the royalists. Unfortunately this appeal was answered by only a minority, the *ralliés*, and after Leo's death both France and the papacy gave up the attempt to reach a settlement, so that unmitigated anticlericalism triumphed for a generation.

In Italy alone Leo adopted a different policy. Like his predecessor, he considered that, whatever the other merits of a united Italy, the papacy could not continue to exist as an independent institution without the protection of a temporal power. At the start of his reign he still hoped for its recovery through the combined action of the powers, and it was partly for this reason that he pursued a conciliatory policy, particularly with France. By his refusal to regard the Italian government as anything but a usurper, he won increased respect for papal independence but saw anticlericalism flourish in Italy as a consequence. Leo tempered his policy toward the middle of his reign by allowing Italians to enter municipal, but not national, politics; Italian Catholics responded with enthusiasm, and the embargo upon collective action in a national political party had to be renewed in a letter to the Italian bishops of Jan. 1902.

Elsewhere Leo's diplomatic ways reaped their reward. In perhaps the most vital field of conflict, the secularization of education, the anticlerical trend was reversed in most countries after the early 1880s. Germany, Austria-Hungary, Belgium and the Netherlands all began or expanded the subsidizing of denominational schools. The last decade of the century saw a revival of Catholic strength in Protestant countries, particularly in the United States. One aspect of the general Catholic revival of this period was the endeavour by Leo to promote Christian reunion. He approached both Anglicans and Orthodox, but the encyclical *Satis cognitum* (June 29, 1896) produced no satisfactory results. Its appeal to Anglicans was counteracted when the bull *Apostolicae curae* (Sept. 13, 1896), formulating the decisions of a commission of inquiry, declared that Anglican orders were invalid, and the movement for reunion lapsed. Another aspect was the expansion of missionary activities, and their scope was impressively illustrated in the exhibition held at Rome in the Jubilee year of 1900.

Leo, however, was more than a diplomat. He had always felt a real concern for the welfare of the lower classes of society and was convinced that the strength of the secular philosophies of his day lay in their almost exclusive monopoly of the study of social questions. Since the 1840s not only intellectuals but also the mass of the populace had been drifting away from the church. The encyclical *Rerum novarum* (May 15, 1891), therefore, while it represented in many respects a sensational departure from traditional policies, was well-timed. In it, though he reasserted the rights of the family and of private property against the encroachments of the state, Leo went on to say that "labour is not a commodity" and so the state is within its rights in endeavouring to prevent its exploitation as it is in safeguarding property and religion. He claimed that it is everyone's duty to ensure that labour receives its just reward, and he specifically approved of legislation designed to effect this, as well as of labour unions and co-operative organizations. Though it would be too much to say that Leo succeeded in inculcating a new spirit into the higher ranks of Roman Catholic society (all too often employers continued to behave primarily as capitalists and only secondarily as Catholics), nevertheless at least in some countries the drift of the working classes into irreligion was stemmed. The Catholic parties already existing in Germany and in Belgium were expanded and new ones in other countries were established, all on the principles laid down in *Rerum novarum*. Beside them Christian labour unions were established, and parties and unions together came to exercise great influence in all Catholic countries north of the Alps and the Pyrenees. Circumstances favoured them, as the spread of Marxist ideas over Europe had created alarm, so that any rival to Marxism among the working classes was welcomed in ruling circles.

The achievements of Leo's pontificate contrast markedly with the series of crises suffered by his predecessor. Leo was a much abler man than Pius IX, and under him the church acquired a prestige unknown since the middle ages. Yet his achievements were built upon the foundations laid by Pius, who, though he left the papacy politically weak, had raised its spiritual powers to an unprecedented degree, so that it had no rivals within the church. As it was the possession of these spiritual powers that enabled Leo to re-establish the papacy's international prestige, so his achievement must not be isolated from Pius IX's. Leo died on July 20, 1903, after celebrating his jubilee in St. Peter's the previous March. For portrait *see* article PAPACY. (I. F. B.)

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LEO I, Eastern Roman emperor from A.D. 457 to 474, was a Thracian who had taken up a military career. He attracted the attention of the patrician Aspar (*q.v.*), who, when the emperor Marcian died, had him proclaimed emperor at Constantinople on Feb. 7, 457, expecting to use him as a puppet. In 457 Leo recognized Majorian (*q.v.*) as emperor of the west but in 461 withheld recognition from Majorian's successor, Libius Severus. On March 25, 467, he sent Anthemius (*q.v.*) to the west and recognized him as emperor there. The most noteworthy political event of the reign was his joint campaign with Anthemius against the Vandals in Africa. He is said to have assembled a fleet of 1,113 ships and to have embarked an army of 100,000 men. But under the influence of his wife, Verina, and of Aspar he entrusted the command of the expedition to Basiliscus (*q.v.*), the brother of Verina. Basiliscus was wholly outwitted by Gaiseric, and the imperial fleet was burned and destroyed (468). The expedition is said to have cost Leo 130,000 lb. of gold, and the East Roman treasury was almost bankrupt for a generation. The eastern frontier was quiet throughout the reign, but the Danube was disturbed by the complicated movements of peoples that followed on the breakup of Attila's empire. In internal politics Aspar's influence was great for the first six or seven years of the reign, and his son Patricius was appointed Caesar. But Leo had no intention of acting as Aspar's puppet indefinitely; and to counterbalance the German soldiers on whom Aspar's power rested, he relied on a force of Isaurians from the mountains of southern Asia Minor. Eventually in 471 Aspar was overthrown and murdered. In ecclesiastical policy Leo was firmly orthodox. In Oct. 473 he appointed his grandson Leo II as Augustus and died on Feb. 3, 474. By his wife, Verina, he had two daughters, Ariadne, who was married to Zeno (*q.v.*) and bore him Leo II, and Leontia, who married Marcian, the son of Anthemius.

See J. B. Bury, *History of the Later Roman Empire,* vol. i, ch. 10 (1923). (E. A. T.)

LEO III (THE NORTH SYRIAN or ISAURIAN) (*c.* 680–741), Byzantine emperor from 717 to 741, was born of peasant stock at Germanicia in the north Syrian province of Commagene (and not in Isauria as used to be believed on a late authority). He was resettled in Thrace with his parents and took service under Justinian II, distinguishing himself in the army. Under Anastasius II he was appointed *strategus* of the Anatolikon theme. In 717, with the support of the *strategus* of the Armeniakon theme, he revolted against Theodosius III, the ineffective nominee of the Opsikion theme, marched to Constantinople and was elected emperor (717). He soon had to meet an Arab attack on the capital, but his stubborn defense, the adroit use of Greek fire, a severe winter and the timely aid of the Bulgar khan Tervel resulted in the withdrawal of the enemy in Aug. 718 after a 12 months' siege. But throughout his reign Leo had to counter continued Arab attacks on Asia Minor. Though he was not able to extend the frontier, he did at least manage to repel these incursions, notably by his victory near Amorium in 740. In these campaigns he was much assisted by his ally, the Khazar khan, whose daughter married his son Constantine. Realizing the danger of the overlarge Heraclian themes in Asia Minor whose commanders might so easily develop into potential rivals, Leo subdivided the Anatolikon theme, and its western part was now called the Thracesion theme. The maritime theme of the Carabisians was also subdivided at some time between 710 and 732 to form the Cibyrraeot theme in southern Asia Minor and the Aegean sea drungariate. Crete also became a theme at this time. Thus the decisive provincial reorganization of the Heraclians was continued. The other outstanding feature of Leo's administrative policy was his legal manual, the *Ecloga,* issued in 726 in his own name and in that of his son Constantine. Its aim was to provide a handbook for practical needs, and it was based partly on the Corpus of Justinian, partly on canon law and recent customary law. Though usually unacknowledged (as being the work of heretics) it exercised considerable influence on later developments both in Byzantium and in neighbouring Slav countries.

Leo's ecclesiastical policy inaugurated a period of controversy lasting until 843. He was opposed to the use of icons (pictures of Christ and the saints; *see* ICON; ICONOCLASTIC CONTROVERSY). He may have been somewhat influenced by Muslim and Jewish teaching which banned pictorial representation, but there was also a strong body of opinion in Byzantium which realized the extent to which the Christian practice of venerating icons was open to abuse. Leo had considerable support from Asia Minor, particularly from the bishops of Claudiopolis and of Nacolea. In 726 he made a public pronouncement against the use of icons, but when he attempted to have a much-venerated icon of Christ removed in Constantinople he was fiercely opposed by the people and his officer was killed. The patriarch Germanus, as well as most of the monks, refused to accept the new policy, and it was severely denounced by John of Damascus. Leo also met stubborn resistance in the theme of Hellas, which in 727 broke into open rebellion and set up a rival emperor. The revolt was suppressed, but throughout the European provinces the traditional policy was firmly supported. Undeterred, Leo went a step further, and in 730 with the approval of many high ecclesiastical and secular dignitaries he banned the use of icons and ordered their destruction. The patriarch Germanus, who refused to assent, was deposed, and the persecution of the iconodules followed. Leo entirely failed to win over the papacy. The popes, though maintaining their loyalty, refused to associate themselves with iconoclasm, and probably in 733 south Italy, Greece and part of the Balkans, hitherto under papal jurisdiction, were transferred to the patriarchate of Constantinople, while certain revenues from the papal patrimonies were appropriated.

In spite of the essential failure of his religious policy, Leo was one of the most outstanding Byzantine emperors. By his defeat of the Arabs before Constantinople he freed Europe from a great danger and by his administrative reforms he continued the work of the Heraclians so that the foundations were laid for the achievements of the Armorians and Macedonians. He died on June 18, 741.

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LEO IV (THE KHAZAR) (749–780), Byzantine emperor from 775 to 780, who succeeded his father, Constantine V, was born on Jan. 25, 749. In 776, at the request of the army and with the support of the senate and citizens, his young son Constantine was crowned as co-emperor. This gave rise to a conspiracy in favour of Leo's stepbrother the Caesar Nicephorus which was however suppressed. Leo, although he did not restore the use of icons, made no attempt to continue his father's fierce iconoclast policy. In fact he at first showed considerable moderation toward the iconodules, even appointing them to bishoprics. This may have been due to the influence of his forceful wife, the Athenian Irene, who was strongly orthodox (*see* IRENE). After Leo's death on Sept. 8, 780, she was regent for their young son Constantine VI.

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LEO V (THE ARMENIAN) (d. 820), Byzantine emperor from 813 to 820, belonged to the military and iconoclast circles of Asia Minor. He proved himself a distinguished general under Nicephorus I and Michael I and became *strategus* of the Anatolikon theme. He took part in the campaign of 813 against the Bulgars; but when Michael I foolishly refused the peace terms they offered, the Asian troops under Leo deserted at the battle of Versinikia, near Adrianople. Leo then deposed Michael, whose poor statesmanship and orthodox religious policy had made him unpopular, and gained the throne in July 813. Leo successfully drove back the Bulgar Krum from the walls of Constantinople and concluded a peace treaty with his successor Omurtag. He revived the iconoclast policy. In 815 the Orthodox patriarch Nicephorus was deposed and a synod was held to reimpose the decrees of the iconoclast synod of Hieria (near Chalcedon) of 754, though in a somewhat modified form. Leo's last years were marked by his terror of conspiracy; he was assassinated while taking part in the Christmas anthems in Hagia Sophia on Dec. 25, 820, and his old comrade Michael II the Armorian was placed on the throne.

BIBLIOGRAPHY.—P. J. Alexander, *The Patriarch Nicephorus of Constantinople* (1958); J. B. Bury, *Eastern Roman Empire* (1912); G. Ostrogorsky, *History of the Byzantine State* (1956). (J. M. Hy.)

LEO VI (THE WISE or THE PHILOSOPHER) (866–912), Byzantine emperor from 886 to 912, was the son of Basil I the Macedonian and his second wife, Eudocia Ingerina, Michael III's former mistress. He was probably born in Sept. 866 and it is now generally accepted that he was not the illegitimate son of Michael. Made co-emperor in 870, he succeeded to the throne on his father's death in 886. His foreign policy was directed mainly against the Arabs and the Bulgars. The able commander Nicephorus Phocas the Elder was recalled from his successful campaigns against the Lombards in south Italy to assist in the Balkans. After this Byzantium met with reverses in the west: Sicily was lost when Taormina fell to the Arabs in 902. In 904 Thessalonica was sacked by Leo of Tripoli, and the Aegean was open to constant attack from Arab pirates. Steps were taken to strengthen the Byzantine navy, which successfully attacked the Arab fleet in the Aegean in 908. But the naval expedition of 911–912 was defeated by Leo of Tripoli. Byzantium's enemy to the north was Simeon, the Bulgar ruler (893–927). Hostilities arising out of a trade dispute began in 894. The Byzantines, helped by the Magyars of the Danube-Dnieper region, forced Simeon to agree to a truce.

Simeon then appealed to the nomadic Pechenegs (Patzinaks) from southern Russia and defeated the Magyars, and then the Byzantines, in 896. Byzantium had to agree to pay an annual tribute to the Bulgars. During Leo's reign the Russian prince Oleg sailed to Constantinople and in 907 obtained a treaty regulating the position of Russian merchants in Byzantium, which was formally ratified in 911. Because of his anxiety for a male heir Leo married four times, thus incurring the serious censure of the church.

Educated by the patriarch Photius, Leo was more of a scholar than a soldier. The legal work begun under his father was completed and the imperial laws of Leo VI (the *Basilica; q.v.*), written in Greek, became the legal code of the Byzantine empire. Leo's decrees (novels) deal with a wide range of ecclesiastical and secular problems. His own works include a funeral panegyric on his father, Basil, liturgical poems, sermons and orations, secular poetry and military treatises. Certain oracular pronouncements have also been attributed to him, probably wrongly.

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LEO, HEINRICH (1799–1878), German historian, an opponent of Leopold von Ranke and a leading Prussian conservative writer. He was born at Rudolstadt on March 19, 1799, the son of a Lutheran pastor. As a student at Breslau, Jena and Göttingen he was in the extreme revolutionary wing of the *Burschenschaft* (students' association). At Göttingen, however, he became deeply impressed by the writings of Edmund Burke and Albrecht von Haller, and when Karl Sand, a friend of his, murdered the reactionary dramatist August von Kotzebue, he rejected violent radicalism and grew increasingly conservative. He became lecturer and then professor at Berlin and from 1828 to 1878 held a chair at Halle. From 1863 he was a member of the Prussian *Herrenhaus.* He died at Halle on April 24, 1878.

Leo had outstanding ability, penetration and knowledge. A philologist as well as a historian, he used philology in comparative history. He was a pioneer in recognizing the importance of social and geographical factors in the development of a state. His efforts toward the union of the Catholic and Protestant confessions are better understood today than in his own time. But his gifts were marred by a violent and impatient spirit. He despised Ranke and his meticulous methods; but his own careless investigation makes his work antiquated in comparison. Politically, his conception of a greater Germany based on a union of monarchical states and of the Christian confessions was supported by a glorification of war. He worked for religious unity as a political instrument and because he was deeply drawn by Catholicism; but his understanding of Rome was not balanced by understanding of Protestantism. Lord Acton described him as "the most remarkable of all the men who, being partisans where partiality is discredit, failed through the want of discipline."

Leo achieved his greatest immediate effects through newspaper articles in the Halle *Volksblatt für Stadt und Land* and elsewhere. His first considerable work was *Geschichte der italienischen Staaten,* five volumes (1829–32); his most ambitious his *Lehrbuch der Universalgeschichte,* six volumes (1839–44). Of interest for his political views is *Studien und Skizzen zu einer Naturlehre des Staates* (1833; new edition by K. Mautz, 1948, with bibliography).

See Lord Acton, *English Historical Review,* vol. i, p. 18 (1886); H. J. Schoeps, *Das andere Preussen,* 2nd ed. (1952).

LEO, LEONARDO (more correctly LEONARDO ORTENSIO SALVATORE DE LEO) (1694–1744), Italian composer of operas, born on Aug. 5, 1694, at S. Vito degli Schiavi (now dei Normanni), near Brindisi. He entered the Conservatorio della Pietà dei Turchini at Naples in 1709 and his earliest known work, a sacred drama, *L'infedeltà abbattuta,* was performed by his fellow students in 1712. In 1714, at the court theatre, he produced an opera, *Pisistrato,* which was much admired. He held various posts at the royal chapel and continued to write for the stage, besides teaching at the conservatory. In 1722 he added comic scenes to Francesco Gasparini's opera *Bajazette* and in 1723 he composed a comic opera in Neapolitan dialect, *La 'mpeca scoperta.* He produced two oratorios in 1734, the second of which, *Sant' Elena al Calvario,* acquired a great reputation. Of his serious operas, *Demofoonte* (1735) and *Olimpiade* (1737) were perhaps the most successful but he is probably best remembered for his comic opera *Amor vuol soferenze* (1739). He died on Oct. 31, 1744.

Leo's serious operas suffer from a coldness and severity of style, but in his comic operas he shows a keen sense of humour. He also wrote some sacred music that is masterly and dignified. A number

of his songs have been reprinted and some of his six concertos for cello and strings are in the modern cellist's repertory. Several of his other instrumental works, including his *sinfonia* (overture) to *Sant 'Elena,* have been published in modern editions.

See G. Leo, *Leonardo Leo, musicista del seculo XVIII e le sue opere musicale* (1905). (Cs. Ch.)

LEO (the Lion), in astronomy, the fifth sign of the zodiac (*q.v.*). According to Greek mythology this constellation is the Nemean lion, which, after being killed by Hercules, was raised to the heavens by Jupiter in honour of Hercules. It contains the first-magnitude star Regulus, approximately 50 light-years from the sun. The swarm of November meteors known as the Leonids appears to come from the region of this constellation. The spectacular displays produced by the Leonids in 1799, 1833 and 1866 are famous in history, but the showers are now of very low activity. *See* Meteor: *Shower Meteors and Cometary Associations.*

LEO AFRICANUS (*c.* 1485–*c.* 1554), the Latinized name by which the Arab traveler and scholar al-Hasan ibn Muhammad al-Wazzan al-Zaiyati (or al-Fasi) is usually known in Europe. Born at Granada, Spain, he was educated at Fès and as a young man traveled widely on commercial and diplomatic missions in the north African states. While in Egypt in 1516–17 he ascended the Nile valley to Aswan. There is less certainty, however, that he ever visited central Africa, Arabia, Istanbul, Armenia or Tatary, as has been claimed. During his return by sea from Egypt he was captured by pirates and presented as a slave to Pope Leo X who, after keeping him prisoner for a year, assigned him a pension and, having persuaded him to profess the Christian faith, stood sponsor at his baptism in 1520 and gave him his own names, Johannes and Leo. The new convert lived in learned society in Italy, acquired Latin and Italian, and taught Arabic. Impelled perhaps by homesickness, he returned to Africa sometime before 1530 and died a Muslim at Tunis, where all trace of him ceases after 1554.

In Rome, in 1526, Leo Africanus completed his greatest work, the *Descrittione dell'Africa,* a work derived possibly from notes which he had taken in the course of his travels, or from a version which he had previously composed in Arabic. From the Renaissance until the 19th century the *Descrittione dell'Africa,* composed of nine books, remained a principal source in Europe for the knowledge of Islam, and still is much cited by historians and geographers of Africa. Book vii describes "Terra Nigra," the then unknown regions south of the Sahara; book viii covers Egypt; book ix deals with the history, geography, animals and plants of places mentioned in the other eight books. The work was first published by G. B. Ramusio as vol. i of his *Navigazioni e viaggi* (1550). An English translation, based on a Latin version by J. Florianus, *J. Leonis Africani de totius Africae descriptione* (1556) was made at the suggestion of Richard Hakluyt: J. Pory, *Historie of Africa* (1600), edited by R. Brown (1896). A French translation, A. Epaulard, *Description de l'Afrique* (1956) uses a hitherto unrecorded Italian version from which G. B. Ramusio's edition was probably derived.

Other works written by or ascribed to Leo are the Arabic, and possibly Hebrew, parts of a polyglot vocabulary (1524), and *Libellus de viris quibusdam illustribus apud Arabes* (1527), edited by J. H. Hottinger (1664), and by J. A. Fabricius (1718), containing lives of learned Arabs and Jews and doubtfully attributed to Leo.

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LEOBEN, a town in Styria (Steiermark), Austria, on the Mur river, 26 mi. N.N.W. from Graz. Pop. (1961) 36,257. In its mountainous setting and with its medieval and other buildings of interest, it became a tourist centre as well as a mining town. The principal features of Leoben include the town hall, the church of Maria am Waasen (12th century, rebuilt 15th) with brilliant Gothic stained glass, the Adler Hof with a Renaissance gateway (1550) and a monument commemorating the peace treaty with Napoleon (1797). Leoben is also a centre of the upper Styrian lignite workings and has an iron industry and trade and a well-known academy of mining and other technical schools. The fountain figure in the market place is that of a miner. The town is situated on international motor routes and has good rail connections.

LEOCHARES, an Athenian sculptor, worked on the Mausoleum at Halicarnassus about 350 B.C. He executed statues of the family of Philip of Macedon in gold and ivory, which were set up by that king in the Philippeum at Olympia about 338 B.C. With Lysippus he made a group in bronze at Delphi representing a lion hunt of Alexander. The base of this with an inscription has been found, as have others with his name, in Athens. There are records of other statues by Leochares of Zeus, Apollo, Ares, Demos and Isocrates. The statuette in the Vatican, representing Ganymede being carried away by an eagle, corresponds with Pliny's description of a group by Leochares.

The original of the "Apollo Belvedere" has been attributed to Leochares by A. Furtwängler and others; the Demeter of Cnidus by B. Ashmole; and a head of Alexander from the Acropolis by Ashmole and E. Buschor.

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LEOFRIC (d. 1057), earl of Mercia, was son of Leofwine, ealdorman of the Hwicce, and according to the chronicler Florence of Worcester was appointed by Canute to the earldom (probably in West Mercia) of his brother Northman, whom Canute had killed in 1017. He first signs as earl in 1032, but may have become earl of Mercia about 1023. On Canute's death in 1035 his influence secured the regency for Harold I. He took part in a punitive raid sent by Hardicanute against Worcester in 1041, and in the despoiling of Queen Emma at Winchester in 1043. He supported Edward the Confessor against Earl Godwin in 1051. In 1056 he helped to make a treaty with Griffith of Wales. He died on Sept. 30, 1057, and was buried at Coventry in the monastery founded by him and his wife Godgifu, famous in legend as Lady Godiva. He was a benefactor of several religious houses. He was succeeded by his son Aelfgar, who had held the earldom of East Anglia in 1051–52, and 1053–57.

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LEOMINSTER, a market town and municipal borough, in the Leominster parliamentary division of Herefordshire, Eng., 13 mi. N. of Hereford by road. Pop. (1961) 6,403.

It still retains some old timbered houses. The parish church of SS. Peter and Paul, a former priory church of mixed architecture with a Norman nave and fine window tracery, was restored in 1866 and enlarged in 1879. The old town hall or Butter Cross, an example of timberwork of 1633, was re-erected in the grounds of the Grange. Merewald, king of Mercia, is said to have founded a religious house in Leominster about 660, and a nunnery existed there until the Conquest, when the place became a royal demesne. It was granted by Henry I to the monks of Reading under whose protection the town grew up. In 1539 it reverted to the crown; and in 1554 the town was incorporated. Leominster was famous for wool from the 13th to the 18th century. Fairs were granted at various times and there are cattle shows in May and October as well as autumn sales of ewes and lambs. Trade is chiefly in agricultural produce and livestock, Leominster being the centre of a large farming area rich in orchards. Agricultural implements, cider, beer, gloves and clothing accessories are manufactured.

LEOMINSTER, a city of Worcester county in north central Massachusetts, U.S., on the Nashua river 45 mi. N.W. of Boston. Incorporated in 1740, it was the site of a comb factory (1775) which subsequently became the leading economic activity. Early in the 20th century the industry shifted to producing plastic combs, plastic articles and machinery for the plastics industry. Three-

fourths of Leominster's working population is engaged in manufacturing, two-thirds of these being in the plastics trade. Textile products, furniture and paper products are other items of manufacture. In the 20th century substantial numbers of people of French-Canadian and Italian background joined the native Yankee population. Leominster's best-known native son is probably John Chapman (*q.v.*), known as "Johnny Appleseed." Pop. (1960) 27,929; Fitchburg-Leominster standard metropolitan statistical area (*see* FITCHBURG), 90,158. For comparative population figures *see* table in MASSACHUSETTS: *Population.*

(M. H. Co.)

LEON OF MODENA (1571–1648), Jewish scholar, was born in Venice, Italy, on April 23, 1571, of a French family which had migrated to Italy after the expulsion of the Jews from France. One of Leon's most effective works was his attack on the Cabala (*Ari Nohem,* first published in 1840), in which he demonstrated that the *Zohar,* the "Bible of the Cabalists," was a modern composition (*see* CABALA). His *Historia dei riti ebraici* (1637) was widely read by Christians, being translated into various languages including English (1650). Leon died at Venice on March 24, 1648.

See H. Graetz, *History of the Jews,* Eng. trans., vol. v, ch. 3 (1956); A. Geiger, *Leon de Modena* (1856).

LEÓN, LUIS DE (1527–1591), the greatest Spanish prose writer of the 16th century and one of the greatest poets in the language, was born at Belmonte (Cuenca), and educated chiefly at Salamanca, where he obtained his first chair in 1561. Academic rivalry between the Dominicans and the Augustinians, whom he had joined in 1544, led to his denunciation to the Inquisition for criticizing the text of the Vulgate: imprudently in Spain at that period, since his great-grandmother had been Jewish. After almost five years' imprisonment (1572–76) he was exonerated and restored to his chair, which, however, he resigned in favour of his interim successor, subsequently gaining a new one, also at Salamanca; a second denunciation in 1582 was unavailing. His prose masterpiece, *De los Nombres de Cristo* (1583–85), a treatise in the dialogue form popularized by the followers of Erasmus, on the various names given to Christ in Scripture, is the supreme exemplar of Spanish classical prose style: clear, lofty, and, though studied, entirely devoid of affectation. His translations from Greek, Latin, Hebrew and Italian include the Song of Solomon (modern edition by J. Guillén, 1936) and the Book of Job, both with commentary. León's poems, containing many of the motifs of *De los Nombres de Cristo,* were posthumously published by Quevedo in 1631 as a counterblast to the Gongorists (*see* SPANISH LITERATURE: *Culteranismo and Conceptismo*); they reflect the tension between his Horatian ideals of moderation and the turbulent life of a man of uncompromising honesty and naturally pugnacious temperament inhabiting a world of ecclesiastical intrigue and rancorous academic politics. His other works include theological treatises and commentaries in Latin on various psalms and books of the Bible, and *La perfecta casada* (1583), a commentary in Spanish on Prov. xxxi, incorporating elements of the medieval ascetic tradition of misogyny interspersed with picturesque glimpses of feminine customs of the day. He died at the monastery of Madrigal (Ávila) on Aug. 23, 1591.

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LEÓN, MOSES BEN SHEM-TOB DE (*c.* 1250–1305), Jewish mystic and presumably the author of the *Sefer ha-Zohar* ("Book of Splendour"), the most important work of Jewish mysticism. Born in León, Spain, he lived until 1290 in Guadalajara, then traveled a great deal and finally settled in Ávila. He died in Arévalo on his return journey from Valladolid, where he had met Isaac ben Samuel of Acre, a Palestinian Cabalist eager to learn more about the origin of the *Zohar.* Attracted to philosophy in his youth, Moses de León soon came under the spell of Cabala without, however, completely abandoning the Neoplatonic theology of his earlier training. Of his life little is known. Of great significance, however, was his close liaison with Joseph Gikatila, whose *Ginat Egoz* ("Nut Garden") brought De León into contact with Abraham Abulafia's mysticism of letters. Gikatila was introduced by him to the cabalistic system of the *Sefirot.*

The rise of rationalism among Spanish Jewry had led to some laxity in religious observance, and it was to combat this tendency that Moses de León wrote the *Zohar.* A homiletical genius, he "revealed" the mysteries of the Torah and the "divine commandments" in the form of a commentary on the Pentateuch, allegedly written by Simeon ben Yohai, the Palestinian teacher of the 2nd century A.D. (Orthodox scholars, it should be noted, believe that the *Zohar* is in fact largely, if not entirely, the work of Ben Yohai and his school.) The language employed in the *Zohar* is an artificial Aramaic that shows unmistakable traces of the influence of medieval Hebrew (as shown by G. Scholem and M. Z. Cadari). The material is culled from a great variety of sources, including ancient treatises otherwise lost; *e.g.,* the passage on physiognomy in section *Yithro.* A series of 24 Hebrew writings (of which 14 are still extant) composed between 1286 and 1293, after the completion of the *Zohar,* further develops De León's mystical theology and aims at popularizing it. *See* also CABALA: *The Zohar.*

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LEÓN (LEÓN DE LOS ALDAMAS), a city of the state of Guanajuato, Mexico, 259 mi. N.W. of the federal capital and 30 mi. N.W. of the city of Guanajuato. Pop. (1960) 209,870. The Mexican National railways connects it with the national capital and other prominent cities of the republic. León stands in a fertile plain on the banks of the Turbio, a tributary of the Río Grande de Lerma, at an elevation of 6,200 ft. above sea level and in the midst of attractive surroundings. The country about León is considered one of the richest cereal-producing districts of Mexico. The city has been subject to disastrous floods, sometimes leading to loss of life as well as considerable damage to all classes of property. León is now protected by a large dam. It has a modern airport and excellent air connections. It manufactures saddlery and other leather work, gold and silver embroideries, cotton and woolen goods, especially *rebozos* (long shawls), soap and cutlery. There are also tanneries and flour mills. The city has a considerable trade in wheat and flour. The first settlement of León occurred in 1552, but its formal foundation was in 1576. It became a city in 1836. (J. A. Cw.)

LEÓN, a department of western Nicaragua on the Pacific ocean, is bounded east by Lake Managua. Pop. (1963) 150,051; area 2,355 sq.mi. With level land, fertile soils, good distribution of precipitation and good transportation, the department is especially important in producing corn (maize), cotton, sugar, sesame, rice, tobacco, vegetables, fruits and cheese. Two of Nicaragua's most productive gold mines (La India and El Linon) are in León. The capital of the department is the classical colonial city of León (*q.v.*). (C. F. J.)

LEÓN, the second largest city of Nicaragua and capital of the department of the same name, is 52 mi. N.W. of Managua, and connected with it and other cities by the Pacific railway and a paved road. Pop. (1963) 62,019 (mun.).

León, one of the oldest cities of Central America, is the centre of an important agricultural and commercial region. Cotton, sugar and rice are the principal crops. Manufactured products include processed cotton, cigars, shoes and saddlery. Cattle are also raised for export.

The city was first founded on the edge of Lake Managua by Francisco Hernández de Córdoba in 1524, but, after an earthquake there, was moved in 1610 to the site of the old Indian capital of Sutiaba, an important Indian shrine. León was the capital of the Spanish province and of the Republic of Nicaragua until 1855, although its great commercial rival, Granada, on Lake Nicaragua,

88 mi. to the southwest, long disputed the honour. The rivalry brought on civil wars that resulted in the coming of William Walker (*q.v.*), the U.S. filibusterer who was expelled in 1857. Managua was established between the two as a compromise capital. León's streets and private houses, mostly one-storied and with fine gardens, are picturesquely Spanish. Historic buildings include the 18th-century cathedral and the church in the old Indian section of Sutiaba.

León has been long noted as an intellectual centre of Nicaragua. In 1952 the University of León (founded in 1812) became part of the National University of Nicaragua along with the Universities of Managua and Granada. Rubén Darío, one of the greatest Spanish-American poets, lived and was educated in León.

(M. F.-G.)

LEÓN, a Spanish city and province, situated in the region of León in the northwestern corner of the northern submeseta. León, the capital of the province, lies on the Bernesga, 134 km. (83 mi.) N.N.W. of Valladolid by road. It is on the Madrid-Oviedo road and railway; there are other railway lines to La Coruña and to Bilbao. Pop. (1960) 73,483 (mun.). It developed from the camp of the Roman 7th legion, its modern name being a corruption of the Latin *legio.* A monumental city with a wealth of artistic interest, it attracts large numbers of tourists. Especially remarkable are the fine Gothic cathedral, noteworthy for its stained-glass windows known as the Pulchra leonina, the Romanesque collegiate church of San Isidoro and the Renaissance-style church of San Marcos. After recapture from the Muslims, León became the capital of the kingdom of Asturias and León in the 10th century when García I transferred his court there from Oviedo. On the pilgrimage route to Santiago, León exercised considerable political, cultural and economic influence during the middle ages. It was an important commercial centre, with many craft guilds and notable fairs and markets. The street names of the old part of the city recall the offices and structure of the medieval town. The economic life of the city declined in the 16th century and did not revive until the 19th with the development of mining. By the mid-20th century León was resurgent, with a new city and increasing industrialization.

León Province, with an area of 15,467 sq.km. (5,972 sq.mi.) and a population (1960) of 584,594, is divided into 235 municipalities and 10 judicial districts: Villafranca del Bierzo, Ponferrada, Murias de Paredes, La Vecilla, Riaño, Sahagún, Valencia de Don Juan, La Bañeza, Astorga and León.

In the northern part of the province is the high Cantabrian range, the highest peak of which is the Torre Cerredo (8,688 ft.). This part of the province also contains the passes of Tarna, San Glorio, Pontón and Pajares, which have links with Santander and Asturias. The natural regions are El Bierzo, a lowland where mining has replaced agriculture; La Montaña, comprising the judicial districts of Murias, Vecilla and Riaño; and La Meseta, a dry desert with fertile strips, such as that along the Órbigo river. The climate is extreme continental. The main catchment area is the basin of the Esla, a tributary of the Duero (Douro), in which is situated the large dam at Ricobayo. Tributaries of the Esla are the Cea, Porma, Bernesga and Órbigo. The second most important river basin is that of the Sil, which runs through Bierzo. Other rivers are the Sella and the Cares; there is another dam at Barrios de Luna.

The main crops are cereals, flax and hops, León being the most important producer of hops in Spain. Timber resources include oak, beech and chestnut. Cattle, donkeys and sheep are bred. There are deposits of anthracite, iron, bituminous coal and mica; Ponferrada is a great coal- and iron-mining area. The considerable mineral resources offer prospects for industrial development. Chemical factories have been established for the manufacture of antibiotics. For history *see* León, Kingdom of. (M. B. F.)

LEÓN, KINGDOM OF, was considered, in the later middle ages, to cover the area of the modern provinces of León, Palencia, Valladolid, Zamora and Salamanca, together with the Asturian province of Oviedo (*qq.v.*). The medieval kings of León also ruled Galicia and as much of the county of Portugal as had been reconquered before that country achieved independence in 1140. They were, in name at least, suzerains of the county of Castile until 1035. The group of dialects spoken and written in medieval León (Asturo-Leonese) were clearly demarcated from the language of Castile. Today these dialects are everywhere in retreat before Castilian, but they survive strongly in Asturias and, to some extent, in rural León as far south as Zamora. There is a popular literature and music of folk tales, ballads and other songs.

The rise of the medieval Leonese kingdom began with García I (909–914), who set up his court on the site of the former Roman permanent camp of the Legio VII Gemina, abandoning the former Asturian capital at Oviedo (*see* Asturias). The period of Leonese hegemony in Christian Spain nominally lasted until the death of Alfonso VII (1157), but it had, long before, been seriously undermined by the conquests of Sancho the Great (1000–35) of Navarre and by the elevation, on his death, of Castile from county to kingdom. During the whole of the 10th century, when the caliphate of Córdoba (*q.v.*) was at its most powerful, León lost rather than gained ground in the struggle with the Moors, and its kings often had to accept a *de facto* submission to the will of the caliphs. León, however, had inherited from the Asturian monarchy a strong attachment to Visigothic tradition, and its rulers, sometimes taking the title of emperor or king of all Spain, tried to further the Reconquest wherever possible. The second period in Leonese history runs from 1157 to 1230, when the kingdom was ruled, in separation from Castile, by its own kings, Ferdinand II (1157–88) and Alfonso IX (1188–1230). Relations with Castile were rarely friendly, but León was a stable political entity during this time and won notable victories over the Moors in Leonese Extremadura. After the final union with Castile (1230), Leonese political and administrative institutions were, for a time, maintained and the records of the *Cortes* show that some sense of the separate identity of León survived into the first half of the 14th century. In modern times, however, the revival of separatist feelings in various parts of Spain has awakened no response in León, now a predominantly agricultural and rather backward region.

During the first century of its existence there was a large influx of Mozarabic immigrants into León. These introduced strong Arabic linguistical and cultural influences into the kingdom. Modern Spanish historiography—concerned often to justify medieval Castilian separatism—has tended to portray medieval León as an archaizing, Byzantine type of state overready to compromise with the Moors. The evidence for this is not wholly convincing. León successfully bore the brunt of the caliphate's attacks and seems to have been the first peninsular kingdom to evolve popular parliamentary institutions. *See* also Castile; Spain: *History.*

(P. E. R.)

LEONARDO of Pisa (Leonardo Fibonacci) (*c.* 1170–1230), Italian mathematician, was born in Pisa and brought up in Bougie, Alg., where his father was customs inspector. In his youth he traveled as a tradesman around the Mediterranean and then settled in Pisa. Leonardo is the outstanding European mathematician of the medieval period, but little is known about his life except for incidental remarks in his works. Most famous among these is the *Liber abaci,* composed in two versions, 1202 and 1228. It became the prototype of later Italian arithmetics and was instrumental in introducing Arabic numerals into Europe. The *Practica geometriae,* also a highly important work, was completed about 1220. Three minor works, *Liber quadratorum, Flos* and a letter to the philosopher Theodorus, deal with problems proposed by John of Palermo and solved by Leonardo in a tournament before the emperor Frederick II; they show an unusual originality and mathematical ability.

His works were edited by B. Boncompagni, *Scritti di Leonardo Pisano,* 2 vol. (1857–62). (O. Oe.; X.)

LEONARDO DA VINCI (1452–1519), Florentine artist and scientist, was born at Vinci near Florence on April 15, 1452. The legend of his universality, with which his fame is primarily linked in the popular view, emanated from Leonardo himself, who propounded it in a letter of self-commendation written as a young man to Ludovico Sforza, the tyrant of Milan. This point of view, together with the complementary, and (to the 20th century) equally justifiable, one—that the variety of Leonardo's interests,

BY COURTESY OF THE UFFIZI GALLERY, FLORENCE; PHOTOGRAPH, ART REFERENCE BUREAU

PORTRAIT OF LEONARDO ATTRIBUTED TO AN UNKNOWN 17TH-CENTURY TUSCAN MASTER, BASED ON A SELF-PORTRAIT IN RED CHALK. IN THE UFFIZI GALLERY, FLORENCE

together with his perfectionism, seriously limited the extent of his achievement in any one of them—is already adumbrated in the earliest written accounts of his career (those of Paolo Giovio, Antonio Billi and the so-called Anonimo Gaddiano), as well as in Giorgio Vasari's *Lives* (1550 and 1568), which has influenced all later writers in the field. Leonardo's surviving works consist primarily of a few paintings together with a large quantity of drawings, scientific diagrams and notes on diverse subjects. After an account of his career, it is proposed to consider his work under the following headings: paintings, sculpture, and drawings and notebooks.

Career.—The exact date—April 15, 1452—of Leonardo's birth was not discovered until about the year 1939, when it was published by Emil Möller. Leonardo's parents, who were never man and wife, were one Piero da Vinci, a young man of 23 at the time of Leonardo's birth, and a certain Caterina. Piero, who was notary to the signoria of Florence from 1469, made the first of his four marriages in the year of Leonardo's birth and subsequently raised a large legitimate family. Leonardo's mother also was married by 1457. Piero acknowledged Leonardo from the first as his son (none of Piero's legitimate children was born until after Leonardo grew up) and brought him up, partly at Vinci, the town of his birth, and partly in Florence.

Concerning his apprenticeship, it should be pointed out that there is no sure authority earlier than Vasari (1550) for his having been Andrea del Verrocchio's pupil. An anonymous denunciation of 1476, in which Leonardo and three other men were accused of frequenting a notorious boy prostitute, states merely that Leonardo was at that time living in Verrocchio's house. But his apprenticeship would have been long since over as he was then 24 years of age and had been admitted a member of the painters' guild at Florence in 1472. Even the existence of a picture (the "Baptism of Christ," now in the Uffizi gallery, Florence), attributable to Verrocchio and Leonardo in collaboration (*see* below), constitutes no proof of apprenticeship. Nevertheless, these two factors, together with the markedly Verrocchiesque quality of Leonardo's earliest paintings and drawings, do furnish strong circumstantial evidence in favour of the accuracy of Vasari's statement. Verrocchio was a sculptor and goldsmith as well as a painter, and it is therefore reasonable to suppose that Leonardo would have received training in all three arts, and not merely in painting.

However, it was primarily as a military engineer, for which there is no evidence that Leonardo ever received any systematic training, that he offered his services to Ludovico Sforza (Il Moro, "the Moor") in the letter already mentioned. This is an undated draft, perhaps not in Leonardo's handwriting but acceptable as of his composition, preserved among his papers in the *Codice Atlantico*. In it, besides offering to construct field bridges, mortars and other engines of his own invention, as well as paint pictures and work in architecture, Leonardo specifies that he will undertake to make the bronze equestrian statue of Ludovico's father, Francesco Sforza. Although the precise object and date of Leonardo's move to Milan are unknown, two later draft letters (*Codice Atlantico* folios 323a and b) suggest that he may have been invited there by Il Moro specifically to construct the monument. The Anonimo Gaddiano's version is that Leonardo had received some patronage from Lorenzo the Magnificent in Florence, who sent him to Milan to present a lyre to Il Moro, Leonardo being then aged 30. This would make the date 1482. Leonardo can be shown to have been in Florence as late as Sept. 1481 but may well have arrived in Milan before the end of that year. Otherwise, he is first recorded there in April 1483 (the date, 1494, given by Vasari for the move is one of the wildest of the demonstrable errors in his biography). He remained at Milan until Il Moro's fall in 1499.

This period, from around the 30th year of Leonardo's life until nearly his 50th, marked the crucial stage of his formation and of his development, since it gave him the opportunity of shining in whatever field took his fancy. At Il Moro's court, he was in fact engaged on tasks as diverse as projects for architectural work at the cathedrals of Milan and Pavia, decorative as well as architectural work at the Castello in Milan, and the organizing of court pageants on special occasions. He also painted the portraits of Il Moro and his court as well as the "Last Supper" at Sta. Maria delle Grazie. In addition, he completed the full-scale model of the gigantic horse for Francesco Sforza's tomb, engaged in military engineering, taught himself Latin and carried out extensive anatomical and other researches.

In Sept. 1499 the dissatisfied Milanese subjects of Il Moro took advantage of his temporary absence to offer the city to the king of France, Louis XII, who had been laying claim to it. On Oct. 6 Louis entered Milan. The French forces in the city behaved after the manner of occupying troops, one of their exploits being to use as a target for their arrows Leonardo's colossal clay model for the Sforza monument, which had been finished in 1493 but never cast in bronze. What may have been the mold for the casting rather than the remains of the model itself, as is sometimes stated, may have been sent to Ferrara soon afterward. In any case, nothing remains of the great model. Meanwhile, late in 1499, or at the beginning of 1500, Leonardo left Milan and returned to Florence. On his way he visited Mantua, where he drew Isabella d'Este, and also Venice.

Between July 1502 and March 1503 Leonardo was in the service of Cesare Borgia as architect and engineer general on his campaign in central Italy (during this time he met Machiavelli, with whom he became intimate later). On his return to Florence he embarked on the two most ambitious undertakings of his career, one scientific, the other artistic. The first of these was a scheme for diverting the course of the Arno river and rendering it navigable to Florence. The second was the painting of a battle piece, in competition with the young Michelangelo, in the great room of the seat of the Florentine republic, the Palazzo Vecchio.

It was doubtless the failure of both these undertakings which induced Leonardo to leave Florence in 1506 and return to Milan, still at that time under French rule. Initially, he was given only

three months leave of absence by the signoria of Florence, but it seems clear that he had no intention of returning. He lost no time in ingratiating himself with the French at the highest level, and his first plea for a prolongation of his leave of absence was supported by the French governor, Charles d'Amboise. A second extension was granted on the strength of a personal letter from Louis XII to the signoria. Louis had seen a painting by Leonardo which had been sent to France and had determined to get him into his employ to paint for him "certain little panel pictures of Our Lady, and other things as the fancy shall take me; and perhaps I shall cause him also to make my own portrait." When, in the autumn of 1507, Leonardo was obliged to return to Florence for a short time on private business, a further letter from the king, who had now arrived in Milan, to the signoria, asking them to expedite Leonardo's affairs, referred to him as "nostre peintre et ingénieur ordinaire." By this time, the signoria were evidently resigned to the probability that Leonardo would never finish the battle piece.

BY COURTESY OF THE UFFIZI GALLERY, FLORENCE; PHOTOGRAPH, ART REFERENCE BUREAU

THE "ANNUNCIATION," ABOUT 1473. PANEL TAKEN FROM THE SACRISTY OF THE CHURCH OF SAN BARTOLOMEO AT MONTE OLIVETO OUTSIDE THE PORTA SAN FREDIANO. IN THE UFFIZI GALLERY, FLORENCE

The only large-scale undertaking during Leonardo's second Milanese period was a project for a mausoleum for Marshal Trivulzio, an Italian *condottiere* in the service of the French, and of this, as of so many of Leonardo's projects, nothing came. For the rest of the time he painted some panel pictures, designed the setting for masques and codified and arranged his notes on many scientific subjects.

It was doubtless again political events—the abandonment of Lombardy by the French in 1512 and re-establishment of the Sforza dynasty—which induced Leonardo to leave it for the second time, though on this occasion he took longer to make a decision. But in Sept. 1513 he left Milan for Rome, where he was installed in the Vatican under the patronage of Giuliano de' Medici, brother of the newly elected pope, Leo X. Vasari has a vivid portrait of Leonardo at this time, indulging in weird scientific experiments and evidently leading a restless and unhappy life. The presence in Rome of Michelangelo and of Raphael, both many years his junior and at the peak of their fame, would have removed any wish Leonardo may still have entertained to undertake further work of importance in the field of the visual arts, and when, in March 1515, his patron died he had every inducement to leave Rome and seek other employment. This he ultimately found, for the second time, with the French. The new king, Francis I, was determined to lure to his court as many distinguished Italian artists as he could. The date of Leonardo's departure from Rome is not known. He is first recorded in the spring of 1517, at Cloux, near Amboise. Here, until his death on May 2, 1519, Leonardo lived as "premier peintre et ingénieur et architecte du roi" in much the same way as he always had, namely organizing court masques on occasion, writing scientific notes, perhaps painting a little and working on projects for a variety of undertakings (including canalization) without greatly caring whether or not they were carried out.

His prestige, which the evident glamour of his personality had always fostered, evidently remained extremely high at the French court and later contributed to Vasari's fable, now discredited, of Leonardo's having died in the arms of the king.

Paintings.—The scarcity of Leonardo's paintings, together with the eagerness of collectors in all ages to possess them, has helped to obscure the distinction between the genuine and the false, and despite much research, some uncertainty remains in a few instances. The existence of a large body of undoubtedly genuine drawings by Leonardo (*see* below) has constituted the principal means of authenticating the paintings. A drawing by Leonardo of a sleeve, for instance, which is in the library of Christ Church, Oxford, is undeniably a preliminary study for part of the angel of the Annunciation in a painting now in the Uffizi gallery, Florence. This picture is the most primitive in style of those attributable to Leonardo and therefore probably the earliest.

Two other paintings for which no clearly authentic drawings survive may be vouched for as Leonardo's on the strength of many resemblances to the latter picture. They are a small "Madonna and Child" (with a carnation) now in the Munich gallery and a small "Head of a Woman" (Liechtenstein collection). The fact that the latter work contains juniper leaves (*ginepro* in Italian) prominently displayed both within the picture and on the back of it has led to the plausible suggestion that the sitter is Ginevra de' Benci—who, according to both the Anonimo Gaddiano and Vasari, was portrayed by Leonardo—since such a pun on her name would be ordinary Renaissance usage. The lady is known to have married in 1474, which would be a plausible date of origin for the picture and an approximate date for the other two. These three paintings are in general in the traditional Florentine style of the later *quattrocento* and show in particular many points of resemblance with the style of Verrocchio. (Participation by the young Leonardo has also been claimed in respect of other pictures in a Verrocchiesque idiom, notably an "Annunciation" in the Louvre, the so-called "Dreyfus Madonna" in the Kress collection and an unfinished "Nativity" acquired by the Detroit Institute of Art in 1957.)

Certain features, however, such as the interest in curling hair and in flowers and leaves, which are common to the Uffizi, Munich and Liechtenstein pictures, already foreshadow the mature Leonardo. Another feature, the fantastic mountains in the background of the Uffizi "Annunciation" and of the Munich Madonna, furnishes a link with the next work to be considered, namely Leonardo's share in Verrocchio's painting of the "Baptism of Christ" (Uffizi, Florence).

This comes from the church of S. Salvi at Florence and it is probably to this picture that a very early printed source, Francesco Albertini's *Memoriale* of 1510, refers when it speaks of "an angel by Leonardo da Vinci" as being among the pictures in that church. For the angel on the left of this picture was mentioned as an interpolation of Leonardo's by Vasari, who goes on to add that Verrocchio was so mortified that his young pupil's work so evidently surpassed his own that he never painted again. The latter part of the tale has long been recognized as a characteristic Vasarian embroidery, but his placing of the context of the incident into Leonardo's extreme youth has continued to be followed. Nevertheless, the evidence of the picture itself does not support this, for the angel on the left is clearly recognizable as Leonardo's work, and as rather more advanced than anything in the other early paintings already discussed. But the landscape background of fantastic mountains, of which Vasari says nothing, is not only patently also Leonardo's work, but already in his ma-

ture style and anticipating the comparable feature in the "Mona Lisa." Since it is known that Leonardo was living in Verrocchio's house in 1476, four years after he became a master, it would be logical to suppose that the "Baptism" represented a collaboration, dating perhaps from that period, rather than the result of the master-pupil relationship of the earlier stage.

Two more small Madonnas—the so-called "Madonna Benois" and "Madonna Litta" (both in the Hermitage, Leningrad)—connect with autograph drawings roughly datable to the mid- or later 1470s (it is possible that they are the two Madonnas which Leonardo in a note says he started at the end of 1478). Of these, the "Madonna Litta" is much repainted and unimportant. The "Madonna Benois" is the earliest portrayal by Leonardo of the Madonna seated with the Child in her lap, a theme which he was often to elaborate later.

Two contracts for pictures are recorded dating from Leonardo's first Florentine period. The first, of Jan. 1478, was for an altarpiece of unspecified subject for the chapel of S. Bernardo in the Palazzo Vecchio. The second, of March 1481, was for a painting, also of unspecified subject, for the high altar of the monastery of S. Donato a Scopeto, outside the walls of Florence. Neither

BY COURTESY OF THE UFFIZI GALLERY, FLORENCE; PHOTOGRAPH, ART REFERENCE BUREAU

"ADORATION OF THE MAGI." UNFINISHED PAINTING COMMISSIONED FOR THE HIGH ALTAR OF THE MONASTERY OF S. DONATO A SCOPETO IN 1481. IN THE UFFIZI GALLERY, FLORENCE

of these contracts was honoured. The first, which had already been accepted, and with equally negative results, by Piero Pollaiuolo, was given, after Leonardo's default, to Domenico Ghirlandajo, who in his turn failed to honour it. It has been suggested that the "Virgin of the Rocks," now in the Louvre, was painted by Leonardo in connection with the Palazzo Vecchio contract, but in that case, since the picture is finished, most unusual for Leonardo, it would be necessary to bring to light some very unusual circumstances to explain why it was never delivered. In the case of the S. Donato a Scopeto contract, an altarpiece by Filippino Lippi, which was ultimately delivered, is of the same size and subject—the "Adoration of the Kings"—as an unfinished picture in the Uffizi, recognizable by means of numerous connected drawings as Leonardo's, and in consequence it is universally assumed that the latter work was started in connection with this contract.

Even in its unfinished state the picture is one of the most marvelous of all Leonardo's works. No photographic reproduction of the whole picture can convey the extraordinary fascination exerted by the original, though detailed photographs on a large scale can give some idea of the wealth of fantasy and imagination which had been lavished on individual portions.

A smaller picture—of St. Jerome in prayer before a crucifix—is usually linked with the Uffizi "Adoration." It is said to have been discovered in two pieces on two separate occasions by Cardinal Fesch, Napoleon's uncle, and is now in the Vatican gallery. It has neither documentation nor connected drawings to authenticate it as Leonardo's work, but it nevertheless represents to so high a degree the quintessence of the master that it has never in fact been doubted. Its obvious resemblance to the "Adoration" is partly accidental (both pictures are in a similar state of incompleteness) but also partly real (St. Jerome is comparable with several of the old men in the Uffizi picture), and the picture is therefore unlikely to have been painted very many years on either side of 1481.

In 1483 Leonardo and two Milanese artists, Evangelista and Ambrogio de Predis, were commissioned to supply pictures to be inserted, probably on an upper tier, into an existing carved altarpiece, and also to paint or gild parts of the latter. The whole was to adorn the chapel of the Confraternity of the Immaculate Conception in the church of S. Francesco Grande at Milan. The pictures in question are the "Virgin of the Rocks" and two angels. All three pictures are now in the National gallery, London, and can be proved to have come from the chapel in question. Formerly, it was supposed that another version of the "Virgin of the Rocks" (the one which is now in the Louvre and whose history before the year 1625 is totally unknown) was Leonardo's contribution to the confraternity's contract and that the London picture was painted by his pupils and substituted for it at a certain stage.

However, re-examination of the copious contemporary documentation by Martin Davies (published in the catalogue of the Earlier Italian schools in the National gallery, 1951) has shown the virtual impossibility of this interpretation. The confraternity's contract became the subject of a lawsuit concerning delay in delivering the pictures and alleged inadequacy of the remuneration. It was not settled until 1506, and the wording of the settlement establishes with absolute certainty that no substitution had then taken place. As a substitution after that date is in the highest degree improbable, it must be concluded that the Louvre picture was never connected with the confraternity's contract. It would presumably have been painted earlier, in Florence. At least one very famous and beautiful drawing by Leonardo (at Turin) connects with it and not with the London version, and despite the absence of documentation, its status as an authentic and major work of Leonardo cannot be doubted. One of the most important consequences of the re-examination of the documents connected with the confraternity's contract is that a statement, in which both Leonardo and the Predis brothers say that the central picture of the Virgin and Child was painted by Leonardo himself, must refer to the London version of the "Virgin of the Rocks" and not to that in the Louvre and constitutes proof of its autography at the highest level. The two panels of angels would thus be the work of Ambrogio or Evangelista de Predis, or both. The London picture is clearly more advanced in style than that in the Louvre—accessories such as flowers have been reduced in number and the contrasts of light and shade strengthened. Both these tendencies mark a stage away from the style of the *quattrocento* toward that of the High Renaissance, though both pictures in differing degrees may be regarded as transitional in that progress. Like most of his major works, the National gallery picture is unfinished.

Four surviving portraits, probably dating from Leonardo's first Milanese period, bring up the question of authenticity in an acute form, since no autograph drawings survive connected with any of them. The first of these, an unfinished portrait in the Biblioteca Ambrosiana at Milan, called "A Musician," is so similar to the angel in the London "Virgin of the Rocks," both as regards the curling hair and the play of light and shade on the face, that Leonardo's authorship can be accepted without difficulty.

In the second portrait—the so-called "Lady with an Ermine" at Cracow—the chief indication is the treatment of the animal itself, with its wonderfully alert expression. Apart from Leonardo, the only painter interested in such things at this time was Piero

di Cosimo, and he can be excluded as author for other reasons. Since the Greek for ermine is *galéē* (γαλέη), it has, moreover, been reasonably suggested that the surprising inclusion of this feature in the portrait constitutes another of those puns on the sitter's name, as in the case of Ginevra de' Benci, and that the sitter is Cecilia Gallerani, who became Il Moro's mistress in 1481 and who is known from two separate contemporary documents to have been portrayed by Leonardo. The fact that the ermine is an emblem of chastity might render its suitability to the present context questionable, though parallel instances could be indicated. Cecil Gould's belief is that the sitter in the Cracow portrait is the same as that in the celebrated profile in the Ambrosiana, which was long called "Beatrice d'Este, by Leonardo da Vinci." The identification with Beatrice has been generally discredited, but even if the sitter were Cecilia it would still not prove Leonardo's authorship, which is always likely to remain in doubt, since the painting is not like any certain work of Leonardo. However, it is incomparably superior in quality to all the works of all his known pupils. Finally, in the case of "La Belle Ferronnière" in the Louvre, the identity of sitter and artist alike have long been disputed, but for the latter the name of Leonardo seems more reasonable than that of the most favoured alternative candidate, namely his pupil, Giovanni Boltraffio.

Besides these easel pictures, there are two wall paintings dating from the first Milanese period. One of these, the decoration (documented as finished in 1498) of the Sala delle Asse in the Castello Sforzesco at Milan, was subsequently painted over and was not uncovered until 1901, when it was entirely repainted. Much or all of this repaint has since been removed. Though never a work of the first importance, it may be regarded as an illustration of Leonardo's habit of introducing into an artistic undertaking one of the scientific games with which he amused himself—in this case, the endless intricately knotted cord (of which some early engravings were made), here combined with an almost equally intricate pattern of *trompe-l'oeil* branches and foliage, which covers the ceiling and springs from trunks painted on the side walls.

The other wall painting was the "Last Supper." This was done to the order of Il Moro in the refectory of the monastery of Sta. Maria delle Grazie. It is not known when Leonardo started it. He had almost finished it in 1497, but if Vasari is to be believed, he never quite did so. He also painted the portraits of Il Moro and his family as spectators in G. D. Montorfano's fresco of the "Crucifixion" on the wall facing the "Last Supper." The story of the latter's ruin (owing to the failure of Leonardo's patent technique evolved in order to permit him to work at his leisure) is part of its legend. The painting was noted as decaying as early as 1517 and pronounced by Vasari (in his life of Garofalo) as "merely a mass of blots" in 1566. Repeated restorations followed, and, although the one carried out after World War II was claimed to have revealed some of Leonardo's own work, it is primarily to the design and to its suitability to its setting that the painting owes such qualities as it still retains. Otherwise it is best studied in old copies or in Raffaello Morghen's engraving. With an effort (and particularly after a study of Leonardo's magnificent drawings of the heads of individual apos-

BY COURTESY OF STA. MARIA DELLE GRAZIE, MILAN; PHOTOGRAPH, ART REFERENCE BUREAU

THE "LAST SUPPER," ON REFECTORY WALL, MONASTERY OF STA. MARIA DELLE GRAZIE, MILAN

tles) it is still possible to understand the place of Leonardo's "Last Supper" not only as the first great manifestation of the High Renaissance style but as the standard and definitive representation of the subject. Leonardo's native fantasy was completely held in check and pictorial accessories reduced to the minimum so as not to distract from the drama of the scene.

The repeated attempts of Isabella d'Este, following her meeting with Leonardo at Mantua early in 1500, to induce him to paint a picture for her had as one result a series of letters, fortunately preserved, in which her agent in Florence, Fra Pietro da Nuvolaria, describes Leonardo's activities after his return there. In the first of these (April 3, 1501), Leonardo is described as having executed a cartoon of the Madonna and Child and St. Anne with a lamb. In the second, dated the next day, Leonardo is said to be working on a small picture for Robertet, the favourite of the French king. In both letters, Leonardo is described as leading a restless life and as being more interested in mathematics than in painting. Both the cartoon and the picture are described by Fra Pietro in considerable detail, and from this there can be no doubt that the picture for Robertet was the so-called "Madonna with the Yarn-Winder," one version of which is now in the collection of the duke of Buccleuch. This is a close-knit composition in the High Renaissance manner of the type which Raphael was to develop soon afterward and with a background of fantastic mountains, as in many of Leonardo's other pictures. The cartoon mentioned by Fra Pietro may have been that for the painting now in the Louvre, or it may have been a separate composition. In either case, it cannot be identical with the cartoon which belonged to the Royal academy in London from the 18th century to 1962, when it was acquired by the National gallery, London, since the latter work contains no lamb. The fact that the relation of the Virgin to the Child is worked out in the National gallery cartoon in a similar way to the "Yarn-Winder Madonna" suggests that there was probably no great interval of time between the two. On the whole, it is most probable that the National gallery cartoon was done just before Leonardo left Milan. Though less developed than the final version of the design, as seen in the Louvre painting, it has enormous importance as being an undoubted original, almost finished and in a good state of preservation.

The greatest undertaking in painting during Leonardo's second Florentine period, and indeed in the whole of his career, was the commission to paint a huge battle scene in the council chamber of the Florentine republic in the Palazzo Vecchio. His subject, the battle of Anghiari, was a cavalry engagement which had been fought in 1440 and ended in a victory for the Florentine and papal forces over the Milanese. The complementary painting, by Michelangelo, was to have been of the battle of Cascina. Neither was ever carried to more than the preliminary stages, Leonardo's probably because of the failure of yet another of his patent techniques (this time a kind of encaustic), Michelangelo's because the pope (Julius II) monopolized his time. Leonardo had begun his cartoon by the spring of 1504, had started to paint on the wall by April 1505 and had probably abandoned the undertaking forever by the end of that year. The portion which he executed was destroyed or covered up when the hall was frescoed by Vasari in the middle of the 16th century. The cartoon was cut up and the pieces lost or destroyed. A contemporary copy (belonging to the Uffizi) and a contemporary engraving (by Zacchia) exist of the portion of the painting which was carried out, together with a number of action sketches by Leonardo for skirmishes, and some single heads of fighters. From this varied material it is possible to obtain some idea of Leonardo's intentions. It is clear that he had realized the possibilities of conveying an impression of movement by means of closely welded units, depicted diagonally in space. This was later to be one of the principles of baroque art, and Leonardo, in this as in other works, was thus one of its forbears. The influence of his design can in fact be traced through the battle scenes of Giulio Romano, Titian and Rubens to the 19th century. It was, in a sense, the first modern battle picture.

At least two other pictures executed by Leonardo during the second Florentine period have likewise been lost. The first was a "Leda." Like other of Leonardo's paintings this was worked on at different times and at least two distinct versions evolved. In the first, which is datable to the "Battle of Anghiari" period, on the strength of a sheet of sketches containing designs for both, Leda is shown with her right knee to the ground. Leonardo himself may not have carried this design beyond the cartoon stage at the most. A painted copy, however, from Schloss Neuwied, is in the Munich gallery. The second version, of a standing Leda, seems to have been the final one, and many copies of it were made. It must have reached at least the cartoon stage by the time Leonardo left Florence in 1506, as there is a sketch of it by Raphael. The painted version was probably finished during Leonardo's second residence in Milan and was last recorded, in the 17th century, in the French royal collection. It would have been unique among Leonardo's pictures as being a pagan subject showing a female nude. Various plant drawings which survive and connect with it suggest that the basic idea of the picture was a kind of allegory of the generative processes of nature.

The second picture was of the head of an angel. Various copies exist, and there is a drawing datable to the second Florentine period by studies for the "Battle of Anghiari" on the same sheet. Vasari says the picture belonged in his day to Duke Cosimo de' Medici. He describes it as representing "the head of an angel, who raises one arm in the air, which, coming forward, is foreshortened from the shoulder to the elbow . . . and with the other raises the hand to the breast."

After these failures and lost works it is agreeable to record one surviving masterpiece dating from this time, namely the "Mona Lisa." This must have been painted in Florence, as Raphael sketched it and borrowed the pose in pictures of his own dating from that time. But the documentation is unsatisfactory. There is no reliable evidence of how the picture entered the French royal collection, and even the identification of the existing picture with Vasari's description of Leonardo's portrait of Mona Lisa can be questioned, though it is probably correct. Though the picture's legend and associations (particularly as embodied in Walter Pater's celebrated essay) have become almost as integral a part of it as its inherent qualities, the latter are nevertheless of great importance. The work constituted a landmark in the development of portraiture, particularly in respect to the ease and relaxation which the half-length pose is shown capable of demonstrating and to the contribution of the hands to the expression of the sitter's character. (*See* also PORTRAIT PAINTING: *Renaissance.*)

The remaining two paintings—the "St. John" and "Madonna with St. Anne" (both in the Louvre)—have, unlike the "Mona Lisa," preliminary drawings associated with them. Those for the "Madonna with St. Anne" are famous; in the case of the "St. John" it is a question of outline sketches for the hands in the *Codice Atlantico*. Leonardo seems to have been working on some stage of both pictures during his second residence in Milan, and both are usually identified with two of the three pictures shown to the cardinal of Aragon by Leonardo in France in 1517. Both would subsequently have left France—the "Madonna with St. Anne" was found in Italy by Cardinal Richelieu, while the "St. John" was exchanged by Louis XIII with Charles I and bought by Cardinal Mazarin at the commonwealth sale after Charles's execution. The "St. John" seems to have developed from the earlier painting of the pointing angel (another version of the subject, also in the Louvre and long attributed to Leonardo himself without foundation, was changed into a Bacchus in the 17th century). The strange, hermaphrodite figure is typical of all that has long been least popular in Leonardo's art, perhaps because its mysterious smile and pointing hand were repeatedly copied and parodied by Leonardo's Milanese followers, such as Bernardino Luini, Giovanni Boltraffio, Cesare da Sesto, Marco d'Oggiono and Francesco Melzi. In the picture's present state, no reasoned assessment of its quality is possible as it is so dark as to be almost invisible. The "Madonna with St. Anne" has already been mentioned in connection with the earlier cartoon of the same subject. Though it has been claimed, inconclusively, that Leonardo may have been assisted by pupils in the painting of the figures, it remains in many ways the most typical, the most haunting and the most imaginative of all his paintings. Like so many of them, it

BY COURTESY OF THE LOUVRE, PARIS; PHOTOGRAPH, AGRACI-ART REFERENCE BUREAU

"LA GIOCONDA" ("MONA LISA"), 1504. IN THE LOUVRE, PARIS

is unfinished. (*See* also PAINTING: *Leonardo da Vinci.*)

Sculpture.—The surviving traces of Leonardo's activity as a sculptor are far more fragmentary than those of his work as painter. There is, in fact, no single work of sculpture which can be proved to be from his own hand. His greatest undertaking in this field—the Sforza monument—disappeared, leaving practically no trace. A series of drawings which were formerly considered to be studies for it have long since been reidentified as belonging to a later and more shadowy project, the tomb of Marshal Trivulzio. It is generally assumed that Leonardo's first project for the Sforza monument envisaged a rearing horse, and that he changed it to a walking one owing to the practical difficulties involved. This seems the most likely view, but the evidence for it is of the most fragmentary kind. As to the Trivulzio monument, the only indication that the project was entertained is a specification for it by Leonardo himself. There is no evidence that any work was ever done except on paper, and even the magnificent series of autograph drawings associable with it have a markedly academic appearance.

Surviving sculptures which have been attributed to Leonardo include a terracotta group of the Virgin and Child in the Victoria and Albert museum, London, which is more probably the work of Antonio Rossellino. Two small bronze horses (Budapest and English private collections, the former with a rider) are very close indeed in design to several of Leonardo's drawings associated with the "Battle of Anghiari" and are presumably cast from models made in his immediate circle. Most important of all are the three figures of St. John the Baptist with the Levite and the Pharisee, by G. F. Rusticci, above the north door of the Baptistery at Florence. These were placed in position in 1511. In 1507–08 Leonardo had lodged in Rusticci's house in Florence on his return there on private business and had, according to Vasari, given him all assistance with the figures short of actually executing them himself. Their extraordinary excellence is therefore some indication of Leonardo's potentialities as sculptor.

Drawings and Notebooks.—Leonardo da Vinci's papers were bequeathed to his young friend and pupil Francesco Melzi, who lived until 1570. Before the end of the 16th century, most of them had passed to the possession of the sculptor Pompeo Leoni, who took it on himself to attempt some rearrangement of them by binding the notes and drawings of scientific subjects into one large volume and the drawings of artistic interest into another. To do this it was sometimes necessary to cut sketches of artistic interest from sheets whose contents were mainly scientific, but in these cases Leoni carefully repaired the sheets he had mutilated. The first of these volumes, the so-called *Codice Atlantico,* was bequeathed in 1637 to the Biblioteca Ambrosiana at Milan, where it remains. The second volume, after various vicissitudes, passed into the collection of the kings of England and is now at Windsor. In the 19th century the drawings, numbering about 600, were removed from Leoni's binding and have since been preserved in separate mounts, with the exception of the anatomical notes and drawings which have been rebound separately. A series of 12 small notebooks, most of which were bequeathed to the Ambrosiana at the same time as the *Codice Atlantico,* were looted with it by Napoleon's forces in 1796 but unlike it were never

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STUDY OF A NUDE MAN. IN THE BIBLIOTECA AMBROSIANA, MILAN

restored to Italy. They are now in the Institut de France and are referred to by letters—alphabetically, A to M.

These events explain why the great majority of Leonardo's drawings of artistic subjects are in one collection. Nevertheless, it must be assumed that a number would have left Leonardo's possession before his death and therefore would never have come into Leoni's hands, and it is a fact that the relatively few drawings which are not at Windsor are nearly all datable to the earlier period of Leonardo's career. These are now divided between various collections, the main ones being the British museum, the Uffizi, the Louvre and the Accademia in Venice. Such notebooks as are not in the Institut de France are likewise dispersed. Three are in the library of the Victoria and Albert museum, others are in the British museum and at Holkham, Turin and the Castello Sforzesco at Milan. (A full list of the manuscripts is printed in J. P. Richter, *The Literary Works of Leonardo da Vinci*, 2nd ed., vol. ii, pp. 400–401, 1939.)

The importance of the Windsor drawings lies not merely in their number and in their quality, but also in the fact that, as their provenance from Leonardo's possession is undoubted, they constitute the touchstone of authenticity for all the other drawings, as well as for the undocumented paintings, as has been shown.

In the last resort, it is on his drawings that Leonardo's claim to be considered one of the greatest of artists must chiefly rest. The importance of his paintings in the history of art is fully capable of proof in terms of their lasting influence on his successors, but their full merits can no longer be appreciated, since many are lost and others ruined or unfinished or darkened with time. With the drawings, on the other hand, no allowance need be made. An enormous quantity exist in good preservation and display a variety of range and a level of accomplishment that have never been approached by another artist. Leonardo used all media—pen and ink, metal points and red and black chalk—and is credited with the invention of pastel. His subjects comprised nearly the whole range of nature—studies of men and women, horses, dogs, trees, flowers, fruit and moving water, also fantastic monsters, caricatures, emblematic drawings, designs for pageants and anatomical, architectural and mechanical diagrams and maps. His characteristic technique included the famous left-handed hatching which in later life tended to be superseded by a system of shading apparently derived from engraving, with curved lines following the outlines of the form, parallel with each other and sometimes cross-hatched to give a greater effect of density.

Among the drawings which were not preparatory studies for paintings, a series of "Deluges" at Windsor call for special mention. They are undated but clearly from a late period of Leonardo's career. They represent aspects of a fantastic vision of a cataclysm and are without parallel in western art. The caricatures constitute another important class of unconnected drawings. All his life, Leonardo was fascinated by supreme ugliness as the complement of supreme beauty, and his most characteristic "doodles" are juxtaposed profiles of beautiful youth and toothless age.

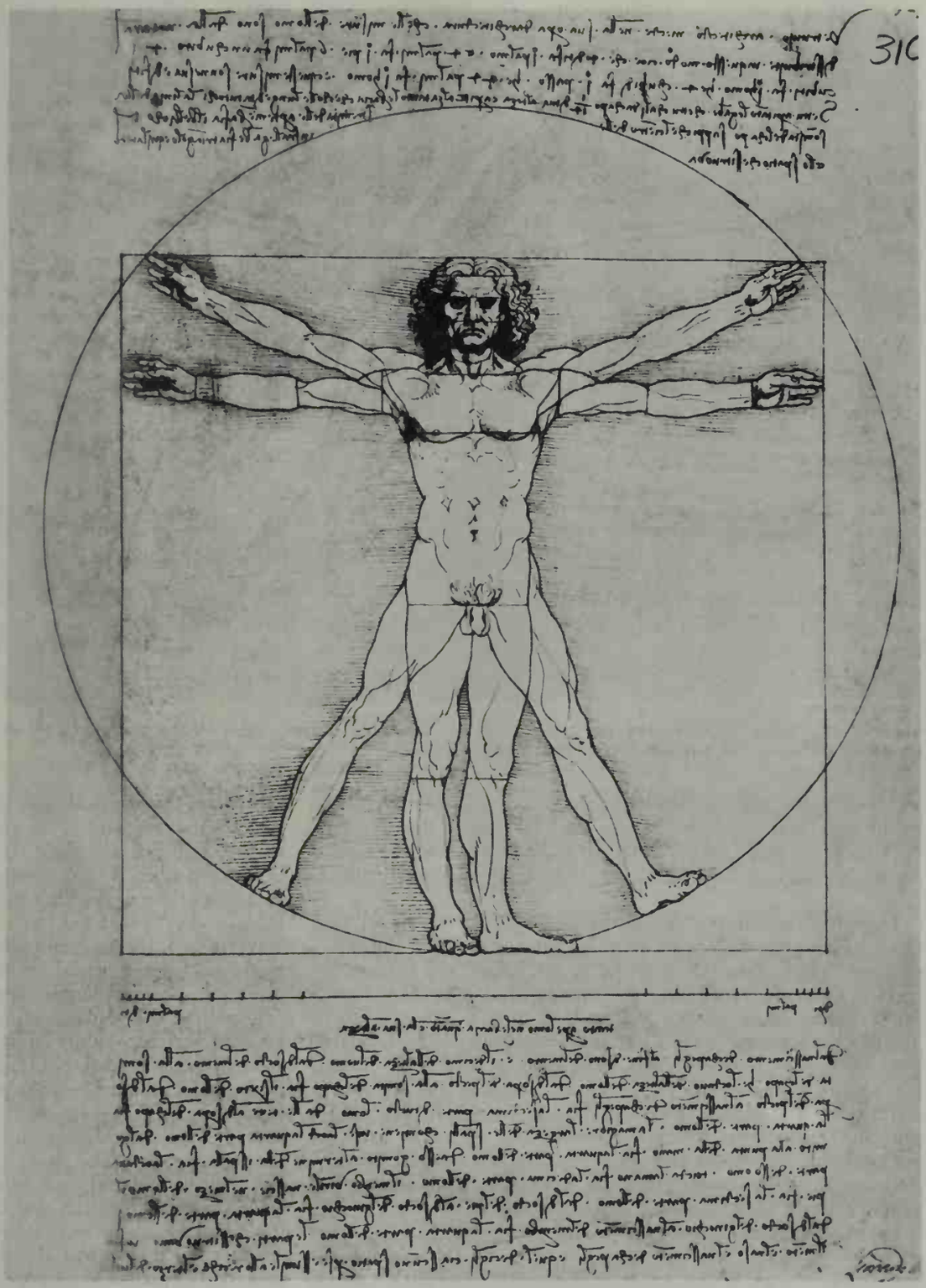
The notebooks (written in Leonardo's famous, left-handed "mirror script," from right to left) illustrate the development of his varied interests and constitute the evidence for his achievement as a scientist. In this connection, two facts are of pre-eminent importance. First, with a few unimportant exceptions, all the (very voluminous) notes date from about the last 30 years of Leonardo's life. Secondly, the bulk of their contents, like the bulk of the drawings, was not published until the 19th century. Although it is possible that some of Leonardo's scientific notes dating from a relatively early stage may have been lost, the quantity is unlikely to have been considerable. Everything, on the other hand, points to the conclusion that serious scientific interests started relatively late in Leonardo's life and that they increased with the years. As a consequence of the second point,

BY COURTESY OF THE BIBLIOTECA AMBROSIANA, MILAN

DRAWINGS IN RED CHALK: AN OLD MAN'S PROFILE, FOR A CARICATURE: AND FRONT VIEW OF A YOUNG GIRL, FOR A PORTRAIT. IN THE BIBLIOTECA AMBROSIANA, MILAN

Leonardo's scientific researches may be said to constitute a backwater in the history of science. As most of them were unknown to the majority of his successors, their influence would have been very limited.

Leonardo's notes give evidence that he intended to write connected treatises on a number of different branches of science, but though he started rearranging his notes to this end and finished, according to Luca Pacioli, a book "on the depiction and movements of men," no finished book by him survives. He collaborated with Pacioli on the latter's *Divina Proportione* and illustrated the 1509 edition, but most of his own writings are in the form of disconnected paragraphs embodying the results of his original, and astonishingly acute, observations. Frequently, he sets himself hypothetical problems in order to have the pleasure of answering them, and frequently the delight in ingenuity for its own sake leads him to design fascinating contraptions which could never have worked at the time. Thus, he projected diving bells, underground canals in town planning and every sort of military gadget, including chariots with varieties of revolving knives on the axles. The eternal small boy in him led him on one occasion (manuscript B, folio 11, r) to give detailed, and perfectly serious, instructions for making and launching stink bombs. He devoted prolonged thought to the subject of flying machines (also experimenting, without success, in this field) and made detailed observations relating to geology, geography, astronomy and botany. In architecture his notes comprise not only the ideal—countless variations on the favourite architectural preoccupation of the Renaissance, the centralized church, or plans for a model city—but also practical scientific notes on stresses of arches, walls and columns. One of his most ingenious architectural devices—the multiple staircase around a common core, whereby different individuals or parties could ascend or descend at the same time without being aware of each other—was executed, soon after his death, at Chambord and therefore presumably derives from his ideas.

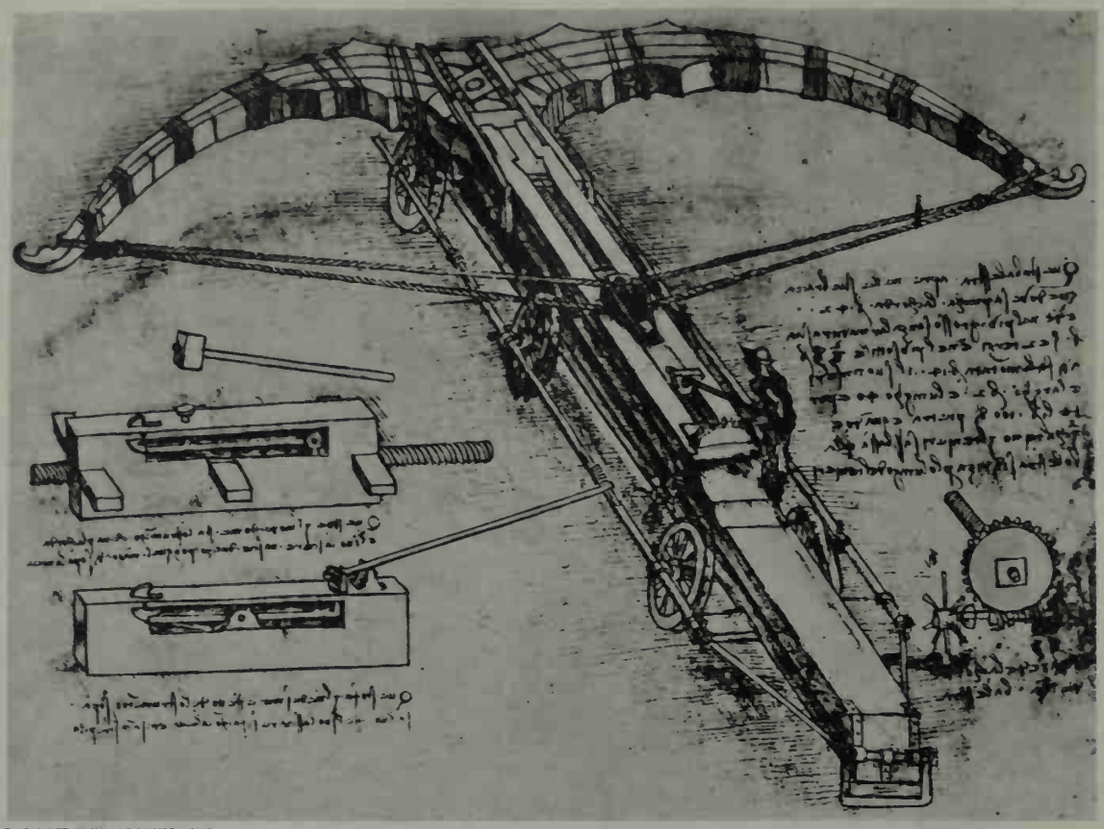


THE BETTMANN ARCHIVE, INC.

MANUSCRIPT ILLUSTRATION OF "THE PROPORTIONS OF MAN." *c.* 1509. IN THE ACADEMY OF FINE ARTS, VENICE

Of all Leonardo's many scientific studies, three in particular stand out for the amount of time and attention he paid them, namely anatomy, light and shade and the movement of water. In these fields and in his other notes Leonardo's great distinction is the truly scientific nature of his method. Unlike most of his predecessors and contemporaries he takes nothing on trust and has faith only in his own observations and experiments. If he quotes a classical authority it is often merely to disprove him from his own researches. At the same time, his main scientific studies tend to be interrelated with his artistic interests. His studies of both anatomy and light and shade seem initially to have developed from his practice as an artist, and his ultimate discoveries in these fields were intended to be embodied both in scientific treatises and in his projected treatise on painting. As regards anatomy (in connection with which Leonardo claimed to have dissected "more than 30 bodies"), he specifies that skill in being able to draw one's dissections as one proceeds is an essential element of success and one not possessed by everyone. (His own anatomical drawings are sometimes of extraordinary beauty and nearly always of extraordinary precision.)

It is agreed that Leonardo's anatomical researches and those of Marcantonio della Torre, a celebrated anatomist with whom he collaborated for a time, were in advance of all contemporary work of the same kind and scientifically the equal of anything that appeared until well into the 17th century; further, that Leonardo



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DRAWING OF A MECHANICALLY OPERATED GIANT CROSSBOW DESIGNED *c.* 1500, FROM "CODICE ATLANTICO" BY LEONARDO DA VINCI. IN THE BIBLIOTECA AMBROSIANA, MILAN

was well on the way to discovering the principle of the circulation of the blood and only failed to take the final steps in this direction. A claim often made on his behalf, that he anticipated the Copernican discovery of heliocentricity, is probably without justification.

Leonardo's astonishing skill at drawing, again, is the aspect most interesting to the modern world of his lifelong study of the movement of water, since his drawing of its eddies and bubbles remained a unique record until the coming of slow-motion photography. Here again, science and art tend to flow into each other. The practical application of his studies was attempted by Leonardo in his various projects for canals. But in one of his most illuminating notes (Windsor, no. 12,579 r) he compares the motion of water with the curls in human hair, and though he attempts a scientific justification for this it needed the eye of an artist to notice the analogy in the first place. Finally, his famous "Deluge" drawings show the transposition into pure fantasy and pure art of years of study of water from a scientific point of view.

Leonardo's notes on painting, which incorporate among other things his discoveries in the science of light and shade, stand out among his writings in two respects. First, after Leonardo's death, attempts were made as early as the 16th century to reduce them to order and prepare them for publication. The earliest and fullest of these compilations, the *Codex Urbinas*, drew on autograph notes, most of which have since been lost, and reads more connectedly than any of Leonardo's other writings. Secondly, a shorter compilation of the kind was published in Paris as early as 1651 (with illustrations by Nicolas Poussin) and was thus able to exert influence denied, through lack of publication, to the bulk of his writings. Though some of the book—such as the plea for painting as an intellectual and scientific activity rather than a mechanical one—is of ephemeral interest, it contains much of permanent value. Leonardo's basic point of view, as always, is empirical. The practice of painting must rest on the study of nature, but, as always with him, science and fantasy interact in the strangest ways. The action of light is scientifically demonstrated in innumerable diagrams, but the student is also enjoined to study pictures in the fire, whereby his imagination may be stimulated in an infinite variety of ways.

Certain of Leonardo's imaginative ideas for paintings—such as his fantastic descriptions of night-pieces, with the figures lit up by flames—were not exemplified until the 17th century, while his scientific observation that shadows cast by the sun on a white wall are not black or gray but blue was later regarded as one of the fundamental discoveries of the Impressionists.

Among the most influential of Leonardo's ideas is his theory of appropriateness in a picture. A king should look like a king, and a figure's gestures clearly express his thoughts (Leonardo even recommended the study of deaf mutes in this connection). This was the aspect of his teaching which had the greatest effect on 17th-century France, while Leonardo's embodiment of it in his own work, notably the "Last Supper," exerted enormous influence on High Renaissance painting, as constituting one of the keynotes of the grand manner. In this, Leonardo, who had none of the romantic feeling for antiquity otherwise prevalent among his contemporaries, seems to have recognized the practical assistance which antique art could provide.

If the development of the grand manner was the most important respect in which Leonardo da Vinci influenced the course of art in his own time, it also represented only a small part of him. A vast proportion of his life's work remained unknown until modern times, and even that was but a fraction of what it might have been. Nevertheless, the contradictions and anomalies of his nature—the modernity of so much of his outlook, combined with the instances of almost medieval fantasy and general love of the grotesque, the emphasis on the value of experience and practice contrasted with his own striking failure in so many practical matters and the sudden and unpredictable transitions from one to another of his innumerable interests—make up a personality which continues to fascinate precisely because it continues to baffle. To the 20th century, moreover, Leonardo's habit of leaving unfinished, merely through dissatisfaction, work that seemed miraculous to everyone else may well appear as a neurosis evocative of sympathy. The astonishing combination that he was of the infinitely curious and the infinitely inventive could not have flourished before the Renaissance but it then was already too late. Already, the ascertainable total of human knowledge and human experience exceeded the compass of one human intellect.

The tragic disparity between what Leonardo so clearly was and the fragmentary nature of his surviving achievement might have been treated by the Greeks as an epic of the punishment by the gods of presumption and, like the Faust legend with which Leonardo's destiny, viewed in this light, has so much in common, has maintained its power to fire the imagination of modern man.

See also references under "Leonardo da Vinci" in the Index.

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LEONCAVALLO, RUGGIERO (1858–1919), Italian opera composer whose fame rests on the opera *I Pagliacci,* which, with Mascagni's *Cavalleria rusticana* (1890), represented a reaction in the last decade of the 19th century against Wagner and romantic Italian opera; both works substituted for the quasi-historical plot a sensational story from everyday life. Born on March 8, 1858, at Naples, Leoncavallo studied at the conservatory there. After graduating he supported himself by playing at café concerts and giving lessons in singing and piano playing. During this time he worked on the composition of an opera based on Alfred de Vigny's *Chatterton* and also on *I Medici,* the first part of a projected trilogy inspired by the Italian renaissance. These works failed to attract attention and he accordingly composed *I Pagliacci* under the spell of the *verismo* style of Mascagni. It was produced at the Teatro dal Verme, Milan, on May 21, 1892, and achieved an immediate success. As a result *I Medici* was given there the following year. An opera based on Murger's *La Vie de Bohème* (Venice, 1897) suffered from comparison with Puccini's work on the same subject produced the previous year. *Zazà* (Milan, 1900) was more successful, but an ambitious work, *Der Roland,* commissioned by the German emperor Wilhelm II to glorify the Hohenzollerns and produced in Berlin in 1904, revealed Leoncavallo's deficiency in musical inspiration. A number of slighter works followed in which he did not attempt to transcend his powers and which achieved passing success. For most of his operas he was his own librettist and here he showed a distinct literary ability together with a flair for theatrical effect. Had these gifts been matched by a corresponding musical imagination he would be remembered by works more subtle than the popular though somewhat brutal *I Pagliacci.* He died at Montecatini Terme, near Florence, on Aug. 9, 1919. (Dy. H.)

LEONIDAS, king of Sparta of the Agiad house, succeeded his half-brother Cleomenes I (*q.v.*) probably in 490 B.C. He was married to Cleomenes' daughter Gorgo, and may have sympathized with his policies. He commanded the small Greek force which resisted Xerxes' Persian army at Thermopylae in 480. On the third day, retaining only part of his force, he fought to the last; whatever the purpose of this heroic stand, it made a deep impression on the Greek imagination and gave rise to the legend that Spartans never surrendered. (A. As.)

LEONIDAS OF TARENTUM (fl. 3rd century B.C.), Greek poet whose importance depends more on his influence on the later Greek epigram than on intrinsic merit. Though probably not, as is usually held, born as early as 315 B.C., he is among the earlier Hellenistic epigrammatists, and is not known to have written anything but epigrams. About 100 survive, preserved, with two exceptions, in the *Greek Anthology.* They contain little information about their author. He speaks of himself as an impoverished wanderer who expected to die far from home.

Leonidas, who writes usually in elegiacs but occasionally in iambics, is a facile versifier but seldom more. Not many of his sepulchral or dedicatory epigrams can have been intended for inscriptions; the deaths often seem contrived, the dedications excuses for listing the implements or products of humble trades tricked out with fancy adjectives. For generations after his death epigrammatists who lacked inspiration continued to ape his manner and to compose variations on his epigrams.

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LEONINE VERSE. Verse in which a word at or near the middle of the line rhymes with the end of the line, a device employed, in particular, in early medieval Latin verse; *e.g.,*

> larga maneto tu*is* semper clarissima serv*is*
> qui tibi mente can*unt* carmen et ore fer*unt*.

(L. P. E. P.)

LEONOWENS, ANNA HARRIETTE (1834–1914), British writer best known as the tutor employed by King Mongkut of Siam for the instruction of his children, including his son and successor, Prince Chulalongkorn. She was born in Caernarvon, Wales, on Nov. 5, 1834, and was taken to the far east at the age of 15. There she met and married Maj. T. L. Leonowens of the Indian army. After the major's death in 1858, Mrs. Leonowens (whose maiden name had been Crawford) lived in Singapore with her two children until she was invited to her Siamese position in 1862. She spent five years (1862–67) as part of the royal household. After leaving Siam, she traveled, wrote and lectured. During these years she published two books: *The English Governess at the Siamese Court* (1870) and *The Romance of Siamese Harem Life* (1872). She spent the last years of her life with her daughter in Halifax, Nova Scotia. She died on Jan. 19, 1914, in Montreal, Que.

Mrs. Leonowens' experiences in Siam as described in her writings inspired a popular book by Margaret Landon, *Anna and the King of Siam* (1944); a musical play by Richard Rodgers and Oscar Hammerstein, *The King and I;* and two motion pictures.

(C. A. B.)

LEONTEV, KONSTANTIN NIKOLAEVICH (1831–1891), Russian essayist who questioned the benefits derived by Russia from following contemporary industrial and egalitarian developments in Europe, was born near Kaluga on Jan. 13, 1831. He studied medicine at Moscow university and served throughout the Crimean War as a military surgeon. In 1863 he entered the Russian consular service, where he held posts in Crete, Edirne and Salonika. In 1879 he became assistant editor of the newspaper, *Warsaw Diary,* and a year later he joined the staff of the Moscow censorship department. In 1887 he settled in a small house near the Optina monastery, where he secretly took monastic vows but never lived under strict monastic discipline. He died near Moscow on Nov. 12, 1891.

Leontev wrote with a clarity and a persistent personal conviction rare among Russian political thinkers. He tried to find in the Russian empire an alternative which could civilize an eastern world that already recoiled from the commercial-minded, democratic west. He elaborated this analysis and his answer to it in a number of remarkable essays in periodicals, such as "Byzantinism and Slavdom" (1875), "The Average European as the Ideal and Instrument of Universal Destruction" (1884) and "Racial Politics as a Weapon of World Revolution" (1888). Many of these were collected in the volume *Vostok, Rossiya i slavyanstvo* (1885–86; "The East, Russia and Slavdom"). He urged that recent social development of the west, far from providing the east with an example of what to follow, gave the grimmest warning of disintegration and decay. Russia, in Leontev's opinion, could still save itself and others from this moral infection if it stood firm and acted on its own initiative. Russian autocratic power, allied with traditional Orthodox religion, provided for him the only trustworthy guide into an otherwise chaotic future.

See Collected Works (1912–14); N. Berdyayev, *K. Leontiev,* Eng. trans. by G. Reavey (1940). (R. Ha.)

LEONTIASIS OSSEA, a rare disease characterized by a bilateral, symmetrical overgrowth of the bones of the face and skull, producing a lionlike facial expression. *See* ACROMEGALY.

LEONTINI (modern LENTINI), an ancient town of southeastern Sicily, 22 mi. N.W. of Syracuse, founded by Chalcidians from Naxos in 729 B.C. The site, originally held by the Sicels, was seized by the Greeks because of its command of the fertile plain on the north. It was reduced to subjection by Hippocrates of Gela (ruled 498–491), and in 476 Hieron of Syracuse established there the inhabitants of Catana and Naxos. Later on Leontini regained its independence. It was mainly the eloquence of Gorgias (*q.v.*) of Leontini which led to the abortive Athenian expedition of 427.

In 422 the Syracusans supported the oligarchs against the people and received the former as citizens, Leontini itself being abandoned. The exiles of Leontini then joined the envoys of Segesta in persuading the Athenians to undertake the great expedition of 415. After its failure, Leontini became subject to Syracuse once more. It was stormed by M. Claudius Marcellus in 214 B.C., taken by the Saracens A.D. 846/847, and almost totally ruined by the earthquake of 1693.

The ancient city is described by Polybius (vii, 6) as lying in a valley between two hills and facing north. There was an acropolis

on each side of the valley, between precipitous hills with flat tops, over which buildings had extended.

The official excavations of 1950 onward filled in the details and with the help of finds in the graves established the chronology and cultural phases, which included a Sicel hut village on the eastern acropolis; this hill still has considerable remains also of a strongly fortified medieval castle (the Castellaccio).

The present Lentini, lying somewhat to the northwest, with over 20,000 inhabitants, maintains the tradition of the prosperous centre of a rich agricultural area. (A. W. V. B.; X.)

LEONTIUS OF BYZANTIUM (d. *c.* 545), also called HIEROSOLYMITANUS (as a monk of Jerusalem) and SCHOLASTICUS (probably as having been trained as a lawyer, though he also introduced Aristotelian distinctions into theology and so is one of the forerunners of medieval scholasticism), anti-Monophysite theologian, whose thought, though developed in controversy, remains of positive significance. His principal work, *Libri III contra Nestorianos et Eutychianos,* develops the idea of enhypostasia, the intimate union of human nature and divine person in Christ, important in the controversies of the age of Justinian and in later orthodox theology. Little is known of Leontius' life besides his participation in a conference of Chalcedonians (Greek Orthodox) and Monophysites at Constantinople in 531. He wrote against the leading Monophysite (*see* MONOPHYSITES) Severus of Antioch, *Solutio argumentorum Severi* (though his own ideas combined the Monophysite emphasis on the unity of Christ with the doctrine of two natures laid down at the Council of Chalcedon in 451), and against the opposite heresy, *Tractatus adversus Nestorianos.* The compendious *De sectis* is by a later hand, but perhaps based on his notes.

Leontius' collected works are found in J. P. Migne, *Patrologia Graeca,* vol. lxxxvi, cols. 1185–2016.

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LEOPARD (*Panthera pardus*), a cat closely related to the lion, tiger and other large flesh eaters of the family Felidae, order Carnivora. It is often known as the panther, especially in India, and also was known formerly as the pard or pardus. The name leopard originally was given to the cat now called cheetah (the so-called hunting leopard), earlier thought to be a cross between the lion and the pard or panther; when the term pard fell into disuse, leopard replaced it. The leopard and panther are one and the same animal: the confusion in names apparently arose because of the great variation that occurs within the species.

C. A. SPINAGE FROM ANNAN PHOTO FEATURES

LEOPARD (PANTHERA PARDUS)

The leopard is found over nearly the whole of Africa south of the Sahara, in northeast Africa and from Asia Minor through central Asia and India to China and Manchuria. It varies greatly in size and markings, averaging about 110 lb. in weight, 7 ft. in length and 30 in. in height at the shoulder; these figures are often greatly exceeded, however. The coat is a shade of yellow, white on the underparts. The dark spots generally arranged in rosettes over much of the body are without the central spot characteristic of the South American jaguar; the ground colour within the rosettes is sometimes a darker yellow, and the size and spacing of the spots vary greatly. As a result of these variations in pattern, it has been erroneously supposed that there are several kinds of leopard.

Leopards are animals of the bush and forest and are agile tree climbers. They are mainly nocturnal in habit but sometimes bask in the sun. They feed upon any animals they can overpower, from small rodents to waterbuck, but generally prey on the smaller and medium-sized antelopes; they appear to have a special liking for dogs as food and, in Africa, for baboons. Leopards are usually solitary. They have no definite breeding season; the female produces from two to four, usually three, cubs after a gestation of about three months. Their calls vary and include a series of harsh coughs, throaty growls and deep purrs. They take to water readily and are good swimmers.

A black mutant, in which the ground colour, as well as the spots, is black, is well known as the black panther; it is commoner in the far east than in other parts of the range of the species. The allied snow leopard and the clouded leopard or clouded tiger (*q.v.*) are distinct species.

See CAT; CARNIVORE. (L. H. M.)

LEOPARDI, ALESSANDRO (fl. *c.* 1500), Venetian sculptor, goldsmith and architect, is famous chiefly as a worker in bronze. First mentioned in 1482, he was exiled from Venice in 1487, established himself at the court of Ferrara but was recalled the following year to cast the bronze equestrian statue of Colleoni, left unfinished at Verrocchio's death. He designed the very high and elaborate base for this group, signing the statue on the saddle girth, thereby becoming known as "Alessandro del Cavallo." He worked with Antonio Lombardo on the bronze tomb of Bishop Zeno in St. Mark's and possibly also collaborated with him and with Tullio Lombardo on the Vendramin tomb in SS. Giovanni e Paolo. From 1501 to 1505 he worked on the bronze bases for the flagstaffs in the piazza of St. Mark's, which are richly decorated with antique motifs. In architecture his outstanding achievement was the church of Sta. Giustina at Padua. (MN. L.)

LEOPARDI, GIACOMO (1798–1837), one of the greatest of Italian poets, was born at Recanati, near Ancona, on June 29, 1798, of a noble family. All the circumstances of his upbringing conspired to foster his precocious and sensitive genius at the expense of his health. Lacking any intelligent sympathy from his parents or any companionship save that of his brothers and sister, the sickly, deformed boy spent his days in his father's extensive library, learning Latin with little help and Greek and modern languages with none. By the end of 1814 he had already written two tragedies, many Italian poems, some erudite studies on Latin and Greek literature and a history of astronomy. But his weak constitution was permanently ruined.

He began to show his poetic powers with his *Appressamento della morte* (1816), a visionary work in *terza rima* modeled on Petrarch and Dante, but inspired by a genuine feeling of despair at the (imagined) approach of death. The young man was not yet a pessimist—he was on the contrary eager for life and love. In 1817, however, he fell seriously in love with his cousin Gertrude Cassi, already married and a mother, whom he made the subject of his journal *Diario d'amore* and of his elegy "Il primo amore." Next in 1818, a young girl of his father's household, Teresa Fattorini, for whom he felt a tender affection and about whom he was later to write his immortal song "A Silvia," died of consumption. These two experiences led him to regard all the hopes of youth as empty and deceptive illusions.

Leopardi's love of learning and of glory remained, however, and for a time he found comfort in correspondence with the scholar and patriot Pietro Giordani, who praised his works and urged him to escape from Recanati. At last his father allowed him to spend a few months in Rome (1822–23), but even there he found little satisfaction and no employment. After another two miserable years in Recanati, brightened only by the publication of a collection of his poems under the title *Canzoni* (1824), Leopardi went in 1825 to Milan and then to Bologna. He returned to Recanati late in 1826, but set off again to Bologna, Pisa and Florence in 1827. His *Versi,* an enlarged collection of his poems, appeared in 1826, and his chief prose work, *Operette morali,* consisting mainly of dialogues and containing an exposition of his philosophy of despair, in 1827. His literary earnings and his meagre allowance from his father being insufficient to support him, he returned again to Recanati in Nov. 1828. In April 1830, however, he was able to leave for Florence, where his friends raised a subscription so that he could publish a fuller collection of his poems. This was the first edition to be entitled *Canti* (1831). In Florence he met Fanny Targioni-Tozzetti, who inspired some of his saddest songs, and formed a friendship with a young Neapolitan Antonio Ranieri, who was to be his companion for the rest of his life. After a short stay in Rome (1831–32), followed by a return to Florence, Leopardi settled in Naples in 1833. There he worked on *I paralipomeni della Batracomiomachia* (a satire in *ottava rima* on the Neapolitan revolution of 1820), authorized the second edition of his *Canti* (1835) and wrote "La Ginestra" (1836), the longest of the poems included with the *Canti* in Ranieri's collected edition of Leopardi's works (1845). Leopardi died in Naples on June 14, 1837.

Works.—Leopardi was a great scholar and a great, if bitter, philosopher. His works of scholarship—notably his commentary on Petrarch's *Canzoniere* and his remarks on Italian literature—and his philosophical writings—*Operette morali, Pensieri* (edited by Ranieri, 1845) and *Zibaldone* (a long book of memoranda including critical and biographical notes first published in 7 vol., 1898–1900)—place him among the great writers of the 19th century, but his poems give him a claim to absolute greatness.

All Leopardi's poetical work, except the verse written before 1818 (which he himself rejected), *I paralipomeni* (of no great merit) and numerous translations, is included in the posthumous edition of the *Canti.* These contain 38 original poems, the longest of 300 lines, the shortest of 15. The first poems are patriotic in theme and eloquent rather than lyrical (the ode "All' Italia" is extremely popular in Italy). Then follows "Bruto minore," in which the poet identifies himself with Brutus and in words of utter despair defies the gods who did not take the side of freedom. In his "Ultimo canto di Saffo" he complains of the deformity which bars him from love. His lyrical genius, however, shines forth at its best in a series of five poems that had appeared in the early collections of his verse under the title "Idillii." One of these, "L'infinito," an inspiring meditation on infinity, is one of the finest achievements of lyric poetry; another, "La sera del dì di festa," on the transience of pleasure, describes movingly the sadness of a Sunday night when the holiday is over and everyone thinks of the next morning's toil.

"A Silvia," "Le ricordanze," "La quiete dopo la tempesta," "Il sabato del villaggio" and "Il passero solitario" (all written in 1828–29) can be counted with "L'infinito" as Leopardi's best poems. The profound sadness of their meaning in no way detracts from the charm of their portrayal of delicate things; the diction is simple and powerful, and the effortless musicality of the verse justifies their being called *canti* ("songs"). The first of these poems commemorated Teresa Fattorini, whose joyful singing used to delight the young Leopardi; the second evokes his childhood and contrasts his former hopes with his present misery; the third and fourth depict village life in the calm after the storm and on the eve of a festival; and the fifth is about a sparrow singing by itself on a fine spring day. They all end sadly but with a sadness that comes from the heart rather than from the cold reasoning of the mind.

In all the poems that Leopardi wrote after these the reasoning of the philosopher prevails over the poet's feelings. Though some have fine passages (especially "Canto notturno" and "Amore e morte"), they are marred by an excess of argument. "La Ginestra," Leopardi's last great poem, has often been called his masterpiece, but is more important for the new opening that it shows in his philosophical system of pessimism and despair and for its message of universal brotherhood than for any specifically poetical quality.

Leopardi's reputation at first suffered, in the English-speaking world, from a moralistic prejudice against his discouraging philosophy (*see* W. E. Gladstone, "Giacomo Leopardi," *Gleanings of Past Years,* vol. ii, 1879). Later British and American critics came to give him his due as a poet. There is a critical edition of Leopardi's works by F. Flora, 5 vol. (1937–49). This includes his letters (second in beauty only to the poems), of which there is a separate edition by F. Moroncini and G. Ferretti, 7 vol. (1934–41). For English versions of the *Canti,* see *The Poems of Leopardi,* with Italian text and translation by G. L. Bickersteth (1923); *Translations From Leopardi,* by R. C. Trevelyan (1941); and *Poems From Giacomo Leopardi,* by J. Heath-Stubbs (1946). For a portrait of Leopardi *see* ITALIAN LITERATURE.

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(F. DI.)

LEOPARD SOCIETIES form part of a magico-religious complex in which primitive communities make use of specific animals to bring them into closer relationship with the supernatural. In Africa, where the leopard is encountered in the wild as a powerful and dangerous animal, there were many leopard societies, of which the most renowned was the *anyota* society of the Bali tribe, eastern Congo.

The significance of these societies, and particularly of the *anyota,* has been grossly misunderstood. It has been popularly imagined that they existed for the sole purpose of murder and cannibalism. A detailed study, however, reveals that the *anyota,* and probably most of the lesser-known leopard societies, existed as an integral part of social structure, assisting in the enforcement of law and order, the preservation of tribal standards of morality, and above all in the maintenance of tribal unity.

The *anyota* members, who had to prove their courage when initiated as young men, were also normal members of tribal society. At times of crisis, however, by virtue of their initiation, they assumed responsibility for solving the crisis by communicating with the ancestors via their chosen medium, the leopard—the symbol of death and of the life beyond. Communication involved a process of physical and psychological identification. The body was adorned so that it resembled that of a leopard; the face was masked, metal claws were worn on the hands and a carved wooden stump was carried to leave leopardlike footprints.

In a trance, the leopard men behaved as if they thought like leopards and lay in wait for suitable prey. Just like the leopard they seemed unconcerned with whether their victims were good or evil; they chose the most vulnerable, usually women and children. They killed by piercing the jugular vein with their claws, and followed this with the ritual eating of a part of the body. The remains were left, again just as they would have been by a leopard.

The commonest occasion for such ritual killings was the death of a chief, when the tribe was split over the question of succession, and so the more vulnerable to outside attack. The horror of the act, and particularly of the eating of human flesh, and the knowledge that such acts would continue until the crisis was resolved, helped to bring about a rapid settlement with restoration of unity, and the leopard-men reverted to their normal position in the community. *See* also LYCANTHROPY; SECRET SOCIETIES, PRIMITIVE.

(C. M. T.)

LEOPOLD I (1640–1705), Holy Roman emperor from 1658 to 1705, was born on June 9, 1640, the second son of the emperor Ferdinand III and his first wife, Maria Anna, daughter of Philip III of Spain. Educated by Graf Johann Ferdinand Portia and, under his direction, by the Jesuits Christoph Müller and Johann Eberhard Nidhard (later cardinal), Leopold was intended for the church, but the death of his elder brother Ferdinand IV, king of

the Romans, in 1654, made him the heir to the throne. He was crowned king of Hungary in 1655 and king of Bohemia in 1656; and in July 1658, more than a year after his father's death, he was elected emperor at Frankfurt, despite French opposition. He was married three times: first, in 1666, to Margarita Teresa of Spain (1651–73); then, in 1673, to Claudia Felicitas of Habsburg-Tirol (1653–76); finally, in 1676, to Eleonore of Palatinate-Neuburg (1655–1720). Of his children by his first wife, only one survived infancy, namely Maria Antonia, who married the elector of Bavaria Maximilian II Emanuel; those by his third wife included the future emperors Joseph I and Charles VI.

BY COURTESY OF THE BILD-ARCHIV, ÖSTERREICHISCHE NATIONALBIBLIOTHEK, VIENNA

LEOPOLD I, ENGRAVING AFTER A DRAWING BY D. ZANETTI

Leopold was a man of peace and never directed his armies in person, but the empire was at war for the greater part of the 47 years of his reign (*see* AUSTRIA, EMPIRE OF; GERMANY: *History*). His main antagonist was his cousin Louis XIV of France. The imperial armies under the generals Raimund Montecuccoli, Charles V of Lorraine, Prince Louis of Baden and finally Prince Eugene of Savoy fought in Denmark and Poland against Sweden, on the Rhine and in Italy against the French and in Austria and Hungary against the Turks. The biggest triumph of Leopold's reign was the raising of the Turkish siege of Vienna (1683) and the subsequent reconquest of Hungary. Leopold was a convinced, devout Catholic, and his hard religious policy against the Protestants in Hungary caused him many difficulties. In the west, however, he eventually found himself forced by circumstances to join the Grand alliance with the Protestant sea powers, England and the Netherlands, against the Catholic Louis XIV, an alliance that remained a basis of Austrian foreign policy until the middle of the 18th century. Some important changes in the constitution of the empire were made during Leopold's reign. In 1663 the imperial diet entered upon the last stage of its existence and became a body permanently in session at Regensburg; in 1692 the duke of Hanover, Ernest Augustus, was made the ninth member of the electoral college; and in Nov. 1700 Leopold, in need of help for the impending war with France, granted the title of king in Prussia to the elector Frederick III of Brandenburg. The net result of these and similar changes was to weaken the authority of the emperor over the members of the empire and to compel him to rely more and more upon his position as ruler of the Austrian archduchies and of Hungary and Bohemia.

Leopold loved music and was himself a good composer. He was also interested in history and collected, with the help of his librarian Peter Lambeck, books, coins and antiquities. Under his sponsorship the Jesuit universities of Innsbruck, Olmütz and Breslau were founded. After the victories over the Turks many castles, churches and convents were built or rebuilt in the "imperial" baroque style, first by Italian, then by Austrian, architects. When the War of the Spanish Succession had broken out, Leopold, together with his elder son Joseph, in 1703 renounced his rights to the Spanish succession in favour of his younger son Charles. He died in Vienna on May 5, 1705.

See also references under "Leopold I" in the Index.

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LEOPOLD II (1747–1792), Holy Roman emperor from 1790 to 1792 after being grand duke of Tuscany, as Leopold I, from 1765 to 1790, was born in Vienna on May 5, 1747, the third son of Marie Therese and the emperor Francis I. As his second elder brother, Charles Joseph, had died in 1761, Leopold succeeded his father in Tuscany when his eldest brother became emperor as Joseph II in 1765. His father's sudden death threw a cloud over his wedding with the Spanish infanta Maria Luisa (Aug. 1765), but the marriage was happy and produced 16 children.

The 25 years that Leopold spent as ruler in Tuscany were used well by him in preparing himself for his later high office. In contrast to Joseph, he possessed neither a winning personality nor a brilliant intellect, but he was serious, careful of judgment, an enemy to haste. His tutor Karl Martini had the greatest influence on his intellectual development, and Leopold came to Florence filled with the ideas of the Enlightenment and the doctrine of natural law. There he made contact with the leading Italian law reformers and political scientists, notably with Cesare Beccaria. His view did not differ essentially from Joseph's, though they disagreed on details. They saw the aim of all government to be the improvement of the welfare of the people, but they differed about the paths which led to it. Whereas Joseph's slogan was "all for the people, nothing by the people," Leopold believed in a more constitutional form of monarchy. Though he did not succeed in realizing his ideas, his reforms raised the material and cultural life of Tuscany to a new height.

Joseph II died childless on Feb. 20, 1790, leaving Leopold as his next heir. It was not easy for Leopold to leave the "garden of Italy" and enter on his brother's shaky heritage. Joseph's hasty measures had lit dangerous fires in all his lands, which had first of all to be put out, and Leopold's task was aggravated by the difficult political situation in Europe: the French Revolution had virtually abrogated the Franco-Austrian alliance, and Prussia's hostility rendered imperative a withdrawal from the Turkish war, which, however, was hardly possible without the loss of Austria's only friend, Russia. By the convention of Reichenbach (July 1790), Leopold, by promising to renounce territorial gains from the Turks, obtained both a free hand from Prussia, Great Britain and the United Provinces to restore order in the Austrian Netherlands and Prussia's support for his election as emperor. Elected emperor in Sept. 1790, he made the peace of Sistova with Turkey on Aug. 4, 1791. Cautiously watching the explosive situation created by the French Revolution and Russia's threatening attitude to Poland, Leopold kept his monarchy free from all entanglements: it was only after the French king Louis XVI's flight to Varennes that he appealed to the European powers in defense of legitimate government; and he abandoned the planned intervention as soon as Louis XVI had taken his oath on the constitution. Finally, however, he concluded a defensive alliance with Prussia (Feb. 7, 1792) to protect his states against the expected French attack (*see* FRENCH REVOLUTIONARY WARS).

Since the convention of Reichenbach had ended the Belgian revolutionaries' hopes of foreign aid, Leopold could prevent the loss of this important outpost by restoring the constitution as it had been before Joseph II's reforms. He counteracted the nationalistic demands of the Hungarian diet by favouring the "Illyrian nation," namely the Serbs, and by detaching Transylvania from Hungarian administrative control. His practice was always to agree to demands that were politically harmless but to refuse all those that encroached on his power as ruler of the Habsburg territories. Thus, when he died unexpectedly in Vienna on March 1, 1792, he left an undiminished heritage to his son Francis. He had not only safeguarded the possessions of his dynasty despite strong threats from other powers but also made the foundations of Habsburg power again so secure that the old empire withstood the first assault of revolutionary France. *See* also references under "Leopold II" in the Index. (FH. WR.)

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LEOPOLD II, DETAIL FROM A PORTRAIT BY JOSEF KREUTZINGER, C. 1790

LEOPOLD I (1790–1865), king of the Belgians from 1831 to 1865, was born at Coburg on Dec. 16, 1790, the fourth son of Francis, duke of Saxe-Coburg-Saalfeld. At the age of 18 he entered the military service of Russia and accompanied the emperor Alexander to Erfurt as a member of his staff. Required by Napoleon to quit the Russian Army, he spent several years in traveling, but took part in the whole of the campaign of 1813–14, distinguishing himself in the battles of Leipzig, Lützen, and Bautzen. At the end of the Napoleonic Wars he entered Paris with the allied sovereigns and accompanied them to England.

ARCHIVES PHOTOGRAPHIQUES, PARIS

LEOPOLD I. PORTRAIT BY LIÉVEN DE WINNE IN THE BRUSSELS MUSEUM

He married in May 1816 Charlotte, only child of the future king George IV of Great Britain and thus heiress presumptive to the British throne. After the death of the princess in 1817 he continued to reside in England. He declined the crown of Greece in 1830. He was elected king of the Belgians on June 4, 1831, and accepted after assuring himself of the support of the great powers.

On July 21 in Brussels he took the oath to observe the constitution. He showed great courage during the disastrous Ten Days' War in the following August. During the first eight years of his reign he was confronted with the resolute hostility of King William I of the Netherlands, and it was not until 1839 that the differences between the kingdoms were finally settled (*see* BELGIUM: *History*).

From that date until his death, King Leopold spent all his energies in the wise administration of the affairs of the newly formed kingdom. In 1848 the throne of Belgium stood unshaken amidst the revolutions which marked that year in almost every European country. On Aug. 9, 1832, Leopold married, as his second wife, Louise of Orléans, daughter of Louis Philippe, king of the French. Of this union were born Leopold, afterward king as Leopold II (*q.v.*); Philip (1837–1905), count of Flanders; and Charlotte (1840–1927), better known as Carlota, who married Maximilian of Austria, the unfortunate emperor of Mexico.

Leopold I died at Laeken on Dec. 10, 1865. He was a cultured man, who encouraged art, science, and education. His judgment was universally respected by contemporary sovereigns and statesmen, and he was frequently spoken of as "the Nestor of Europe." The uncle both of Queen Victoria of Great Britain (daughter of his sister Victoria) and of her consort Albert (son of his brother Ernest), Leopold maintained a close friendship and a regular correspondence with Queen Victoria, although she never encouraged any interference in English politics.

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LEOPOLD II (1835–1909), king of the Belgians from 1865 to 1909, also sovereign of the Congo Free State from 1885 to 1908, was born in Brussels on April 9, 1835, the eldest son of Leopold I by his second wife, Louise of Orléans. Created duke of Brabant in 1846, he served in the army in his youth and traveled in Egypt, India, and China. In 1853 he was married to Marie Henriette (1836–1902), daughter of the Austrian archduke Joseph, palatine of Hungary. He took his oath as king of the Belgians on Dec. 17, 1865, a week after his father's death.

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LEOPOLD II

The internal affairs of Belgium during Leopold II's reign were marked by increasing conflict between the political parties, culminating in the revision of the constitution, with a modification of the electoral system on more democratic lines (*see* BELGIUM: *History*). The development and improvement of Brussels itself, meanwhile, owed much to the king's own interest.

In foreign affairs, Belgium's neutrality during the Franco-German War of 1870–71 was maintained with the help of British diplomacy: new conventions between Great Britain and the belligerents made it clear that any violation of the Belgian frontier would be regarded as a reason for war. Leopold, however, remained anxious to strengthen his country's defenses, the more so as the danger of a European war seemed to be increasing in the latter years of his reign. The fortification of the cities of Liège, Namur, and Antwerp bore witness to this preoccupation; and on the eve of the king's death Parliament resolved to make military service compulsory.

The most notable event of Leopold's career was the establishment of the Congo Free State (État Indépendant du Congo) (*see* BELGIAN CONGO). Concerned from the outset of his reign with his country's economic advancement, he was determined that Belgium should have a share in the colonial expansion of Europe overseas. He gave the first impulse to the development of the idea of colonizing the Congo by founding the Association Internationale Africaine in 1876 and by engaging the famous explorer H. M. Stanley to undertake a survey of the Congo Basin. Leopold became sovereign of the vast new territory in 1885; but his exploitation of it was subjected to hostile criticism on the grounds of atrocities against the Africans, and in 1908 it became a Belgian colony.

Leopold II died at Laeken on Dec. 17, 1909. As his son Leopold (1859–69) had predeceased him, he was succeeded by a nephew, Albert I. His eldest daughter Louise (1858–1924) had been divorced from her husband, Prince Philip of Coburg, in 1906; his second daughter, Stéphanie (1864–1945), widow of the Austrian crown prince Rudolf, had married the Hungarian count Elémer Lónyay in 1900; his third daughter, Clémentine (1872–1950), was married in 1910 to Prince Napoléon (Napoléon Victor Jérôme Bonaparte). Leopold II's own domestic life had been unhappy, and his personal reputation was not enhanced by his numerous amours.

See Louis de Lichtervelde, *Leopold of the Belgians,* Eng. trans. (1929).

LEOPOLD III (1901–), king of the Belgians from 1934 to 1950, was born in Brussels on Nov. 3, 1901, the son of Albert I and his consort Elisabeth of Bavaria. He was educated in England, at Eton, and served as a private soldier during the final campaign of World War I. On Nov. 10, 1926, he married Princess Astrid of Sweden (1905–35); and of this marriage were born Joséphine-Charlotte (1927–), Baudouin (1930–) and Albert (1934–). Leopold became king of the Belgians on his father's death on Feb. 17, 1934. Favouring a policy of strict neutrality for his country, Leopold severed the defensive alliance with France after the German occupation of the Rhineland in 1936 and fortified the frontier. He assumed the supreme command of the Belgian Army at the outbreak of World War II. After the German invasion and the encirclement of the Allied forces in Abbeville, Leopold informed the British Gen. Viscount Gort, on May 26, 1940, that he would have to surrender if no immediate help was

forthcoming. He did in fact surrender during the night of May 27–28. The Belgian government declared the king's action illegal and moved to London. The Germans held Leopold a prisoner at Laeken until June 7, 1944, when they took him to Germany. Meanwhile, on Sept. 11, 1941, he had morganatically married Marie Liliane Baels (1917–), an industrialist's daughter, whom he created Princesse de Réthy; of this marriage were born Alexandre (1942–), Marie Christine (1951–) and Marie Esmeralda (1956–). After the liberation of Belgium by the Allies in 1944, the Belgian Parliament appointed Leopold's brother Charles to be regent pending a decision as to the king's return. At a plebiscite held on March 12, 1950, the king obtained a majority of 57.68%; and he returned to Brussels on July 22, 1950. His resumption of power, however, was resented by Socialists and Liberals unanimously; and because of the general unrest in the country Leopold announced on Aug. 1 that he had handed over his sovereignty to his son Baudouin, who took the constitutional oath ten days later. (JE. D.)

DALMAS FROM CAMERA PRESS

LEOPOLD III

LEOPOLD II (1797–1870), the last reigning grand duke of Tuscany, was born in Florence on Oct. 3, 1797, the second son of the grand duke Ferdinand III, of the house of Habsburg-Lorraine. His elder brother having died in 1800, he became grand duke on his father's death (June 18, 1824). For the first 20 years of his reign he showed himself less reactionary than Italian rulers of the period, allowing a free press and letting political exiles from other states live undisturbed in Tuscany. After food riots in 1845–46 he granted some administrative reforms.

The election in 1846 of Pope Pius IX, who had a reputation for liberalism, gave a new impulse to the liberal movement throughout Italy (*see* ITALY: *History*). In accordance with this movement, Leopold instituted a national guard (September 1847), appointed Cosimo Ridolfi as his prime minister, and finally granted a constitution to Tuscany (February 1848). Then popular pressure forced him, in April 1848, to send a Tuscan contingent to cooperate with the Sardinian-Piedmontese against the Austrians in Lombardy (*see* ITALIAN INDEPENDENCE, WARS OF): his speech on its departure was uncompromisingly on the side of Italian patriotism. The first Tuscan Parliament met on June 26. Ridolfi resigned in August and Gino Capponi, who had been the author of the constitution, was appointed prime minister. Disorders within Tuscany itself grew worse, however, and Leopold had eventually to accept a "democratic" ministry under Giuseppe Montanelli and Francesco Guerrazzi (October 1848).

While the new ministry was proceeding with plans for a constituent assembly, Leopold withdrew from Florence to Siena (Jan. 30, 1849) and then to Porto S. Stefano (Feb. 7), informing Guerrazzi that he could not agree to the assembly because the pope, now a refugee from Rome, objected. Two weeks later he took refuge with the pope at Gaeta. Then the Austrian victory over the Piedmontese at Novara (March 23) alarmed the Tuscans: Guerrazzi was for a short time made dictator in Florence, but in April the grand duke was invited to return.

MANSELL-ALINARI

LEOPOLD II, PORTRAIT BUST BY OTTAVIANO GIOVANNOZZI, 1846; IN THE UFFIZI GALLERY, FLORENCE

Austrian forces, secretly authorized by Leopold, intervened in Tuscany, entering Florence on May 25, 1849. Leopold himself, who on May 24 had appointed Giovanni Baldasseroni as prime minister, returned on July 28. He signed a treaty allowing the Austrians to maintain 10,000 men in Tuscany for an indefinite period, prorogued the Parliament (September 1850), made a concordat with the papacy that greatly enhanced clerical influence (April 1851), and finally revoked the Tuscan constitution (May 1852). The Tuscan revolutionaries, including Guerrazzi, were sentenced to long terms of imprisonment.

The Austrian occupation ended in 1855, but Leopold's prestige was irreparably damaged. When France and Sardinia went to war against Austria in 1859, the Tuscans demanded that he should support them. Instead, on April 27, he quietly retired to Bologna in Lombardy; and on July 21 he abdicated in favour of his son Ferdinand IV, who never reigned in fact. Leopold died in Rome on Jan. 29, 1870. He had had three daughters by his first marriage (1817), to Maria Anna of Saxony; and ten children by his second (1833), to Maria Antonia of Sicily.

LEOPOLD, CARL GUSTAF AF (1756–1829), Swedish poet and critic who succeeded J. H. Kellgren as the exponent of classical taste and rationalism, was born March 26, 1756, at Stockholm. He studied at Uppsala and Greifswald. In 1786 he became a member of the Swedish Academy and in 1799 was appointed principal private secretary to Gustavus IV. He was ennobled in 1809 and died in Stockholm, Nov. 9, 1829.

His real literary career began in 1792 and thereafter he propagated the ideas of the Enlightenment in skilful articles and essays, chiefly published in newspapers and periodicals. His lofty resignation of character did not prevent him from being fierce in attack and in parrying the criticism of the younger romantics. His philosophical didactic poetry is seen at its best in *Forsynen* ("Providence," 1793), a thought-provoking reflective ode, revealing mature experience of life.

The complete edition of Leopold's *Samlade skrifter* appeared in six volumes (1814–33).

See A. Sjoding, *Leopold den gustavinnske smakdomaren* (1931); A. O. Holmberg, *Leopold* (1953 *et seq.*). (S. E.)

LEOPOLD, JAN HENDRIK (1865–1925), Dutch poet and the purest and most individualistic member of the last stage of the Dutch literary revival of the 1880s, was born at 's Hertogenbosch on May 11, 1865. His deafness may in part account for the sensitive introspection of his lyrical poetry. Herman Gorter and perhaps Pieter Boutens influenced him, but the delicacy of his meditative verse is unique. Later he read and translated Oriental poetry, including passages from the *Rubaiyat* of Omar Khayyam, yet his epic poem *Cheops* (1915) suggests that a stoical attitude cannot be imposed on a creative spirit as vulnerable as his. Leopold died at Rotterdam on June 21, 1925.

See J. H. Leopold, *Verzameld Werk*, 2 vol. (1951–52). (P. K. K.)

LÉOPOLDVILLE (Congo): *see* KINSHASA.

LEOTYCHIDES (LEOTYCHIDAS), Spartan king, of the Eurypontid family, in 491 B.C. succeeded Demaratus (*q.v.*), whose title to the throne he had successfully challenged with the help of the other king, Cleomenes I. He took part in Cleomenes' second expedition to Aegina, on which ten hostages were seized and handed over to the Athenians for safe custody; for this he narrowly escaped being surrendered to the Aeginetans after Cleomenes' death. In the spring of 479 he commanded the Greek fleet of 110 ships, first at Aegina and afterward at Delos. Later the same year he attacked the Persian position at Mycale on the coast of Asia Minor opposite Samos, defeated the army and annihilated the fleet which was drawn up on the shore. Soon afterward he sailed home with the Peloponnesians, leaving the Athenians to prosecute the siege of Sestos. Perhaps in 476, he led an army to Thessaly to punish the leading family there, the Aleuadae, for helping the Persians and to strengthen Spartan influence in northern Greece, but was bribed to withdraw. For this he was tried at Sparta, and fled to the temple of Athena Alea at Tegea. Sentence of exile was passed, his house was razed, and his grandson Archidamus II ascended the throne. He died probably in 469.

An earlier king of the same name fought in the Second Messenian War.

LEOVIGILD (d. 586), the last Arian ruler in Visigothic Spain, did much to restore the extent and power of the Visigothic kingdom. Brother of King Athanagild (d. 567), Leovigild succeeded (568) to that part of the Visigothic kingdom which lay south of the Pyrenees. Another brother, Liuva, ruled in Septimania, but after his death (572) Leovigild became sole king. Throughout his reign he was constantly at war. He took (569) León and Zamora from the Suebi in the northwest and Cordoba (571–572) from the Greeks in the south. One of Leovigild's sons, Hermenegild, married Ingonthe, daughter of Brunhilda and of the Frankish king Sigebert, and was converted by her to Catholicism. He received support from his father's enemies and Leovigild had to fight on all fronts. He defeated the Suebi, ultimately annexing their kingdom, and after a two-year siege he wrested Seville from the Byzantines (581–583). Hermenegild was executed in 585, his wife fleeing to Africa. On a pretext of avenging her treatment, the Frankish kings Childebert II and Guntram attacked Septimania and sent a fleet to help the Suebi; they were repulsed by Leovigild. He died at Toledo in April or May 586 and was succeeded by his remaining son Reccared.

LEPANTO, BATTLE OF, a naval victory of allied Christian forces under the command of Don John of Austria over the Turks on Oct. 7, 1571. Venice had upheld the Christian cause in the eastern Mediterranean until 1540, but then, exhausted and despairing of support, made a humiliating peace with Suleiman the Magnificent. His successor, Selim II, determined to acquire the Venetian outpost island of Cyprus and, when the Venetians refused to cede the island, invaded Cyprus in 1570.

Venice appealed for help to Pope Pius V who had tried since 1566 to form an alliance of Catholic states. France and the empire were unco-operative. Spain was the only hope, but Philip II, with an empty treasury, was occupied with revolts in Andalusia and the Netherlands. Venice deeply distrusted Spanish preponderance in Italy. Pius determined to draw Spain, Venice and the smaller Italian states into an alliance with himself but encountered heartbreaking delays. Venice wished to save Cyprus; Philip wished to acquire Algiers and Tunis. They argued over contributions and rewards. Meanwhile, the town of Nicosia on the island of Cyprus surrendered on Sept. 9. The Turks then besieged the town of Famagusta and appeared in the Adriatic. Not until May 25, 1571, could the pope persuade Spain and Venice to agree to the terms of an offensive and defensive alliance. Don John of Austria, Philip's young half-brother, was to be commander in chief and the papal general Marcantonio Colonna, his lieutenant.

The allied fleets assembled at Messina in Sicily, waiting until Aug. 24 for the Spaniards. The combined fleets sailed on Sept. 16 for Corfu where they heard that Famagusta had fallen and that the Turkish fleet was in the gulf of Patras, near Lepanto (Navpaktos), in Greece. Orders were given to engage on Oct. 7. Estimates of the Christian force vary slightly; there were 6 large Venetian 44-gun galleasses (much larger than galleys), 207 oar-propelled galleys (105 Venetian, 81 Spanish, 12 papal and 9 from Malta, Genoa and Savoy), carrying 30,000 soldiers, and also some auxiliary vessels. The Turkish force is said to have been larger but less well equipped and not so well disciplined. Behind the galleasses (employed to spread preliminary confusion), the Christian fleet advanced in four squadrons. Don John commanded the centre; the Venetian, Agostino Barbarigo, the left; Philip's admiral, Andrea Doria, the right; the Spaniard, Santa Cruz, the reserve. The Turkish fleet, initially in a crescent across the bay, adopted a similar formation: Ali Pasha, the commander, in the centre; Mohammed Saulak, governor of Alexandria, the right; Uluch Ali, pasha of Algiers, the left. Uluch Ali, by threatening to outflank Doria's squadron, drew it toward the open sea, then penetrated the gap thus formed, but was held by Santa Cruz. Meanwhile the allied centre and left, supported by a Venetian force led by Sebastian Venier, after about four hours' fierce fighting, overcame the Turks. Thereupon, Uluch Ali made off with 30 or 40 galleys. Although the dead on each side were put at about 8,000, the Christian victory was complete. The allies captured 117 galleys and many thousands of men, liberated about 15,000 enslaved Christians, and sank or burned about 50 galleys. They lost 12 galleys and had about 8,000 wounded, among them Miguel de Cervantes. The battle was remarkable as the last and greatest engagement with oar-propelled vessels and the first great victory over a Turkish fleet.

The news reached the pope early on Oct. 22. That morning he offered thanksgiving in St. Peter's and spoke of his hopes of further success, quoting the Fourth Gospel, "There was a man sent by God, whose name was John." But papal hopes for further efforts were frustrated by quarrels among the allies. The pope died in 1572 and Venice made peace in 1573, surrendering Cyprus to the Turks. Though the immediate practical effect of Lepanto was small, its moral effect was great. The battle was glorified in paintings by Titian, Tintoretto, Veronese and others. In the 20th century it was the subject of a long poem, "Lepanto," by Gilbert Keith Chesterton.

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(R. G. D. L.)

LEPIDOLITE or LITHIA MICA: *see* MICA.

LEPIDOPTERA, the order of insects including the moths and butterflies, with their larvae, the caterpillars. They have a complete metamorphosis: the earlier stages (active larvae, caterpillars) have no external trace of wings or reproductive structures; the penultimate stage (inactive pupa, chrysalis) has external rudimentary wings; the active adult practically always has imbricated scales on the wings, spirally coiled sucking mouth structures, one upper spur (modified into a cleaning brush) on the fore leg, a terminal pair of spurs on the middle and two pairs on the hind legs. Except for the Antarctic, lepidopterans are world-wide and very numerous. *See* BUTTERFLY AND MOTH.

LEPIDUS, the name of a Roman patrician family in the gens Aemilia, of which the following were the most notable members:

MARCUS AEMILIUS LEPIDUS, one of the ambassadors to Greece, Syria and Egypt in 200 B.C., when he delivered the Roman ultimatum to Philip V of Macedonia. He was consul in 187 and 175, censor in 179 (reforming the *comitia centuriata*), *pontifex maximus* from 180 onward and *princeps senatus* from 179 to 152. He fought against the Ligurians, made the Via Aemilia from Ariminum (Rimini) to Placentia (Piacenza) and led colonies to Mutina (Modena) and Parma.

MARCUS AEMILIUS LEPIDUS, father of the triumvir. In the civil wars he sided with Sulla. Afterward he became leader of the popular party and, with the help of Pompey, was elected consul for 78 B.C., in spite of the opposition of Sulla. On Sulla's death, Lepidus tried to upset the Sullan constitution, proposing the renewal of cheap grain, the recall of exiles, the restoration of confiscated lands and, ultimately, the re-establishment of tribunician power. To carry out his program and obtain a second consulship, he raised forces in Etruria and Cisalpine Gaul. When declared a public enemy (early in 77), he marched on Rome but was repelled by Q. Lutatius Catulus at the Pons Mulvius (Milvian bridge) and defeated by Pompey in Etruria. He sailed to Sardinia, where he soon died; his followers joined Sertorius in Spain. Lepidus was too small a man to carry through a counterrevolution.

MARCUS AEMILIUS LEPIDUS, the triumvir. He joined the party of Julius Caesar in the civil wars, was consul in 46 B.C. and Caesar's *magister equitum* in 45 and 44. When Caesar was murdered, Lepidus, as commander of the only army near Rome, became important. He sided with Mark Antony when civil war broke out. Antony, after his defeat at Mutina, joined Lepidus in Gaul; and in the autumn of 43, Octavian (later the emperor Augustus; *q.v.*) effected an arrangement with Antony and Lepidus, and their triumvirate was organized at Bononia (Bologna). Lepidus was consul again in 42, but Antony and Octavian soon reduced him to an inferior position. His provinces of Gaul and Spain were taken from him in 42, and though he received Africa in 40, his inclusion in the renewed triumvirate in 37 was only formal. In 36, in the campaign against Sextus Pompeius, he attempted to raise Sicily against Octavian, but his soldiers betrayed him. He was allowed to remain *pontifex maximus* but had to retire into

private life. He died in 13 (or 12) B.C.

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LE PLAY, (PIERRE GUILLAUME) FRÉDÉRIC (1806–1882), French mining engineer and sociologist, whose chief contribution was a discovery of the important relations between family type and the rest of society. Born at La Rivière St. Sauveur, Calvados, on April 11, 1806, the son of a customs official, he was educated at the École Polytechnique at Paris and entered the state department of mines. In 1840 he was made engineer in chief and professor of metallurgy at the School of Mines, where he became inspector in 1848.

Between 1835 and 1855 Le Play studied mining all over Europe. He reorganized the coal mines in the Ural mountains for the Russian government and became Europe's most influential mining engineer, meanwhile devoting spare time to sociological field studies. Depressed by the constant revolutions in France and challenged by the wide acceptance of what he thought were erroneous ideas in Rousseau's *Social Contract,* he gave up mining for sociology by 1855. His friends forced him into politics and he became senator in 1867.

He sought on the basis of his sociological studies to persuade Napoleon III and his court to re-create and preserve the French family system. He suggested the adoption of a stem family system which kept the main branch intact on the undivided homestead while other members entered industry, city life and government. His scientific studies and persuasion were of no avail so he abandoned politics after 1870 and devoted his life to study of sociology, to scientific writing and to educating leading people through information meetings of French intellectuals at his house. This he continued until his death in Paris, April 5, 1882.

In his studies of society he began with the family and industry and moved up to theories of the relations between the worker and industry, the people and the leaders and the best functions of government. His tool was a family budget which, after recounting income and its sources, expenses and their uses, covered the work and moral attitudes and the relations between worker, employer, government and society.

Le Play's first sociological publication of importance was *La Réforme sociale en France* (2 vol., 1864; 7th ed., 3 vol., 1887), although he had been honoured for the earliest and abridged edition of *Les Ouvriers européens* in 1855 (2nd ed. in 6 vol., 1879).

Le Play evolved a theory of the cyclical changes in society with increases or decreases of family morale, contrary to the evolutionary ideas of continued progress by men such as Auguste Comte, Herbert Spencer and Émile Durkheim which were most popular in Europe during the 19th century. Thus Le Play, who predicted the future weakness of France and western society prior to any other thinker, was not widely accepted in his time. Even the Le Play School of Sociology, which was founded around the Société internationale des études pratiques d'Économie sociale and which published a series of studies called *Ouvriers des deux mondes* did not keep his cyclical ideas but emasculated them into an evolutionary progressivism under the leadership of Edmond Demolins, Robert Pinot and Paul de Rousièrs. After the French collapse of 1940, the eyes of intellectual France again turned to him, and most of his sociological writings were republished. (C. C. Z.)

LEPRECHAUN, a fairy peculiar to Ireland, who appeared in the form of an old man of minute stature, wearing a cocked hat and a leather apron. He was solitary and unfriendly by nature, living alone in remote places and spending his time making shoes and brogues. In most of the stories concerning him it was the noise of his hammering which betrayed his whereabouts. Every leprechaun was believed to possess a hidden crock of gold. If captured and threatened with bodily violence, he could be made to reveal its hiding place, but only if his captor kept his eyes on him all the time. If, as usually happened, he was tricked into glancing away, the fairy instantly vanished with his secret untold.

The word *leprechaun* is said by Thomas Keightley in *The Fairy Mythology* (1850) to be derived from the English *lubberkin,* an Elizabethan name for a fairy akin to the brownie (*q.v.*). A later derivation, given in Funk and Wagnalls *Standard Dictionary of Folklore, Mythology and Legend* (1949–50), is from the Old Irish *lu-chorpan,* "little body." (C. S. He.)

LEPROSY (HANSEN'S DISEASE) is a widespread, chronic disease of man that affects chiefly the skin, eyes, mucous membranes of the nose and throat, certain peripheral nerves and the testes in males. In certain stages the disease is mildly communicable (infectious). It is caused by *Mycobacterium leprae,* an acid-fast bacillus that is similar to the bacillus that causes tuberculosis.

History.—The precise origin of leprosy is unknown, but much evidence suggests that the disease prevailed in antiquity. Many difficulties are inherent in the interpretation of ancient medical writings and descriptive terms used for clinical conditions by ancient authors often are misleading, but diseases similar to leprosy were recorded in many documents and it was with certainty described in Suskruta Samhitra in 600 B.C. Both Hippocrates and Aristotle described a disease that may have been leprosy, but the Greeks did not apply to this disease the term *lepra* ("scaly"), from which the word leprosy is derived, but instead referred to it as *elephantiasis graecorum.*

The leprosy referred to in the Bible, the disease of Lazarus (Heb. Zaraath), was not described in a manner clinically recognizable and it is probable that the word was used for a large variety of severe, chronic skin diseases.

It is difficult to say where leprosy originated, but it was widespread throughout India, China and Japan millenniums before Christ and was also endemic in Africa and along the shores of the Mediterranean. The disease was introduced into Europe and the British Isles very possibly by Roman legionnaires or their followers, and by A.D. 1000 was so widespread in Europe that there were more than 2,000 lazar houses in France and 325 in Great Britain. The disease disappeared in the British Isles by 1798, yet it lingered in other parts of Europe, and in the early 1960s numerous endemic foci existed on the continent.

It is possible that the followers of Columbus introduced the disease to the new world, but its spread was greatly speeded by the introduction of slaves from highly endemic areas of west Africa. The disease in the early 1960s was a major public health problem throughout most of Central and South America, although North America was relatively free except for a few small endemic areas in the southern and western states.

In almost all cultures throughout history the attitude toward persons ill with leprosy was an emotional loathing and rejection. The leprosy patient has been excommunicated from the community and deprived of his civil rights; this action has extended even to burial, either symbolic or actual, while still alive.

Because of its stigmatic and derogatory connotations, the use of the word "leper" is undesirable and should be avoided. Abandonment of the term will help attain a more realistic acceptance in the minds of both the patient and the public of a clearly defined clinical entity amenable to treatment. This distinction is not simply a nicety of language but represents a definite step toward acceptance of leprosy by both the public and the patient as simply another disorder that requires medical attention.

Modern Incidence and Distribution.—It is estimated that from 9,000,000 to 12,000,000 persons were infected with the disease at any one time in the early 1960s. The greatest number of cases were concentrated in south China, India and central Africa. South and Central America, the Malayan peninsula and the islands of the South Pacific are also areas of high incidence. Although leprosy occurs most frequently in damp, tropical climates, the disease also occurs in subtropical areas, in temperate zones such as Crete and Japan, and even within the subarctic zone in Norway and Iceland and the cold northern islands of Japan. In some areas of Africa up to 10% of the population is infected with the disease.

In the United States from 800 to 1,000 cases of the disease are known. About 275 of these are hospitalized in the federal Public Health Service hospital at Carville, La. Most of the other cases are supervised by the state health department in the patient's home state or by private physicians. In addition, an estimated 1,000 to 2,000 cases are either undiagnosed or not reported to health departments. The majority of U.S. cases occur in the Gulf coast regions of Florida, Louisiana and Texas and in southern California. Many of the undiagnosed and unreported cases are among immigrant farm workers, although a few small endemic foci are present.

Etiology.—*Mycobacterium leprae* is a schizomycete of the order Actinomycetales and of the family Mycobacteriacea. It is a straight or slightly curved rod ranging from 1 to 8 microns in length and from 0.2 to 0.5 microns in width. It is known as an "acid-fast" organism because of its ability to absorb certain dyestuffs and resist decolorization with weak mineral acid in the same manner as does *Mycobacterium tuberculosis*. In the body the organism frequently occurs in masses termed "globi," which have the appearance of bundles of sticks.

Mycobacterium leprae is one of the few pathogenic bacteria that microbiologists have been unable to cultivate in vitro on artificial culture media. By the early 1960s a few investigators had reported some success in maintaining the organism in viable state with possible slight proliferation in living tissue cell cultures. Attempts to inoculate experimental animals with the disease have been unsuccessful or, at best, questionable. Because of these difficulties, laboratory research in leprosy has been greatly hindered, although such research has been furthered to a limited extent by study of a somewhat similar disease occurring in wild rodents called murine leprosy and caused by *Mycobacterium lepraemurium*.

Mycobacterium leprae is sometimes called Hansen's bacillus after its discoverer, G. Armauer Hansen, who first described the organism after seeing it in microscopic sections taken from biopsies of patients in 1874.

Transmission.—Girolamo Fracastoro was the first (in 1546) to propose the concept of the spread of disease by contagion; he postulated that leprosy, among other contagious diseases, was spread by minute, animate agents emanating from the patient. This theory resulted in the total segregation and unreasoning fear of the patient that dominated medieval thinking in Europe.

Although it is now known that leprosy is not congenital, at one time it was thought to be hereditary. This belief was probably strengthened by the fact that leprosy is often a familial disease, which is not surprising in view of the intimate and long contact that is common within the family group. It is probable that skin-to-skin contact is the major factor in transmission of the disease. This is corroborated by the fact that the site of the initial lesion often is in an area where such contact is habitual; for example, among the Japanese, babies are often carried on the back of the mother in a sling arrangement that brings the child's forehead into contact with the nape of the mother's neck. Frequently when the mother is found to be infected, the child will be found to have a lesion of the forehead. In those portions of equatorial Africa where the child is frequently carried astride the mother's hip, the thigh is a frequent site for the initial lesion. Other possible means of transmission, such as through the soil, by insects, or by ingestion of certain foods, have never been confirmed.

Clinical Manifestations.—Once infection with *Mycobacterium leprae* occurs, the skin and peripheral nerves are the principal loci of the disease. The mucous membranes, particularly of the nasopharynx, are frequently involved, and the testes and the eyes are often affected. The larynx is often attacked by the disease-producing agent, resulting in marked changes in voice quality.

The disease is characterized by long duration and slow progress, which may be interspersed with acute episodes of what is probably hypersensitive reaction (erythema nodosum leprosum). Following an acute exacerbation, the course of the disease may be radically altered, followed by either improvement or intensification of the symptoms.

The disease occurs in several forms. The two major ones are designated as lepromatous and tuberculoid. In the former, apparently little tissue or humoral (blood and lymph) resistance occurs. The disease is progressive and, in general, the prognosis is poor. In the latter type, a high degree of tissue and humoral resistance is present, and usually relatively few organisms are found in the lesion. The tuberculoid form has a marked tendency to become quiescent or to show improvement.

One of the most marked manifestations of the disease is the loss of thermal and tactile sense. Such anesthesia is due to destruction by *Mycobacterium leprae* organisms of peripheral nervous tissue in the affected area. Neural destruction results frequently in atrophy and may lead to marked deformities of the extremities, such as *main en griffe*, or claw hand. In untreated cases, bone damage may result in disfiguring autoamputation of the extremities. The lepromatous type of the disease—due to the thickening of the skin, formation of nodules and loss of the eyebrows, which is characteristic—may result in a *leonine facies*, or lionlike appearance of the patient.

Paradoxically, although the patient is incapable of perceiving pain sensation in the "anesthetic" area, severe pain is frequently an accompaniment of the disease, particularly in the neural form in which the reaction of the nerve cells to invasion by the bacteria results in expansion of the nerve within the nerve sheath, with the accompanying pressure causing extreme pain.

As a result of the anesthesia, the patient will often unwittingly injure or burn the anesthetic areas, resulting in marked ulcerations that are then subject to infection with pyogenic microorganisms.

The disease is rarely fatal in itself, and death is usually due to a superimposed infection from a more virulent organism that overwhelms the patient because of his weakened condition. Tuberculosis, intestinal infection and amyloid nephrosis are among the major causes of death in the leprosy patient.

Treatment.—For hundreds of years before the mid-1940s, chaulmoogra oil (hydnocarpus) and the purified esters of this oil were commonly used in the treatment of the disease. The drug was applied locally to the affected tissues, administered by mouth or injected. The value of chaulmoogra has been questioned by most authorities and was never definitely established.

Modern therapy involves the use of the sulfone drugs, which were introduced about 1941. (Sulfones are complex organic chemicals that contain the radical SO_2.) Diaminodiphenylsulfone (DDS) and its derivatives, such as Promin and Diasone, are now believed superior to chaulmoogra. The sulfone drugs have not been totally accepted, although many cases improve under treatment. Not infrequently, a patient with leprosy recovers without treatment. Further, recurrence and acute exacerbations frequently occur during the course of sulfone therapy. Nevertheless, it would seem that the sulfones are a step forward from therapy with chaulmoogra oil.

In the late 1950s a new drug was developed that seemed to be relatively effective against leprosy. This drug, known as Ciba-1906, a diphenylthiourea [1-(*p*-N,N-dimethylaminophenyl)-3-(*p*-*n*-butoxyphenyl)-2-thiourea], seemed in preliminary studies at least equal in efficacy to the sulfones but far less toxic and less productive of undesirable side reactions. The number of bacteria in the lesion may be sharply reduced under treatment with this drug. Relatively rapid clinical improvement is often noted, and tolerance of the patient for the drug seems high.

In addition to the improvements in treatment, great advances have been made in physiotherapy, surgery and orthopedic surgery to prevent or to correct the deformities and mutilations that in the past were often unavoidable concomitants of the disease.

Prevention and Control.—Until the mid-1940s the only control applied to prevent spread of the disease was compulsory segregation of the patient. Such segregation, even though judicially enforced, often failed to accomplish its purpose. Persons who contracted the disease avoided situations in which a diagnosis could be made and sometimes went "underground" to avoid incarceration. Evasion resulted in the patient avoiding medical attention and frequently led to more widespread dissemination of

the disease among those with whom he lived, particularly when they were unaware of his affliction.

It is to be anticipated, as segregation facilities are gradually improved and as more efficacious therapeutic measures become available, that voluntary segregation will become practical and widespread. Eradication of the disease can, and eventually will, occur through effective treatment of the individual patient and segregation to prevent dissemination of the disease.

Realization by the public of the importance of this disease problem, and support by the public of research into the problem, will result in eventual solution.

See also references under "Leprosy" in the Index.

BIBLIOGRAPHY.—For a scientific discussion of all facets of the disease and its epidemiology, *see* R. G. Cochrane (ed.), *Leprosy in Theory and Practice* (1959). For history, *see* R. Chaussinand, *La Lepre* (1950); J. Lowe, "Comments on the History of Leprosy," *Indian Med. Gaz.*, vol. 33 (1942); and W. P. Macarthur, "Medieval Leprosy in the British Isles," *Journal of the Royal Army Medical Corps*, vol. 45 (1925). Much further information can be obtained from the publication, *The Carville Star*, published regularly at the Public Health Service Hospital, Carville, La. (C. M. CR.)

LEPSIUS, KARL RICHARD (1810–1884), German Egyptologist, was born at Naumburg an der Saale on Dec. 23, 1810. He studied at Leipzig, and at Göttingen, where he finally decided to devote himself to archaeological philology. After earning his doctorate in Berlin in 1833, he went to Paris, where he was commissioned by the duc de Luynes to collect Greek and Latin writings for his work on weapons of the ancients. In 1834 he took the Volney prize with his *Paläographie als Mittel für die Sprachforschung*. Lepsius next turned to Egyptological studies and, after four years spent in studying the Egyptian collections of Italy, Holland and England, he returned to Germany where royal support was secured for a scientific expedition to Egypt. For three years his Royal Prussian expedition explored from the Sudan above Khartoum to the Syrian coast. At the end of 1845 they returned with an extensive collection of casts, drawings, original antiquities and papyri.

In 1846 Lepsius became professor at Berlin university. In 1859 the 12 volumes of his vast *Denkmäler aus Ägypten und Äthiopien* were finished, supplemented posthumously by a *Text* prepared from the notebooks of the expedition. In 1866 Lepsius returned to Egypt and discovered the famous Canopus decree, an inscription similar to the Rosetta stone, in hieroglyphic, demotic and Greek. In 1873 he was appointed keeper of the Royal library, Berlin, which, like the Berlin museum, owes much to his care. He died at Berlin on July 10, 1884. Besides the colossal *Denkmäler* and such texts as the *Todtenbuch der Ägypter* (1842), other works, including his *Königsbuch der alten Ägypter* (1858) and *Chronologie der Ägypter* (1849), still attract scholarly interest in the 1960s.

See G. Ebers, *Richard Lepsius, Ein Lebensbild* (1885), trans. by Z. D. Underhill (1887).

LEPTIS, the name of two towns in ancient Africa.

LEPTIS MAGNA (or Lepcis; Punic Lpqi), the largest city of the ancient Tripolis, now Labdah near Homs (Al Khums), Libya. The correct name, also found in local inscriptions, is Lepcis, but classical writers usually call it Leptis. Founded as a seasonal trading station (*emporion*) by the Phoenicians, it was first permanently settled from Carthage, probably at the end of the 6th century, in answer to the Greek attempt (*c.* 520 B.C.) to establish a colony at the mouth of the Cinyps river (Wadi Ki'am) 12 mi. to the east. It controlled a territory which according to Herodotus was remarkable for its fertility, and it is reputed to have paid a tribute of a talent a day to Carthage. It was also a major entrepôt for trade with the interior of the African continent. After the Second Punic War it passed in 202 B.C. to Masinissa's Numidian kingdom, whence it broke away in 111 B.C., signing a treaty of friendship and alliance with Rome. After the civil war between Caesar and Pompey, Leptis (or possibly its namesake in Byzacena) had to pay to the former a heavy indemnity in olive oil. It continued, however, to enjoy considerable local autonomy even after the Augustan settlement, whereby Tripolitania became part of the military area governed by the proconsul of Africa. It was only under Tiberius that it lost the right to mint its own coinage, and it retained its Punic municipal constitution and the official use of the Punic language throughout the 1st century A.D. It was made a *colonia* by Trajan. At the end of the 2nd century, during which the city's commercial contacts were greatly extended, the emperor Septimius Severus (193–211), who was born at Leptis, conferred upon it the *jus italicum*, and many of the city's major buildings date from his reign. Thereafter the increasing insecurity of the frontiers, culminating in the disastrous Austurian incursion of 363, and the growing economic difficulties of the empire led to a rapid decline, only temporarily arrested under Diocletian, who made Leptis the capital of the new *provincia Tripolitana*. The Byzantine reconquest of Tripolitania from the Vandals, in 533, saw the city re-established within a greatly reduced circuit of walls; but the revival was ephemeral, and effective urban life ceased soon after the Arab conquest of 643.

The choice of site was dictated by the presence of a natural harbour at the mouth of the Wadi Labdah, a harbour which was artificially improved in the 1st century and again remodeled by Severus to form a great inner basin, covering 24 ac., with moles, warehouses, harbour temple, signal tower and lighthouse. The Punic town, which lay just to the west of the harbour, has yet to be explored, although a Punic cemetery dating back to the 5th century has been found beneath the Roman theatre. Near the early site are the excavated remains of the old forum, the heart of the city in early Roman times. These include two major temples, dedicated to Rome and Augustus and to Liber Pater (Dionysus), several smaller temples, porticoes, a public basilica and the meeting place of the local senate (*curia*), all of early imperial date. One of the temples later became a church, with a baptistery, and the whole area lies within the well-preserved Byzantine walls. From this early nucleus the Roman city rapidly spread westward along the coast and southward along the west bank of the wadi as well as across the wadi, where there were many wealthy villas. Already in the lifetime of Augustus a whole new quarter had been laid out inland from the old forum, including a porticoed market with two circular kiosks (8 B.C.), a magnificent theatre (A.D. 1–2) and a large colonnaded enclosure of uncertain purpose (A.D. 11–12); and by the middle of the century the city had reached and incorporated a stretch of the great coastal highway, half a mile inland. A circuit of improvised defenses, thrown up probably in A.D. 69, encloses an area of about 1,200 ac., of which at least a third must have been fully built up. The 4th-century walls covered barely half of this area, and the Byzantine walls enclosed little more than the harbour area and the original Punic and Roman nucleus.

The 2nd-century buildings include a large and finely preserved bath building of "imperial" type, erected under Hadrian; and many of the existing buildings, including the theatre, were rebuilt

THE BRITISH SCHOOL, ROME

THE RUINED BASILICA AT LEPTIS MAGNA, COMPLETED A.D. 216 BY CARACALLA, SON OF SEPTIMIUS SEVERUS

in marble. It is, however, to the time of Severus that the city's outstanding monuments belong. Both in quality and scale and in preservation these are among the finest remains surviving from classical antiquity, and they include the rebuilding of the harbour, the provision of a new water supply with an aqueduct 12 mi. long, the erection of a triumphal arch and the establishment of a grandiose complex of buildings on the left bank of the wadi, between the Hadrianic baths and the harbour. The triumphal arch, built in honour of the emperor's visit in A.D. 203–204, stood at the intersection of the main street of the early town and the main coast road; it was an extremely ornate structure, incorporating two intersecting archways and decorated with a remarkable series of historical reliefs, most of which are now in the museum at Tripoli. The new quarter beside the wadi was laid out about a monumental street, 450 yd. long and flanked by elaborately arcaded porticoes. At the head of it was a large circular piazza, dominated by a huge ornamental nymphaeum; at the lower end it opened onto the quays of the harbour; and it was flanked on the west side by a monumental forum and basilica. The forum consisted of an open rectangular space, 340 by 200 ft., surrounded by arcaded porticoes, with shops and offices within the porticoes, and a temple, dedicated probably to the imperial family, set on a lofty podium in the middle of one short side. Opposite the temple stood the basilica, an enormous three-aisled, colonnaded hall, with an apse at each end of the central nave and galleries over the lateral aisles; the nave measured 120 by 230 ft. internally and not less than 100 ft. from floor to ceiling. An inscription records its completion in A.D. 216 by Caracalla. The whole group of buildings was lavishly equipped with marbles imported from Attica, Proconnesus (Marmara) and the Aegean islands, and the columns throughout were of red Egyptian granite and green marble from Euboea. There was also a great deal of elaborately sculptured ornament, the outstanding pieces being a set of pilasters in the basilica carved with scenes from the stories of Hercules and Dionysus, the city's patron divinities. Like the architecture itself, this carving indicates strong Greek influence; not only was the anonymous architect a Greek, probably from Asia Minor, but many of his assistants also came from the Greek east. In late antiquity the forum was converted into a fortress, and under Justinian the basilica became a church.

Other notable monuments are the amphitheatre, and a circus 500 yd. long; the 4th-century west gate, incorporating an earlier honorary arch; arches over the main street in honour of Tiberius and Trajan; the "Hunting Baths," a remarkably preserved 3rd-century building, with wall paintings and mosaics that indicate its occupation by a guild of merchant hunters supplying wild beasts to the amphitheatres of Italy; and several outlying mausolea. The villas of the residential quarter have yielded some fine mosaics, mostly now in the museum at Tripoli.

LEPTIS MINOR (or Leptiminus) (modern Lamta, Tunisia), 10 mi. from Ruspina (Monastir) and 24 mi. S.W. of Hadrumetum (Sousse), a small Punic city which in Roman times was the centre of a prosperous olive-growing district. It was Julius Caesar's base before the battle of Thapsus in 46 B.C. There were large imperial estates in the neighbourhood, and for a time, under Justinian, it was with Capsa one of the two residences of the *dux Byzacenae*. Its bishops appeared in the African councils from 250 onward. Apart from a Christian cemetery with funerary mosaics, the ruins have been little explored.

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LEPTOSPIROSIS (WEIL'S DISEASE, CANICOLA FEVER, MUD FEVER, PEA PICKER'S DISEASE, SWINEHERD'S DISEASE) is a specific, infectious and contagious disease of animals, occasionally communicable to man, caused by a pathogenic spirochete of the genus *Leptospira*. Such diseases of animals that are communicable among animals and occasionally to human beings are called zoonoses. In 1886, A. Weil described the first cases of leptospirosis and the classic disease caused by *Leptospira icterohaemorrhagiae*. R. Inada and his associates successfully infected guinea pigs, demonstrated the organism and identified it as a spirochete. H. Noguchi in 1917 named the organism *Leptospira*.

Causative Organism and Transmission.—The leptospire is a long, very thin organism from 5 to 40 μ in length and about 0.1 μ wide. Microscopically, hooks can be seen at each end, and the organism moves by a characteristic spinning motion. Electron photomicrographs reveal a coiled spiral flagellum.

The reservoir of leptospires includes rodents and certain domestic animals. These animals excrete live, fully virulent organisms in their urine and contaminate the environment. Outside the animal body, leptospires can live for several weeks in fresh water. Thus infection takes place by direct contact with urine of infected animals or by indirect contact with contaminated food or water. Leptospires can readily penetrate mucous membranes but probably cannot gain entrance to the body through intact skin. A scratch or abrasion as well as the nasal mucosa and eye are excellent portals of entry; thus it is not surprising that the origin of many infections can be traced to wading, swimming or other contact with water containing virulent leptospires. The density of the leptospiral population in any given area is directly proportional to the number of animal carriers in the area. The incidence in man depends upon the opportunity for exposure by swimming, harvest of rice, contact with animals, etc.

The principal hosts among the animal species are rats, mice, voles, swine, cattle, dogs, opossums, mongooses and horses. The rat, once infected, shows no evidence of disease but sheds millions of leptospires in its urine during its lifetime. On the other hand, the horse, which shows no immediate evidence of disease, sheds the organism only for a short period, usually one to three months. Man rarely voids urine containing leptospires, primarily because of the acidity of human urine. Leptospires cannot survive in an acid or brackish medium.

Symptoms and Diagnosis.—Clinical evidence of disease in man varies depending upon the infecting type of leptospire. Leptospirosis, therefore, is a series of separate diseases, each with its separate and distinct clinical features, rather than one entity as described by Weil. Usually after an incubation period of about a week, fever, weakness, pains in the legs, back and abdominal muscles are noted. Nausea, vomiting and diarrhea are not uncommon. One characteristic symptom is congestion of the conjunctival blood vessels around the corneas of the eyes. Jaundice may or may not occur after the first week of illness. The death rate is approximately 30% of the severely ill and jaundiced patients.

The symptoms of leptospirosis in cattle vary from a mild, almost inapparent infection to one of acute fulminating disease terminating in death. The principal symptoms are fever, loss of appetite, diarrhea, depression, cessation of milk flow, blood in urine and loss of weight. Frequently abortion is the first and only sign of disease.

In swine the disease is characterized by fever, bloody urine, loss of appetite, anemia and jaundice. Abortions occur frequently, and baby pigs commonly die. Inapparent cases occur, but leptospires can be isolated from the urine of these animals.

Canine leptospirosis exhibits an extremely variable clinical picture. Many mild or inapparent cases occur. Generally fever, depression, loss of appetite, bloody diarrhea and conjunctival congestion are seen, with occasional uremia and jaundice.

The infected horse rarely exhibits more than a transient rise in temperature, but late symptoms include recurrent iridocyclitis (moon blindness or periodic ophthalmia).

Confirmation of a clinical diagnosis may be obtained in the laboratory, utilizing bacteriological and serological methods.

Treatment.—The broad-spectrum antibiotics have not proved of value for treatment of leptospirosis in man. Aureomycin, streptomycin and tetracycline are beneficial in the treatment of canine leptospirosis in the acute phase, as well as for the elimination of carriers. (R. H. YR.)

LERDO DE TEJADA, SEBASTIÁN (1825–1889), president of Mexico from 1872 to 1877, was born in Jalapa, Veracruz,

April 25, 1825. After becoming professor and rector of the College of San Ildefonso in Mexico City, he entered politics as a liberal in the reform movement of the 1850s which was eventually identified with the career of Benito Juárez (*q.v.*). In 1861 he joined Juárez' cabinet and during the European Intervention (1861–67) loyally followed Juárez in all his wanderings, serving him as minister of foreign relations and virtual prime minister.

Appointed president of the supreme court and *de facto* vice-president of Mexico in 1867, Lerdo succeeded to the presidency on the death of Juárez in 1872. Thereafter his popularity steadily declined, partly because he made little effort to organize his own political machine and allowed opposition newspapers extensive freedom. The Roman Catholic Church opposed him for his connection with the anticlerical reforms of Juárez, while progressives fretted because he undertook few public works and local leaders resented his highly centralized government. After putting down several revolts, he managed to secure re-election in 1876, but another uprising under Gen. Porfirio Diaz forced him into exile in Feb. 1877. He fled to the United States and died in New York in 1889. (D. M. Pr.)

LÉRIDA, capital of the province of the same name in the region of Catalonia, northeastern Spain, lies on the Segre river, 158 km. (98 mi.) W. of Barcelona by road. Pop. (1960) 63,850 (mun.). The old cathedral in Byzantine-Gothic style, with a Moorish admixture, was begun in 1203 and consecrated in 1278, but has not been used since 1707; it has been restored and declared a national monument. Other notable buildings include the new cathedral (18th century); the church of San Lorenzo (14th century); the Palacio de la Pahería with its 13th-century façade, the meeting place of the municipal council; and the Alcazaba castle, built in 1149. The Alcazaba dominates the older quarter, a maze of narrow streets, on the right bank of the Segre. On the left bank are the modern suburbs. Lérida is on the railway from Saragossa to Barcelona; other lines run to Pobla de Segur and Tarragona. Called Laréda or Lerita by the Arabs, the town was reconquered by Ramón Berenguer in 1149. In the 13th century Lérida university was founded, but it was transferred to Cervera after the War of the Spanish Succession when Lérida took the side of the archduke Charles. Lérida suffered sieges by the French in 1646, 1647 and 1813. In the civil war of 1936–39 the town was first in Republican hands and was nine months in the front line before being taken by the Nationalists in April 1938.

Lerida Province was formed in 1833 of districts previously included in the ancient province of Catalonia, and is bounded north by France and Andorra, east by Gerona and Barcelona, south by Tarragona and west by Saragossa and Huesca. Pop. (1960) 333,765. Area 12,028 sq.km. (4,644 sq.mi.). The northern half belongs to the Mediterranean section of the Pyrenees and comprises some of the finest scenery in the whole chain, including the valleys of Aran and La Cerdaña and large tracts of forest. It is watered by many rivers, the largest of which is the Segre, a left-hand tributary of the Ebro. Lérida is crossed by the main railway and road from Barcelona to Saragossa. In 1904 the Spanish government agreed with France to carry another line to the mouth of an international tunnel through the Pyrenees, and this was inaugurated in 1928.

There is a thriving trade in wine, oil, wool, timber, cattle, mules, horses and sheep. Fruit, which is exported, is a principal source of wealth, and the province leads in the production of electricity. Balaguer has nearly 10,000 inhabitants and Tárrega, Cervera and Seo de Urgel more than 5,000. Seo de Urgel, near the headwaters of the Segre, is an episcopal see with a close historical connection with Andorra. (G. J. F. de U.)

LÉRINS, ABBEY OF, was founded *c.* 390–410 by St. Honoratus on an island in the bay of Cannes in the Mediterranean. He had spent some years in Greece and the eastern Mediterranean and probably owed his inspiration more to the Basilian monasteries and Palestinian lauras than to the Pachomian monasteries of Egypt. Lérins became a centre of intellectual activity and a "nursery of bishops" throughout the 5th century, owing its reputation to the highly educated men, trained elsewhere, who were attracted by its spiritual discipline. Vincent of Lérins was its chief theologian; its sons also included SS. Hilary and Caesarius of Arles. Later it adopted the Benedictine rule and was reformed by Cluny in 978. From the early 16th century it was attached to various reformed congregations until its secularization in 1791. Worship was restored in 1859, and the monastery was entirely rebuilt by Cistercian monks in 1871. The original buildings were demolished at this time, though some ancient chapels remain on the island, which is now called St. Honorat.

See H. Moris, *L'Abbaye de Lérins* (1909); A. C. Cooper-Marsdin, *The History of the Islands of the Lerins* (1913). (M. M. Ch.)

LERMA, FRANCISCO GÓMEZ DE SANDOVAL Y ROJAS, Duque de (1553–1625), Spanish statesman who died a cardinal, having been the first of the *validos*—strong men or favourites—through whom the Habsburg kings were to govern Spain till the end of the 17th century. He was the son of the 4th marqués de Denia by his wife Isabel de Borja, daughter of the 4th duque de Gandía (*see* Borgia, Saint Francis). He was brought up at Seville, where his uncle, Cristóbal de Rojas, was archbishop; and in 1576 he was married to Catalina de la Cerda, daughter of the duque de Medinaceli. A grandee and one of the gentlemen of the king's chamber under Philip II, he won the confidence of the heir to the throne, who on becoming king as Philip III in 1598 entrusted him with the conduct of public affairs and, in 1599, created him duque de Lerma. Thenceforward till 1618 Lerma had the monarchy's destiny in his hands.

Lerma was basically a pessimist and may perhaps have been aware of the crisis that was overtaking Spain in his time. In European affairs, his policy was consistently for peace. Believing that Philip III might maintain Spanish supremacy to some extent by relying on dynastic hegemony, he worked to continue the series of marriages between members of the Spanish royal house and Viennese Habsburgs or French Bourbons. He achieved the peace of London between Spain and England (1604) and the 12-year truce with the United Provinces of the Netherlands (1609).

It was Lerma who sponsored the decrees (1609–14) for the expulsion of the Moriscos, or officially Christianized Moors, from Spain—a decision affecting about 350,000 people, half of them in the lands of the crown of Aragon, where they constituted 25% of the population. Motivated by religious and political rather than economic considerations, he wanted to stop a controversy which could be solved only by drastic means in view of the failure to assimilate the Moriscos with the Spanish Christians.

Lerma accumulated an immense personal fortune—a fact which his enemies exploited when they launched their final attack on his position. His own son Cristóbal, duque de Uceda, cleverly manipulated by the ambitious conde (later duque) de Olivares, took part in the conspiracy against Lerma. Foreseeing his fall from favour, Lerma sought leave to retire into private life, but first obtained a cardinal's hat from Pope Paul V (March 1618). He was dismissed from power a few months later (Oct. 1618). A judicial investigation into the means by which he had enriched himself led to his being condemned to a heavy fine. The cardinal duque de Lerma died at Valladolid on May 17, 1625.

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LERMONTOV, MIKHAIL YUREVICH (1814–1841), the foremost Russian romantic poet and author of an important novel, was born in Moscow on Oct. 15 (new style; 3, old style), 1814. Descended from a 17th-century Scottish adventurer, George Learmont, he was brought up by his wealthy grandmother, having lost his mother at the age of three. Childhood travels in the Caucasus gave him a taste for its romantic scenery, later to bulk prominently in his writings. Sensitive, vain and introspective, Lermontov early embarked on that concentration on his own ego and its sufferings which was later to turn him into Russia's greatest romantic poet. In his early teens he was already writing verse and had become obsessed, like so many earlier Russian contemporaries, with the poetry and personality of Byron,

whom he sought to imitate. In 1830 he entered Moscow university, leaving for St. Petersburg in 1832 after a quarrel with a teacher. There he soon gave up his academic studies in order to join the cadet school, from which he graduated as ensign in 1834.

He took up the life of pleasure traditional among young officers in the capital, but his melancholy and penchant for mordant self-examination turned it into something far from pleasant for him. He had already brought with him from Moscow the memories of two love affairs which characteristically seemed to cause him equal unhappiness, though in one his love was reciprocated and in the other it was not. Though his early poetry was prolific, Lermontov did not seek publication, and his first published poem, *Khadzhi Abrek* (1835), appeared without his permission. Fame came to him in 1837 with the circulation in manuscript of *Smert poeta* ("Death of a poet"), a lyric denouncing the court society which had ill-treated Pushkin and permitted his death in a duel. For this poem he was exiled to a regiment stationed in the Caucasus. Pardoned after one year, he returned to St. Petersburg, now a well-known poet and public figure. In 1840 he was again exiled, this time for fighting a duel with the son of the French ambassador, and on July 27 (N.S.; 15, O.S.), 1841, he died as the result of a duel at Pyatigorsk in the Caucasus with a Major Martynov.

Lermontov owed even more to the influence of Pushkin than to that of Byron but began to develop on lines independent of both. His romanticism has often been contrasted with Pushkin's classicism, and he was much more concerned than the earlier poet to infuse his writings with emotion. Much of Lermontov's poetic *oeuvre* consists of juvenilia which, though unimportant, can often be seen to have been the preliminary sketches for later work. Though his poems appeared in periodicals regularly after 1837, and a selection of them came out in book form in 1840, many—including some of the best—were first issued after his death. The most important long poems are: two wildly romantic works set in Georgia—*Demon* (1839; Eng. trans., *The Demon,* 1930) depicting a demon's love for a mortal girl, and *Mtsyri* (1840); also a very different work, *Pesnya pro tsarya Ivana Vasilevicha* (1837; Eng. trans., *A Song About Tsar Ivan Vasilyevitch,* 1929) written in the idiom of Russian folk ballads. Among his lyrics *Parus* (1832; "The Sail") is probably the most famous short poem in Russian. But Lermontov's most important single work is the novel *Geroi nashego vremeni* (1840; Eng. trans., *A Hero of Our Time,* 1886; *A Hero of Nowadays,* 1920) for which the earlier unfinished prose works *Vadim* (1833–34) and *Knyaginya Ligovskaya* (1836; "Princess Ligovskaya") were preliminary sketches. The novel contrasts with much of Lermontov's verse because emotion and technique are under tighter control. Though the book's setting —once more the Caucasus—is romantic, it illustrates the trend toward realism characteristic of Lermontov's development. The hero, Pechorin, belongs to the character-type of the "superfluous man," of which Pushkin's Onegin had been an earlier model. In some ways an idealized self-portrait (though Lermontov denied this), Pechorin is a cynical person of superior accomplishments who, having experienced everything else, devotes himself to experimenting with human situations. Despite its affinities with Pushkin and Byron, the novel is a brilliantly original work, written in prose of superb quality. When he died at the age of 27 Lermontov was developing fast as a writer, and his early death was probably as great a loss to Russian literature as that of Pushkin.

See A. Heifetz, *Lermontov in English,* a bibliography (1942).

(R. F. Hi.)

LEROUX, PIERRE (1797–1871), French philosopher and economist who combined socialism with a form of pantheism, was born at Bercy near Paris on April 17, 1797, the son of an artisan. His education was interrupted at his father's death, and he worked for a time as a mason and later as a compositor to support his mother and family. In 1824, together with Paul François Dubois, he founded a newspaper, *Le Globe.* Early in 1831 he made this newspaper the organ of the Saint-Simonian sect (*see* Saint-Simon, Claude Henri de Rouvroy, Comte de), of which he had become an enthusiastic member, but in the following November he seceded from the Saint-Simonians when Barthélemy Prosper Enfantin advocated free love. After founding *La Revue encyclopédique,* he established *L'Encyclopédie nouvelle* with Jean Reynaud, of which only eight volumes appeared (1838–41). His treatise *De l'Humanité,* which contains the fullest exposition of his system, appeared in 1840. Together with George Sand he established *La Revue indépendante* in 1841. He then formed a printing association at Boussac, Creuse, and founded *La Revue sociale* (1843). Elected mayor of Boussac and a member of the constituent assembly in Paris after the revolution of Feb. 1848, he was in 1849 elected to the legislative assembly, where he sided with the extreme socialists. He withdrew to London after the *coup d'état* of 1851, but later settled with his family in Jersey, where he pursued agricultural experiments. After moving to Lausanne, he returned to Paris on the amnesty of 1869. He died in Paris on April 11, 1871, during the Commune.

Leroux's philosophy was composed of heterogeneous elements. His belief in the power of number was like that of Pythagoras, and the triad, or group of three, played an important part in the development of his philosophico-socialist ideas. Man is sensation, sentiment or intellect, and sometimes all three at once. Social harmony results from this triad, which is also discernible in God (power, love and intelligence). Leroux was a vigorous critic of modern society, in which "the millionaires and the capitalists are the nobles of our time"; of the wage system, as allotting to the workers less than half of the revenue from their labour; of the family, in its effect on society; and of property. He was a feminist and a "revolutionary pacifist" whose ideal was a progressive and religious democracy: "We gravitate toward God," he wrote.

In *Sept discours sur la situation actuelle de la société et de l'esprit humain* (1841), Leroux wrote that the role of society "is to give to all its members, to each according to his needs, his capacity and his works, the enjoyment of the product of the common labour, whether such labour be an idea, a work of art or material prosperity." Although he was not the first to use the term "socialist," he was the first to analyze the concept, in an article "De l'Individualisme et du Socialisme" which appeared in *La Revue encyclopédique* in 1834.

See P. F. Thomas, *Pierre Leroux, sa vie, son oeuvre, sa doctrine* (1904); E. Dolléans, *Histoire du mouvement ouvrier 1830–71* (1936).

LERROUX, ALEJANDRO (1864–1949), Spanish Radical leader, prominent in political life under the second republic, was born at La Rambla (Cordoba) on March 4, 1864, the son of a sergeant major. He practised as a barrister in Barcelona and, after the Montjuich disorders (1896), became known for his violently radical and anticlerical speeches and journalistic writings. He was elected to the *Cortes* in 1901, and his supporters (clandestinely assisted by the central government) defeated the Catalan nationalists in the 1903 elections. His republican views led to his exile in 1907, when he fled to Argentina. The youth organization (*Jóvenes bárbaros*) of Lerroux's party was accused of convent-burning in 1909; thereafter the Radicals became less extreme and came to rely for support mainly on the middle classes.

Lerroux played a major part in bringing the second Spanish republic in 1931 and was the republic's first foreign minister. He headed four governments during the so-called *bienio negro* (the period of centre-right government, 1933–35). It was his ministry which suspended Catalan autonomy after the rising of Oct. 1934 and put down the miners' revolt in Asturias.

Lerroux could never recover politically from the "Straperlo" scandal (1935), in which his adopted son was implicated on a charge of corruption over the granting of concessions for gambling saloons. Lerroux lost his seat in the *Cortes* in the elections of Feb. 1936. He went to Portugal during the civil war and did not return to Spain until 1947. He died in Madrid on June 27, 1949.

(H. F. Gr.)

LERWICK, the only small burgh of County Zetland (Shetland Islands), Scot., and the most northerly town in the British Isles. Pop. (1961) 5,908. The origin of its name is the Norse *Leir-vik; i.e.,* "clay creek." It is on Bressay sound, a natural harbour on the east coast of the island called Mainland, 98 mi. N.N.E. of Kirkwall, in Orkney, and 270 mi. from Leith by steamer.

The town dates from the beginning of the 17th century, and the older part consists of a narrow flagged causeway, Commercial street, at right angles to which lanes ascend the hillside to Hillhead, where the more modern houses and buildings are located. Some of the old houses are built out over the water at the south end. At the north end is Ft. Charlotte, erected by Oliver Cromwell, repaired by Charles II, burned later by the Dutch and repaired by George III, after whose queen it was named. It is now used as a coast guard station and for the offices of several organizations. The Anderson Educational institute was built in 1862 by Arthur Anderson, a native, who also presented a home for seamen's widows. The town hall (1881) contains stained-glass windows which were a gift of the burghers of Amsterdam and Hamburg. Lerwick's main industries are agriculture, fishing and the making of Shetland knitwear. The herring fishery has declined since World War II. There is a general post office repeater station. The "Up Helly A'" mumming festival, held on the last Tuesday in January to welcome the return of the sun, is linked with the period of Norse occupation. It is undoubtedly a survival of pagan sun worship in which a Viking ship is carried in procession by torchbearers.

LE SAGE, ALAIN RENÉ (1668–1747), French dramatist and novelist whose *Gil Blas,* a novel in the picaresque tradition, qualifies as a minor classic of world literature. Le Sage (he himself seems to have preferred the form, Lesage) was born at Sarzeau (Morbihan), on Dec. 13, 1668, and brought up in Brittany. He studied for the bar in Paris, but almost immediately turned to literature, beginning as a translator and adaptor from the Spanish. Although occasionally very successful, he remained a rather marginal figure in the literary world of his day. He appears to have earned his living mainly by writing forgotten pieces for the popular Théâtre de la Foire. He also wrote two plays, *Crispin, rival de son maître* and *Turcaret* (both 1709), which occupy an honourable place in the history of the French theatre. In addition to *L'Histoire de Gil Blas de Santillane,* published in three installments (1715, 1724, 1735), he published *Le Diable boiteux* (1707), a collection of satirical sketches, and a number of other picaresque tales. The most interesting for the modern reader is the *Vie et aventures de M. de Beauchesne* (1733), a Defoelike documentary novel about a buccaneer. Le Sage died at Boulogne, on Nov. 17, 1747.

Crispin and *Turcaret* are satirical comedies dealing with the struggle for money and social advancement in the early 18th century. Sprightly and biting, they are well-made plays, chiefly notable for their presentation of the character of the scheming valet, who was later to develop into Beaumarchais' "Figaro."

The picaresque hero, as he appears in *Gil Blas,* is partly a scheming valet of the same kind and partly a device for moving from one milieu to another for the purposes of social satire. Le Sage used Spanish local colour and borrowed episodes from Spanish and Italian sources, but his work is French in tone and subject matter, as indeed it was bound to be, since he never visited Spain. He had a sharp eye for the ridiculous and is reminiscent of Molière in his treatment of doctors, fops, amorous spinsters, vain authors, worldly prelates and other traditional social types, but nearer to Voltaire in the rapidity and gaiety of his style, with its affectionately ironical overtones. It is probable that *Gil Blas* was more effective in making the picaresque form a European fashion than were the Spanish originals. The novel may lack the complexity of organization and the significance of a great masterpiece, but it still appeals to the general reader.

See also PICARESQUE NOVEL, THE.

See E. Lintilhac, *Le Sage* (1893); C. Dédéyan, *Lesage, Gil Blas* (1956). (J. G. WE.)

LESBIANISM is a term popularly used to connote female homosexuality, since it was in the Aegean island of Lesbos that the Greek poetess Sappho, in the earlier half of the 6th century B.C., made herself the leader of a group of women whose mutual relations were characterized by strong homosexual feeling.

Homosexual attraction among females is not by any means always associated with homosexual practices. These practices, where they occur, include various activities such as tribadism (a form of masturbation; from Greek *tribein,* "to rub"), which is the commonest method; mouth-genital contact; and the use of a phallus (extremely rare).

Homosexual practices are believed to occur much less widely among women than among men and seem never to have been thought to constitute so grave a danger to society. There have in fact been only very few cases of violation or seduction of children by women and it is most unusual for homosexual practices between consenting adult women to occur in public places.

Biblical references to female homosexuality are to be found both in the Old and in the New Testament; for the latter, *see* Rom. i, 26. The Jews, while strongly disapproving of it, seem to have considered it less of a moral or social evil than male homosexuality. Some Christian penitentials of the middle ages take cognizance of it.

Richard Krafft-Ebing discusses the subject at some length in his *Psychopathia Sexualis,* where he says that the basis for inversion is the same in both sexes. He states that it is apparently infrequent in women (though it is difficult to gain the confidence of women with sexual perversion) and that it does not make a woman impotent as it does a man. Woman, he considers, whether sexually inverted or not, is by nature not so sensual or so aggressive in pursuit of her sexual needs as man. His view that homosexuality per se leads to neurasthenia in women is not supported by modern psychiatric opinion.

Krafft-Ebing remarks that neither female nor male homosexuals necessarily betray their anomaly by external appearances; nor do female inverts invariably show masculine mental characteristics. However, in the form which he terms "viraginity" and which he regards as analogous to "effemination" in the male, the woman assumes the masculine role in her life generally (in dreams and in ideas as well as in homosexual function); and he speaks of "viragins" who have excelled by virtue of genius and in brave and noble deeds. He considers that the majority of female homosexuals are produced by "cultivation" rather than by innate impulse; but modern medical opinion would not regard this as proved. Krafft-Ebing cites A. J. B. Parent-Duchâtelet's book *De la prostitution dans la ville de Paris* (1857) to the effect that certain types of prostitute who are markedly sensual indulge in Lesbian practices because they are unsatisfied by intercourse with perverse or impotent men.

The report on *Homosexuality and Prostitution* prepared by a special committee of the British Medical association (1955) states that there was little evidence of female homosexuality in the women's forces during World War II, even where women were deprived of male company for considerable periods; but that it sometimes constitutes a problem in prisons, in approved schools and in remand homes. The report further states that there is no evidence of any relationship between homosexuality and the reproductive complex and that when homosexual women marry and have children no special physical or mental disturbance seems to result during pregnancy, childbirth or the puerperium; but that conscious or unconscious homosexuality is recognized as one of the causes of frigidity in wives. While female homosexuals seem to have no greater predisposition to neurosis or to psychosis than the average person, many homosexual relationships end in disaster because of social pressure or of jealousy. On the other hand such friendships have also played a constructive part in the lives of both partners and have occurred between women of outstanding ability.

Female homosexuality as a form of organized vice exists to some extent in most large cities, but the seduction of children, as has been said, or even of young girls by women is relatively rare.

Lesbianism has occasionally been practised by small groups of women as a "cult." *See* also HOMOSEXUALITY; SEXUAL DEVIATIONS; SEXUAL BEHAVIOUR: *Legal Aspects.* (D. M. OM.)

LESBOS (modern Gr. LESVOS; also MYTILENE), an island in the Aegean sea, off the coast of ancient Mysia (in northwest Asia Minor), north of the Gulf of Smyrna, formerly a *sanjak* (subdivision) in the archipelago *il* (province) of Turkey, was annexed in 1912 to Greece. Area 623 sq mi. Pop. (1961) 140,251.

It now forms (with Lemnos and Ayios Evstratios) a *nomos* (department), the three eparchies on Lesbos being Mytilene (Mitilini), Plomarion and Mithimna. The Gulf of Pyrrha (modern Kolpos Kallonis) is a deep inlet on the southwest between Sigri, a small port on the western point, and Malia at the southeast; the Gulf of Hiera (modern Gera or Olivieri) lies behind Mytilene town. Both have difficult entrances (though Gera is of naval value), and commerce is concentrated at the small safe harbour of Mytilene. The surface is rugged, the highest point, Mt. Lepetimnos, being 3,176 ft. The country is, however, very fertile in wine, oil and grain. Its chief produce and principal export is olives. Soap, skins and valonia are also prepared, mules and cattle are bred, the sardine fishery is important, and antimony, marble and coal are found. The island has suffered from periodical earthquakes. There is a telegraph station on the island and a cable to the Turkish mainland and to Greece.

The chief town, Mytilene (*q.v.*; Mitilini), pop. (1961) 25,758, was originally built on an island close to the eastern coast: afterward it was joined to Lesbos by a causeway, and the city spread along the coast. There was a harbour on each side of this small island; the southern one forms the medieval and modern port; the island is now occupied only by the ruined medieval fortress. Besides the five cities which gave the island of Lesbos the name of Pentapolis (Mytilene, Methymna [Mithimna], Antissa, Eresus [Eressos], Pyrrha), there was a town called Arisba, northeast of Kalloni, destroyed by an earthquake in the time of Herodotus. Pyrrha lay in the plain around the gulf of Pyrrha. Antissa, on the north coast near Sigri, was destroyed by the Romans in 168 B.C. Eresus was on the southwestern coast below Sigri. Mithimna survives as one of the larger towns of the island. Town walls and other buildings are on all these sites.

History.—The position of Lesbos near the old trade route of the Hellespont marks it as an important site at all times. There was an important Early Bronze Age town at Thermi, and Mycenaean finds have been reported in various places. In historic times it was peopled by Aeolians who claimed to have migrated about 1050 B.C. from Boeotia; its nobles traced their pedigree to Agamemnon who conquered it in the Trojan War. Lesbos was the most prominent Aeolian settlement. Its commercial activity is attested by its colonies in Thrace and the Troad, and by its participation in the settlement of Naukratis in Egypt; it was by its good harbour that Mytilene became the political capital. The climax of its prosperity was about 600 B.C., when Pittacus, appointed as *aesymnetes* (dictator), by his wise administration and legislation won a place among the Seven Sages of Greece. The lyric poetry of Greece owed much to Lesbians of the 7th century, the musician Terpander and the dithyrambist Arion, and culminated under Pittacus' contemporaries Alcaeus and Sappho (*qq.v.*).

From the earlier 6th century there are important remains of "Aeolic" architecture, but later the island declined, after a protracted struggle with Athens for Sigeum on the Hellespont, and a naval defeat by Polycrates of Samos. The Lesbians readily submitted to Persia after the fall of Croesus of Lydia, and although hatred of their tyrant Coës, a Persian protégé, drove them into the Ionic revolt (499–493), they displayed poor spirit at the decisive battle of Lade. In the 5th century Lesbos long remained a privileged member of the Delian League (*q.v.*), with full self-administration, and the sole obligation of assisting Athens with a naval contingent. Nevertheless, early in the Peloponnesian War (*q.v.*) the oligarchy of Mytilene forced on a revolt, which was ended after a year's siege of that town (428–427). The Athenians recalled their hasty resolve on a wholesale execution, but killed the ringleaders, confiscated the land and established a garrison. Thereafter Lesbos was repeatedly attacked by the Peloponnesians, and in 406 Mytilene witnessed the naval battle of Arginusae (*q.v.*). In 389 most of the island was recovered for the Athenians by Thrasybulus; in 377 it joined the Second Delian League, and remained throughout a loyal member, although its democracy was for a while supplanted by a tyranny. In 333 Lesbos served as a base for the Persian admiral Memnon against Alexander the Great of Macedonia; for Perseus against Rome in the Third Macedonian War; and for Mithradates VI of Pontus in 88 B.C. Mytilene was raised by Pompey to the status of a free city, due no doubt to Theophanes, a native of it.

Antissa, Eresus and Pyrrha possess no separate history. Methymna in the 5th and 4th centuries was sometimes a rival of Mytilene. During the Byzantine age the island flourished. In 1091 it fell to the Seljuks; in the next century repeatedly to the Venetians; in 1224 it was recovered by the Byzantine emperors, who in 1354 gave it to the Genoese family Gattilusi. Prospering under them, Mytilene passed in 1462 under Turkish control and had an uneventful history till its annexation to Greece.

BIBLIOGRAPHY.—Herodotus, ii, 178, iii, 39, vi, 8, 14; Thucydides, iii, 2–50; Xenophon, *Hellenica,* i, ii; Strabo, xiii, pp. 617–619. *See* also A. Philippson, *Die Griechischen Landschaften,* vol. iv, pp. 233–244 (1959).

LESCHETIZKY, THEODOR (originally THEODOR LESZETYCKI) (1830–1915), Polish pianist and teacher who was one of the principal founders of the modern technique of piano playing, was born at Lancut (then in Austrian Poland) on June 22, 1830. He was a pupil of Czerny and Simon Sechter in Vienna, and in 1852 he went to St. Petersburg, later teaching at the conservatory there. From 1878 he taught privately in Vienna, where his pupils included I. Paderewski, A. Schnabel and B. Moiseiwitsch. His method maintained that the wrist should be kept flexible while the shape of the hand should be arched (the "Kugelhand"), thus allowing rapid successions of octaves and chords and a great agility of the fingers. Leschetizky died at Dresden on Nov. 14, 1915.

See Malwine Brée, *Die Grundlage der Methode Leschetizky* (1902); George Woodhouse, "How Leschetizky Taught," *Music and Letters* (July 1954).

LESDIGUIÈRES, FRANÇOIS DE BONNE, DUC DE (1543–1626), constable of France, was born at St. Bonnet de Champsaur in Dauphiné, on April 1, 1543. He was educated at Avignon under a Protestant tutor and had begun the study of law in Paris when he enlisted as an archer. He joined the Huguenot troops in Dauphiné and distinguished himself in mountain warfare. In 1575 he became the acknowledged leader of the Huguenot resistance in the district, with the title of commandant general. He seized Gap by a lucky night attack on Jan. 3, 1577, reestablished the reformed religion there and fortified the town. He refused to acquiesce in the treaty of Poitiers (1578), which involved the surrender of Gap, and after a year of fighting secured better terms for Dauphiné. Nevertheless in 1580 he was compelled to hand Gap (among other towns) over to Mayenne.

Lesdiguières took up arms for Henry of Navarre in 1585 and, after the truce of 1588–89, secured the complete submission of Dauphiné. In 1590 he beat down the resistance of Grenoble and was able to support the governor of Provence, Bernard de Nogaret de La Valette, against the raids of Charles Emmanuel I of Savoy. He defeated the Savoyards at Esparron in April 1591 and in 1592 began the reconquest of the marquisate of Saluzzo. After his defeat of the Spanish allies of Savoy at Salebertrano in June 1593, there was a truce, during which Lesdiguières was occupied in maintaining the royal authority against the duc d'Épernon in Provence. The war with Savoy proceeded intermittently until 1601. Henry IV made him a marshal of France in 1609.

Lesdiguières was created duke and peer of France in 1611 and made governor of Dauphiné in 1612. He moderated the political claims made by his coreligionists under the terms of the Edict of Nantes. In 1622 he formally abjured the Protestant faith and took up arms against the Protestants in the south; he became constable of France and received the Order of the Saint Esprit. He nevertheless pleaded the cause of the Vaudois with Charles Emmanuel. His last campaign, fought in alliance with Savoy to drive the Spaniards from the Valtelline (1625), was the least successful of his enterprises. He died of fever at Valence on Sept. 28, 1626. Much of his official correspondence is in *Actes et correspondance du connétable de Lesdiguières,* edited by C. Douglas and J. Roman, three volumes (1878–84).

See C. Dufuyard, *Le Connétable de Lesdiguières* (1892); E. Escalier, *Lesdiguières* (1946).

LESKIEN, AUGUST (1840–1916), outstanding German specialist in comparative Indo-European linguistics, was born in Kiel on July 8, 1840, and studied in Kiel, Leipzig and Jena. At Jena he was a student of August Schleicher (*q.v.*). He taught for short periods at Göttingen and Jena before going to the University of Leipzig, where he remained until his death on Sept. 20, 1916. Leskien early began to concentrate on the Baltic and Slavonic branches of the Indo-European language family, and his contributions were both varied and impressive. He published a study of noun declension in Slavonic, Baltic and Germanic (1876), and several studies in Lithuanian and Slavonic accentology; he furthered the study of Old Church Slavonic, publishing both a grammar (1909) and a handbook (7th ed., 1955). He made a number of contributions to the study of Lithuanian, including a combined grammar and reader (published posthumously in 1919). He also completed the first volume of a Serbo-Croatian grammar (1914). In addition to his linguistic work, Leskien did considerable research in Lithuanian and South Slavonic folk poetry.

(L. L. T.)

LESKOV, NIKOLAI SEMENOVICH (1831–1895), Russian novelist and short-story writer, who has been described as the greatest of Russian storytellers, was born in the village of Gorokhovo, Orel province, on Feb. 16 (new style; 4, old style), 1831. As a child he was taken to different monasteries by his grandmother and he used those early memories of Russian monastic life with good effect in his most famous novel *Soboryane* (1872; Eng. trans., *Cathedral Folk,* 1924). At the age of ten he was sent to the Orel secondary school which he left five years later without finishing its eight-year course. In 1847 he became a junior clerk of the criminal court in Orel, and three years later he got himself transferred to Kiev. He left the civil service in 1857, and joined the English firm of Wilkins and Scott, one of whose governors, Alexander Scott, was his uncle by marriage. As a member of this firm he had to travel all over Russia and it was during these travels that he obtained the material for most of his novels and short stories.

He began his writing career as a journalist under the pseudonym of Stebnitski. His first stories were published in 1862. In 1865 he published his best-known story, *Ledi Makbet Mtsenskogo uezda* (Eng. trans., *Lady Macbeth of the Mtsensk District,* 1961). Another story, the picaresque *Ocharovanny Strannik* (1873; Eng. trans., *Enchanted Wanderer,* 1961), was written after a visit to the monastic islands on Lake Ladoga in 1872. His early novels *Nekuda* (1864; "Nowhere to Go") and *Na Nozhakh* (1870–71; "At Daggers Drawn") were violently attacked by the Russian radicals as revealing an attitude of uncompromising hostility toward the Russian revolutionary movement, an attitude Leskov later modified. His approach to literature in general is summed up in the phrase: "I love literature as something that enables me to express what I regard as truth and what I esteem to be good for humanity at large." Leskov died in St. Petersburg on March 5 (N.S.; Feb. 21, O.S.), 1895.

(D. Mk.)

LESLIE, DAVID: *see* Newark, David Leslie, Lord.

LESLIE (Lesley), **JOHN** (1527–1596), Scottish bishop and historian, a firm adherent of Mary Stuart and opponent of the Reformation, was born on Sept. 29, 1527, the son of Gavin Leslie, parson of Kingussie. He studied at the universities of Aberdeen, Paris and Poitiers and on his return to Scotland (*c.* 1554) was appointed canonist (professor of canon law) at King's college, Aberdeen. He also held the post of official of the diocese, together with the parsonage and prebend of Oyne. He was a Roman Catholic spokesman against John Knox and other reformers at Edinburgh in Jan. 1561. Leslie was one of those who tried to persuade Mary Stuart to return to Scotland by way of Aberdeen, where she would have a large force of Catholics at her disposal. Although this counsel was declined he remained her supporter and adviser. During her reign he was a privy councilor, a judge of the court of session and one of the commissioners appointed to revise and publish the laws of Scotland. In 1566 he obtained the abbacy of Lindores and the bishopric of Ross, but was not formally provided by the pope until 1575. Although disapproving of Mary's marriage to the earl of Bothwell, Leslie was loyal to her even after her deposition. When she summoned him to England for consultation, he undertook her defense at the abortive conference at York in 1568. In 1569 he became her ambassador at Elizabeth's court, where he kept in communication with her adherents in Scotland. He published in 1569 a pseudonymous *Defence of the Honour of . . . Marie, Queene of Scotland,* reprinted with alterations in 1571. Twice his schemes, particularly that of marrying Mary to the duke of Norfolk, resulted in his imprisonment, and on the second occasion his confession and other evidence led to Norfolk's execution.

On his release in 1573, Leslie endeavoured unsuccessfully to obtain assistance for Mary from continental rulers. At Rome in 1578 he published his history of Scotland, *De origine, moribus et rebus gestis Scotorum,* a work which owes much in its earlier chapters to Hector Boece and John Major, but thereafter provides a valuable statement of the Roman Catholic viewpoint and a corrective to the bias of George Buchanan and John Knox. This work is Leslie's chief claim to remembrance.

From 1579 Leslie resided in France, where he was appointed suffragan and vicar-general of the diocese of Rouen. In 1592 he was translated to the bishopric of Constance, with licence to retain Ross, but did not take possession of his see. He died in an Augustinian monastery near Brussels on May 31, 1596.

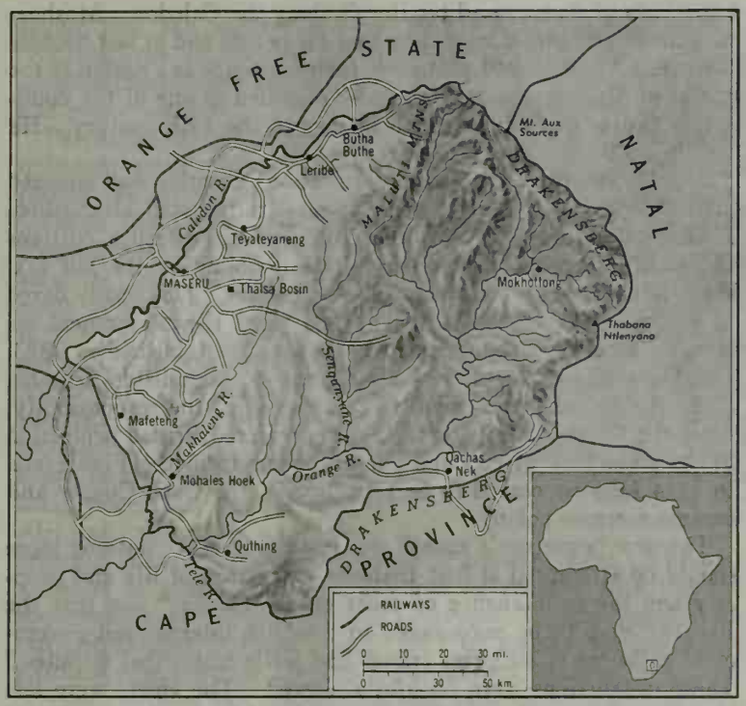
(A. L. Mu.)

LESLIE, SIR JOHN (1766–1832), Scottish mathematician and physicist, whose main contributions to physics were on radiation, was born at Largo, Fifeshire, on April 10, 1766, and was educated at the University of St. Andrews. In 1805 he was elected to succeed John Playfair in the chair of mathematics at Edinburgh, and in 1819 succeeded Playfair as professor of natural philosophy. In his *An Experimental Enquiry Into the Nature and Properties of Heat* (1804) Leslie compared the emissive, absorptive and reflecting powers of various substances to radiant heat. This work was carried out with the help of his "differential thermometer" and a "Leslie cube." The substances tested were made to cover a face of the cube or the bulb of a differential thermometer. He used the latter instrument in a great variety of investigations, connected especially with photometry, hygroscopy and the temperature of space. He also performed pioneer research on capillary action (*see* Surface Tension). In 1820 he was elected a corresponding member of the Institute of France and was knighted in 1832. He was a prominent contributor to the fourth and sixth editions of the *Encyclopædia Britannica,* contributing to the latter (1830) an essay on 18th-century progress in mathematics and physical science. He died at Coates, near Largo, on Nov. 3, 1832.

LESOTHO, formerly, as Basutoland, an internally self-governing British colony in southern Africa. It became an independent monarchy within the Commonwealth of Nations on Oct. 4, 1966. An enclave within the Republic of South Africa, Lesotho has an area of 11,716 sq.mi. (30,344 sq.km.) and extends from latitude 28°35′ to 30°40′ S and from longitude 27° to 29°30′ E. Much of the country is impoverished and heavily populated, and its economy is entirely dependent on the export of agricultural products and labour, mainly to South Africa. The capital is Maseru.

Geographical Regions.—Lesotho consists mainly of the highest part of the great plateau of southern Africa. Nearly three-quarters of the country is between 6,000 and 11,000 ft. (1,800 and 3,300 m.) in height; this region is a highly dissected plateau of basaltic lavas overlying Stormberg rocks of the Karroo System, mainly shales and sandstones, which outcrop below about 6,500 ft. (2,000 m.) to the west and in the Orange River Valley. These sedimentary rocks form the so-called lowlands and foothill regions of Lesotho.

The country can be divided into well-marked regions. The Western Lowlands form a long fringe, about a quarter of the area of Lesotho, between the Caledon River and the Cave (Stormberg) Sandstone foothills, and are situated at an altitude of about 5,000–6,000 ft. (1,500–1,800 m.). They consist of undulating basins and plains composed of softer sedimentaries with numerous, steep-sided plateaus and conical hills of more resistant Cave Sandstone. The plateaus formed useful natural fortresses, the best known being Thalsa Bosin (Thaba Bosiu), which was Moshoeshoe's head-



LESOTHO

quarters (see *History* below). There are many caves and shelters at the base of the sandstone cliffs, used originally by the Bushmen (whose paintings can still be seen); villages are now strung out along the slopes of the hills. Cultivation is carried on extensively in the basins and plains, the plateaus being reserved for grazing. The majority of the Basuto (Suto) people live here, and the density of population is high, with more than 200 persons per square mile (77 per square kilometre) in places. Most of the administrative centres are situated in the lowlands. Soil erosion is serious, particularly in the south, and this region has the highest proportion of migrant labour in Lesotho. A vigorous soil conservation campaign has been carried on for many years with considerable success.

The Cave Sandstone Terrace is a long narrow zone between the highlands and the lowlands, with an average altitude of more than 6,000 ft. (1,800 m.). This region is one of the most productive in Lesotho and is better watered than the lowlands, with a more fertile soil and higher crop yields. The long barrier of the Maluti Mountains, spurs of the main Drakensberg, over 10,000 ft. (3,000 m.) in places, marks the western edge of the highland region, a mature plateau deeply cut by river valleys and forming South Africa's main watershed. There rise the Orange River and its main tributaries, which drain west to the Atlantic and have cut the highlands into great blocks; and from there flow the Natal coastal rivers, such as the Tugela. Much of the eastern edge of the plateau is above 10,000 ft. (3,000 m.) high, descending in a spectacular escarpment thousands of feet to the terraces of Natal. The fingers of high plateaus above 8,000 ft. (2,400 m.) in height form the cattle post country; they are not permanently inhabited, except for herdboys, and are used as grazing for livestock. The deep valleys, such as the Sinqunyane, have fertile soil, produce good crops, and are well populated. The highlands are the most important economic region in Lesotho; large amounts of wool and mohair are produced, and wheat and peas are the main crops. The long narrow subregion of the Upper Orange Valley lies at a lower altitude, has less rainfall and more infertile soil, and is more densely populated than the highlands. Maize (corn) and sorghum are the main crops, as in the lowlands.

Climate.—Despite the country's subtropical latitude, the climate is equable with moderate annual temperatures because of the high altitude. Rainfall varies considerably in amount and seasonal periodicity. Three-quarters of Lesotho has more than 25 in. (635 mm.) average annual rainfall, the highest totals occurring in the highlands and the lowest in the Western Lowlands and Orange River Valley. There is a marked summer maximum, with three-quarters of the total annual rainfall from October to April. Rainfall is generally convectional and associated with thunderstorms. Showers tend to be of short duration and heavy; sometimes more than an inch falls in an hour. Hail often falls and may do much damage to crops. Snow may fall in considerable amounts at any time of the year in the mountains, while the lowlands occasionally have snow in winter. Mean annual temperatures are fairly low, ranging from an average of about 45° F (7° C) for June and July to about 70° F (21° C) for January in the lowlands, while it is estimated that in the highest part of the plateau the range of temperature is from about 10° to 60° F (−12° to 15.5° C). Frosts occur widely in winter and occasionally during summer as well. The highlands usually have a growing season of less than six months.

Vegetation and Animal Life.—The vegetation of Lesotho consists mainly of temperate grasslands. Most of the country is treeless; willows, poplars, and gums have been planted at the administrative and mission stations, and some of the warm sheltered valleys have indigenous trees and shrubs. The highlands contain some of the finest natural grazing in southern Africa, particularly those areas with *Themeda triandra,* or red grass. A bitter karroo bush, *Chrysocoma,* invaded large areas of highland which had been seriously overgrazed, but with controlled grazing this problem has been largely overcome.

A wide variety of wildlife was once found in Lesotho, but it has been nearly all exterminated, except for a few small antelopes and hares. During the 19th century the Basuto traded otter and leopard skins, ostrich feathers, and cranes' wings with the Zulus for cattle, hoes, assegai blades, necklaces, and copper rings.

(N. C. P.)

THE PEOPLE

The people of Lesotho consist of a cluster of tribes which accept the authority of the paramount chief, the ruling member of the house of Moshoeshoe. Most of these tribes, collectively Basuto or Suto (*q.v.*), are of southern Sotho (*q.v.*) linguistic stock. Moshoeshoe was originally the chief only of the Kwena group (Molibeli, Monaheng, Hlakwana, Kxwakxwa, and Fokeng tribes), which thus formed the nucleus of the nation. The nation absorbed members of other southern Sotho—but non-Kwena—tribes, including the Phuting, Kxolokwe, Sia, Tlokwa, Taung, and Rolong. There were also many Nguni-speaking tribes (*see* NGUNI), some of which (Phetla and Phuthi) were original settlers in the area and others (Natal Nguni such as Tebele, Bhaca, and Zulu and Cape Nguni such as Tembu) were offshoots of and fugitives from Nguni tribes outside Lesotho. They fled into Lesotho during the inter-African wars of 1818–30 that followed the rise of Shaka among the Zulu. Both these and later wars with the *Voortrekkers* increased the degree of interdependence among the various groups which accepted Moshoeshoe's leadership and protection.

The growth of the Basuto state has been marked by the policy of Moshoeshoe and his successors to appoint their close kinsmen as governors of territorial areas to rule over groups often of different dialect and custom. Under them, chiefs include both members of the Basuto royal house and also of royal houses of formerly independent tribes. There has been a continual process of cultural adaptation by non-Kwena groups to the culture and language of the Kwena, although the Nguni groups in particular have tried to resist cultural amalgamation.

The 1936 census report, the last to show the ethnic affiliations of the population, showed that Sotho-speakers accounted for just over 85% of the total population, some 14.5% being Nguni. The proportion of men absent from Lesotho on labour migration is extremely high. It is estimated that more than 45% of males between 15 and 50 are absent at any one time, leaving half the wives of the country without husbands. (J. F. M. M.)

In 1965 the African population of Lesotho was estimated at more than 740,000. There were about 2,000 Europeans, mainly government officials, missionaries, and traders. The average population density was 63.6 per square mile (25 per square kilometre), decreasing considerably from the lowlands to the highlands; in some areas it exceeded 300 per square mile (116 per square kilo-

metre). At the 1956 census the African population numbered 638,857, an increase of 14.3% over 1946; there were also 154,782 absentees in South Africa. Europeans at that time numbered 1,926, and there were 891 Asians and Eurafricans. The only large urban centre of population is Maseru, the capital (pop. [1962 est.] 10,000). (N. C. P.; X.)

HISTORY

The Bushmen were the earliest inhabitants of what is now Lesotho, but they died out many years ago. The first Bantu were Nguni (Zulu-speaking) tribes who crossed the Drakensberg in the 18th century and settled along the banks of the Caledon River. Later they were joined by Sotho-speaking tribes. They all lived at peace, disturbed only by intermittent cattle raids, until early in the 19th century, when that part of Africa was set in turmoil by the Zulu despot Shaka. Many tribes fled over the Drakensberg, pursued by his ravaging and plundering regiments until the social fabric of the people was almost destroyed. Eventually a young chief, Moshoeshoe (Moshesh), born about 1790, gathered the remnants of the tribes about him and, using impregnable mountain fortresses such as Thalsa Bosin as his bases, beat back the invaders, and established his people securely against the Zulus.

No sooner was the Zulu menace from the east contained than the Basuto people had to face the Europeans who were trekking up from the south. With the unerring skill of a diplomat, Moshoeshoe played off the rulers of the Boer states and the colonial government of the Cape Colony against each other. He welcomed missionaries and traders to Lesotho, but with both he showed himself well able to hold his own. As tension increased between the Basuto and the Boers, who were passing through or settling in his country in increasing numbers, Moshoeshoe's conviction grew that the only hope of "existence and peace" lay in British protection. He laboured incessantly to make this hope a reality, and with the help of Sir George Napier, governor of the Cape Colony, he achieved it.

Protection was first granted in 1843. Then in 1848 British sovereignty was proclaimed over the Orange River country, and in 1849 the boundaries of Moshoeshoe's territory were reduced. But in 1854 the British renounced sovereignty over the Boers north of the Orange, and Moshoeshoe was left to battle on through repeated disappointments and almost continuous strife with his Bantu, Boer, and British neighbours, until at last, in 1868, Lesotho was proclaimed British territory. The Boers, who had overrun practically the whole country up to the foothills, protested in vain against this interference and had to be content with a 30-mi. (48-km.) strip of "conquered territory" along the Caledon. Moshoeshoe died two years later, happy that his people had at last become British subjects. The Basuto owe their existence as a nation to the genius of Moshoeshoe, who must be regarded as one of the dominating figures of South African history in the 19th century. He died in 1870.

In 1871, without adequate consultation, Lesotho was annexed to the Cape Colony and a small administrative staff established. Then tactless attempts at direct rule, ignoring Basuto customs and loyalties, coupled with precipitate doubling of the hut tax, led to minor revolts and increasing restlessness. This finally flared into open revolt (the Gun War, 1880) when the government attempted to disarm the people. Peace was reestablished in 1883. The Cape Colony, weary of attempting to administer Lesotho, asked the British government to be relieved of the responsibility, while the Basuto chiefs for their part preferred British protection to the possibility of renewed encroachment from the Free State. In 1884 Lesotho ceased to be a portion of the Cape Colony and became a crown colony.

The new "governor's agent" was instructed that "nothing more should be attempted at first than the protection of life and property and the maintenance of order on the border," and that the Basuto "were to be encouraged to establish internal self-government sufficient to suppress crimes and settle intertribal disputes." These instructions were faithfully obeyed. The chiefs were left to rule their people according to traditional law and custom, and the authority of Moshoeshoe's senior son and of his son Lerotholi after him was supported. By 1898, after a few bloody affrays, Lerotholi enjoyed "undisputed supremacy," and British control was accepted. Credit for this was due to the early resident commissioners, Sir Marshall Clarke (1884), Sir Godfrey Lagden (1893), and Sir Herbert Sloley (1902), and to Lerotholi, who was paramount chief from 1891 to 1905 during the difficult transitional period. In 1905 Lerotholi died, and the national council with the imperial government concurring elected his son Letsie chief.

Basuto fears for their future were never entirely allayed, however. During the South African War, they were uneasily neutral. In 1906 the extension of the South African railway system to Maseru, indicative of the growing importance of the country's agriculture, trade, and labour supplies, was strenuously opposed by the younger chiefs as a potential threat to their independence, although only one mile of the new line lay inside the border. These fears were revived again in 1909 by the unification of the four South African colonies and discussion about the transfer of the administration of the High Commission Territories to the government of the new Union of South Africa. A deputation petitioned the king,

(LEFT) STEPHEN LEWIN; (RIGHT) WIDE WORLD

(LEFT) BASUTO HORSEMAN. (RIGHT) A TRAVELING BARBER SETS UP SHOP IN AN OPEN FIELD AT MASERU, LESOTHO. THE BLANKETS WORN BY THE MEN IN BOTH PICTURES ARE CHARACTERISTIC BASUTO DRESS, SERVING ALSO AS MATTRESS AND COVER AT NIGHT

asking that the country remain "outside [the Union] as far as possible, independent as it is now" and was reassured.

Thereafter the matter remained quiescent until 1933, when informal discussions were opened between the Union and British governments. In 1935 an *aide-mémoire* recalled the pledges made by the British government both to the British Parliament during the passage of the South Africa Act (1909) and to the inhabitants of the Territories, and recorded that the two governments now agreed that in the ensuing years their policies toward Africans "should be directed to bringing about a situation in which if transfer were to become a matter of practical politics it could be effected with the full acquiescence of the populations concerned." The South African government continued until 1955 to assume that it would ultimately incorporate Lesotho. The Basuto, however, never expressed anything but hostility to this assumption, and their determination not to be taken over by South Africa was strengthened in mid-20th century by the rise of a nationalist movement seeking independence and by the support given the movement by member states of the United Nations and the Organization of African Unity. The South African government initially showed great anxiety about the possibility of an independent African state in its heartland, but after the electoral victory in 1965 of the conservative and traditionalist Lesotho National Party, led by Chief Leabua Jonathan, it agreed to its small and completely dependent neighbour's mapping out its own political future.

(LEFT) WIDE WORLD; (RIGHT) STEPHEN LEWIN

(LEFT) CROWD AWAITING MEDICAL HELP AT A DISPENSARY IN MASERU.
(RIGHT) BASUTO BOY BEFORE A THATCH-ROOFED, STONE AND MORTAR HOUSE

After discussions in September 1966 Hendrik Verwoerd, prime minister of the Republic of South Africa, and Chief Jonathan issued a statement which outlined the objectives of their meeting. These were "to establish how good neighbourly relations and cooperation could be arranged. . . . We are pleased to say that our meeting took place in a spirit of good will and that it is quite clear that there is no desire for our states to interfere in one another's domestic affairs, but that friendly relations between these two independent neighbouring states will be preserved."

Lesotho became an independent kingdom within the Commonwealth on Oct. 4, 1966, Queen Elizabeth II being represented at the ceremonies by Princess Marina, duchess of Kent. The first head of state of the new country was the paramount chief (Motlotheli) Moshoeshoe II; Chief Jonathan was the first prime minister.

The paramount chief was dissatisfied with his position under the new constitution (*see* below). Riots followed a meeting called by him in December 1966 to demand powers wider than those of a constitutional monarch. As a result, on Dec. 28 he was placed under house arrest on the orders of Chief Jonathan. He was released after agreeing to accept the limits placed on him by the constitution.

GOVERNMENT, ADMINISTRATION, AND SOCIAL CONDITIONS

Until 1964 Lesotho's administration followed the traditional colonial pattern of indirect rule with a resident commissioner—under the direction of the British high commissioner in South Africa—presiding over an advisory council (established 1910) with the paramount chief as chief adviser. In 1960 constitutional changes took place which led to internal self-government.

In 1965 a closely contested general election was held, with a high proportion of those able to vote doing so. The Lesotho National Party, which emerged victorious, obtained 41.6% of the poll and 31 (out of 60) seats in the National Assembly. The Lesotho Congress Party, with pan-African sympathies, received 37.6% of the votes and won 25 seats. The Marema Tlo Freedom Party received 16.4% of the poll but only 4 seats. The latter two parties contested the National Party's right to lead an independent Lesotho and appealed unsuccessfully to the British government to delay the granting of self-government until a more representative cabinet could be formed. The opposition parties accused the National Party of being willing to make Lesotho a satellite of South Africa. These accusations were supported by the paramount chief, and independence was achieved under some strain.

Parliament.—Parliament comprises the Senate and the Legislative Assembly. The Senate consists of 22 principal chiefs, or their nominees, and 11 other persons nominated by the paramount chief acting entirely at his own discretion. These nominations were, however, for the duration of Parliament and could not be altered during the life of the Parliament. The National Assembly consists of 60 members elected by single-member constituencies on the basis of adult suffrage. The Senate can refer bills back to the Assembly with amendments, but it has no power to initiate legislation; if the Senate fails to pass a bill within a specified period the Assembly can resubmit it and the Senate must then accept it. The Senate cannot delay the passage of an appropriation bill.

Parliament under the new constitution has a normal life of five years, and the power to prorogue or dissolve it is vested in Motlotheli, who must act on ministerial advice except when the ministry loses the support of the National Assembly. Then the ruler may, using his own discretion, either dissolve Parliament or choose a new prime minister. Motlotheli retains the right to be consulted on all matters. The Lesotho constitution provides for detailed safeguards for the protection of civil rights, and these are enforceable by the courts.

Judiciary.—The highest court is a newly organized (since independence) Court of Appeal, which hears appeals from the Lesotho High Court. The chief justice of the High Court is appointed by Motlotheli on the advice of the prime minister. A Judicial Service Commission advises on the appointment of the remaining judges. A system of subordinate courts with civil and criminal jurisdiction exists, and these are presided over by administrative officers or magistrates. Below these courts are customary law courts from which appeal can be made either to the lowest rung of the subordinate courts or to a judicial commissioner. Appeals on matters of customary law may be made to the highest courts. The criminal procedure of the courts of Lesotho is largely based on the Criminal Procedure and Evidence Act of the Republic of South Africa; the common law of the country is South African.

Public Health.—The general health of the Basuto is poor. They suffer from chronic rheumatism, malnutrition, infection of the respiratory tract, digestive disorders, and venereal disease. The heaviest toll of lives in children is due to tuberculosis, malnutrition, diphtheria, whooping cough, and gastroenteritis. The incidence of nutritional deficiency diseases is high and is associated with the staple diet of maize (corn). Mass immunization measures against diphtheria, whooping cough (with the assistance of UNICEF), and smallpox have been carried out. The World

Health Organization has cooperated in nutritional and tuberculosis surveys.

Education.—The first schools were started by the Paris Evangelical Missionary Society shortly after its arrival in Lesotho in 1833. The Roman Catholic Mission founded its first school in 1864, and the Anglican Church Mission followed in 1870. From 1871 onward the administration of Lesotho began to give financial support to the mission schools, but it was not until 1939 that a government high school was established in Maseru. In the 1960s there were about 1,070 primary schools and just over 20 secondary schools, four of the latter providing a five-year course leading to the Cambridge Overseas School Certificate. It was estimated that 479 students would pass that examination between 1964 and 1968. In 1945 the Pius XII College was established at Roma, 22 mi. (33.8 km.) from Maseru; with the assistance of Colonial Development and Welfare Funds, it was taken over in 1964 by the governments of Lesotho and Botswana (as they became), and Swaziland and renamed the University of Botswana, Lesotho, and Swaziland. In the first year of independence it was estimated that there were 300 Basuto graduates in Lesotho and the Republic of South Africa.

THE ECONOMY

Lesotho's economy is entirely subservient to that of South Africa, and without the remittances of migrant Basuto workers, employed mainly in mining and agriculture in South Africa, the country's precarious economic position would be even worse. Moreover, this dependence is continually increasing. In 1950, 50,000 Basuto were issued passes by South African officials. In 1962 this figure had risen to 120,000. Lesotho has no industries. Agriculture, the predominant activity of the country, is on a subsistence level, but this is not adequate, since recurring droughts, poor soil, communal tenure, and inadequate farming methods have made it necessary to import maize (corn), the staple diet, into the country. In 1954, 9,000 tons of maize had to be imported; in 1962 this figure had risen to 19,000 tons, and in the devastating droughts of 1964–65 import figures were much higher.

Agriculture.—The 1966 constitution provides for the land of Lesotho to be owned by the Basuto nation and to be administered in trust by Motlotheli and the chieftainship. The principles by which they will be governed in the exercise of this trust are regulated by laws passed by Parliament. Arable land is allocated as far as possible to each household (average four persons), but thousands of households remain without land. The system of land tenure "does not permit of real development or of much improvement, either in crop production or in agricultural methods" (*Basutoland,* Annual Report, 1957). Soil erosion and primitive farming have decreased the area of arable land to 930,000 ac. (380,000 ha.), only 12.4% of the total land area. Soil conservation measures, however, have been undertaken on the remaining arable land, and much has been done to encourage improved farming methods.

The principal crops are maize, sorghum, beans, and winter wheat in the lowlands, and maize, spring wheat, peas, and barley with some sorghum in the highland valleys. The villages are encouraged to grow vegetables. In 1936 there were 800 vegetable gardens under the supervision of field demonstrators. By the 1960s there were about 30,000 such gardens. In 1963 livestock valued at £300,000 ($840,000) were imported into Lesotho, and the combined wool, hides, and livestock exports came to £3,700,000 ($10,260,000). There are 20 livestock improvement centres, and considerable efforts have been made, with the assistance of the cooperative movement, to improve the standard of wool classing which, until recently, has depressed the price of Lesotho wool. Hides and skins could add substantially to the country's revenue, but marketing needs to be improved.

Trade.—Most of the retail trade in the territory is conducted by Europeans, but there are a few Asian traders in the northern districts. Further licences to trade, however, will be granted only to Basuto, and since World War II an increasing number of them have gained such licences. Licensed Basuto are concerned mainly with bakeries, butchers' establishments, cafés, livestock trading, milling, general trading, and transport, both of goods and passengers. Lesotho imports all the consumer and capital items the country needs (principally foodstuffs, clothing, blankets, and tin ware) as well as certain agricultural commodities such as plows and livestock.

A fairly large cooperative movement exists, but it received a substantial setback as a result of the collapse of the Basutoland Cooperative Banking Union formed in 1957. This was a multipurpose organization embracing banking advances to cooperative societies and marketing. The government intervened directly thereafter, and the newly formed cooperative has rectified the damage done.

Finance.—Treasury expenditure, which was £9,000,000 in 1964–65, showed a very substantial increase during 1961–66. The British government provided £3,170,000 during 1965. Annual revenue included a sum of about £1,000,000 ($2,800,000) in customs and excise duties collected by South Africa for Lesotho. After achieving independence Lesotho asked for a grant-in-aid from the British government amounting to £18,000,000 to be provided over three years, but only £11,000,000 was promised. The prime minister made unofficial attempts to obtain assistance from the German Federal Republic. UN economic advisers were sent to Lesotho, and the prime minister appointed Anthon Rupert (the head of one of the leading Afrikaner financial institutions) as industrial adviser and Owen Horwood, vice-chancellor and principal of Natal University, as his economic adviser. Lesotho's currency is the same as South Africa's.

Transport and Communications.—The country is linked with the railway system of South Africa by a short line from Maseru to Marseilles on the Bloemfontein-Natal main line. The main road system, totaling approximately 500 mi. (800 km.), is principally confined to the Western Lowlands. From Maseru a main road extends to the north to Butha Buthe and to the south to Quthing, with several short branch main roads eastward to the foothills of the mountains and a few westward to join South Africa's road system. A road from Maseru into the mountainous area to the east was completed in 1966. Qachas Nek on the southeastern border is connected by a main road with South Africa. Main roads are maintained by the Public Works Department, but the standard is generally low, the roads in many cases following the line of the original sunken wagon tracks formed by early missionaries and traders. Motor services of the South African railways operate between the government stations of Butha Buthe, Mohales Hoek, and Quthing and the railways in the Orange Free State. There are approximately 1,600 mi. (2,600 km.) of bridle paths in the country, which are now constructed and maintained by the administration. The territory's main air strips are at Maseru, Mokhotlong, Sehonghong, Semonkong, and Qachas Nek, although there are others, used principally by traders, for transporting merchandise to their stores. Air transport includes regular mail services. A telegraph system covers much the same area as the main roads, and a government radio links Maseru with Mokhotlong and Qachas Nek. (S. Tr.)

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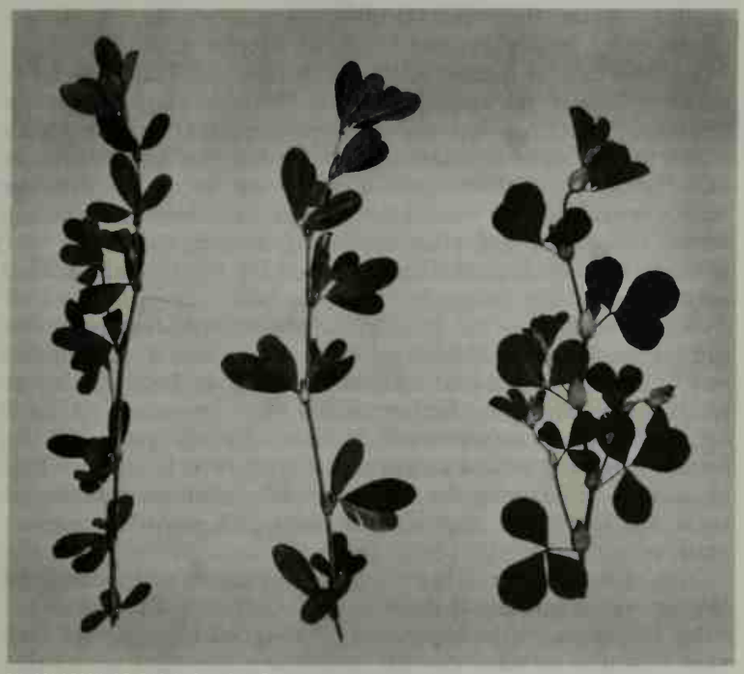
LESPEDEZA, the name of a genus of herbaceous plants of the pea family (Leguminosae; *q.v.*); some are grown as ornamentals and several are used as forage and green manure. All are natives of eastern Asia and eastern North America. This peculiar distribution has given rise to the theory that these forms developed in eastern Asia, from which some migrated in past geologic time by way of a land connection in the north to North



BY COURTESY OF THE U.S. DEPARTMENT OF AGRICULTURE

LESPEDEZAS: (LEFT TO RIGHT) STRIATE (L. STRIATA); KOBE (L. STRIATA VARIETY); KOREAN (L. STIPULACEA)

America and so down the east coast. This is believed to have occurred before the emergence of the western part of the North American continent. Later, the species established on the eastern border were prevented from moving west by the barrier of desert and mountains.

Of the known species, about 20 are natives of North America. None of the American species occurs in the orient and none of the oriental species is indigenous to America. The lespedezas may be roughly grouped as annuals, herbaceous perennials and shrubs. Where the current growth is not cut down by winter cold, the perennials may attain a height of ten feet or more. Some of these shrubs, as *L. bicolor* and *L. japonica* in the United States and *L. delavayi* in France, have long been known as ornamentals. Most of the known species, including those indigenous to America, are herbaceous perennials. In these the stems die after producing seed, and new growth comes each year from the crown.

Only two kinds are annuals, the common or striate (*L. striata*) and the Korean lespedezas (*L. stipulacea*), and these two with one herbaceous perennial, the Chinese or sericea (*L. cuneata*), are the only ones useful in agriculture.

Annual Lespedezas.—The common or striate lespedeza, called also hoop-coop and Japan clover, is believed to have been brought to the United States in the early years of the 19th century. It probably came with a cargo of tea from China or Japan and escaped at Charleston or Savannah. The plant was first recognized at Monticello, Ga., in 1846. (The plant then collected is still in the Gray herbarium at Harvard.) Lespedeza spread rapidly during the American Civil War and was well known in Alabama and Mississippi in 1867. In 1880 it was used commercially for hay in Louisiana. In 1870 it was known in parts of Tennessee, and in 1887 it was found in northern Virginia. The earlier maturing strains have since carried the species as far north as central Indiana.

L. striata is a slender plant with trifoliolate leaves. The leaflets are oval to oblong, about $\frac{1}{2}$ in. long by $\frac{1}{8}$ to $\frac{3}{16}$ in. wide, and slightly rounded at the end. Three varieties of striate lespedeza are recognized: the common, a low-growing pasture type; Kobe, a tall-growing variety with larger leaves and seed; and Tenn 76, a tall-growing variety selected and developed from common by S. J. Essary of the University of Tennessee, Knoxville.

The Korean lespedeza, a much later introduction, is very popular. The seed was sent by Ralph Mills, an American missionary in Korea, to the U.S. department of agriculture in 1919 and was first distributed in 1922. Korean lespedeza is a strong-growing plant with larger and broader leaflets than those of *L. striata* and makes a larger growth. Isolated plants are spreading in habit. It matures about one month earlier than *L. striata* and is therefore suited to a more northern range.

The seeding habit also differs from that of *L. striata*. While in the latter seeds are borne in the axils of leaves or branches all along the stem, in Korean lespedeza seeds are borne in the leaf axils at the ends of branchlets only. At maturity the leaves on these branchlets turn forward so that the tip of the branch resembles a small cone. Besides the standard Korean variety, several other varieties of *L. stipulacea* are recognized, the three most important being: Iowa 6, an early-maturing variety developed by Iowa State college, Ames; Rowan, a productive worm-resistant variety developed co-operatively by North Carolina State college, Greensboro, and the U.S. department of agriculture; and Climax, a variety maturing two weeks later than standard Korean, developed by the U.S. department of agriculture in co-operation with many of the southeastern agricultural experiment stations. Two other varieties, Harbin, an extra early dwarf variety capable of maturing seed in southern Canada, and Early Korean, maturing two weeks later than standard, are little used.

Perennial Lespedeza.—The Chinese lespedeza, popularly known as sericea or sericea lespedeza, was first tried in the United States by Gerald McCarthy of the North Carolina agricultural experiment station in 1896. He condemned the plant as without value. In 1899 seed was sent to the department of agriculture by Seaman Knapp, an agricultural explorer, but though the species was grown on the experimental farm no use was made of the plants. In 1924 a new introduction was made and a few years later seed was distributed by the U.S. department of agriculture and the species was introduced into agriculture.

L. cuneata, the only perennial lespedeza that has come into agricultural use, is an erect plant. The stems and branches are very leafy, more than 60% of the total dry weight consisting of leaves. The leaflets are long and narrow and gray-green in colour. Many forms have been distributed by the U.S. department of agriculture differing in maturity, habit of growth and content of tannin.

Culture.—The culture of the annual lespedeza is very simple. Seeded alone or on grain in early spring, the plants are ready for grazing between June 1 and July 1, according to latitude. A volunteer stand in the extreme south may be ready for grazing early in April. When grazed, the plants will produce seed enough to provide a heavy volunteer crop the following year. When cut for hay, care must be taken to cut at a time that will permit a second growth for seed or the crop must be handled in some other way so as to permit seed production. When a hay crop is wanted or when the field is to be grazed to full capacity, 15 to 30 lb. of seed of common lespedeza and of the Korean varieties of lespedeza, and 30 to 40 lb. of Kobe lespedeza, are sown per acre. When a light stand is wanted to produce a volunteer stand the following year, as little as 5 lb. per acre is sufficient.

L. cuneata is seeded in spring, using 30 lb. of scarified seed per acre. In some localities, the unscarified seed may be seeded in fall. Growth the first season is small and often disappointing, but it resists the competition of weeds and will come strong from the crown the following spring. A good stand will thereafter effectively suppress summer weeds.

Agricultural Utilization.—Lespedezas are used extensively in the United States only. In Japan and Korea some use has been made of the shrubby species for hillside planting to control soil erosion, but as a regular farm crop they are used in no country other than the United States. In southeastern United States, west to eastern Texas, Oklahoma and Kansas and north to central Illinois, one or both of the annual lespedezas occupies a place of the first importance as a hay and pasture crop. The part of this general area in which the annual lespedezas have become most important consists of a belt covering the Piedmont region of Georgia and Alabama north to the Ohio river, but including southern Illinois and the whole of Missouri. The total annual production of hay reported in the United States usually exceeds 5,000,000 tons. The principal producing states are usually Missouri, Kentucky, Virginia, North Carolina and Arkansas.

No statistics are available covering the acreage in lespedeza used for grazing. It is, however, known to be vastly greater than that cut for hay. Lespedeza is the most generally grown forage plant in southeastern United States, and, especially in the chief production belt as already described, is grown on nearly every farm. The three species mentioned are used for hay and pasturage, for soil improvement and as an aid in the control of soil erosion. It has been shown that crops of corn and cotton can be increased 10%–30% by turning under a crop of lespedeza.

Use in Soil Erosion Control.—A growing realization of the importance of soil erosion control has led specialists and farmers to turn to the lespedezas as aids in this control on the low fertility soils of the south. The annual lespedezas serve to control erosion in the summer. The soil loss from a field in lespedeza has been recorded as 1.18 tons of soil per acre during the months of June to September inclusive, as compared with 17.87 tons from an adjacent field of cotton. Even the debris from a lespedeza field materially aids in checking erosion during winter.

Perennial lespedeza makes so dense a canopy during the growing season that the heaviest rains cannot beat upon the bare ground. During winter the great root system and the living crowns hold the soil. The ability of this species to grow on soils already badly eroded places it in the first rank of plants useful to the soil conservationist. It is used in buffer strips on sloping cultivated fields, as a permanent cover on land too badly eroded to be worth cultivating, for the control and healing of gullies and for the control of critical slopes.

Relation to Soil Fertility and Lime.—The lespedezas are not competitors of the clover but are suited to soils of a lower fertility level. Many of the fields now in lespedeza formerly grew red clover, but declining fertility due to improper cropping and erosion has resulted in such frequent clover failures that this crop has been replaced by lespedeza.

Lespedeza is not so dependent on lime as is red clover, but on soils that are decidedly acid it will respond to applications of lime. Most southern soils are deficient in phosphates, and lespedezas respond markedly to an application of superphosphate. On the poor soils of the coastal plains the common lespedeza does not make a profitable crop without the application of phosphate.

While economic conditions made it necessary for farmers in the lespedeza territories to turn to this crop in order to save their lands, it should not be forgotten that a continuance of careless farming with lespedeza will lower the fertility level still more. Every crop takes something from the soil in which it is grown and lespedeza, when removed as hay or pasturage, also removes from the land some lime, phosphorus and potash. If these are not replaced, the time will come when even lespedeza will not thrive. Lespedeza has revolutionized the agriculture of a great region and saved thousands of farmers from economic ruin. It can continue this service only if proper attention is paid to the need of the crops and soils for plant food.

Hay Production.—Well-cured hay of the annual lespedezas is of nearly the same feeding value as alfalfa. The average yield over the entire United States is about one ton per acre, although two or even three tons per acre have been cut under favourable conditions. While the lespedezas are quite drought resistant, good hay production is possible only under conditions of abundant rainfall or on low moist ground. The amount of growth made is directly proportional to the moisture available. On high dry ground lespedezas make growth enough for grazing but not for hay. Hay is cut when the plants are in full bloom. For Korean, this is from the first to the middle of August or a little later in the northern part of its range. Earlier cutting in July favours a second growth, which may be taken for hay or seed. The earlier cut hay is also of superior quality. Striate lespedeza, maturing later, is cut somewhat later in the season.

A first volunteer stand usually makes the most and best hay. In older fields the weeds tend to invade and the hay becomes of lower grade. Good hay can be made from sericea lespedeza, but the plants should be cut when the spring growth is about one foot high. Cut at this stage, the hay is palatable, tender and of high quality. Later the stems tend to become woody, the leaves shatter more readily and the hay is of inferior quality.

Sericea contains tannin, which, in the mature plant, may be as much as 10% of the total weight. In the early stages of growth the tannin content is low and the protein content is high. With advancing age these positions are reversed, as the protein content falls the tannin content rises. For the best hay, therefore, the plants should be cut when young. The lespedezas contain less water than alfalfa and must not be left long in the swath. On good drying days lespedeza can be cut in the morning and housed before night.

For Pasturage.—The chief use of the annual lespedeza is for summer pasturage, and most of the vast acreage is used in this way. Lespedeza is mixed with such grasses as Bermuda in the south and orchard grass farther north. More important is the use of pure lespedeza for summer pasturage. In this system the lespedeza is usually seeded on grain that is allowed to ripen or that is cut for hay. During the summer months when permanent pastures are frequently unproductive, lespedeza provides excellent grazing.

The value of sericea lespedeza for grazing is a controversial subject among farmers of the southeastern states. Reports on the value of sericea for pasturage vary from good to very poor each year. Studies by research workers in the region have shown that the high tannin content of the species lowers the palatability to the grazing animal. Other studies have shown that the tannin content varies with season, soil type and fertilization and between strains of lespedeza. Plant breeders of the region have developed strains of sericea inherently low in tannin. The subsequent release of productive, palatable varieties of this species would greatly increase the importance of this drought-resistant, summer-growing, perennial legume for livestock production in the southern states.

Seed Production.—Seed is freely produced by all the lespedezas and is harvested throughout the territory where lespedeza is grown. The statistics of seed production are eloquent of the rise and spread of Korean lespedeza. Seed of this species is produced mainly in North Carolina, Tennessee, Kentucky and Missouri. The chief producing areas of striate lespedeza are North Carolina, Mississippi, Louisiana and Tennessee.

Harvesting.—Seed of striate lespedeza is harvested with a shallow metal pan attached to the rear of the mower cutter bar and provided with a perforated cover. The lespedeza as cut is raked over the pan, the seed shatters off and falls through the holes. The straw may later be threshed if more seed is wanted. Seed of Korean does not shatter readily and the plants are cut, windrowed and later passed through a thresher. A similar procedure is followed in the case of sericea.

Seed Weight and Number of Seeds per Pound.—In North Carolina and Arkansas, the legal weight of *L. striata* seed is 25 lb. per bushel. This weight is generally accepted even where not confirmed by legislation. The actual weight, however, depends upon how well the seed has been cleaned. Clean seed of striate lespedeza weighs 29 lb. per bushel; that of Kobe 30 lb.; of Korean 45 lb.; and of unhulled sericea 34 lb. When hulled, all weigh about 60 lb. per bushel.

In striate lespedeza, there are about 343,000 seeds per pound; in Kobe 185,000; in Korean 240,000; and in hulled sericea about 350,000.

Use for Wildlife.—All the lespedezas are valuable for wildlife, especially birds. Quail are fond of the seeds and many thousands of acres are seeded especially for wildlife. In addition, *L. bicolor* and sericea form an ideal cover for birds. Natob, a later variety of *L. bicolor* developed by the U.S. department of agriculture, is hardy, has large seed desirable for bird feed, is good cover and is valuable for soil conservation.

The native American species inhabit waste ground, the margins of woodland and similar places. They never occur in dense stands, but as single plants or small groups of plants. Their only known value is for wildlife. Quail and other birds make extensive use of the seed.

For more detailed information, *see* U.S. Department of Agriculture

Circular 863 and *Farmers' Bulletins 1852* and *2033*.
(A. J. Pi.; P. R. H.)

LESPINASSE, JULIE JEANNE ÉLÉONORE DE (1732–1776), French woman, whose passionate letters have been compared with those of Héloïse and those of the "Portuguese Nun" (*see* GUILLERAGUES, VICOMTE DE), was born at Lyons. A natural child of the comtesse d'Albon, she was brought up as the daughter of Claude Lespinasse of Lyons. On leaving her convent school she became governess in the house of her mother's legitimate daughter, the marquise de Vichy, sister-in-law of Mme du Deffand (*q.v.*). The latter recognized her extraordinary gifts and persuaded her to come to Paris as her companion. The alliance lasted ten years (1754–64), until Mme du Deffand became jealous of the younger woman's increasing influence. Mlle de Lespinasse set up a salon of her own which was joined by many of the most brilliant members of Mme du Deffand's circle. Jean le Rond d'Alembert (*q.v.*) was one of the most assiduous of her friends and eventually came to live, without scandal, under the same roof. For eight years he worshiped her but she did not return his love. She gave her heart first to the marquess de Mora, son of the Spanish ambassador and ten years her junior, then to the worthless comte de Guibert. Although she had neither beauty nor rank, her ability as a hostess made her reunions the most popular in Paris. She figures in Diderot's *Rêve de d'Alembert,* which she requested Diderot to suppress. She owes her lasting fame to two volumes of *Lettres,* published in 1809, which showed her as the victim of a passion of rare intensity. She was torn between her lingering affection for De Mora who died in 1774, and a burning but unrequited love for Guibert, the author of an *Essai général de tactique* (1772). Her letters described her feelings of remorse, her pathetic efforts at checking her ardour, her selflessness in helping on Guibert's marriage, her partial disillusion and her final despair. Brokenhearted, she died in Paris on May 23, 1776, having handed over to d'Alembert the letters she had addressed to Guibert. In addition to the *Lettres* she wrote two chapters intended as a kind of sequel to Sterne's *Sentimental Journey.*

BIBLIOGRAPHY.—*Lettres,* publ. by Mme de Guibert, 2 vol. (1809); spurious additional collection (1820); *Lettres inédites de Mademoiselle de Lespinasse à Condorcet, à d'Alembert, à Guibert, et au comte de Crillon,* ed. by C. Henry (1887); *Letters of Mlle de Lespinasse,* with notes on her life and character by d'Alembert, Marmontel, de Guibert, etç., and an introduction by C. A. Sainte-Beuve, trans. by K. P. Wormeley (1902); *Correspondance entre Mademoiselle de Lespinasse et le comte de Guibert,* ed. by the comte de Villeneuve-Guibert (1906); *Letters to and from Mme du Deffand and Julie de Lespinasse,* ed. by Warren Hunting Smith (1938). *See* also Marquis de Ségur, *Julie de Lespinasse* (1905; Eng. trans. 1907); N. Royde-Smith, *The Double Heart: a Study of Julie de Lespinasse* (1931); J. Bouissounouse, *Julie de Lespinasse, ses amitiés, sa passion* (1958); Mrs. Humphrey Ward's novel, *Lady Rose's Daughter* (1903), owes something to the character of Mlle de Lespinasse. (R. Ni.)

LESSE, a river rising at Ochamps in the Ardennes and flowing in a northwesterly course, reaches the Meuse at Anseremme, a few miles above Dinant, Belg. The river is only 52 mi. long, but meanders considerably. Its early northward course lies in a shallow valley in the Ardennes, where it receives two main tributaries, the Lhomme and the Wamme. When the river reaches the less resistant rocks (shales and limestones) of the Famenne depression, it abruptly changes direction and flows westward to the Meuse. In its lowest section, from Houyet to Anseremme, the river flows in a deeply incised winding valley, with steep limestone cliffs on either side. In 1866, in the cavern of Naulette on the left bank of the river, some remains of early man were discovered, associated with mammoth, reindeer and rhinoceros bones. They are now assigned to the Mousterian culture period. A curious natural feature of the Lesse is that at Han-sur-Lesse the river disappears underground through fissures in the rock and reappears about half a mile below the village. By its underground course the Lesse has created the celebrated Grottes de Han, renowned for their stalactites and stalagmites. One of the grotto chambers is 505 ft. long and 446 ft. wide. The Lesse receives in its short course the waters of 13 tributaries.
(F. J. M.)

LESSEPS, FERDINAND MARIE, VICOMTE DE (1805–1894), French diplomat and maker of the Suez canal, one of the most powerful embodiments of the creative genius of his time, was born at Versailles on Nov. 19, 1805, of a family long distinguished in the service of the state. Appointed assistant viceconsul at Lisbon in 1825, he was sent to Tunis in 1827 and to Alexandria in 1832. At Alexandria, J. M. Lepère's memoir on the Suez canal and his friendship with Mohammed Ali and with the latter's son, Said Pasha, led him to hope that he might one day finish what Lepère had begun. For the time, however, nothing was accomplished. From 1833 to 1837, Lesseps was consul at Cairo, where he gained distinction in combating an outbreak of plague. Two years later he was transferred to Rotterdam. Subsequently he served at Málaga and at Barcelona, where he was promoted to the grade of consul general. From 1848 to 1849, after the February revolution, he was minister of France at Madrid. In May 1849 he was sent by the French government to negotiate with the republican government in Rome; but the French elections, which occurred shortly after his departure, encouraged the government to adopt a more aggressive attitude toward the Roman republic, and Lesseps was recalled in disgrace. He was given no opportunity to justify his actions and therefore retired from the service. An invitation from Said Pasha, now viceroy of Egypt, revived in him his early ambitions. On Nov. 30, 1854, Said Pasha signed the first act of concession authorizing Lesseps to pierce the isthmus of the Suez.

A first scheme, indicated by Lesseps, was immediately drawn out by Linant Bey and Mougel Bey (L. M. Linant de Bellefonds and E. Mougel) providing for direct communication between the Mediterranean and the Red sea; and, after being slightly modified, it was adopted by an international commission of engineers in 1856. Encouraged by this approval, Lesseps allowed no obstacles to retard the work, and he succeeded in rousing the French people to subscribe more than half the capital needed to form the company, which was organized in 1858. The first blow of the pickax was given by Lesseps at Port Said on April 25, 1859; and on Nov. 17, 1869, the canal was officially opened by the khedive, Ismail Pasha. (*See* SUEZ CANAL.) On the acquisition of the Suez shares by Lord Beaconsfield in 1875 Lesseps co-operated loyally with the British and facilitated the consolidation of interests thus formed. Though he generally tried to keep out of politics, Lesseps stood as a Bonapartist candidate at Marseilles in 1869, but was defeated by Léon Gambetta.

In 1879, when the international congress of geographical sciences met in Paris and voted in favour of the construction of a Panama canal, the 74-year-old Lesseps undertook to carry out the project (*see* PANAMA CANAL). His despotic temper and stubbornness, however, made him fail to appreciate the difficulties of the task: at first he thought that it would be possible to pierce a canal without locks even though the route was barred by the Culebra col and by the torrential Chagres river. The task proved to be beyond the capacities of a private company, so that eventually, in 1889, the company that Lesseps had formed had to go into liquidation. After an official inquiry in 1892, the French government instituted the prosecution of the company's administrators; and in Feb. 1893 Lesseps and his son Charles (1849–1923) were sentenced to five years' imprisonment. Only Charles, however, was imprisoned, and in June the Cour de Cassation quashed the verdict because of an error in procedure. On the other hand the fact that members of the government and parliamentarians were accused of having accepted bribes from the company made the Panama scandal a political affair as well as a financial one, with important repercussions in the history of the third French republic.

Lesseps was a member of the French Academy, of the Academy of Sciences and of numerous scientific societies. He was also decorated with the grand cross of the Legion of Honour and the Star of India and received the freedom of the City of London. His great gifts, coupled with his supreme unselfishness and social charm, made him everywhere respected, and the scandal which clouded the last years of his life has done nothing to tarnish his reputation. He died at La Chenaie, near Guilly (Indre), on

Dec. 7, 1894. He had published his *Souvenirs de quarante ans* in 1887; an English translation appeared in the same year.

See G. Edgar Bonnet, *Ferdinand de Lesseps*, 2 vol. (1951–59).

(Ad. D.)

LESSING, GOTTHOLD EPHRAIM (1729–1781), German dramatist, critic and writer on aesthetics, one of the great seminal minds in German literature. Lessing has been claimed by many schools and many opinions, not only because of the significance of his work but because for him the greatness of man lay in his search for truth.

He was born on Jan. 22, 1729, in Kamenz, in Upper Lusatia, Saxony, where his father, a considerable theologian, was chief pastor, or *pastor primarius*. In spite of this respected position he could not prevent his large family from often going hungry. Young Lessing read eagerly from an early age and when he was 12 entered the famous *Fürstenschule* in Meissen where he laid up a solid knowledge of Latin and Greek which stood him in good stead in his later work. The comedies of Plautus and Terence also fired him with the idea of writing comedies himself, a plan he realized after he entered Leipzig university in 1746. He was a student of theology, but other subjects interested him more. He attended lectures on philology, art and mathematics, but was even more fascinated by the social life of Leipzig, with the comings and goings of its fairs and its book trade. To this he was largely introduced by his cousin Christlob Mylius, who was a writer, and the dramatist C. F. Weisse.

Above all, in Leipzig he came into contact with the theatre, which had just been given new stimulus by the work of the important and energetic actress Caroline Neuber (*q.v.*). She took Lessing up and in 1748 successfully produced his comedy *Der junge Gelehrte*, in which he even mocked a little at his own bookishness. He wrote a series of other comedies in Leipzig (*Damon, Die alte Jungfer, Der Misogyn, Die Juden, Der Freigeist*) in which he wittily satirized typical weaknesses and duly praised unappreciated nobility, as in *Die Juden*. Lessing's parents disapproved of his association with the theatre, however, and summoned him home, but he won their consent to a medical training and was allowed to return to Leipzig. There he soon found himself in difficulties, since he had stood surety for some members of the Neuber company although he was himself heavily in debt. When the company broke up he was forced to flee from Leipzig to avoid arrest as a debtor. In Nov. 1748 he reached Berlin, where he hoped to find journalistic work through his cousin Mylius who was already established as an editor. During the next four years he wrote prolifically. He translated English and French history and philosophy; made a name for himself as a brilliant critic in the *Berlinische* (later *Vossische*) *Zeitung*, especially in the monthly supplement *Das Neueste aus dem Reiche des Witzes* ("the latest from the world of wit"); and launched two periodicals of his own, *Beiträge zur Historie und Aufnahme des Theaters* and *Theatralische Bibliothek*. In spite of their topical character these two did not survive long, the first ceasing publication in 1750 and the second in 1758. The financial difficulties that faced a free-lance writer in Germany at that time were too much for Lessing.

From 1751 to 1752 he was in Wittenberg, where he took his degree in medicine, and he then returned to Berlin until Oct. 1755. Between 1753 and 1755 he published a six-volume collection of his works. Besides many telling epigrams, which he called *Sinngedichte* on the model of the 17th-century writer Friedrich von Logau, and the most important of his Leipzig comedies, the collection included the first German *bürgerliches Trauerspiel*, or domestic tragedy, *Miss Sara Sampson* (1755). This play was a decisive break with the French drama which still dominated the German stage and was inspired by George Lillo's *The Merchant* (1731) as well as by Samuel Richardson's novels. Performed in Frankfurt an der Oder with great success, the play gives tragic consequence to ordinary people and depicts in prose, which skilfully lays bare the psychology of the situation, the conflict between subjective feeling and objective morality, between passion and conscience.

Lessing's *Rettungen* ("Vindications") are characteristic of his writing at this period. In them he aimed, in the spirit of the Enlightenment, to defend independent thinkers who had been unjustly slandered, such as the Reformation-period writers Johannes Cochläeus and Geronimo Cardano (*qq.v.*). His scintillating and biting polemic *Vademecum für den Pastor Samuel Gotthold Lange* is a "vindication" of the poet Horace, directed against the carelessly corrupt translations of the arrogant Lange, whose literary reputation was thoroughly demolished by the attack. From this time Lessing, whose style became an increasingly polished weapon, was rightly feared as a literary opponent but, personal though his attacks could be, he fought things, not people, and for truth, not victory. Among his Berlin friends the philosopher Moses Mendelssohn and the publisher C. F. Nicolai (*qq.v.*) came increasingly to the fore. With them he conducted a correspondence which was published as *Briefwechsel über das Trauerspiel* in 1756–57 and which was epoch-making for the aesthetic of tragic drama.

In Nov. 1755 Lessing settled in Leipzig. He planned to go to England with a young merchant, Gottfried Winkler, but they got no farther than Amsterdam, being forced to return by the outbreak of the Seven Years' War. In Leipzig Lessing became friendly with Ewald von Kleist (*q.v.*), the author of the poem *Der Frühling*, of whom he left a moving memorial in the figure of Major von Tellheim in *Minna von Barnhelm*.

Besides occasional contributions to Nicolai's *Bibliothek der schönen Wissenschaften*, Lessing, who was in Berlin again from May 1758 to Nov. 1760, contributed regularly (1759–60) to his weekly, *Briefe, die neueste Literatur betreffend*. In these critical essays on contemporary literature he praised his friend J. W. L. Gleim's *Kriegslieder eines preussischen Grenadiers* and Kleist's poetry and emphasized the importance of Wieland and Klopstock, though he severely criticized their weaknesses and their pietism. The central point of his essays, however, was his vigorous attack on the arbiter of the German stage, J. C. Gottsched (*q.v.*), and his dependence on French models and especially on Corneille. Lessing demanded a national drama belonging to the people, with Shakespeare as model, and for which the prerequisites were truth to nature and reality. In 1759 appeared his masterly prose fables (largely social criticism) together with an essay on the form, in which he successfully derives the particular laws of the fable from its didactic and allegorical structure. In the following year he went to Breslau as secretary to General Tauentzien and thereby became familiar with the garrison life of the Prussian officer. At the same time he read philosophy and aesthetics in the Breslau libraries, the result being the great treatise *Laokoon oder über die Grenzen der Malerei und Poesie* (1766). J. J. Winckelmann (*q.v.*), who admired the artistic control of suffering in the late classical sculpture of Laokoon, provided the starting point for the discussion, in which Lessing aims to define the particular conditions of painting and poetry. While painting is bound to observe proximity in space, poetry has the task of developing action organically in proximity of time. The nature of poetry is movement. Lessing showed the finest understanding of Greek literature, without recommending its imitation. The poetic fruit of his years in Breslau was the comedy *Minna von Barnhelm oder das Soldatenglück* (1767). Under the sway of Lessing's concept of humanity the Prussian major and the Saxon noblewoman turn into ordinary people. The upright officer's conscientiousness and his strict interpretation of honour endanger the love between him and the charming and spirited Minna, who takes matters decisively into her own hands. By her bold intervention, made out of the perceptions of her own heart, she overcomes the misunderstanding and bridges the gulf between ethos and eros, or between the claims of conscience and the claims of happiness.

When Lessing returned to Berlin in 1765 he tried unsuccessfully for the post of director of the royal library; but since he had quarreled with Voltaire, who lived at Frederick the Great's court, the king (who in any case thought little of German writers) rejected him. So Lessing accepted the offer of some Hamburg merchants to act as adviser and critic in their privately founded venture of a national theatre. After only a year the theatre closed, however, and Lessing recognized with some bitterness that the

time for it was not yet ripe. His notices of over 50 performances appeared in 104 parts as *Hamburgische Dramaturgie* (1767–69). Here too Lessing attacked French tragedy of the Corneille and Voltaire type, though he praised the "common reality" of Diderot. He argued over Aristotle's conception of the nature of tragic passion, believing that pity and fear should be transformed into virtuous action, and pleaded for the principle of artistic unity in drama. In 1768–69 he wrote *Briefe antiquarischen Inhalts,* which took the field against the pretentious erudition and cliquishness of the Halle professor C. A. Klotz (1738–71). Another result of this dispute was the fine essay *Wie die Alten den Tod gebildet* (1769), in which Lessing contrasts the ugly skeleton figure of the middle ages with the youthful spirit with the lowered torch, whom the Greeks thought of as the brother of sleep.

Being extremely poor, in 1770 Lessing accepted the badly paid post of librarian in Wolfenbüttel, under the duke of Brunswick. In 1775 he went to Vienna and from there, as companion to one of the princes of Brunswick, to Italy; but although he was there for nine months, it made little impression on him. In 1776 he was at last able to marry Eva König, the widow of a Hamburg merchant and a friend of long standing. But his happiness was short lived. In 1778 she died, giving birth to their first child. The end of his life was sad, and he died, tired, lonely and poor, on Feb. 15, 1781, in Brunswick.

Yet his last years produced a rich harvest. In 1771 he published *Zerstreute Anmerkungen über das Epigramm* in which he effectively took up the cudgels for Martial. In *Wolfenbütteler Beiträge,* which appeared from 1773, he reported on discoveries he had made in the library, bringing to light the late medieval fable poet Ulrich Boner and publishing extracts from the papers of the biblical critic H. S. Reimarus (*q.v.*), which orthodox theology viewed as a serious challenge. This led to violent controversy, the leader being the chief pastor of Hamburg, J. M. Goeze. Against him, as the exponent of rigid dogma, Lessing slung his most cutting polemics, notably *Eine Parabel, Axiomata* and *Anti-Goeze* (1778), until the duke forbade him to publish any more. *Ernst und Falk* (1778–80), profound dialogues on freemason lines, pleading for men to prove themselves humane in their practical dealings, had to be published anonymously. Meanwhile, in 1772, the tragedy *Emilia Galotti* had been performed. In this brilliantly constructed prose play he presents a conflict of conscience at the court of an Italian prince, with its questionable relationships. In 1779 appeared the iambic "dramatic poem" *Nathan der Weise,* in which Lessing once more preaches from his old pulpit, the theatre. Although a theological-philosophical didactic piece, it is of high poetic rank. The work proclaims the doctrine of the true religion of humanity, of love acting without prejudice in the service of mankind. Among the representatives of the three religions—Islamic (Saladin), Christian (the Templar) and Jewish (Nathan)—only the Jew (who embodies a tribute to Lessing's friend Moses Mendelssohn) can embody ideal humanity. Lessing's last work was the treatise *Die Erziehung des Menschengeschlechts* (1780). In 100 paragraphs which closely reflect the workings of his mind he formulates his belief in mankind's endless progress. In the history of religion he sees the development of human consciousness, which he believes will finally reach a peak of moral freedom. The salvation of mankind and the eternity of the individual soul beckon, but from an infinite distance.

After Lessing's death it became known that in conversations with the Christian philosopher Friedrich Heinrich Jacobi (1743–1819) he confessed his belief in Spinoza and his pantheistic philosophy. He thus passed beyond theological controversy and proclaimed the two lodestars of his life, truth and reason, as the creative principles of the world. For a portrait of Lessing *see* article GERMAN LITERATURE.

See also references under "Lessing, Gotthold Ephraim" in the Index.

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LESSON is the name given to a passage read aloud from the Bible or from another religious work at divine service. It frequently provides the subject for the sermon, as it has done since the early church. In the Orthodox, Roman Catholic and Anglican Churches the lessons follow fixed systems (*see* LECTIONARY) which have grown up gradually and can be modified by ecclesiastical authorities. In most other churches the lessons are chosen by the minister; there are usually two at each service, one from the Old Testament and one from the New.

L'ESTRANGE, SIR ROGER (1616–1704), English journalist and pamphleteer, active in the king's cause during the Restoration. Born at Hunstanton, Norfolk, Dec. 17, 1616, he fought on the royalist side, tried to recapture King's Lynn, was imprisoned in Newgate for four years, but escaped and was pardoned by Cromwell in 1653. Just before the Restoration he attacked Milton savagely in *No Blinde Guides* (1660). As licenser and surveyor of the press (1653–88) he was efficient and rigorous. He published two news sheets, the *Intelligencer* and the *Newes* (1663–66) but lost his monopoly of news to Henry Muddiman, whose *Oxford* (later *London*) *Gazet* appeared in 1665 (*see* NEWSPAPER). He finally discredited the "Popish plot," and was knighted in 1685. Another news sheet, the *Observator* (1681–87), was more successful, but though a zealous high Tory he was unwilling to advocate James II's Edict of Toleration and ceased publication. The revolution cost him his office. He died in London, Dec. 11, 1704. L'Estrange translated Aesop and other standard authors.

See G. Kitchin, *Sir R. L'Estrange* (1913).

LE SUEUR, EUSTACHE (1616–1655), French painter of religious subjects and one of the founders of the French Academy of Painting and Sculpture, was born on Nov. 19, 1616, at Paris, where he passed his whole life and where he died on April 30, 1655. He was the son of Cathelin Le Sueur, a turner and sculptor in wood, who placed his son with the decorative painter Simon Vouet. Admitted at an early age into the guild of master painters, he left them to take part in establishing the Academy of Painting and Sculpture, and was one of the first 12 professors of that body. Some paintings reproduced in tapestry brought him into notice, and his reputation was further enhanced by a series of decorations in the mansion of Lambert de Thorigny, which he left uncompleted.

He also painted many pictures for churches and convents, some of which are in the Louvre, Paris. His most important works are "St. Paul Preaching at Ephesus" (Louvre), and his famous series of the "Life of St. Bruno" (Louvre), executed in the cloister of the Chartreux. These have more personal character than anything else Le Sueur produced. He was a charming draftsman. His graceful facility in composition was always restrained by a fastidious taste. He had too frequent recourse to conventional types, however, and he rarely saw colour except with the cold and clayey quality proper to the school of Vouet.

LESUEUR, JEAN FRANÇOIS (1760–1837), French composer of religious and dramatic works who helped to transform musical taste during the Revolution and who influenced Berlioz, was born at Drucet-Plessiel, near Abbeville, Feb. 15, 1760. He acquired his musical training as a chorister at Amiens. In 1781 he was appointed chapelmaster at the cathedral of Dijon and in 1786

at Notre Dame in Paris. There he aroused controversies by introducing a large orchestra to accompany his masses, which, he maintained, should make a dramatic appeal. Though Lesueur's masses, admired by operagoers, caused Notre Dame to be described as *L'Opéra des gueux* ("the beggars' opera"), he succeeded in blending the sacred and secular styles, thus anticipating the religious works of Berlioz and Gounod and also the *Requiem* of Verdi. He made a study of the Greek modes and, in his Christmas oratorio, he also transformed themes in a manner suggesting Wagner's use of leitmotiv. After 1789 he wrote several odes and chants for performance at the open-air celebrations of the Revolution by vast numbers of choristers and instrumentalists. Between 1793 and 1796 he wrote three operas and in 1795 he became inspector of the Paris Conservatoire. In 1804 he was made director of music to Napoleon I, to whom he dedicated his opera *Ossian ou les Bardes*. He was later appointed director of music to Louis XVIII and in 1818 professor of composition at the Conservatoire, his pupils including Berlioz, Gounod and Ernest Guiraud. He died in Paris, Oct. 6, 1837.

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LESZNO (Ger. LISSA), a city in the Poznan *wojewodztwo* (province), Poland, 40 mi. S.S.W. of Poznan. Pop. (1960) 29,100. It is a junction for six railway lines. Industries include machinery manufacture, sawmilling and food processing; there is a large grain and cattle market. In the 16th century a band of Moravian Brothers, expelled from Bohemia, settled in Leszno and made it the seat of Moravian culture in Poland and a centre of the Reformation. Johann Amos Comenius (Jan Komensky) was rector of the high school there. Moravian cloth manufactures were famous throughout Europe in the 17th and 18th centuries. After the second partition of Poland (1793) Leszno was seized by the Prussians. It was included in the duchy of Warsaw from 1807 to 1815; was returned to Prussia by the congress of Vienna; and reverted to Poland in 1919. (K. M. WI.)

LETCHWORTH, an urban district of Hertfordshire, Eng., 37 mi. N. of London by road. The first "garden city" of Britain, it was founded in 1903 by Sir Ebenezer Howard. The population in 1961 was 25,515, but the town is planned for a maximum of 32,000. Of its 4,897 ac., about 3,000 are a permanent agricultural belt. There are residential, commercial and industrial zones and a civic centre which contains a museum. Local industries include light and heavy engineering, foundries, the making of corsets and baby carriages, printing and publishing. The church of Our Lady, in the old village, dates from *c.* 1150. The Icknield way runs through the town. *See* GARDEN CITY.

LE TELLIER, MICHEL (1603–1685), French statesman who was secretary of state for war from 1643 to 1677 and chancellor of France from 1677, was born at Paris on April 19, 1603. A career in the magistracy led to his being made intendant to the French army in Italy in 1640 and secretary of state for war in 1643. He won the confidence of the regent Anne of Austria, and of Cardinal Mazarin, whom he served well during the Fronde and who gave him the name Fidèle ("Faithful"). Employed in many ways outside his main function, he acquired a wide knowledge of the kingdom and of the circles from which the high officers of state and the members of the administration were recruited. Yet his prudence and his conciliatory temperament prevented him from flaunting his power and from giving offense to anyone. With the title of minister of state, he was appointed to the inner council that Louis XIV set up in 1661.

As war minister, Le Tellier laboured to turn the feudal and disorganized French army into a disciplined body that would really be at the king's service. He did not, however, interfere with the conduct of military operations, which was left to the army chiefs. He pursued his own task of reform, in which from 1664 onward he had the collaboration of his son the marquis de Louvois (*q.v.*). When Louvois entered the king's council (1672), the Le Tellier family was balanced evenly with the Colberts.

Appointed chancellor in 1677, Le Tellier reformed law studies in 1679 by introducing the study of French law. He did much to improve recruitment to the magistracy; and it was he who prepared the Edict of Fontainebleau (1685), which repealed the Edict of Nantes. He was one of those great civil servants of 17th-century France who contributed to the establishment of monarchical absolutism and to the progress of the royal administration. At the same time, his bourgeois origins and his austere mode of living (in accordance with his leanings toward Jansenism) helped him manage his very large personal fortune wisely and assure the advancement of his family. He died in Paris on Oct. 30, 1685.

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LETHABY, WILLIAM RICHARD (1857–1931), English architect, writer and educationalist, was born at Barnstaple, Devon, on Jan. 18, 1857. In 1878 he began work in London under R. N. Shaw, with whom he remained for 12 years. A disciple of Philip S. Webb (*q.v.*), he was strongly influenced by the Arts and Crafts movement (*q.v.*), particularly by John Ruskin and William Morris (*qq.v.*), whose concepts of the integrity of the artist and the dignity of labour formed the basis of his theories. These are expressed primarily in *Architecture* (1912, reprinted 1955) in which he also stresses the evolutionary character of architectural development, emphasizing the functional aspects of great building types. Praising the engineering of Roman and Gothic architects, he deplored the modern schism between the two professions. He advocated the use of modern materials and a return to efficient and honest building. His lectures and essays were collected in *Form in Civilization* (1922, reprinted 1957); studies of the symbolic origins of architectural forms, "Architecture, Nature and Magic," appeared in *The Builder* in 1928 (reprinted in book form 1956). Throughout his writings Lethaby maintained his opposition to the "catalogued styles." His criterion of building was always "the welldoing of what needs doing": beauty was a by-product of this—"the complexion of health." He was also an eminent medieval scholar; his *Mediaeval Art* appeared in 1904 (reprinted 1955).

Of Lethaby's buildings Avon Tyrrell (1891) in the New forest shows Shaw's influence, but Melsetter house (1898) in the Orkneys is a characteristically austere yet harmonious composition. The Eagle Insurance building, Birmingham, dates from 1899–1900. Lethaby's masterpiece is All Saints' church, Brockhampton, Herefordshire (1901–02). As at Melsetter, the exterior follows local tradition, but the interior is strikingly original: chevronlike arches rise sheerly, bearing a vault of exposed concrete slabs covered externally by thatch. The building was done by direct labour instead of through a contractor, and, like all his work, is distinguished by simple planning and skilful use of materials.

From 1906 to 1928 Lethaby was an exemplary surveyor at Westminster abbey, publishing *Westminster Abbey and King's Craftsmen* (1906) and *Westminster Abbey Re-examined* (1925). He was in favour of a broadly based aesthetic education and helped to found the Central School of Arts and Crafts, London. He was its first principal from 1896 to 1911 and was professor of design at the Royal College of Art, 1900–18. He died on July 17, 1931, in London.

Lethaby, the last major exponent of the English rationalist tradition of "free building," is chiefly important for the sanity and integrity of his ideas. These probably had a more radical effect on the continent of Europe than in England.

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LETHARGY, in medicine, is a morbid condition of deep and lasting drowsiness from which the sufferer can be aroused with difficulty and only temporarily. It is a symptom of various disorders, and descriptive adjectives are used to make the term more specific, as African lethargy (African trypanosomiasis), induced lethargy

(hypnotic trance), etc. *See* also ENCEPHALITIS; TRYPANOSOMIASIS.

LETHBRIDGE, southernmost city of Alberta, Can. Pop. (1961) 35,454. It is located on the Oldman river near the foothills of the Rocky mountains, within the second largest bituminous coal mining region in Canada. Mining in the area began as early as 1870 but the town was not established until 1885 when a railway was built. Lethbridge serves a wheat-growing and ranching region. Substantial irrigation works were started in 1883, and in the early 1960s the town was also the centre of the most extensive irrigation system in Canada, with over 250,000 ac. under irrigation. Sugar beets, vegetables and alfalfa are grown. Vegetable canning and freezing plants and sugar-beet factories are in the area. The town is located on the Crowsnest Pass railway route to Vancouver; it has air connections with transcontinental air lines and to the United States. (JN. H. W.)

LETHE, "Oblivion," in Greek mythology, the daughter of Eris. Lethe is also the name of a water or plain in the infernal regions. Orphism (*see* ORPHEUS) distinguished a spring of memory and one of oblivion; near Lebadeia, at the oracle of Trophonius, which was counted an entrance to the lower world, the two springs Mnemosyne and Lethe were shown.

LETO (Latin LATONA), a Titaness, the daughter of Coeus and Phoebe, and mother of Apollo and Artemis. The chief seats of her legend were Delos and Delphi, and the generally accepted tradition is a union of the legends of these two places. Leto, pregnant by Zeus, sought a place of refuge to be delivered. After long wandering she reached the barren isle of Delos, which, according to Pindar, was a wandering rock borne about by the waves until it was fixed to the bottom of the sea for the birth of Apollo and Artemis. In the oldest forms of the legend Hera is not mentioned, but afterward the wanderings of Leto are ascribed to the jealousy of that goddess, enraged at her amour with Zeus. The foundation of Delphi follows immediately on the birth of the god; and on the sacred way between Tempe and Delphi the giant Tityus offers violence to Leto and is immediately slain by the arrows of Apollo and Artemis. Such are the main facts of the Leto legend in its common literary form, which is due especially to the two Homeric hymns to Apollo. But Leto is a real goddess, not a mere mythological figure. She has been plausibly identified with the Lycian goddess Lada, and in Lycia graves were frequently placed under her protection; she is also known as a goddess of fertility and as *Kourotrophos* ("rearer of youths"). It is to be observed that she appears far more conspicuously in the Apolline myths than in those that grew around the great centres of Artemis worship, the reason being that the idea of Apollo and Artemis as twins is one of later growth on Greek soil.

LETRINOI: *see* PYRGOS.

LETTER OF MARQUE, the name given to the commission issued by a belligerent state to a private shipowner authorizing him to employ his vessel as a ship of war. A ship so used is termed a privateer (*q.v.*).

LETTERS PATENT. Letters patent (*litterae patentes*) are letters addressed by the British sovereign "to all to whom these presents shall come," reciting the grant of some dignity, office, monopoly, franchise or other privilege to the patentee. The present article is concerned only with the general characteristics of letters patent. The law relating to letters patent for inventions is discussed in the article PATENT; *see* also MONOPOLY.

Letters patent are not sealed up, but are left open (hence the term "patent") and are recorded in the patent rolls in the Record office or, in the case of very recent grants, in the Chancery Enrolment office, so that all subjects of the realm may read and be bound by their contents. In this respect they differ from certain other letters of the sovereign directed to particular persons and for particular purposes, which not being proper for public inspection, are closed up and sealed on the outside, and are thereupon called writs close (*litterae clausae*) and are recorded in the close rolls. Letters patent are used to put into commission various powers inherent in the crown—legislative powers, as when the sovereign entrusts to others the duty of opening parliament or assenting to bills, judicial powers, *e.g.*, of jail delivery; executive powers, as when the duties of treasurer and lord high admiral are assigned to commissioners of the treasury and admiralty. Letters patent are also used to incorporate bodies by charter, to grant a *congé d'élire* ("permission to elect") to a dean and chapter to elect a bishop, or licence to convocation to amend canons, and to confer certain offices and dignities. No exemption from income tax, etc., can be effectively granted by letters patent to any city, borough or town (Income Tax act, 1952, s. 512). Among grants of offices, etc., made by letters patent the following may be enumerated: offices in the Heralds' college; the dignities of a peer, baronet and some knights bachelor; the appointments of *custos rotulorum* ("keeper of the rolls" or "records") of counties, judge of the high court or lord justice of appeal (Judicature act, 1925, s. ii), king's counsel, crown livings; the offices of attorney and solicitor general. The fees payable in respect of the grant of various forms of letters patent are fixed by orders of the lord chancellor. These orders are set out at length in the section "Clerk of the Crown in Chancery" in *Statutory Rules and Statutory Instruments Revised to 1948,* vol. iii (1950). Formerly each colonial governor was appointed and commissioned by letters patent under the great seal of the United Kingdom. But since 1875 the practice has been to create the office of governor or governor general in each colony or dominion by letters patent, and then to make each appointment to the office by commission under the Royal Sign manual and to give to the governor so appointed instructions in a uniform shape under the manual. The letters patent, commission and instructions are commonly described as the governor's commission (*see* W. I. Jennings and C. M. Young, *Constitutional Laws of the Commonwealth* [1957]). A modern instance may be given: letters patent of Jan. 20, 1959 (Mauritius). The Colonial Letters Patent act, 1863, provides that letters patent shall not take effect in the colonies or possessions beyond the seas until their publication there by proclamation or otherwise (s. 2), and shall be void unless so published within nine months in the case of colonies east of Bengal or west of Cape Horn, and within six months in any other case. Colonial officers and judges holding offices by patent for life or for a specified term are removable by a special procedure—"amotion"—by the governor and council, subject to a right of appeal to the king in council (Colonial Leave of Absence act, formerly cited as "Burke's Act," 1782).

The construction of letters patent differs from that of other grants in certain particulars: (1) Letters patent, contrary to the ordinary rule, are construed in a sense favourable to the grantor (viz., the crown) rather than to the grantee; although this rule is said not to apply so strictly where the grant is made for consideration or where it purports to be made *ex certa scientia et mero motu* ("out of sure knowledge and of its own volition"). (2) When it appears from the face of the grant that the sovereign has been mistaken or deceived, either in matter of fact or in matter of law, as, *e.g.*, by false suggestion on the part of the patentee, or by misrecital of former grants, or if the grant is contrary to law or uncertain, the letters patent are void and may still, it would seem, be canceled (except as regards letters patent for inventions, which are revoked by a special procedure, regulated by ss. 24–27 of the Patents and Designs act, 1949, s. 32–36), by the procedure known as *scire facias,* an action brought against the patentee in the name of the crown with the fiat of the attorney-general.

See T. Terrell and K. E. Shelley, *The Law of Patents,* 10th ed. (1961); W. R. Anson, *Law and Custom of the Constitution,* vol. ii, part i, 4th ed. (1935). (A. W. R.; SN. G.)

LETTISH (LATVIAN) LANGUAGE, which is spoken by less than 2,000,000 people, mainly in Latvia, belongs to the Baltic branch of the Indo-European family. Although it did not become an official administrative language until 1918, a literary language was already well developed at the end of the 19th century. The earliest texts are a Catholic catechism of 1585 and a Lutheran catechism of 1586. G. F. Stender (1714–96) was the first grammarian and lexicographer. Through the efforts of John Endzelin and his pupils at the University of Riga (after 1920), the language and its dialects have been thoroughly investigated. The dialects are classed into three major groups: East or Upper

Lettish, Central Lettish and West Lettish. Central Lettish, which is more conservative than the other two groups, became the basis for modern standard Lettish.

Lettish is very close to Lithuanian with which it shares a number of morphological and phonetic features in contrast to Old Prussian, the third member of the Baltic branch. There are, however, many differences between Lithuanian and Lettish. In most cases the former is more archaic, and in the main the Lettish sounds and forms may be traced back to such older sounds and forms which still exist in Lithuanian today. In Lettish words the main stress falls on the first syllable. Lithuanian *k* and *g* before front vowels appear in Lettish as *c* (=*ts*) and *dz* (Lith. *penki* "five," *gervė* "crane": Lett. *pieci, dzerve*). Lith. *š, ž* are *s, z* in Lettish (Lith. *širdis* "heart," *žolė* "grass": Lett. *sirds, zāle*). Lithuanian tautosyllabic *an, en, in, un* appear in Lettish as *uo, ie, ī, ū* (Lith. *ranka* "hand, arm," *penki* "five," *minti* "to tread," *juntu* "I feel": Lett. *ruoka, pieci, mīt, jūtu*). Primitive Baltic *tj, dj* became Lith. *č, dž*, but Lett. *š, ž* (Lith. *svečias* "guest," *briedžio* "of a stag": Lett. *svešs, brieža*). Primitive Baltic *sj* became Lith. *si* (*i.e.*, palatalized *s*), but Lett. *š* (Lith. *siauras* "narrow": Lett. *šaurs*). The reduction of vowels in final syllables went much further in Lettish than in Lithuanian. Lithuanian and Lettish inherited from Primitive Indo-European two types of intonation or pitch accent on diphthongs and long vowels. However, the two types developed differently in the two languages.

As a result of German influence (since A.D. 1200) the Lettish vocabulary was replete with Middle Low German loanwords until (in the second half of the 19th century) the language was purged of these foreign elements. The former orthography, based on German, was replaced in 1922 by a new system with Latin characters and diacritic signs.

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(AD. SN.)

LETTISH LITERATURE: *see* LATVIAN LITERATURE.

LETTRE DE CACHET, an important instrument of the administration under the *ancien régime* in France. From the point of view of diplomatics, *lettres de cachet* constitute a particular category of "letters close" or "letters missive" insofar as they were part of the sovereign's private correspondence (applied, however, to administrative or political affairs) and were not only signed by the king or by a secretary with authority to imitate the king's signature, but also always countersigned by a secretary of state. On the other hand *lettres de cachet* were distinguished from other "letters missive" (1) by the special way in which they were closed up, the fold being secured by a band of paper bearing the cachet or wax impression of the king's coat of arms; and (2), above all, by the use that was made of them, particularly from the time of the cardinal de Richelieu's ministry for Louis XIII to the last years of Louis XVI's reign.

One of the first mentions made of *lettres de cachet* is in the ordinance of Orléans (Jan. 1561), which condemns the practices of persons who "have obtained *lettres closes* . . . on the authority of which they have had girls taken into custody and forced into marriages against their fathers' wishes." As their use became more general, *lettres de cachet* were also called *lettres du petit signet* or *lettres du roi* or simply "orders of the king." Couched in very brief, direct terms, a *lettre* commanded the recipient to obey the orders therein without delay, giving no explanation.

A distinction must be made between (1) state *lettres de cachet*, used for political and police purposes; and (2) *lettres de cachet* supplied at the request of private families.

State *lettres de cachet* were sent by the government in the interests of society, either to maintain public order or to assure the proper functioning of institutions. In the first case a public authority (in Paris the lieutenant general of police) would obtain from the king orders for someone's detention for a limited period of time, or a public prosecutor would demand a *lettre de cachet* for the arrest of an accused person before trial. In the second case, the king might use a *lettre de cachet* to summon political bodies (such as the estates-general or provincial estates), to order them to discuss a particular matter, or to exclude from their meetings some person or persons considered undesirable. It was also by *lettres de cachet* that suspect foreigners or spies were arrested.

Lettres de cachet were granted to private families on demand if one of their members proved particularly recalcitrant or misbehaved as a young man or did something to dishonour the family later in his life; and a husband could request his wife's imprisonment, or a wife her husband's, for misconduct.

It is obvious that a device such as the *lettre de cachet* could be used quite arbitrarily, with abuses justifying the numerous complaints on the subject to be found in the lists of grievances presented at the estates-general of 1789. There was also a strong belief in the 18th century that *lettres de cachet* had sometimes been delivered blank, but duly signed and countersigned, so that the grantee had only to fill in the name of a personal enemy of his in order to be rid of him; and it was also alleged that there was an illicit trade in blank *lettres de cachet*. In fact, however, research has shown that, while an intendant (*q.v.*) might perhaps be provided with some signed blanks so that he could intervene in an emergency without delay, *lettres de cachet* were delivered only in accordance with a well-defined procedure and after a serious inquiry into the grounds of the demand, especially when the demand was made by private persons. In Paris this inquiry was conducted by the lieutenant of police and his commissaries at the Châtelet (*q.v.*); in the provinces it was conducted by the intendants and their *subdélégués*.

The effect of a *lettre de cachet* was to enforce imprisonment in a state fortress, particularly the Bastille (*q.v.*), or in a convent or hospital; and the fact that the duration of the imprisonment was not necessarily specified in the *lettre* served to aggravate the arbitrary character of the measure taken, at least when the reasons for it were not apparent. Nor was there any legal mechanism for appeal against a *lettre de cachet:* release, no less than detention, depended entirely on the king's pleasure. In the law of the *ancien régime* the *lettre de cachet* was an expression of that exercise of justice which the king reserved to himself (*la justice retenue du roi*), independently of the law courts and their processes, just as he reserved the right to grant *lettres de grâce* or pardons to persons convicted by the courts. Two years before the fall of the monarchy the use of *lettres de cachet* was abolished by the Constituent Assembly in March 1790.

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(MI. F.)

LETTUCE is the most popular salad plant in all parts of the world where climatic conditions permit its growth. The cultivated annual form (*Lactuca sativa*) probably was derived from the prickly lettuce, a wild species of the family Compositae, native to Asia Minor and adjacent areas. The milky juice characteristic of the plant is expressed by *lac*, meaning "milk," the root of the Latin name, as well as in "lettuce" from *laitues*, plural of the archaic French word for "milky."

Ancient writers noted that lettuce was served to kings of Persia as early as 550 B.C. During succeeding centuries it was well known to the Greeks and Romans, who praised it for its medicinal values. In the 1st century A.D. many different types were being grown. By the 5th century the Chinese were using the cultivated form. Lettuce spread to northern and western Europe during the middle ages and it is believed that Columbus carried it to the new world. Just when head lettuce types appeared is not recorded, but they were common by the 16th century.

Four botanical varieties of lettuce are cultivated: (1) asparagus lettuce (var. *asparagina*), with narrow leaves and a thick, succulent, edible stem; (2) head or cabbage lettuce (var. *capitata*), with the leaves folded into a compact head; (3) leaf or curled lettuce (var. *crispa*), with a rosette of leaves that are curled, finely cut, smooth edged or oak leaved in shape; and (4) cos or romaine

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LEAF OR CURLED LETTUCE (LACTUCA SATIVA CRISPA)

lettuce (var. *longifolia*), with smooth leaves that form a tall, oblong, loose head. There are two classes of head lettuce: the butter-head types with soft heads of thick, oily leaves; and crisp-head types with brittle-textured leaves that form very hard heads under proper temperature conditions. Horticultural varieties within these two classes differ in seasonal adaptability and disease resistance.

Average monthly temperatures of from 55° to 60° F. (14° to 16° C.) promote good quality, firmness in the heading varieties, stocky growth in the loose-leaved types. At high temperatures lettuce quickly becomes bitter and produces seedstalks. For successful cultivation lettuce requires ample water, especially in warmer weather. During unseasonable weather, protection is furnished and growth stimulated with greenhouses, frames, cloches or polyethylene covers. Small seedlings usually are transplanted at proper spacings when such shelters are used. In large-scale production the seeds are drilled directly in the field, with subsequent thinning.

In many parts of the world the leaf and butter-head types are most popular. They are not suitable for shipping, so they are usually grown on truck farms or market gardens relatively close to markets. The crisp-head varieties, well adapted for long-distance shipment by rail or truck at 32° to 36° F. (0° to 2° C.), are dominant in the United States, where over half of the acreage is located in California and Arizona. In Britain cabbage and cos types are grown primarily.

See also VEGETABLE. (J. E. K.; X.)

LEUCIPPUS (5th century B.C.), Greek philosopher, credited by Aristotle and by Theophrastus with having originated the theory of atomism, is said to have been a native of Miletus in Asia Minor (the opinion that he came from Elea in southern Italy is generally rejected). Epicurus, however, denied his very existence; and in modern times E. Rohde and A. Brieger have reasserted this view, though without identifying Leucippus with Democritus (*q.v.*). The work of H. Diels in separating out the literary testimonies which refer to Leucippus as distinct from Democritus has made possible a much clearer notion of the theories of Leucippus.

Leucippus' theory appears to have been the result of an attempt to mediate between the monism of the Eleatics, which allowed neither plurality nor motion, and the qualitative pluralism of Empedocles and Anaxagoras: matter was homogeneous, but existed ultimately in an infinity of small particles, which were indivisible ("atoms": this was intended to counter arguments of the type advanced by Zeno of Elea). (*See* ELEATIC SCHOOL; PLURALISM AND MONISM: *The Eleatics.*) Motion was made possible by positing empty space which, Leucippus maintained, existed just as much as body. Atoms were infinite in number, space was infinite in extent. Differences between physical things were due to the shape, arrangement and position of their constituent atoms, which were eternally in motion in all directions: this motion gave rise to collisions and entanglements and so to the formation of compound things. Within the compound things the atoms were in juxtaposition (not in "combination"); and they continued even there to be in motion, though their motion would then be modified. A cosmos is formed by the collision of atoms which have gathered together into a "whirl," as a result of which similar atoms get sorted together. The earth, which is drumshaped, is at the centre; but our cosmos is not unique. Leucippus' cosmology is largely an adaptation of earlier theories made to conform with his own main doctrines.

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LEUCITE, a rock-forming mineral composed of potassium and aluminum metasilicate $KAlSi_2O_6$. Since leucite contains a considerable amount of potash (K_2O, 21.5%), many attempts have been made to extract potash commercially from this mineral. In Italy the crude mineral is used as a fertilizer and it is a major source of commercial alum (*q.v.*). Crystals of leucite have the form of cubic icositetrahedra [211], but, as first observed by Sir David Brewster in 1821, they are not optically isotropic. They consist of a complex intergrowth of orthorhombic or monoclinic individuals, which are optically biaxial and repeatedly twinned, giving rise to twin lamellae and to striations on the faces. When the crystals are raised to a temperature of about 500° C. they become optically isotropic, the twin lamellae and striations disappearing; they reappear, however, when the crystals are again cooled. This pseudocubic character of leucite is exactly the same as that of the mineral boracite (*q.v.*).

The crystals are white or ash-gray in colour, usually dull and opaque, but sometimes transparent and glassy; they are brittle and break with a conchoidal fracture. The hardness is 5.5; the specific gravity 2.45. Enclosures of other minerals, arranged in concentric zones, are frequently present in the crystals.

See also PETROLOGY; PHONOLITE; POTASSIUM. (L. J. S.)

LEUCITE ROCKS. Igneous rocks containing the mineral leucite, though quantitatively very scarce, are widely distributed over the globe. They exhibit considerable variation and include many named rock types. They are found principally among surface or near-surface rocks of Tertiary or Recent Age, the best-known occurrence being the lavas of the Roman region. In pre-Tertiary rocks leucite is uncommon, presumably since it alters rather readily to form zeolites, analcite, etc.

Although some leucite-bearing lavas cover large areas, their actual total volumes are small. It is estimated that in the entire Roman region, from Mt. Vesuvius north 170 mi. to the volcano Bolsena, there are only 10 cu.mi. of leucite lava. Compared to other igneous rocks, leucite rocks are characteristically low in silica (45%–55% SiO_2), and high in potassium oxide (6%–12% K_2O). Economically unsuccessful attempts have been made to extract this potassium from leucite-rich rocks for agricultural fertilizers.

Leucite is found in association with most of the common rock-forming minerals and usually with one or more of the less common ones (nephelite, sodalite, noselite, hauynite, melanite-garnet and melilite), but it is not found with free silica (quartz, etc.), with which it would react chemically to form potassium feldspar. Leucite rocks belong chemically to a potassium-rich suite; in contrast to the sodic Atlantic and calcic Pacific suites, this group is sometimes referred to as the Mediterranean suite, from their relative abundance in the Roman region. In addition to this region, however, leucite rocks are found in the East Indies (Java, Celebes, Borneo), Alaska, Arkansas, Montana, Wyoming, Brazil, Madagascar, Germany (Baden), Czechoslovakia, Portugal, Spain, east Africa and other areas.

The conditions governing the formation of leucite in rocks are still imperfectly known, although experimental phase-equilibrium research has thrown considerable light on the problem. The com-

mon potassium feldspar orthoclase ($K_2O.Al_2O_3.6SiO_2$) melts incongruently to form leucite crystals and a more siliceous liquid. It might thus be expected that leucite crystals would form in feldspar-rich rock magmas and might in some cases escape later reaction with liquid. This incongruent melting would explain not only the known occurrence of leucite crystals in some rocks whose glassy groundmasses contain "free" silica, but also a number of known examples where crystals of an external shape and mineral association resembling leucite have crystallized from slowly cooled, alkali-rich, deep-seated magmas and have later been converted to an aggregate of orthoclase and nephelite (or its alteration products). This material, called pseudoleucite, has been explained as a result of the reaction of early formed leucite crystals with late sodium-rich liquid causing the precipitation of orthoclase and nephelite. If this explanation is assumed to be correct, it also provides a mechanism for the development of some nephelite-syenite magmas. Leucite has a rather low density (2.45), and it has been shown that high pressures favour the formation of potassium feldspar at the expense of leucite. This and the "pseudoleucite reaction" explain the lack of leucite in plutonic rocks.

When in euhedral crystals, that is, with well-formed faces, leucite always shows the trapezohedral crystal shape. This only represents, however, the crystal outline of the high-temperature form in which the mineral crystallized; when examined at any temperature less than approximately 600° C. these crystals have optical and other properties indicating a lower symmetry, and the rapid inversion from the one form to the other has been studied in detail. Although it would seem reasonable to expect that at least small amounts of the low-temperature form of leucite crystallize directly, at less than 600°, from the residual liquid in low-melting magmas, no evidence has yet been found to verify this in natural rocks and the synthetic silicate systems involving the compound so far explored do not permit direct crystallization of leucite from melts at such low temperatures.

The origin of the high-potassium, low-silica magmas from which leucite rocks form represents an enigma. Many mechanisms have been proposed, one of the most popular involving the desilication of a magma by its reaction with limestone or dolomite. The carbon dioxide formed by this reaction might actually be of significance in volcanic eruptions. It is known that the lavas of Mt. Vesuvius have come up through two miles of limestones and there has been a striking increase in the amount of leucite in the various eruptions there since prehistoric times. No single simple mechanism seems adequate to derive the low sodium to potassium ratio in these rocks, however, and to explain their concentration in certain limited areas over the globe.

See also PETROLOGY: *Habit of Igneous Rocks*. (E. RR.)

LEUCKART, (KARL GEORG FRIEDRICH) RUDOLF (1822–1898), was an outstanding German zoologist and teacher, his studies ranging widely over the invertebrates but his most valuable work dealing with parasites. He was born at Helmstedt on Oct. 7, 1822, and worked successively in the universities of Göttingen (where he had been educated), Giessen and Leipzig.

While Leuckart did useful work in systematics, dividing, for example, the echinoderms from the coelenterates and creating in the Protozoa the parasitic class Sporozoa, nevertheless his enduring influence lay in his experimental approach. Thus, he investigated the complex life histories of such parasites as the taenioid tapeworms, the aberrant Linguatulida, the acanthocephalan *Echinorhynchus* and the nematode *Trichinella*. Unraveling the life cycle of the sheep liver fluke involved him in an exciting race (1880–83) with A. P. Thomas of Oxford. In entomological fields he worked on metagenesis and parthenogenesis in aphids, the fertilization of insect eggs through the micropyle and the development of the viviparous sheep ked, a bloodsucking fly, to select three examples.

In addition to a mass of scientific papers, Leuckart wrote a fundamentally important textbook, *The Parasites of Man* (1879–84; Eng. trans., 1886), a greatly extended second edition of which remained unfinished at his death, on Feb. 6, 1898. (B. G. P.)

LEUCOTHEA ("white goddess" of the foam), a sea-goddess first encountered in Homer's *Odyssey*, where she rescues Odysseus from drowning. Already in Homer begins her customary identification with Ino, daughter of the Phoenician Cadmus and wife of Sisyphus' brother Athamas, whom Hera drove mad so that she leaped terrified into the sea with her son Melicertes and was changed with him into an immortal. The link with Cadmus suggests possible Semitic connections, and Melicertes, significantly reported to have been worshiped with sacrifice of children, may be identical with the Phoenician Melqart. *See* CADMUS; ATHAMAS; MELICERTES. (D. E. W. W.)

LEUCTRA, BATTLE OF (371 B.C.), fought on the plain of Leuctra (near modern Levktra) in southern Boeotia, in which a Boeotian army under Epaminondas defeated a Spartan army under King Cleombrotus. The battle is important not only because of its decisive blow to the reputation of the Spartan hoplite phalanx and establishment of the Theban hegemony in Greece (371–362) but also because of Epaminondas' tactical innovations: oblique order and concentration against the enemy's command.

After the Theban refusal to sign the peace of 371 (*see* GREECE: *History: The City States, 404–354*), Cleombrotus, who was in Phocis with about 10,000 Spartan and allied hoplites and 1,000 cavalry, was ordered to invade Boeotia and attack Thebes. He was met by a Boeotian army of not more than 6,000 hoplites and an unknown number of cavalry. The Spartans' hoplite phalanx was drawn up 12 deep, Cleombrotus being on the right wing, the usual place for the commander; the cavalry were ahead of the line. Behind the Theban cavalry Epaminondas massed hoplites to a depth of 50 on his left wing, which advanced ahead of the centre and right (not in a continuous front with them, as was usual). The superior Theban cavalry drove the Spartan cavalry back on to the phalanx, and the Theban left wing, led by the Sacred Band under Pelopidas (*q.v.*), followed quickly. Cleombrotus was killed and the Spartan right eventually routed; the rest of the line fled. The contemporary account of Xenophon gives the Spartan dead as nearly 1,000.

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LEUKAS (LEUCAS; modern LEVKAS; called by the Venetians SANTA MAURA), one of the Ionian islands off the coast of Acarnania, Greece, 6 mi. N. of the islands of Ithaca and Cephalonia. Area 114 sq.mi.; pop. (1961) 28,980. Together with the islands of Ithaca and Meganisi it constitutes Levkas *nomos* (department). It is a rugged mass of limestone and bituminous shales (partly Tertiary), rising to 2,000 and in some places over 3,000 ft. with limited areas of level ground. The grain crop suffices only for a few months' local consumption; but much olive oil is produced. The vineyards (in the west especially) yield red wine which is exported; the currant, introduced about 1859, has become the principal cash crop; and cotton, flax, tobacco and valonia are grown. There is also some trade in salt. The chief town, Levkas (formerly Amaxichi or Santa Maura after the neighbouring fort), is at the northeast end opposite a lagoon that barely covers a mudbank connecting the island to the mainland. In the southwest is the village of Vasiliki, whence the currant crop is exported. Mycenaean remains at Nidhri testify to early occupation. In the mid-7th century B.C. Corinthians established the classical city about 3 mi. S. of the present town and constructed a channel through the isthmus. This was already silted up in the 5th century B.C. when ships had to be dragged across the bank. Under Roman rule (after 197 B.C.) a bridge was built to the mainland. Between the town and Fort Santa Maura extends a Turkish aqueduct partly destroyed with the town by the earthquake of 1825. Other earthquakes occurred in 1867, 1953 and 1958. Forts Alexander and Constantine commanding the bridge are relics of the Russian occupation; the other forts are of Turko-Venetian origin (*see* GREECE: *Modern Greece*). Cape Leucatas, called by the Venetians Capo Ducato (modern Akra Doukaton), at the southwestern end of the island, has ruins of the temple of Apollo Leucatas. It was from the extremity (164 ft. high) of this cape that in ancient times the "Leucadian leap" was made, an ordeal whereby at the feast of Apollo accused persons were tried, those

who survived the leap being picked up by boat. The leap also was supposedly a cure for lovesickness and the story that Sappho, out of passion for Phaon, committed suicide by leaping from this precipice seems to be a late invention.

For the theory that Leukas is the Homeric Ithaca *see* ITHACA. The strait separating the island from the mainland is liable to silt. In 1903, however, a canal was completed 50 ft. broad and 17 ft. deep. *See* also IONIAN ISLANDS.

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LEUKEMIA is a fatal disease of the blood-forming organs which is encountered at all ages and in both sexes. Its cause is unknown but is considered to be of the same nature as that of various forms of cancer. The frequency of occurrence of the disease throughout the world increased substantially during the 20th century. There are two main varieties of leukemia, myelogenous and lymphatic, and a number of less common forms. All varieties may be acute or chronic. Without treatment, the acute forms run their course in a few weeks to a few months; the chronic form may not lead to death for three to ten or more years.

As a rule, the first symptoms of leukemia are weakness, increased fatigability and anemia or hemorrhages. In the acute form the symptoms may be severe, the anemia may progress rapidly and there may be accompanying fever. The chronic form is much more insidious in its development, and the early manifestations may be overlooked until enlargement of the spleen or lymph glands is discovered. In both myelogenous and lymphatic leukemia, as well as in the less common varieties, certain abnormalities can be demonstrated in the bone marrow as well as in the liver, spleen, lymph glands and other tissues. As a rule the white cell (leukocyte) count is increased, sometimes to very great proportions—10, 20 or even 100 times the normal values. In other instances, however, and especially in acute leukemia, the white cell count may be lower than normal. Varying degrees of anemia accompany the changes in the leukocytes, and in the acute form the number of platelets is decreased (thrombocytopenia). A characteristic of leukemia is the appearance in the blood of immature forms of leukocytes which are not normally found there.

Probably many factors lead to the development of leukemia. One that is clearly established is exposure to radiation. The myelogenous form of leukemia was observed in the Japanese victims of atomic bombing and in persons exposed, without adequate protection, to X ray radiation. Experimentally produced leukemia in animals indicates other factors—genetic, chemical, and hormonal—that influence the development of the disease. Thus, it is possible to raise strains of mice in which the incidence of leukemia is very high. Again, estrogens (the female sex hormones), the adrenocortical hormones and the thymus gland play important roles in the development of leukemia in mice. In fowl leukemia a viral agent is an important factor and a viral factor or factors are known to have a part in the development of leukemia in mice as well. Except for the role of radiation, the bearing of these various factors on the development of the disease in man is uncertain, but an etiologic relationship appears quite possible.

Although spontaneous remissions occur occasionally, especially in acute leukemia, this disease is invariably fatal. A number of methods are available, however, whereby the severity of the manifestations may be so modified that the victim may carry on in comparatively good health for a time. Furthermore, life span may be prolonged. In acute leukemia, these methods include chemical agents such as 6-mercaptopurine and methotrexate; in the acute lymphatic form, the adrenocortical hormones also are used. In the treatment of chronic leukemia X-ray therapy and radioactive substances such as radioactive phosphorus, as well as certain chemical agents, especially busulfan and chlorambucil, have proved to be useful.

See ANEMIA; BLOOD, DISORDERS OF; CANCER; LYMPH AND LYMPHATIC SYSTEM; *see* also references under "Leukemia" in the Index. (M. M. WE.)

LEUNA, an industrial town of East Germany in the *Bezirk* (district) of Halle, German Democratic Republic, is on the western bank of the Saale River and on the southern outskirts of Merseburg, 16 mi. (26 km.) S of Halle and 19 mi. (30.5 km.) W of Leipzig. Pop. (1964) 12,480.

It is in the centre of the extensive central German brown coal region, and Leuna's industry is devoted mainly to obtaining and processing that raw material. The largest industrial establishment in eastern Germany, the Leuna-Werke, a chemical enterprise, is there; among other products it manufactures synthetic benzine.

Leuna was the site of the first (1916) synthetic-nitrogen plant (Haber-Bosch process) in Germany. The town was heavily bombed during World War II, the chemical installations being the principal target.

LEUTZE, EMANUEL (1816–1868), U.S. historical painter, was born at Gmünd, Württemberg, on May 24, 1816, and as a child was taken by his parents to the United States, where the family settled first at Fredericksburg, Va., and later in Philadelphia, Pa. He early displayed talent as an artist, and by the age of 25 had earned enough through his portraits and figure pieces to take him to Düsseldorf, where he studied at the Royal Academy. Leutze remained in Düsseldorf, concentrating chiefly on historical painting, until his return to the United States in 1859. In 1860 he was commissioned by the U.S. Congress to decorate a stairway in the Capitol at Washington, D.C., for which he painted a large composition, "Westward the Course of Empire Takes Its Way" (often, though erroneously, called "Westward Ho"), designed to illustrate the settlement of the far western U.S. His best-known work, popular through engraving and widely reproduced in U.S. history texts, is "Washington Crossing the Delaware," a large canvas containing a score of life-sized figures; it is owned by the Metropolitan Museum of Art, New York City. Among his other works are "Washington at Monmouth," "The Landing of the Norsemen," "The Storming of Teocalli, Mexico," "The Settlement of Maryland," and "Cromwell and Milton."

Leutze died at Washington on July 18, 1868.

LEVALLOIS-PERRET, a town of France, a suburb of Paris, which borders it on the south, is located in the Hauts-de-Seine *département,* on the right bank of the Seine river, 6.5 km. (4 mi.) N.W. of Notre Dame cathedral. Pop. (1962) 61,962. About two-thirds of the town is reserved for residential use; the remainder, containing approximately one-fifth of the population, is designated for industry. Local manufactures include automobiles, electrical and radio equipment including radar, lighting and optical equipment, and perfume and soap; there are also foundries, distilleries and food-processing plants.

Levallois-Perret is a modern town with broad streets and open spaces. It grew up after 1820 from the village of Villiers and a later village which, in 1846, took the name of Levallois after its founder. It became a commune in 1867 under its present name, and increased rapidly in importance with the expansion of Paris toward it and the construction of the Paris-Le Havre railway. (RA. D.)

LEVANT, a general name for the countries of the eastern Mediterranean (from the French *lever,* "to rise," as sunrise, meaning the east). Its common use for that area is associated with early Venetian and other trading ventures and the establishment of commerce with cities such as Sidon (modern Saida) and Tyre as a result of the crusades. It was applied to the Mediterranean coastlands of Asia Minor and Syria and sometimes included the coastlands from Greece to Egypt. It was also sometimes used as synonymous with Anatolia for Asia Minor and also sometimes as a synonym for the middle east and the near east. In the 16th and 17th centuries the term high levant was used of the far east.

The Levant was at the crossroads of the great caravan routes and invasion routes linking Europe, Asia and Africa. It was the meeting place of the civilizations of Phoenicia, Macedonia, Assyria, Babylonia, Egypt, Greece, Rome and Byzantium. It was the birthplace and became the holy land of Judaism, Christianity and Islam.

The name Levant States was given to the French mandate of Syria and Lebanon after World War I (1923) and the term is sometimes still used for those two nations, which became independent in 1946 (*see* LEBANON; SYRIA; MANDATE). *See* also ASIA MINOR; COMMERCE, HISTORY OF; MEDITERRANEAN SEA: *History;* and separate articles on ancient and modern Levantine states and cities.

LEVELLERS, a republican and democratic party in England during the Civil War and Commonwealth period, and the first political party in modern Europe. The name was given by enemies of the movement to suggest that its supporters wished to "level men's estates." Midland rioters against enclosures in 1607 had been called "Levellers."

The Leveller movement originated in 1645–46, among radical supporters of parliament in and around London. The Civil War had been waged in the name of parliament and people: the Levellers demanded that real sovereignty should be transferred to the house of commons (to the exclusion of king and lords); that manhood suffrage, a redistribution of seats and annual (or biennial) parliaments should make the commons truly representative; that government should be decentralized to local communities. They put forward a program of economic reform in the interests of small men in town and country—complete equality before the law, abolition of trading monopolies, laying open enclosures, security of tenure for copyholders, no conscription (impressment) or billeting, drastic law reform, abolition of tithes (and so of a state church), complete freedom of religious worship and organization. Disappointed by parliament's attitude, the Levellers turned directly to the people—and to the New Model army.

In April 1647 the army rank and file elected agitators who were largely influenced by Leveller ideas. The generals had to accept an army council which included agitators as well as officers. At Putney, in Oct. 1647, this representative body discussed the Agreement of the People, presented by the Levellers as a new social contract to refound the state, dissolved by parliament's victory in the Civil War. Commissary Gen. Henry Ireton argued that political democracy must lead to economic democracy, to subversion of property. He therefore wished to preserve the old propertied franchise. Col. Thomas Rainborow (later assassinated by royalists) and the civilian Leveller John Wildman replied by appealing to natural right. The Putney debates touched on the fundamentals of political theory. But they ended in deadlock. The generals restored "discipline" by force; and a renewed threat from the king in the second civil war reunited the disputants.

Pride's purge (Dec. 1648) was preceded by negotiations between Independents and Levellers, but the latter objected to the failure to dissolve parliament and appeal to the people. In March 1649, John Lilburne (*q.v.*) and other Leveller leaders were imprisoned. A mutiny of Leveller troops in London was suppressed, and in May a more serious revolt was put down at Burford and Banbury. That was the end of the Levellers as an organized political force, though some of their leaders conducted inconclusive negotiations with royalist *émigrés,* and there were signs of a Leveller revival in the winter of 1659–60.

The Levellers never won national support. Their sea-green colours held London's streets, and the troops listened to them eagerly. But propaganda was difficult among a population used to taking its ideas from parson and squire. The Leveller failure to capture the army was decisive. But had they been allowed time to educate a democratic electorate, their program was well calculated to appeal to peasant farmers and artisans—the overwhelming majority of the people. Their repudiation of the communist Diggers (*q.v.*) was aimed at reassuring men of small property. So perhaps was their failure to press for conversion of copyhold into freehold, and their modification of manhood suffrage to exclude not only royalists but also paupers and servants—those who were economically dependent. In 1649 the Levellers were becoming active outside London and were suggesting that English armies had no business in Ireland, that the English and Irish peoples had common enemies. Oliver Cromwell may have been right when he shouted to the council of state: "If you do not break them they will break you!"

The racy, forthright pamphlets of Lilburne, William Walwyn and Richard Overton are important in the evolution of a popular English prose style. Their appeal to reason against arguments drawn from precedent or biblical authority marks a historic break in political thinking. The Quakers took over some of their social ideas.

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(J. E. C. H.)

LEVEN, ALEXANDER LESLIE, 1ST EARL OF (*c.* 1580–1661), Scottish general, commander of the Scottish army that took part in the English Civil War under the terms of the Solemn League and Covenant. The son of George Leslie, captain of Blair Atholl, he fought in the Dutch service and later in that of Sweden; he rose to the rank of lieutenant general and ultimately (in 1636) to that of field marshal. He had a brilliant record during the Thirty Years' War and especially distinguished himself by his successful defense of Stralsund against Count Wallenstein in 1628. He always revered the memory of his great leader, Gustavus Adolphus, and was present at the battle of Lützen (Nov. 1632) when the king was killed.

An ardent covenanter, he was given command of the Scottish forces arrayed against Charles I during the first Bishops' War (1639), and his commission was renewed during the second (1640–41). He captured Edinburgh castle in March 1639 without losing a man and invaded England in 1640, defeated the king's troops at Newburn, entered Newcastle and mastered the whole of northeast England. The general was one of the Scottish commissioners who treated with the king at Ripon and, in the summer of 1641, peace having been made, he was able to disband his army. In Oct. 1641 Leslie was created earl of Leven and Lord Balgonie, his peerage being one of many conferred by Charles at this stage on his opponents in a fruitless endeavour to win them over to his side. He led the Scottish forces in the Irish campaign in 1642, but he returned to take command, in Jan. 1644, of the army dispatched to England in accordance with the terms of the Solemn League and Covenant (*see* CIVIL WAR, ENGLISH).

Leven was prominent in the campaigns of 1644–45 and in May 1646 Charles I surrendered to him at Newark. Unable to convince the king of the need to make lasting peace in the only feasible way—by subscribing the covenants—Leven handed over his embarrassing charge to the English parliament and returned with his army to Scotland (Jan. 1647). This was the end of his active military service as commander, though he remained keenly interested in national affairs. He agreed with the duke of Argyll in opposing the secret Engagement made by the Scottish commissioners to send an army to rescue Charles in 1648, but he was brushed aside while the duke of Hamilton led the Scottish royalists to their utter defeat at Preston in August.

The execution of Charles I led to further warfare and brought the "godly" into the royalist camp. Leven was present at Dunbar in Sept. 1650, though he left the effective command to his kinsman David Leslie. Along with the other members of the committee of estates, he was captured at Alyth in Aug. 1651 by a party of English dragoons. Imprisoned for a time in the Tower of London, he was soon liberated on parole, and eventually, in 1654, he was given complete freedom after the intercession, on his behalf, of Christina, queen of Sweden. He spent his last years on his estate of Balgonie, in Fife, dying there on April 4, 1661. (G. S. P.)

LEVEN, a small burgh of Fife, Scot., at the mouth of the Leven on Largo bay in the Firth of Forth, 15 mi. S.W. of St. Andrews by road. Pop. (1961) 8,872. The old town cross has been erected on the grounds of the municipal buildings. The industries are numerous, including iron and steel foundries; paper, oil cake and jute spinning and sawmills; and the making of creo-

sote and golf clubs. There are collieries in the neighbourhood. Leven is a seaside holiday town with fine sands; the golf links, extending for 2 mi. N.E. to Lundin, are among the best in Scotland. Early occupation is indicated by three fine monoliths, and in the vicinity are the remains of an old house of the Lundin family dating from the reign of David II. One mile east of Lundin lies Largo, consisting of Upper Largo, or Kirkton of Largo, and Lower Largo. A statue of Alexander Selkirk or Selcraig, the prototype of Robinson Crusoe, who was born in Largo, was erected in 1886. Sir John Leslie, the scientist and mathematician, Adm. Sir Philip Durham, commander in chief at Portsmouth from 1836 to 1839, and Sir Andrew Wood (d. 1515), who sailed the "Great Michael," the largest ship of its time, were natives of Largo. When the last named was past active service he had a canal cut from his house to the parish church, to which he was rowed every Sunday in an eight-oared barge.

LEVEN, LOCH, a lake of Kinross-shire, Scot. Situated near the southeast boundary of the shire, it is $3\frac{2}{3}$ mi. long and $2\frac{2}{3}$ mi. broad, and lies 353 ft. above sea level. The mean depth is about 15 ft., with a maximum of 83 ft., and it is thus one of the shallowest of Scottish lochs. Draining the county and itself drained by the Leven, it is famous for its trout.

Of the loch's seven islands, St. Serf's, the largest, contains the ruins of the priory of Loch Leven or Portmoak, on the site of one of the oldest Culdee establishments in Scotland. About 955 it was made over to the bishop of St. Andrews and about 1150 it was granted to the Augustinians of that city. Its best-known prior was Andrew of Wyntoun, the 15th-century chronicler.

On Castle Island is a ruined castle dating from the late 14th or early 15th century. An earlier structure resisted, according to the *Scotichronicon,* a siege by the English party in 1335, and in it Robert the Steward and his son Alexander, earl of Buchan (the "wolf of Badenoch"), suffered detention in 1368–69. The former, as Robert II, granted the castle in 1390 to Sir Henry Douglas of Lugtoun, ancestor of the Douglases of Lochleven. It was in turn the prison of Archibald, 5th earl of Douglas (1431); of Patrick Graham, archbishop of St. Andrews (who died there in 1478); and, above all, of Mary, queen of Scots. She signed her abdication within its walls in July 1567, and effected her escape from it on May 2, 1568. The keys of the castle, which were thrown into the loch during her flight, were found and are preserved at Dalmahoy in Midlothian. Support of Mary's cause had involved Thomas Percy, 7th earl of Northumberland. He too was lodged in the castle, in 1569, and after three years' imprisonment was handed over to the English, by whom he was beheaded at York in 1572. The proverbial saying that "Those never got luck who came to Loch Leven" sums up the history of the castle. An ancient causeway connecting the isle with the mainland was long submerged too deeply for use, but the work of lowering the water level and reclaiming some land, which was carried out in 1826–36, brought it almost into view again. (G. S. P.)

LEVEN AND MELVILLE, EARLS OF. The family of Melville which holds these two earldoms descends from Sir John Melville, of Raith, Fife, executed for treason in 1548, leaving a son, Robert (*c.* 1527–1621), who was created Lord Melville of Moneymaill in 1616. GEORGE (1636–1707), 4th lord, was involved in the Rye House plot against Charles II (1683), took refuge in the Netherlands and returned to England after the revolution of 1688. Appointed secretary for Scotland by William III in 1689, he was created earl of Melville in 1690, and was also president of the Scottish privy council, but was deprived of this office by Queen Anne.

The earldom of Leven was created in 1641 for SIR ALEXANDER LESLIE (*c.* 1580–1661), the celebrated general (*see* LEVEN, ALEXANDER LESLIE, 1st Earl of). Under an entail of his grandson, ALEXANDER (*c.* 1637–64), 2nd earl, the title passed in 1681 to DAVID MELVILLE (1660–1728), second son of George, 1st earl Melville, to whose title he also succeeded in 1707, being styled 3rd earl of Leven and 2nd earl of Melville. He fought for William III at Killiecrankie and as commander in chief in Scotland suppressed the Jacobite rising in 1708. RONALD (1835–1906), 11th and 10th earl, was lord keeper of the Scottish great seal and lord high commissioner to the Church of Scotland assembly (1898–1905). ALEXANDER (1924–), 14th and 13th earl, succeeded to the title in 1947.

LEVER, CHARLES JAMES (1806–1872), Irish novelist, who produced vivacious sketches of post-Napoleonic Ireland and Europe, was born in Dublin on Aug. 31, 1806, the son of an English-born builder and architect. He studied medicine at Trinity college; qualified in 1831; procured a dispensary appointment and married in 1833. In spite of a fairly substantial inheritance and the income from his practice, gambling losses and extravagance left him short of money, so he began to utilize his gifts as a raconteur, and in 1837 *The Confessions of Harry Lorrequer* appeared serially in the *Dublin University Magazine,* where it was an uproarious success. In 1839 Lever settled in Brussels. *Charles O'Malley,* one of the best of his early novels, which ranges from the west of Ireland to the Peninsular War, appeared in 1841; *Jack Hinton* and *Tom Burke of "Ours,"* a vigorous story of an Irishman in the service of the French empire, in 1843.

In 1842 Lever returned to Dublin to take up the editorship of the *Dublin University Magazine.* He was a successful editor, but the gregariousness and extravagance of his nature succumbed too easily to the Irish atmosphere and in 1845 he returned to the continent, where he spent the rest of his life, first in travel round the various resorts and subsequently as British consul at La Spezia and Trieste, which he disliked. Meanwhile he continued to produce novel after novel. *The Knight of Gwynne* (1847), one of his best books, *Confessions of Con Cregan* (1849) and *Roland Cashel* (1850) mark a transition from the loosely constructed picaresque works of his youth to the less ebullient, more analytic manner of his last books, among which *The Fortunes of Glencore* (1857) and *Lord Kilgobbin* (1872) are outstanding. Rough and ready though they are, however, the vivacity of his early novels, the picture they present of the devil-may-care, hard-riding gentry and their ragged adherents and a certain down-to-earth Irish realism in the comic passages make them perennially attractive. Lever died in Trieste on June 1, 1872.

See W. J. Fitzpatrick, *The Life of Charles Lever* (1879); L. Stevenson, *Dr. Quicksilver* (1939). (A. CR.)

LEVER. A mechanical device generally used for raising weights. The lever is the oldest form of all elementary machines and appears in the sculptures of Egypt some 5,000 years ago. A simple kind of lever is shown in the illustration. This lever can turn about a point or axle called the fulcrum shown at f in the figure. With this lever a heavy load L can be raised by a force or effort E applied at the points l and e on the rod. The distances, lf, ef, of the fulcrum from the load and effort forces are called the lever arms of the load and effort respectively. When the effort force E is just balancing the load force L then the product of the forces and their lever arms must be equal, that is, for balance or equilibrium $L \times \text{lf} = E \times \text{ef}$. The mechanical advantage of a lever is defined as the ratio of the load to effort L/E, and is equal to the inverse ratio of their lever arms, ef/lf.

LEVER WITH FULCRUM, LOAD L AND EFFORT E

The fact that the lever balances or is in equilibrium when $L \times \text{lf} = E \times \text{ef}$ is based on direct experimental proof in which the forces and distances are measured directly. Archimedes undoubtedly had experimental basis for his axiom for the lever, "Equal weights at equal distances are in equilibrium, and unequal weights at unequal distances are not in equilibrium but incline toward the weight which is at greater distance"; and for the principal theorem of the lever: "Two magnitudes, whether commensurable or incommensurable, balance at distances reciprocally proportional to the magnitudes."

By placing the load, fulcrum and effort in different relative positions two other types of levers are formed. In a wheelbarrow the order is fulcrum, load and effort while for a foot treadle as used for driving small looms the order is fulcrum, effort and load. Theoretically, a lever can be used to lift a load of any magnitude. It was probably this idea that caused Archimedes to exclaim,

"Give me a fulcrum on which to rest and I will move the earth."
(R. J. Sn.)

LEVERHULME, WILLIAM HESKETH LEVER, 1st Viscount (1851–1925), English entrepreneur who in 1884 leased a small, unprofitable soapworks and built it into the international firm of Lever Bros., was born at Bolton, Lancashire, Sept. 19, 1851, and began his career in 1867 in his father's wholesale grocery warehouse. In making and selling soap he used extensive advertising and product innovations, and by 1925 his firm served a world market through a system of 250 associated companies.

As early as 1888 the brothers introduced extensive employee benefits, beginning with a company financed model industrial village at Port Sunlight. Employee benefits included pensions, medical care, unemployment compensation and free insurance. In 1909 a copartnership arrangement for sharing profits, but not management, was inaugurated.

In 1906 Lever was elected a member of parliament. In 1917 he was raised to the peerage as a baron; he received a viscounty in 1922. Lever died in Hampstead May 7, 1925.

See *Viscount Leverhulme,* by his son (1925). (J. R. Lt.)

LEVERKUSEN, a town of Germany which after partition of the nation following World War II became part of the *Land* (state) of North Rhine-Westphalia in the Federal Republic of Germany, lies on the Rhine 13 km. (8 mi.) N. of Cologne by road. Pop. (1961) 94,641. Formed in 1930 by the union of the villages of Schlebusch, Rheindorf and Steinbüchel with the town of Wiesdorf, Leverkusen stretches from the Rhine to the Berg foothills. It is crossed by the Dhünn river which flows into the Wupper just above the latter's confluence with the Rhine. The House of Rest and Morsbroich castle are used for plays, exhibitions and concerts. There are several schools, two hospitals, swimming pools and sports grounds. The numerous parks and open spaces have given Leverkusen the name of "the green town." It is connected with Cologne, Düsseldorf and all parts of the Ruhr by railway; the airports of Düsseldorf-Lohausen and Cologne-Wahn are nearby; and it lies at the crossing of two *Autobahnen,* Essen-Frankfurt and Kamen-Cologne-Aachen. About half the inhabitants are employed in industries, of which the principal is the production of chemicals.
(H. Ad.)

LEVERRIER, URBAIN JEAN JOSEPH (1811–1877), French astronomer, who predicted the existence of the planet Neptune, was born at St. Lô in Normandy on March 11, 1811. He was educated at the École Polytechnique, where his scholastic abilities were rewarded with a free choice among the departments of the public service open to pupils of the school. He selected the administration of tobaccos, and proved his ability with two papers on the combination of phosphorus with hydrogen and oxygen, later published in the *Annales de Chimie et de Physique.* Appointed teacher of astronomy at the École Polytechnique in 1837, Leverrier abandoned chemistry for celestial mechanics. Continuing the previous investigations of Laplace, he rigorously proved the stability of the solar system and calculated the limits within which the eccentricities and inclinations of the planetary orbits vary. This was followed by an extensive study of the theory of Mercury, resulting in greatly improved tables of that planet.

Leverrier next investigated the perturbations of the comets Faye (1843) and De Vico (1844) and then turned his attention to the motion of Uranus, from which he deduced the presence of a previously unknown planet. On Sept. 23, 1846, J. G. Galle at Berlin discovered the planet Neptune within one degree of the place Leverrier had indicated. As a result of this achievement he received, among other awards, a Copley medal from the Royal society, the order of the Dannebrog from the king of Denmark, and was named officer in the Legion of Honour and preceptor to the comte de Paris. Also, a chair of astronomy was created for him at the faculty of sciences and he was appointed adjunct astronomer to the bureau of longitudes. On Jan. 30, 1854, he succeeded D. F. J. Arago as director of the Paris observatory. Leverrier re-established the efficiency of this institution, which had declined, but some of the uncompromising measures taken and his unconciliatory manner of enforcing them raised a storm of protests that was only appeased by his removal on Feb. 5, 1870. On the death of his successor C. E. Delaunay in 1872, he was reinstated, but with authority restricted by the supervision of an observatory council. During his difficulties as the director of the observatory, he carried out a complete revision of the planetary theories and compared theory with the best observations then available. His theories and tables of the planets are published in vol. i–vi and x–xiv of the *Annales de l'Observatoire de Paris* (Mémoires). Leverrier's aim was the elaboration of the scheme of the heavens laid down by Laplace in *Mécanique céleste,* and the predictions of the existence of Neptune and of Vulcan, with which his name is popularly identified, were only incidental to this scheme. Vulcan was never discovered, and the mathematical necessity for its existence, stated by Leverrier, was only removed by Einstein's relativity theory in 1915. Leverrier died at Paris on Sept. 23, 1877.
(O. J. E.)

LEVERTIN, OSCAR IVAR (1862–1906), Swedish poet and scholar, a leader of the romantic movement of the 1890s, was born, of a Jewish family, near Stockholm on July 17, 1862. He received his doctorate in letters at Uppsala in 1888 and became a *docent* there, and, in 1899, professor of literature at Stockholm. In his first prose works and his early literary criticism he closely followed the naturalist school. But after the death of his first wife and an attack of tuberculosis, which sent him to Switzerland, and led to close personal and literary contact with the poet Verner von Heidenstam (*q.v.*), he abandoned naturalism for romanticism. The first sign of his literary conversion is the pamphlet *Pepitas bröllop* (1890), written with Heidenstam in Davos. In Davos he also completed his first volume of poems, *Legender och visor* (1891), which placed him at the head of the new romantic movement. In this poetry—"black with purple-coloured threads"—he draws his material partly from medieval legend and art, partly from Jewish tradition and history. In *Nya dikter* (1894), the atmosphere and colouring is less melancholy; new personal experiences and the combined influence of Renan and Nietzsche are prominent. A third volume of poetry, *Dikter* (1901), is an attempt in the direction of a more simple and compressed style; here he approaches genuine Swedish themes. His last and perhaps finest poetical work is *Kung Salomo och Morolf* (1905) in which, using material drawn from Oriental tales and medieval romances, he reveals much of his own melancholy and disillusion.

As a literary historian Levertin concentrated his interest on the 18th century, especially the period of Gustavus III (*Från Gustaf III:s dagar,* 1896; and *Svenska gestalter,* 1903); the same period formed the background to the volume of short stories *Rococonoveller* (1899), a kind of literary pastiche. From 1897 until his death he was the leading literary critic of the *Svenska Dagbladet* and exerted great influence on contemporary readers and writers. Among his books on the history of art that on *Jacques Callot* (1911; French trans. 1935) is the most important. At the time of his death (in Stockholm, Sept. 22, 1906) he was engaged on a great work on Linnaeus, but had written only a fragment, published as *Carl von Linné* (1906). His *Samlade skrifter* were published in 24 vol. (1907–11).

See W. Söderhjelm, *O. Levertin,* 2 vol. (1914–17); C. Fehrman, *O. Levertin* (1947). (Cl. Fn.)

LÉVI, SYLVAIN (1863–1935), French orientalist, was born in Paris on March 28, 1863. Educated at the University of Paris, in 1886 he was appointed a lecturer at the school of higher studies in Paris. As special lecturer in Sanskrit he taught at the faculty of letters from 1889 to 1894 when he was appointed to a professorship at the Collège de France. In 1897 and 1898 he made tours of scientific research in India and Japan, and from 1921 to 1923 he traveled in India, Indochina, Japan, Korea, Siberia and Russia. Lévi became a director at the school of higher studies and a member of numerous societies, including the Royal Asiatic society, the Linguistic society and the Society of Jewish Studies. His works include *Le Théâtre indien* (1890); *La Doctrine du sacrifice dans les Brahmanas* (1898); *Le Népal* (1905–08); *Dans l'Inde* (1925); *L'Inde et le monde* (1925). Lévi died in Paris on Oct. 30, 1935.

LEVI-CIVITA, TULLIO (1873–1941), Italian mathematician, best known for his work in differential calculus and relativity, was born March 29, 1873, in Padua. He studied at the University of Padua, where he became instructor in 1898 and professor of rational mechanics in 1902. Later he taught at the University of Rome (1918–38), where he occupied successively the chairs of higher analysis and rational mechanics.

Ranked as one of the leading scientists of the 20th century in both pure and applied mathematics, Levi-Civita made important contributions to almost every domain of mathematics. In celestial mechanics, he published a number of memoirs on the problem of three bodies. With his teacher, Curbastro G. Ricci, he founded the absolute differential calculus. The memoir of Ricci and Levi-Civita appeared as *Méthodes de calcul différentiel absolu et leurs applications* (1900). In 1917 Levi-Civita made his most important original contribution, the introduction of the concept of parallel displacement in general curved spaces. This immediately found many applications, including the unified representation of gravitational and electromagnetic fields. Other publications dealt with problems in differential geometry, hydrodynamics and engineering. He died Dec. 29, 1941, in Rome. His works included *Lezioni di meccanica razionale*, with U. Amaldi, three volumes (1923); *Questioni di meccanica classica e relativista* (1924); *Lezioni di calcolo differenziale assoluto* (1925; Eng. trans., 1927); and *Caratteristiche dei sistemi differenziali e propagazione ondosa* (1931). (E. Ka.)

LEVINSON, SALMON OLIVER (1865–1941), U.S. lawyer and publicist, was distinguished for originating and publicizing the outlawry of war movement in the United States. Born of immigrant parents in Noblesville, Ind., on Dec. 29, 1865, he clerked in the family store, attended Yale university (A.B., 1888) and studied law with an uncle. He was noted for skill in reorganizing the finances of distressed corporations and in negotiating rather than litigating creditors' claims.

He announced his outlawry idea in the *New Republic* March 9, 1918. Changes brought about by violence were to be declared illegal by nation-states. Levinson marshaled leaders in many fields to advocate outlawry, including the philosopher, John Dewey; Sen. William E. Borah; the New York minister, John Haynes Holmes; the editor of the *Christian Century,* C. C. Morrison; and the popular orator, Raymond Robins.

Aristide Briand, foreign minister of France, and Henry L. Stimson, the U.S. secretary of state, along with others, paid tribute to Levinson for his contributions to the Kellogg-Briand peace pact (1928) which "outlawed" war in a legal sense.

Bibliography.—Robert H. Ferrell, *Peace in Their Time* (1952); C. C. Morrison, *The Outlawry of War* (1927); John E. Stoner, *S. O. Levinson and the Pact of Paris* (1943). (Jn. E. S.)

LEVIRATE. In ancient Hebrew society, when a man died without sons his brother was required to marry the widow in order to provide a "son" and heir of the dead man, thus perpetuating the paternal line. A similar custom prevailed among the Vedic Aryans of India (1500 to 1000 B.C.), among whom the son performed funeral rites for the salvation of his deceased father's soul. The term, from the Latin for "brother-in-law," also applies to the custom of preferred—but not mandatory—marriage to the deceased husband's brother. The "brother" may be an actual sibling of the deceased or a person so classified. Where only the dead man's younger brother is required or expected to marry the widow, the custom is called the junior levirate. G. P. Murdock's world-wide sample of 185 primitive societies of the 19th and 20th centuries found that 69% exhibited a preference for some such form of secondary marriage. Whether the widow and the dead husband's brother regard each other as desirable or undesirable depends on such factors as age, personality, economic assets and other indices of status. This custom may be explained as a reflection of the principle that many peoples have regarded marriage as a contract between families or lineages as well as individuals, so that a deceased spouse was most appropriately replaced by another from the same social or kin group. The customary replacement of a dead wife by her sister, the sororate (*q.v.*), often exists side by side with the levirate.

See also Kinship; Kinship Terminology; Marriage, Primitive; Social Anthropology.

See R. H. Lowie, *Social Organization* (1948); G. P. Murdock, *Social Structure* (1949). (H. E. D.)

LEVITA, ELIAS or Elijah (Elia Levi ben Ascher) (1469–1549), Jewish grammarian, who furthered the study of Hebrew in Christian circles by his activity as a teacher and by his writings, was born at Neustadt on the Aisch, Bavaria. He preferred to call himself Ashkenazi, "the German," and bore also the nickname of Bachur or Bahur, "the youth" or "student," which latter he gave as a title to his Hebrew grammar. Before the end of the 15th century he went to Italy, living first at Padua, then (1509) at Venice, going in 1513 to Rome, where he found a patron in the learned general of the Augustinian order, the future cardinal Egidio di Viterbo, whom he helped in his study of the Cabala. The storming of Rome by the Constable de Bourbon in 1527 compelled Elias to go to Venice, where he became corrector in the printing house of Daniel Bomberg. In 1541 and 1542 he lived at Isny, Württemberg, where he published several of his writings in the printing house of the learned pastor Paul Fagius. The last years of his life he spent at Venice.

Levita's works on Hebrew grammar (*Bachur,* a textbook, 1518; *Harkaba,* an annotated dictionary of irregular word forms; a table of paradigms; *Pirke Elijahu,* a description—partly metrical—of phonetics, and other chapters of the grammar, 1520; his earliest work, a commentary on Moses Kimchi's Hebrew grammar, 1508) are clear and methodical. Among his other writings is the first dictionary of the Targumim (*Meturgeman,* 1541) and the first attempt at a lexicon in which much of the treasure of late Hebrew language was explained (*Tishbi,* explanation of 712 new Hebrew vocables, as a supplement to the dictionaries of David Kimchi and Nathan b. Yehiel, 1542). Scientifically most valuable, and of original importance, are the works of Levita on the *Massora;* his concordance to the Massora (*Sefer Zikhronot,* completed in the second revision 1536) and *Massoreth Hamasoreth* (1538; Eng. trans. by C. D. Ginsburg, 1867). Also may be mentioned his commentary on Kimchi's grammar and dictionary (in the Bomberg editions, 1545, 1546), his German translation of the Psalms (1545) and the *Baba-Buch* (more properly *Buovobuch,* a German recension of the Italian novel *Historia di Buovo d'Antona,* 1508).

LEVITATION, the raising of the human body in the air without mechanical means or contact, is an occasional phenomenon reported in many religious traditions and also as a rare paranormal phenomenon in a nonreligious setting. Levitations are reported among the holy men of India. They have also been reported among Christian saints, and the evidence given by witnesses at the process of canonization often provides a useful measure of how well authenticated these occurrences have been. A case of levitation in the 19th century is that of the medium Daniel Dunglas Home, of whom Sir William Crookes wrote: "On three separate occasions I have seen him raised completely from the floor of the room . . . On each occasion I had full opportunity of watching the occurrence as it was taking place." A report of a more spectacular levitation was made by the earl of Dunraven and two other witnesses, who were convinced that Home was transported through a window 70 ft. from the ground and into another window seven feet away.

The puzzling thing about levitation is that while it is intuitively rejected as impossible by the mind accustomed to scientific habits of thought, there is nevertheless a great weight of evidence in favour of its occurrence. This evidence would indeed be regarded as overwhelming if the phenomenon were intrinsically more likely. Some investigators have suggested that witnesses to levitation were subject to hallucinations induced by mass hypnosis, but this is a very improbable explanation since mass hallucinations of this kind have not been demonstrated experimentally and levitations have often been reported in conditions unfavourable to hypnosis. It may be argued that the experimental evidence for psychokinesis produced by workers in parapsychology (*q.v.*) has somewhat reduced the intrinsic unlikelihood of levitation. The two phenomena, on the one hand of a certain measure of willed control of the rolling of dice, and, on the other, of the raising of a human body from

the ground, would, however, involve forces of a very different order.

There are obvious difficulties in the way of experimental study of levitation since it is a rare phenomenon that cannot be produced at will. However, the motion-picture camera and the use of infrared photography provide means of objective recording that might settle the question of the reality of levitations. *See* also SPIRITUALISM.

See Sir W. Crookes, *Researches in the Phenomena of Spiritualism,* new ed. (1926); H. H. C. Thurston, *The Physical Phenomena of Mysticism,* ed. by J. H. Crehan (1952). (R. H. T.)

LEVITES, or sons of Levi (son of Jacob by his first wife, Leah), a sacred caste in ancient Israel, the guardians of the Temple service at Jerusalem.

Place in Ritual.—In the developed hierarchical system the ministers of the sanctuary are divided into distinct grades. All are "Levites" by descent, and are thus correlated in the genealogical and other lists, but the true priesthood is confined to the sons of Aaron. The mass of the Levites are subordinate servants who are not entitled to approach the altar or to perform any strictly priestly function. All access to the Deity is restricted to the one priesthood and to the one sanctuary at Jerusalem; the worshiping subject is the nation of Israel as a unity, and the function of worship is discharged on its behalf by divinely chosen priests. The ordinary individual may not intrude under penalty of death; only those of Levitical origin may perform service, and they are essentially the servants and hereditary serfs of the Aaronite priests (Num. xviii).

But such a scheme finds no place in the monarchical period of Israel; it presupposes a hierocracy under which the priesthood increased its rights by claiming the privileges that in the past had been enjoyed by the kings. It is the outcome of a complicated development in Old Testament religion in the light of which it is to be followed. Three stages in this development may be distinguished.

1. An early period in which there was no tribal restriction on the priesthood or on offices connected with the sanctuary. Thus Micah consecrated one of his own sons as priest (Judg. xvii, 5), and Samuel seems to have been an Ephraimite by birth. The more menial offices connected with Solomon's Temple were performed by the royal bodyguard or by slaves especially dedicated ("Nethinim")—usually foreigners. At the same time there is evidence suggesting a distinct preference for Levites (*cf.* Judg. xvii, 13).

2. A period in which all Levites, and Levites only, were eligible for the priesthood. This is represented in the literature of the Old Testament by Deuteronomy and Ezekiel. Both use the phrase "the priests, the Levites," though Ezekiel makes a distinction between those who had ministered at the local sanctuaries (to him, as a Jerusalem priest, an illicit cult), and the sons of Zadok who were the proper attendants of the sanctuary at Jerusalem. The former are condemned to menial offices, while the higher duties are reserved for the latter (Ezek. xliii, 19; xliv, 10, 15). This is the position which would naturally follow on the centralization of sacrifice in Jerusalem. Though there is no direct evidence to prove that Ezekiel's attempt to limit the priesthood proper to the family of Zadok succeeded, it is quite possible that this condition persisted till the promulgation of the Priestly document (*see* PENTATEUCH) about the 5th century B.C.

3. The last stage, in which the priesthood was confined to the family of Aaron. This is usually traced back to the time of Ezra, and was certainly the rule for the whole of the Greek and Roman periods. The term "Levite" now includes (through some fictitious genealogy) the former menial attendants, and the whole body of non-Aaronic Levites is now placed on the same level.

Origin of the Levites.—Biblical tradition is practically unanimous in tracing the Levites to the third son of Jacob and Leah. But the earliest reference to the tribe as a tribe is found in Gen. xlix, 5–7, where, along with Simeon (*q.v.*), it is condemned as bloodthirsty and cruel. To the same traditional element probably belongs the story of the slaughter of the Shechemites by these two brothers (Gen. xxxiv, 25–30), and the language of Gen. xlix, 7 suggests that the tribe disappeared in the same way as Simeon. There seems no real reason to doubt the tradition which makes Moses and Aaron members of this tribe, and its special devotion to Yahweh, the God introduced by Moses to Israel, is illustrated by the story of the vengeance the Levites took on the calf-worshipers at Sinai (Ex. xxxii, 26 ff.). Since Moses seems to have derived his knowledge of the cult of Yahweh among the tribes of the north of the Sinai peninsula (Midianites, Kenites, etc.), it has been suggested that the Levites, as a tribe, belonged to a group that entered the country from the south, along with the Kenites and Danites, independently of the great invasion of the Israelites under Joshua. It accords with this theory that the first mention of a Levitical sanctuary in the north connects its establishment with the migration of the tribe of Dan. *See* also TWELVE TRIBES OF ISRAEL.

See G. B. Gray, *Sacrifice in the Old Testament,* pp. 241–255 (1925); A. van Hoonacker, *Le Sacerdoce lévitique dans la loi et dans l'histoire des Hébreux* (1899). (S. A. C.; T. H. R.)

LEVITICUS (in the Hebrew Bible, WAYIQRA), third book of the Old Testament and of the Pentateuch, is the book seldomest read and least admired, because of its dry style. It contains dull, repetitious listings of uninteresting details about a sacrificial system no longer observed by either Jews or Christians. It is practically never utilized in any modern liturgy. Nevertheless, at unexpected moments, it reveals brilliant flashes of religious insight. That law which is generally considered to be a Christian innovation and the most distinctive of Jesus' teachings, "Love your neighbor as yourself," appears in fact in Lev. xix, 18. The "scapegoat" and "jubilee" referred to in Leviticus are among the most familiar concepts of modern culture. The portions of Leviticus (xix–xxii) found in the Qumran caves are among the oldest fragments of that find and thus constitute the earliest surviving transcript of any portion of the Bible. Other discoveries at Mari, Nuzi and Ugarit have created an entirely new awareness of the live cultic background in which Leviticus assumes not only a natural but a relatively sensible and humane prominence; and they prove the antiquity and essential historicity of the Levitical rites.

Leviticus (supposing *liber,* "book") is a Latin form of the Greek *leueitikon* (*biblion*). The Greek word *leueites* seems to have had the meaning "priest"; the book deals in fact chiefly with functions of the Hebrew priests, who were of the tribe of Levi. The caste today called "Levites" is not mentioned in the book of Leviticus and is only vaguely distinguished from the "priests" in the rest of the Bible, as a sort of sacristans (Num. i, 50), whose functions therefore are also prominent in Leviticus. The Hebrew name of the book is its opening word, *wayiqra,* or "Third Book of Moses."

Literary History.—The only source claimed relevant to Leviticus is "P," the "Priestly document" (*see* PENTATEUCH). It is generally admitted that some of the prescriptions of Leviticus stem from about the time of Moses or even earlier, and some were insertions or rather organic developments of a later date. Experts differ widely as to what percentage of the total volume these accretions constitute and what date is to be assigned to various successive stages of development. But it seems inescapable that some changes at least, be it only of diction, were still being introduced until as late as the time of Ezra, about 400 B.C., so that no one should hesitate to subscribe to the position formulated by St. Jerome: "Whether you want to call Moses the originator or Ezra the redactor makes no difference." Leviticus thus represents the cultus in the form in which it existed during and after the exile, at a time when the royalty was dispersed and the priesthood had come to take over the guidance and unification of the chosen people.

Outline.—The book opens, "The Lord called Moses and spoke to him from the tent of meeting, saying, 'Speak to the people of Israel and say to them. . .' " This opening seems to fit in smoothly with what precedes and to carry forward the largely narrative character of the Pentateuch. But the seven chapters which follow contain detailed regulations for private and largely optional sacrifices: burnt offering (ch. i), meat offering (ch. ii), peace offering (ch. iii), inadvertence offering (ch. iv), with supplements (ch. v). Ch. vi and vii repeat the same regulations in almost identical style but in a quite different order and more briefly.

Ch. viii returns abruptly to the setting of the last verse of

Exodus; that is, in Lev. viii, 1 is recorded the fulfillment of the command of Ex. xl, 12 regarding the consecration of Aaron's sons to the priesthood. The transition from Lev. vii to viii is somewhat smoothed by the fact that the consecration in Lev. viii–ix includes several sacrifices similar to those detailed in Lev. i–vii; but precisely this detail is missing in Ex. xl, 12. The only genuinely narrative passage of the book of Leviticus is ch. x, describing the replacement of Nadab and Abihu after their violent death in punishment for infraction of the rubrics.

With xi, 1 a short narrative formula introduces a long list of unclean animals and the manner in which they render unclean (xi, 31–47), followed by prescriptions for purification after childbirth (ch. xii) and after various eruptions on body, garments or buildings (ch. xiii–xv). The narrative tone of Lev. x is echoed in Lev. xvi, 1, introducing the striking Day of Atonement ritual of the "escape-goat" for Azazel.

There follows in ch. xvii–xxvi a miscellany of laws in which the only discernible principle of unity is the repeated refrain, "You shall be holy; for I, the Lord your God, am holy," interspersed with hortatory passages in the style of Deuteronomy: kosher slaughtering to guarantee abstinence from blood (ch. xvii); kinship and other impediments to lawful coitus (ch. xviii). Ch. xix gives cultic and social-humanitarian regulations culminating in verses 17–18: "You shall not hate your brother in your heart, but you shall reason with your neighbor, lest you bear sin because of him. You shall not take vengeance or bear any grudge against the sons of your own people, but you shall love your neighbor as yourself: I am the Lord." With these must be considered verses 33–34, "When a stranger sojourns with you in your land, you shall not do him wrong. The stranger who sojcurns with you shall be to you as the native among you, and you shall love him as yourself; for you were strangers in the land of Egypt: I am the Lord your God." The intervening and following verses of ch. xix contain regulations reminiscent of the Covenant code (Ex. xxi–xxiii), Hammurabi and other ancient Semitic tribal usages. These are continued in ch. xx, with special penalties against infant sacrifice to Moloch and against illicit sexual intercourse. Ch. xxi details special requirements for the priests, especially physical integrity and avoidance of cadavers. Ch. xxii adds further restrictions and purificatory rites. A liturgical calendar is given in ch. xxiii: Sabbath, Passover (in the "first" month), Pentecost, opening of the "seventh" month (subsequently New Year's day), Day of Atonement and Feast of Tabernacles (Booths). Ch. xxiv includes some tabernacle-lamp and showbread rubrics and an odd narrative about the stoning of a blasphemer. Ch. xxv is the famous sociological treatise: the *yobel* or (50th) Jubilee year, as a restitution of landed property to debtor families, with note of its origins in the seventh-year "release" (rather than fallow) of land and debts and its development into the land-redemption rights to safeguard further the family estates, especially of Levites (*see* JUBILEE, YEAR OF). Ch. xxvi is an exhortation to observe the preceding laws, while ch. xxvii is a rather money-conscious regulation for the release of various kinds of vows.

Structural Origin.—In the contents of the book as summarized above, there are recognizable four obvious natural sections: ch. i–vii, viii–x, xi–xvi and xvii–xxvii.

Ch. viii–x resume and carry forward the narrative-style rubrics broken off at the end of Exodus. They may thus best be considered as a unit with Ex. xl and Num. i ff., into which the remainder was somewhat abruptly inserted.

Ch. xvii–xxvi were in 1877 recognized by A. Klostermann to possess a special unity of tone—linked chiefly with the recurrent "You shall be holy; for I, the Lord your God am holy"—and named therefore the Holiness code; with these chapters may be considered also ch. xxvii as an amplification of xxvi. The Holiness code is thought to be the earliest independently formulated block of our actual Leviticus.

Ch. i–vii are a Sacrifice code, recognizably homogeneous in style, even though within that style ch. vi–vii represent a second formulation, perhaps for the use of priests, of the material already formulated for the laity in ch. i–v.

Ch. xi–xv constitute the Cleanliness code. These chapters have no special uniformity of style. Hence ch. xvi, too, the Atonement ritual, may be considered with them.

Themes and Interpretation.—*Levitical Holiness.*—Leviticus (especially the Holiness code, ch. xvii–xxvi) establishes a close relation between holiness and minute rules guarding against physical uncleanness. It is obvious that there is some natural nexus between hygiene and human strivings toward godliness. These and many other aspects of human culture pertain to that "refinement" toward which man's intelligence lifts him progressively away from his bestial inclinations. Ernest Renan contended that our "holy" means merely pure, and pure means merely clean. But, paradoxically, the equation of "holy" with "unclean" would perhaps better reflect the primitive anthropology. Like blood and carrion, "the holy" is set apart as a mysterious force, active in human life, from which it is best to stay as far away as possible. The more recent Semitic notion that insanity enshrines a special divine influence, and even the Greek *en-thou-siasmos,* are not far from this world of thought. Whatever be the earliest origins of the Hebrew *qodesh* (?"separateness," awesomeness), which we call "holiness," it is clear that as surviving in Leviticus it has taken on a truly religious and moral character. Though the major function of the book is to regulate liturgical details, this in no way implies indifference to the interior religion praised by Hos. vi, 6 ("the knowledge of God, rather than burnt offerings") and Jer. vii, 22–23 as vastly superior to external rites. A book of rubrics has no obligation to inculcate the Ten Commandments.

Yet Leviticus does in fact include many profoundly important moral exhortations, especially in ch. xix. The law that "you shall love your neighbor as yourself" (Lev. xix, 18) has the same universality as implied by Jesus in Luke x, 27, and forms thereby the basis of the whole moral law (love of all men as an expression of the love of God). The very fact that the sacrificial system requires such meticulous regimentation as indicated in Lev. i–vii is from a certain point of view a proof of the transcendent importance of God's claims in human life. H. Cazelles (see *Bibliography*) sees in the institution of priesthood a link between sacrifice, as the spontaneous expression of a people's reaction to its God, and oracle, as a declaration of God's will for his people. It may well be that many of the moral precepts preserved in Leviticus were in origin oracular responses communicated in the manner approved by I Sam. xxviii, 6 and II Sam. xvi, 23.

Sacrifice.—Lev. i–vii poses the problem of the meaning of sacrifice in biblical religion. Various theories have had their vogue. Each focuses more sharply on one or other of the kinds of sacrifice admitted in these seven chapters: holocaust, communion peace, praise, reparation for oversight or sin, and festival (incense or banquet). But each of these, despite persistence of older usages that have been reoriented by revelation, is by Cazelles rightly evaluated as contributing essentially to our understanding of that concept of sacrifice which has come to prevail in the religious world of today. A vestigial link with the survival of the spirits of the dead seems admissible, and indeed this vague "intimation of immortality" is not a bad thing. Some biblical expressions ("sweet savour") provoke comparison with Semitic neighbours among whom sacrifice was regarded as a real nutriment by which the divinity nourished himself, at least by inhaling or symbolically; if such concepts influenced biblical religion at all, it was only insofar as a certain amount of anthropomorphic nomenclature persisted. Influence of agrarian feasts of Canaanite neighbours is not excluded; the dying and resurrected vegetation-god Tammuz of ancient mythology reflects after all an awareness of the Creation cycle, which also may be seen in the Bible in the form of more soberly founded rites of harvest-thanksgiving or fertility-petition.

From another world of thought, south Arabian usages suggest that devouring in common, especially the blood of a single living creature, produced a (comm-)union among all the participants; this stress on blood has been controverted and seems contrary to the Semitic distaste for blood nutriment (Lev. ii, 17), but some modern liturgists are not averse to finding such a notion in the New Testament Eucharist. But Leviticus itself, and especially the scapegoat ritual of ch. xvi, has inspired the "substi-

tution" theory of sacrifice, according to which the animal is slaughtered as a sort of criminal condemned vicariously for the sins of the sacrificers. This view has been strongly opposed as fostering an unhealthy interpretation of the sacrifice of Calvary; it also may be suggested that sacrifice is fundamentally a gift, an instinctive reaction of grateful love. In any case it would be unrealistic to expect to find in Leviticus either the lofty theology of a prophet or apostle or the outmoded primitivism of an age in which were coined terms to which a nobler meaning came progressively to be attached. The Sacrifice code of ch. i–vii is simply what it is, a book of rubrics; and that is a good thing, requiring no apology for not being something else.

Influence.—The sacerdotal spirit that dominated in the ultimate codification of the Pentateuch continued to dominate in postexilic Judaism. Its "purest" or most intense expression is isolated in the book of Leviticus, which may thus rightly be called the keynote of postexilic Judaic literature.

Just as Deuteronomy inspired Kings, so Leviticus has profoundly marked the redaction of Chronicles. Several Psalms (notably lxxviii and lxxix) betray its influence. . . . Maccabees attests what the Temple sacrifices and feasts meant for [postexilic diaspora] Jews. Even after the conflagration of Titus and the suppression of the cultus . . . the Mishna fills out the details of Leviticus, and it is taken by the rabbis as point of departure for the religious formation of youth. Thus Leviticus became the citadel of Judaism. . . . [Though] the chief Christian feasts of Easter and Pentecost, and the rites of consecration and lustration [are borrowed directly from Leviticus], hardly any of the texts themselves have been retained (three only in the Missal, Passion Wednesday, Pentecost Saturday, September Saturday and one in the Breviary, Feb. 2). The individualistic rationalizing spirit which has prevailed in the West since the Renaissance has been scarcely favorable to Leviticus; but it is having its day in the current interest in liturgy and history of religions. (Condensed from H. Cazelles, *Leviticus,* Editions du Cerf, Paris, 1951.)

See also BIBLE.

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(R. No.)

LEVITTOWN, on Long Island, N.Y., U.S., is a mass-produced residential development of more than 17,000 moderately priced houses built by the firm of Levitt and Sons, Inc., during the period between 1947 and 1951. One of the nation's largest post-World War II suburban communities, its name became a national symbol for suburbia in general. Its population in 1960 was 65,276. Situated in the southeast quadrant of Nassau county, in a section of the Hempstead plain, the community is approximately 32 mi. E. of the centre of New York city. The Levittown formula made use of extensive planning before construction. Streets and building sites were laid out systematically, and the plans included shopping centres, churches and other community facilities. School sites were provided by the builder, as were park-playgrounds, swimming pools and a community centre with meeting rooms and a combination auditorium-dance hall. (WI. M. D.)

LEVITTOWN, a large housing development of Bucks county in eastern Pennsylvania, U.S., situated near the big bend of the Delaware river, midway between Philadelphia and Trenton, N.J. It was built between 1951 and 1955 by Levitt and Sons, Inc., who repeated there the construction formula that resulted in Levittown, Long Island, N.Y., in the late 1940s. The first family moved into Levittown in June 1952; the population is about 60,000.
(D. L. D.)

LEVKOSIA: *see* NICOSIA.

LEVULOSE: *see* CARBOHYDRATES; SUGAR.

LÉVY-BRUHL, LUCIEN (1857–1939), French philosopher who specialized in the psychology of primitive peoples, was born in Paris on April 10, 1857. He was professor of philosophy at the Sorbonne (1899–1927). He wrote a *History of Modern Philosophy in France* (1899), as well as monographs on Comte and Jacobi. His *La Morale et la science des moeurs* (Eng. trans., *Ethics and Moral Science,* 1905) shows the influence of the positivist philosophy of Comte. From the sociologist Émile Durkheim he derived the concept of *représentation collectives* ("group ideas"), which he applied to the analysis of the mentality of people in primitive societies. He sought to explain social phenomena in terms of the social tradition that molds individual responses rather than through individual psychology. Lévy-Bruhl held that there was an essential difference between primitive and civilized thought. His notion of the "prelogical" character of primitive mentality, formulated in *Les Fonctions mentales dans les sociétés inférieures* (1910; Eng. trans., *How Natives Think,* 1926), became the target of unfavourable criticism, and he later conceded that his use of the term "prelogical" tended to confuse psychological and cultural data. His ideas had value, nevertheless, as a contribution toward an understanding of the irrational factors in social thought and primitive religion and mythology. He died in Paris on March 13, 1939.

Among his other works were *La Mentalité primitive* (Eng. trans., 1923); *Le Surnaturel et la nature dans la mentalité primitive* (Eng. trans., *Primitives and the Supernatural,* 1935); and his notebooks, entitled *Les Carnets de Lévy-Bruhl* (1949).

See G. Davy, "Lucien Lévy-Bruhl (1857–1939)," *Revue Universitaire,* vol. 49 (1940). (D. BY.)

LEWALD, FANNY (1811–1889), German novelist and one of the earliest German feminists, was born at Königsberg on March 24, 1811. Her family was Jewish, but she became a Protestant at the age of 17, and traveled widely over the continent, finally settling in Berlin. In 1854 she married the writer A. W. T. Stahr (1805–76), and herself earned wide repute with cleverly constructed novels which were vehicles of her feminist and liberal ideas. She was frequently described as the George Sand of Germany, though her works described cultivated society in the towns rather than the life of the country. *Diogena* (1847) is a satirical parody of the sentimentalism of Ida Hahn-Hahn (*q.v.*), but was prompted also by personal rivalry. Her *Römisches Tagebuch* (1845–46) describes some of her early travels, and her early novels *Klementine* (1842) and *Jenny* (1843) are based on her own experiences. She died at Dresden on Aug. 5, 1889.

See her autobiography, *Meine Lebensgeschichte,* 6 vol. (1861–62).
(W. D. WI.)

LEWES, GEORGE HENRY (1817–1878), English philosophical writer and literary critic, chiefly remembered for his theory of metaphysical development of positivism and for his liaison with the novelist George Eliot (*q.v.*), whose real name was Mary Ann Evans. He was born in London on April 18, 1817, of a theatrical family: his grandfather was the actor Charles Lee Lewes, and his father was manager of the Theatre Royal at Liverpool. After a desultory education he spent two years in Germany, returned to London in 1840 and for the next ten years was a frequent contributor to various reviews. He also tried his hand as actor and playwright and wrote two unsuccessful novels. During this period Lewes, who had married in 1841, lived with his wife in a communal marriage experiment with Thornton Leigh Hunt, Mrs. Hunt and two other couples. Initially a success, the venture ended in failure when Mrs. Lewes had two children by Hunt. Lewes was thus already estranged from his wife when he met Miss Evans in 1851 and they were finally separated three years later, but the circumstances precluded a divorce (Lewes having condoned his wife's adultery). From 1854 until his death in London on Nov. 30, 1878, he and Miss Evans lived happily together as though husband and wife.

All his important writings date from this association. They include *Comte's Philosophy of the Sciences* (1853); the well-known *Life and Works of Goethe,* 2 vol. (1855); *Seaside Studies* (1858); *Physiology of Common Life,* 2 vol. (1859–60); *Studies in Animal Life* (1862); *Aristotle* (1864); and his greatest work, *The Problems of Life and Mind,* 5 vol. (1874–79).

In general Lewes' thought was positivistic, and throughout his

life he was especially influenced by the philosophy of Auguste Comte. He diverged from strict positivism in that he believed the problems of metaphysics were legitimate and reserved his criticism for the means used to settle metaphysical issues. In *The Problems* he differed from Comte in claiming a place for introspection in psychological research, but held that this subjective method must be balanced by an objective one, consisting partly in a reference to nervous conditions and partly in the employment of sociological and historical data. Highly regarded as a philosopher by many contemporaries, Lewes contributed much to the development of a school of empirical metaphysics, and his idea of dealing with mental phenomena in relation to social and historical conditions was a significant contribution to psychological thought.

See A. T. Kitchel, *George Lewes and George Eliot* (1933); J. Kaminsky, "The Empirical Metaphysics of George Henry Lewes," *Journal of the History of Ideas,* vol. xiii, no. 3 (June 1952).

LEWES, a municipal borough and the county town of East Sussex, Eng., lies 8 mi. N.N.E. of Brighton on the South Downs. Pop. (1961) 13,637. The town is built on a steep hill above the river Ouse. Its ruined castle which was begun in the 11th century is now owned by the Sussex Archaeological society, which has museums at Barbican house (originally a 16th-century building) and Anne of Cleves house (1599). The county hall was built in 1812. Many fine 18th-century buildings are to be found in the town centre, but a number which were originally residences are now used as offices by various government departments. Shelleys, originally a 16th-century inn, was added to as the home of the Shelley family in the 18th century and is now a hotel. Six of the ten original parish churches remain. The town is an educational centre. Southover grange (1572) and walled gardens are owned by the corporation and are available for public use; there are other extensive parks and pleasure gardens in the borough.

The several earthworks and the stone and bronze implements found in the area indicate the town's prehistoric origins. By the 11th century Lewes was a market centre and a port of importance. A Cluniac priory, founded in the 11th century, was demolished at the Dissolution but a few fragments remain. For a time after the battle of Lewes in 1264 (*see* below), the town was walled. During Mary I's reign, 17 Protestants were burned at the stake. Lewes is now renowned for its firework and bonfire festivities on Guy Fawkes' day, Nov. 5. For several centuries the town was governed by a body known as "The Society of the Twelve" selected from "the wealthier and discreeter sort of the townsmen," but by the early part of the 18th century this body had been replaced by the jury of the court leet. The charter of incorporation of the borough was granted in 1881.

Local industries include the manufacture of agricultural implements, cement, iron goods, beer, cricket bats, hypodermic equipment, perfume and soap. As the town is an administrative centre many persons are engaged in the public services.

There is a railway junction with services to London, Brighton, Eastbourne and Newhaven; several major roads radiate from the town. Three miles east is Glyndebourne with its modern opera house. (R. A. R. G.)

Battle of Lewes, fought on May 14, 1264, during the Barons' War (*q.v.*). Henry III and his heir the Lord Edward having defeated the larger Montfortian rebel army at Northampton (April 5), overran the midlands, marched through Kent, forcing Simon de Montfort and Gilbert de Clare, earl of Gloucester, to abandon their siege of Rochester, captured Tonbridge castle, overawed the Cinque Ports and halted at Lewes to rest (May 11). Montfort, compelled to attempt a settlement or fight, advanced from London to Fletching, 8 mi. north of Lewes, supported by thousands of untrained Londoners, and offered terms (May 13) which the royalists rejected contemptuously. Hastily drilling the Londoners by firelight, Montfort left Fletching before dawn, climbed the Downs northwest of Lewes, surprised the only royalist picket on the crest and, while the royalists still slept, arrayed his army on the ridge: the Londoners on the left, Gloucester in the centre, his own sons on the right, himself in reserve (May 14). The royalists, waking to find Montfort deployed, attacked without co-ordination. On the right, Lord Edward and the Marchers, advancing impetuously uphill over firm ground, swept the Londoners off the ridge, pursued them murderously for several miles down to the forest, delayed to plunder Montfort's baggage train and returned too late with tired straggling forces. Meanwhile Montfort had thrown all his cavalry at the royalist centre and left, who were disorganized by uneven and wet ground; he swept them through the town across the Ouse, where many perished when the bridge collapsed. Many royalists surrendered, including Richard of Cornwall, Henry's brother: Henry fled to the Cluniac priory; his Poitevin brothers, with John de Warenne, earl of Surrey, and Hugh Bigod, galloped to Pevensey and fled to France. The Marchers withdrew westward in fighting order: Edward took sanctuary with the Franciscans. Negotiations that night led to the Mise of Lewes, whereby Henry and Edward surrendered on Montfort's terms, which restored the Provisions of Oxford in modified form.

See W. H. Blaauw, *The Baron's War . . .* (1844); F. M. Powicke, *King Henry III and the Lord Edward,* vol. ii (1947). (R. F. T.)

LEWIN, KURT (1890–1947), German-born social psychologist of the Gestalt school who transformed psychological thinking about man in society, was born at Mogilno, Ger. (now Poland), on Sept. 9, 1890. In 1922 he joined the staff of the University of Berlin and contributed brilliantly to *Psychologische Forschung.* In 1932 he went to the United States as a visiting professor and, being Jewish, found it impossible to return to Germany. He served on the faculty of the University of Iowa, Iowa City (1935–45), and was director of the research centre for group dynamics (1945–47) at the Massachusetts Institute of Technology (Cambridge).

He died on Feb. 12, 1947, at Newtonville, Mass. Lewin excelled in the imaginative planning of experimental situations by which theoretical intuitions about social unrest could be tested. His work, and that of his students, opened one important approach to the study of social groups.

His principal works include: *A Dynamic Theory of Personality* (1935); *Principles of Topological Psychology* (1936); Dorwin Cartwright (ed.), *Field Theory in Social Science: Selected Theoretical Papers by Kurt Lewin* (1951).

See also *Human Relations,* vol. i, pp. 135–139 (1948). (J. My.)

LEWIS, SIR GEORGE CORNEWALL, Bart. (1806–1863), English statesman, classical scholar and man of letters, was born in London on April 21, 1806. He was educated at Eton and at Christ Church, Oxford, entered the Middle Temple and was called to the bar in 1831. He was forced by ill-health to abandon the law, and after acting as joint commissioner on an enquiry into the affairs of Malta and succeeding his father as a poor law commissioner, Lewis was returned as Liberal member for Hertfordshire.

During his parliamentary career Lewis held office as undersecretary to the home office and financial secretary to the treasury in Lord John Russell's ministry, and as chancellor of the exchequer (1855–58), home secretary (1859–61) and secretary for war (1861–63)—unwillingly succeeding Sidney Herbert—under Lord Palmerston. He was a most efficient administrator, employing the same precise, critical qualities which characterized his scholarship.

Lewis was a distinguished scholar and in 1835 published an *Essay on the Origin and Formation of the Romance Languages* (revised 1862), which criticized the theory of François Raynouard (*q.v.*) of a uniform romance language, represented by the poetry of the troubadours. During his brief absence from parliament from 1852 to 1855, when he succeeded his father in the baronetcy, Lewis was editor of the *Edinburgh Review,* to which he contributed a number of essays, and in 1855 he published an *Inquiry Into the Credibility of the Early Roman History,* in which he attacked the theories and methods of investigation of Barthold Niebuhr (*q.v.*). Lewis also wrote a *Treatise on the Methods of Observation and Reasoning in Politics* (1852), and his later works included *Essay on Foreign Jurisdiction and the Extradition of Criminals* (1859) and *Dialogue on the Best Form of Government* (1863). He died in office at Harpton Court, Radnor, on April 13, 1863.

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LEWIS, GILBERT NEWTON (1875–1946). U.S. chemist whose realization of the significance of the electron pair in molecular structure laid the foundation for a revised theory of valence, was born at Weymouth, Mass., on Oct. 23, 1875. He was educated at the University of Nebraska, Lincoln, and Harvard (B.A., 1896; M.A., 1898; Ph.D., 1899) and subsequently studied at Leipzig and Göttingen. In 1905 he joined the research laboratory of physical chemistry at the Massachusetts Institute of Technology, Cambridge, becoming professor of chemistry in 1911. In 1912 he became professor of physical chemistry and dean of the college of chemistry of the University of California, Berkeley. With Merle Randall he wrote *Thermodynamics and the Free Energy of Chemical Substances* (1923). Lewis also published by himself *Valence and the Structure of Atoms and Molecules* (1923).

Lewis was probably the first to grasp the significance of the electron pair in molecular structure. He extended the concept of acids and bases and was the first to isolate heavy hydrogen. In his later years, a series of investigations on the excited electron states of organic molecules contributed to the understanding of the colour of organic substances and the complex phenomena of fluorescence and phosphorescence. He died on March 23, 1946.

(W. M. La.; X.)

LEWIS, JOHN LLEWELLYN (1880–), U.S. labour leader, president of the United Mine Workers of America union from 1920 to 1960, when he retired, was born near Lucas, Iowa, Feb. 12, 1880, of parents who came from Welsh mining towns. He left public school in the seventh grade and entered the mines. In 1905 he became legal representative for the U.M.W.A. Lewis achieved national prominence in 1935 when he led a highly successful committee of the American Federation of Labor which organized mass production workers into industrial unions. In 1936 these unions left the A.F.L. and became the nucleus of the Congress of Industrial Organizations with Lewis as its first president. Lewis led militant, often violent, but successful C.I.O. drives to organize the giants of U.S. industry in steel, automobiles, tires and rubber and electrical products. In 1940 he resigned as president of the C.I.O. and in 1942 he withdrew the U.M.W.A. from the C.I.O. Members of his union were the first to attain pay for traveling time and a welfare fund. He was a lifelong Republican except for his support of F. D. Roosevelt's first two terms.

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LEWIS

His conduct during World War II was believed to be in part responsible for alienating public sympathy from labour generally and for the passage of restrictive labour legislation, the Smith-Connally act (1943) and the Taft-Hartley act (1947). Despite widespread criticism, Lewis retained the miners' support. After his retirement as president of the U.M.W.A., he served as the chairman of the board of trustees of the union's welfare and retirement fund. *See* also Labour (Trade) Union.

See Saul Alinsky, *John L. Lewis* (1949). (R. M. R.)

LEWIS, MATTHEW GREGORY (1775–1818), English romance writer and dramatist, often referred to as "Monk" Lewis after his best-known work, was born in London on July 9, 1775. Educated at Westminster school and Christ Church, Oxford, Lewis served as attaché to the British embassy at The Hague and was a member of parliament from 1796 to 1802. In 1812 he inherited a large fortune, and on May 14, 1818, he died of the yellow fever, caught while visiting his estates in Jamaica.

Lewis was only 19 when he wrote *The Monk* (1796), a Gothic romance influenced by Ann Radcliffe (*q.v.*) and by contemporary German literature. Lewis increased and intensified the customary horrors, and the book's violence and eroticism resulted in a sensational success which was attacked as profane and indecent. His subsequent work, which included the popular drama *The Castle Spectre* (1798); although in the same vein, was less spectacular, and his only lasting, very different, triumph was the *Journal of a West Indian Proprietor* (published 1834; edited by M. Wilson 1929). Lewis' work has no great literary merit, but is interesting as an outstanding example of the popular and influential Gothic vogue.

See *The Monk,* ed. by L. F. Peck, introduction by J. Berryman (1952).

LEWIS, MERIWETHER (1774–1809), U.S. explorer who was one of the leaders of the first overland expedition to the Pacific northwest (1804–06), was born near Charlottesville, Va., on Aug. 18, 1774. As a boy he spent much time in the woods and grew up loving the wilderness. At the age of 20 he served as a militiaman in the suppression of the Whisky insurrection in western Pennsylvania. He liked the military life and transferred into the regular army. He was a captain in 1801 when Pres. Thomas Jefferson invited him to become his private secretary, and for the next two years he lived in the executive mansion in Washington, D.C. During this period Jefferson was preparing Lewis for leadership of a transcontinental exploring expedition. The president apparently intended that Lewis should be sole commander but acceded to Lewis' wish that he share the command with another Virginian, William Clark. The two leaders organized the expedition after congress appropriated $2,500 for it in 1803. Jefferson's confidence was well placed, and the Lewis and Clark expedition (*q.v.*) was a great success.

BY CDURTESY OF INDEPENDENCE NATIDNAL HISTORICAL PARK, PHILADELPHIA

LEWIS, PORTRAIT BY CHARLES WILLSON PEALE

Named governor of the Louisiana territory by Jefferson, Lewis assumed his duties at St. Louis in March 1808. He governed well in most difficult circumstances, but factional strife complicated his task. His personal financial problems were compounded by the refusal of agencies in Washington to honour some of his official drafts. He set out for Washington to clear himself but died en route near Nashville, Tenn., on Oct. 11, 1809. Whether his death resulted from murder or suicide is still a mystery.

See John Bakeless, *Lewis and Clark, Partners in Discovery* (1947).

(T. A. Ln.)

LEWIS, PERCY WYNDHAM (1884–1957), English artist, and imaginative, critical and polemical writer who, despite some of the failings of a natural egotist and showman, and a certain political and artistic irresponsibility, at his best can be called "great." He was born of English parents on board ship in the Bay of Fundy, off Maine, on Nov. 18, 1884, and was educated at Rugby school and at the Slade School of Art, where he revealed an outstanding gift for naturalistic drawing, which he retained all his life. He was, however, essentially an experimentalist. The Vorticist movement, which developed from Imagism (*q.v.*) and which he helped to make known through his magazine *Blast* (1914), had in its violent and theatrical handling of harsh shapes something in common with Futurism. In his portraits of such sitters as Ezra Pound or Edith Sitwell, he seems to be searching for a new pictorial language for the human form, juxtapositions of hard, almost steely surfaces. In his prose fiction, this eye for external corrugations and the creaking, mechanical aspects of human movement lends itself admirably, as in *The Apes of God* (1930), to the purposes of satire; and much of Lewis' criticism is, in effect, a defense of satire as the most classical and healthy of literary forms in an unclassical and unheroic age. But in his best novels, *Tarr* (1918), *The Revenge for Love* (1937) and *Self-Condemned* (1954), the satirical approach is crumbled away by a

reluctant, yet deep and penetrating, human sympathy. Lewis' hatred of subjectivity and the cult of flux in modern art and philosophy was most brilliantly expressed in *Time and Western Man* (1927). He died in London on March 7, 1957.

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LEWIS, SINCLAIR (1885–1951), U.S. novelist and social critic, winner of the Nobel prize for literature in 1930, was born in Sauk Centre, Minn., on Feb. 7, 1885. He graduated from Yale university in 1908 and was for a time a reporter, afterward serving in an editorial capacity for several publishing houses and magazines. His first adult novel, *Our Mr. Wrenn* (1914) (he had previously published a boys' book entitled *Hike and the Aeroplane* under the pseudonym of Tom Graham), attracted favourable critical attention but few readers. At the same time he was writing with ever increasing success for such popular magazines as the *Saturday Evening Post* and *Cosmopolitan.* His stories were read by millions and brought him popular fame. This work constituted an apprenticeship in his craft, but he never lost sight of his ambition to become a serious novelist. He undertook the writing of *Main Street* as a major effort, assuming that it would not bring him the ready rewards of magazine publication. Yet its publication in 1920 made his literary reputation. The book satirized both the narrowness of life in the Main streets of the U.S. and the hollowness of a superficial intellectualism that despised Main street without having anything better to offer. *Main Street* was born of the new mood of national self-consciousness which followed World War I and became a text of numerous attacks upon provincialism.

THE GRANGER COLLECTION

LEWIS

In 1922 Lewis published *Babbitt,* a study of the complacent American whose individuality had been sucked out of him by Rotary clubs, business ideals and general conformity. The name Babbitt passed into general usage, and it is possible that this novel had more effect upon public consciousness than any other written in English in that decade. *Babbitt* was not only Lewis' most important novel but, in the opinion of many critics, his best.

He followed this success with *Arrowsmith* (1925), a satiric study of the medical profession, with emphasis upon the frustration of fine scientific ideals. One group of critics staunchly advanced this as Lewis' best and most artistic work. His next book, *Elmer Gantry* (1927), was a pamphleteering attack upon the ignorant, gross and predatory leaders who had crept into the Protestant Church. *Dodsworth* (1929) concerned the experiences of a retired U.S. automobile manufacturer and his wife on a European tour and offered Lewis a chance to present effectively the contrasting values and manners of Europe and the U.S. and the very different temperaments of the man and his wife.

It Can't Happen Here (1935) was an important link in the Lewis bibliography. It dramatized the dangers of the Nazi technique as it might be applied in the United States. The two most important novels of his later period were *Cass Timberlane* (1945) and *Kingsblood Royal* (1947). The former dealt with the marriage of a man past middle age and a girl in her 20s. While it had much of the old Lewis bite, it showed a distinct mellowing in attitude. *Kingsblood Royal* was a novel of race relations—the story of a prosperous young Minnesota banker who discovered that he had Negro ancestry and who espoused the cause of the Negroes in his city. His 22nd and last novel, *World So Wide* (1951), concerned Americans in Italy. It was completed in Florence in 1950. After a brief trip back to the United States he returned to Italy, where he died in a nursing home near Rome on Jan. 10, 1951. His ashes were buried in Sauk Centre.

Lewis' importance as a novelist of the early 20th century defies his critics. He undoubtedly was the leading American satirist of his time, despite the fact that some critics held that he was better at caricature than character. Combining his talent for irony with his crusading spirit, his greatest novels were, on the surface, attacks on the United States, but were in fact an expression of his passionate Americanism. While critics belittled his literary style, they generally admitted its vigour and effectiveness; they agreed his characters epitomized the U.S. middle-class mind and established his position in literature.

See Mark Schorer, *Sinclair Lewis: an American Life* (1961). (H. S. C.; H. E. M.)

LEWIS AND CLARK EXPEDITION, one of the most famous expeditions of exploration in U.S. history and the first overland expedition to the Pacific coast and back, took place in 1804–06 under the leadership of Meriwether Lewis and William Clark (*qq.v.*). They followed the Missouri river from its juncture with the Mississippi to its source and, crossing the continental divide, explored the Columbia river from its source to the Pacific ocean.

Preparations for the expedition were initiated by Pres. Thomas Jefferson before the Louisiana purchase of 1803 and his appointment of Captain Lewis as his private secretary in 1801 was probably with a view to preparing him for leadership of the expedition. He had known Lewis as a boy in Virginia, trusted him completely and realized that his several years of army life in the Northwest Territory was good training for such an exploration. Lewis rounded out his preparations by going to Philadelphia to learn botany, zoology and celestial navigation. Jefferson seems to have had in mind a single leader but he accepted Lewis' suggestion that Lieutenant Clark be invited to share command. Like Lewis and Jefferson, Clark came from an old Virginia family. He was the younger brother of George Rogers Clark who won fame in the American Revolution.

The two leaders, well-chosen and possessed of rare intelligence, selected their personnel from "good hunters, stout, healthy, unmarried young men, accustomed to the woods." Among these were George Drouillard, an expert on the universal Indian sign language, and other experts on carpentry, gun repair and boat handling. Many of the men were from the army. All were enlisted as privates except for nine watermen and Clark's Negro servant, York. The two leaders chose their sergeants from among the enlisted men. Clark, who was 33 in 1803, was the oldest member of the expedition; Lewis was 29.

Jefferson supplied detailed instructions. In exploring the projected route, Lewis and Clark were to take note of the character and customs of the Indian tribes, commercial opportunities, plant and animal life, geography, "mineral productions of every kind," "climate as characterized by the thermometer, by the proportion of rainy, cloudy & clear days, by lightening, hail, snow, ice, by the access & recess of frost. . . . ," etc.

After the men were assembled, the party went into winter quarters near St. Louis late in 1803. Lewis and Clark devoted the first winter to training and instilling military discipline into their small band of approximately 40 men, as well as gathering supplies and equipment. On May 14, 1804, according to the journals of the expedition, they "Set out at 4 oClock P.M., in the presence of many of the neighbouring inhabitents, and proceeded on under a jentle brease up the Missourie." They traveled in three boats: two pirogues and a 55-ft. keelboat. The boats were heavily loaded with such things as 21 bales of presents for the Indians, 3,705 lb. of pork in 50 kegs, 3,400 lb. of flour, 2,000 lb. of "parchmeal," 750 lb. of salt, 600 lb. of "Grees," 560 lb. of biscuit, "Tools of Every Description," powder and balls, a swivel gun, an air gun and Lewis' Newfoundland dog, Scannon. Although they set out with a well-stocked larder, their staple food was wild game, supplemented occasionally by Indian dogs and fish. By Nov. 2 they had made the difficult ascent of the Missouri to the Mandan Sioux villages in what later became North Dakota. There, among the friendly Indians, they built Fort Mandan near the present site of Bismarck and passed the second winter in comfort.

Early in April 1805, after sending 16 men back to St. Louis with reports and specimens for President Jefferson, they continued

the ascent of the Missouri in smaller boats as far as the three forks. From that point they followed the stream they named the Jefferson to its source in the southwestern part of what is now the state of Montana. Leaving their boats they procured horses and a guide named Toby from the Shoshone Indians, and pushed westward over the continental divide to the headwaters of the Clearwater river. There they made canoes which carried them down the Clearwater into the Snake and Columbia rivers. They reached the mouth of the Columbia on Nov. 15, 1805.

After spending their third winter at Fort Clatsop which they had built on the south side of the Columbia near the site of present-day Astoria, Ore., they began their return journey on March 23, 1806. Just east of the continental divide Lewis, with one party, turned north and explored the Marias river while Clark and another group turned south to strike the Yellowstone river. They reunited below the junction of the Yellowstone and the Missouri and continued downstream, reaching St. Louis on Sept. 23, 1806.

Lewis and Clark, conscientiously following Jefferson's instructions, brought back a remarkable set of diaries which stand as some of the most interesting narratives of North American exploration in existence. Several other members of the expedition kept shorter diaries and Clark made excellent maps. Together, the records provided a rich mine of information, much of it completely new at the time. Lewis and Clark thus did much to open the west and to dispel ignorance about the region. In particular they destroyed the myth of an easy water crossing of the continent—the long-sought Northwest passage.

The journals of the expedition include accounts of many stirring adventures. Considering Indian hostilities, accidents, sickness, encounters with grizzly bears and rattlesnakes, exposure and near starvation, it is remarkable that only one man died en route. This was Sgt. Charles Floyd who succumbed, perhaps with a ruptured appendix, at the present site of Sioux City, Ia., on the outward journey. Lewis had a narrow escape in Montana on the return journey when a hunting companion mistook him for an elk and shot him in the upper thigh. Without the benefit of special training, Lewis and Clark did the doctoring for members of the expedition and for many Indians along the way. They bled, purged and sweated their patients in accordance with standard medical practice of the period. Their medical supplies included 1,500 doses of purgative, 1,100 of emetic and 3,500 of diaphoretic, or sweating agents.

Before leaving the Mandan villages on their way west, Lewis and Clark employed a French-Canadian interpreter, Toussaint Charbonneau, who was permitted to take along his Indian girl-wife, Sacagawea, and their infant son, Jean-Baptiste. It is sometimes asserted that Sacagawea guided the expedition, but, in fact, she determined the route on only one occasion. On the return trip in southwestern Montana, she accompanied Clark to the Yellowstone river. When he saw in the distance Flathead and Bozeman passes, Clark permitted the Indian girl to choose between them. Either would have served, but she chose Bozeman pass, the less favourable of the two. It led through swampy ground which Clark called "an intolerable rout caused by beavers daming the stream; a muddy wet rout." While Sacagawea does not deserve to be called the guide, she may properly be called the heroine. She equaled the men in endurance and fortitude except, perhaps, for one night when she was sick and Clark noted "The Indian woman complaining all night." She made her own special contributions to the success of the expedition. Once when Charbonneau clumsily caused one of the pirogues to turn on its side, she retrieved, from her position in the stern, some of the light articles that floated out. She dug roots for food and was helpful as an interpreter among the Shoshone and Walla Walla Indians. She particularly helped to win the friendship of the Shoshone, her own people whom she had not seen since she was kidnapped by Minnetarees several years earlier.

There was much excitement when the expedition arrived at St. Louis in Sept. 1806. "we Suffered the party to fire off their pieces as a Salute to the Town. we were met by all the village and received a harty welcom from it's inhabitants &c." Lewis and Clark were each given 1,600 ac. of public land; the men received 320 ac. of land and double pay. Lewis became governor of the Louisiana territory and Clark was governor of the Missouri territory.

See also references under "Lewis and Clark Expedition" in the Index.

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LEWIS-AND-HARRIS, the most northerly island of the Hebrides, Scot., 24 mi. from the mainland, from which it is separated by the Minch strait. Although forming one geographic unit, Lewis-and-Harris is generally referred to as if it were two separate islands. The boundary runs roughly between Loch Resort (west) and Loch Seaforth (east). The northerly and larger portion, the island of Lewis (area 631.1 sq.mi.), belongs to the county of Ross and Cromarty; the southern portion, the island of Harris (area 193.3 sq.mi.), belongs to Inverness-shire. The coast line is deeply indented by sea lochs and inland there are several hundred freshwater lochs, of which the largest is Loch Langavat (9 mi. long). Most of Lewis is covered by a peat moor, but in the southwest Mealasbhal reaches 1,885 ft. and in the southeast Beinn Mhor, 1,874 ft. The whole of Harris is hilly. The Clisham reaches 2,622 ft. and there are more than 30 summits above 1,000 ft. The rivers are small, but many streams abound with salmon and trout, notably the Grimersta. Otters, seals, red deer and hares, game birds and waterfowl are plentiful.

The population of Lewis at the 1961 census was 21,614, excluding the island of Bernera (pop. [1961] 317), now linked to Lewis by a bridge, and the Flannan Isles lighthouse (pop. [1961] 3). The population of Harris was (1961) 2,493, excluding the islands (pop. 1961) of Scalpay (470), Scarp (46), Berneray (201), Ensay (2), Pabbay (2) and Taransay (5). The only town is Stornoway (*q.v.*) in Lewis, a burgh of barony (pop. [1961] 5,229). The population of Stornoway is growing, but that of the rural areas is declining. The number of people in the parish of Uig (Lewis) was less in 1956 than in 1811. Outside Stornoway the population is Gaelic speaking, but education is conducted almost entirely in English. As a result, although Gaelic is the language of the home, English is read more easily.

Stornoway has air service to Glasgow and to Inverness and is connected by steamer with Kyle of Lochalsh and Mallaig. Tarbert, Rodil and Scalpay in Harris also have regular steamer connections with Kyle of Lochalsh and Mallaig. In addition, Stornoway has cargo services to Aberdeen, Dundee, Leith, Glasgow and Liverpool, and Harris has a cargo service to Glasgow.

There is little cultivable land: only 3.5% of the total area is arable and 1.6% under grass. There are few farms, most of the agricultural land being tenanted by crofters. There are 168 crofter townships and about 4,000 crofter holdings, most of them of less than seven acres. All but three of the townships are on the coast, as the crofters formerly depended on the inshore fishing for their livelihood. Since the advent of the steam trawler, however, the fisheries have ceased to be of any importance in the rural economy of the island, although Stornoway continues to be a centre of the herring industry. In 1918 the 1st Lord Leverhulme bought estates in Lewis-and-Harris and planned, though without success, to develop the fishing on modern lines. As a result of the abandonment of the Leverhulme schemes there was a wave of emigration, more than 3,000 people, mostly young men, leaving the island in a period of five years, with serious social consequences. The rise of the Harris tweed industry later compensated for the loss of the fishing industry. The annual output exceeds 5,000,000 yds. and the industry provides employment in the rural areas as well as in Stornoway.

Lewis-and-Harris was under Norse occupation for several centuries, and the evidence remains in the islands' place names, and to a lesser extent in the personal names. The abortive Jacobite rebellion of 1719 was launched from Stornoway. The most important ecclesiastical building is the early 16th century church of St. Clement in Rodil. It contains a tomb prepared by Alastair Crotach, one of the MacLeod's of Dunvegan (d. about 1547), which is considered one of the best in Scotland. At Callanish,

13 mi. W. of Stornoway, there are several stone circles, one of them a cruciform setting of megaliths unique in Scotland.

(J. S. G.)

LEWISHAM, one of the 32 London boroughs constituting Greater London, Eng., is bounded west by the Borough of Southwark, north by the Thames, east by the Borough of Greenwich, and south by the Borough of Bromley. This inner London borough was established on April 1, 1965, under the London Government Act 1963 by the amalgamation of the metropolitan boroughs of Lewisham and Deptford (*see* LONDON). Area 13.4 sq.mi. (35 sq.km.). Pop. (1965 est.) 289,560. The borough includes the districts of Ladywell, Catford, Hither Green, Lee, Sydenham, Forest Hill, Deptford, and New Cross, and contains four parliamentary constituencies: Lewisham North, Lewisham South, Lewisham West, and Deptford. The main administrative offices are in Lewisham Town Hall, Catford.

In the extreme southwest of the borough is some light industry. In the north one of the chief industries is the timber import-export business. There are also light engineering and electrical engineering firms, employing many local residents, but the borough is mainly residential with the inhabitants traveling to the City and central London to work. Shopping centres are surrounded by residential districts of privately owned and council houses. The shopping centres in the Lewisham Clock Tower area and Lee Green were considerably redeveloped after bomb damage in World War II. Open spaces include Horniman's Gardens with the Museum of Natural History and Ethnography, Beckenham Place Park, part of Blackheath, Ladywell Fields, and Deptford Park.

Lewisham appeared in the Domesday Book as Levesham and Deptford as Depeford, signifying "deep ford." The Goldsmith's College, New Cross, was built in 1843 and accommodates about 2,000 students. The parish church of old Lewisham, St. Mary's in Lewisham High Street, dates from the 15th century. St. Margaret's, the parish church of Lee, lies to the east; it was rebuilt a few yards from the site of the original church, some ruins of which still remain. St. Paul's, the church of the parish of that name, dates from 1712–30 and lies in Deptford High Street. At the former Manor House (Sayes Court), which was demolished in 1729, Peter the Great of Russia lived for a short period in 1698. John Evelyn, the diarist, also lived there. The old dockyard founded by Henry VIII in which Elizabeth I knighted Sir Francis Drake was closed in 1869. The Royal Victualling Yard is in this part of the borough.

Celebrities who have lived in the borough include Lord Howard of Effingham who commanded the British fleet which defeated the Spanish Armada in 1588, Adm. John Benbow, and the wood-carver Grinling Gibbons. (AR. R. T.)

LEWISTON, a city of Androscoggin county in southwestern Maine, U.S., on the Androscoggin river opposite Auburn (*q.v.*), 35 mi. N. of Portland. Lewiston is the site of Bates college, a coeducational liberal arts college, founded by Free Baptists in 1864 and long known nationally and internationally for its record in debating. A major portion of the population of the city is of French-American origin and three-fifths of the younger local students attend parochial schools. Before 1945 the industry was dominated by textiles—blankets, sheetings, bedspreads and rayons; thereafter it became more diversified. In 1957 an industrial park, 125 ac., began to attract new factories. Two hydroelectric dams give the community one of the highest water-power potentials in New England.

Lewiston is the seat of the Central Maine General hospital, a home for the aged, and a Catholic hospital. The armory (1927) houses one of the largest auditoriums in Maine and in 1959 the new youth centre provided the largest covered ice rink in New England.

Settled in 1770, Lewiston became a town in 1795 and a city in 1861. Pop. (1960) 40,804; Lewiston-Auburn standard metropolitan statistical area (Lewiston, Auburn and Lisbon town), 70,295. For comparative population figures *see* table in MAINE: *Population.* (RO. BE.)

LEXINGTON, the seat of Fayette county, Ky., U.S., the largest loose-leaf tobacco market in the country and the chief centre in the U.S. for the breeding and sale of thoroughbred and standardbred horses. Situated in the centre of the Bluegrass region of the state 80 mi. S. of Cincinnati, O., Lexington was named by a party of hunters who were encamped there in 1775 when news of the battle of Lexington (Mass.) reached them. Permanent settlement (largely from Virginia and North Carolina) was begun in April 1779. Because of its early culture and learning it soon became known as the "Athens of the west." In 1782 the general assembly of Virginia granted the town a charter. The *Kentucky Gazette* was established there in 1787 and the first state legislature convened there in June 1792. Lexington was incorporated as a city in 1832.

The city is a trading centre for the Bluegrass region and a manufacturing centre, its products including electric typewriters, electronic equipment, bourbon whisky, furniture, automobile headlights and parts, heavy electric equipment, parachutes, television parts, paper drinking cups and peanut products. There are two race tracks, Keeneland, a nonprofit track, and the famous track widely known as the Red Mile, upon which many trotting and pacing records have been made. Many noted race horses were bred and raised on the celebrated horse farms in the surrounding area.

Lexington is the seat of the University of Kentucky (1865); Transylvania college (chartered 1780), related to the Christian Church (Disciples of Christ); and the College of the Bible (1865), a graduate seminary of the Christian Church. Also located there are the U.S. public health service hospital for narcotics addicts; the Lexington army signal depot (Avon); a Shriners hospital for crippled children; a U.S. Veterans administration hospital; Cardinal Hill convalescent hospital for crippled children; the Eastern Kentucky state hospital for the mentally ill (established in 1815); and Kentucky Village, the state reform school.

Lexington was the home of John C. Breckinridge, vice-president of the U.S. under James Buchanan and secretary of war in the Confederate cabinet of Jefferson Davis; John Hunt Morgan, Confederate cavalry leader; Mary Todd, wife of Abraham Lincoln; and Henry Clay, who lived there from 1797 until his death in 1852. Both Clay's home, Ashland, and Morgan's home, Hopemont, are public shrines.

The city has a council-manager form of government, in effect since 1932. Pop. (1960), city 62,810; standard metropolitan statistical area (Fayette county) 131,906. For comparative population figures *see* table in KENTUCKY: *Population.*

(J. W. CL.)

LEXINGTON, a city of Massachusetts, U.S., is best known as the site of the first skirmish of the American Revolutionary War. On April 19, 1775, local minute men took position on Lexington green, 11 mi. N.W. of Boston and on the direct road to the provincial congress's arms depot at Concord. The 77 minute men found 700 British regulars in front of them but before they could retreat someone fired a shot. The British answered with a volley that left eight colonials dead and ten wounded. Though the first real battle took place at Concord, Lexington proudly calls itself "the birthplace of American liberty."

The town then had 700 inhabitants. Originally a meadow belonging to Cambridge, it became a separate parish, Cambridge Farms, in 1691 and an independent township in 1713. After the Revolutionary War its population grew. Public schools were built, including in 1839 the first public normal school in the United States (later transferred to Framingham). The town's population broadened, as evidenced by the gradual planting of churches other than the Congregationalist—Baptist in 1833, Unitarian in 1840, Roman Catholic in 1865 and 1929, Episcopal in 1887, Christian Science in 1903, Jewish in 1913. In the early 19th century East Lexington had some industry but little of it survived the panic of 1837.

After the beginning of the 20th century Lexington was gradually drawn into the Boston metropolitan area. Railroads and highways facilitated commuting. Gifts established a public library, a municipal recreation centre and other attractions. The town grew considerably; for comparative population figures *see* table in MASSACHUSETTS: *Population.* With all construction in the centre of town subject to approval by the Historic Districts commission, however, its appearance changed less than its size and

character. (E. R. M.)

LEXINGTON, a city of Missouri, U.S., 43 mi. E. of Kansas City, on the south bank of the Missouri river; the seat of Lafayette county. Founded in 1819, platted in 1822 and chartered in 1845, it was named after Lexington, Ky. For a short time it was terminus of the Santa Fe trail (*q.v.*).

At the beginning of the American Civil War it was the most important river town between St. Louis and St. Joseph and commanded the river approach to Ft. Leavenworth, Kan. The battles of Wilson's Creek and Lexington, Aug.–Sept. 1861, resulted in victories for Confederate Gen. Sterling Price over the forces of Nathaniel Lyon and Col. James A. Mulligan.

Except for agriculture, a shirt company is the chief industry. Noteworthy features include Wentworth Military academy (1880); Anderson house, used as a Civil War hospital, now a museum; Memorial building in College park on the site of the first Masonic college in the world, operated in Lexington from 1846 to 1859; the courthouse, erected in 1847; and the Pioneer Mother statue. (C. St.)

LEXINGTON, a historic college town in western Virginia, U.S., the site of Virginia Military institute (V.M.I.) and of Washington and Lee university, is 52 mi. N.E. of Roanoke, on the Maury river, a tributary of the James. Established by the Virginia assembly in 1777 as the seat for the new county of Rockbridge, it was settled by Scotch-Irish Presbyterians, still an important element in the population, and named for the battle of Lexington during the American Revolution; five of its original streets bear the names of Virginia's Revolutionary leaders. In 1796 Lexington was almost completely destroyed by fire.

Lexington is the shopping centre for an agricultural area specializing in beef cattle, sheep and dairying. Many army, navy and marine officers have established homes there. V.M.I., where "Stonewall" Jackson taught before the American Civil War, is a state military college established in 1839 and offering degrees in engineering and liberal arts. During the Civil War 94% of the institute's alumni fought for the Confederacy. After 1865 the distinguished scientists Matthew Fontaine Maury and John Mercer Brooke taught at V.M.I. Washington and Lee university is a private men's liberal arts college with schools of commerce and law; founded as an academy in 1749, it became a college in 1813 and a university in 1871. It was named for George Washington, its first large benefactor, and Gen. Robert E. Lee, who from 1865 until his death in 1870 served as its president. Generals Lee and Jackson are buried in Lexington. The town has a council-manager form of government, in effect from 1938.

Nearby are the famous Natural bridge and the birthplaces of Sam Houston and Cyrus McCormick.

For comparative population figures *see* table in Virginia: *Population.* (G. M. Be.)

LEYDEN: *see* Leiden.

LEYDEN JAR, a device for storing quantities of static electricity discovered accidentally by P. van Musschenbroek of the University of Leiden in 1745, and, independently, by E. G. von Kleist of Kammin in Pomerania about the same time. The name appears to have originated in the writings of the abbé Nollet. In its earliest form the Leyden jar consisted of a glass phial, partly filled with water, whose orifice was closed by a cork pierced by a wire or nail which dipped into the water. To charge the jar the phial was held in the hand and the exposed end of the wire brought into contact with the prime conductor of an electrical machine. On removing the phial from the machine and touching the wire with the other hand, the person experienced a violent shock. In its present form the jar is made of thin flint glass of high dielectric strength, coated for part of its height, inside and out, with tin foil. The outer coating is connected to earth and contact is made with the inner coating through a central brass rod which projects through a wooden stopper beyond the mouth of the jar and has a chain or spring on its lower end. For further details *see* Capacitor.

LEYTE, eighth largest of the Philippine Islands, located in the east central part of the Visayan group; area 2,786 sq.mi. Samar Island is to the northeast, Cebu to the west, Bohol to the southwest and Mindanao to the south. Leyte is bisected by a range of rugged mountains reaching a maximum height of 4,426 ft. at Mt. Lobi in the centre and is crossed by only one main road. Rolling plains are found around the coastal areas, particularly near Tacloban (*q.v.*) and Ormoc in the north. Leyte averages about 100 in. of rainfall; the western third of the island has even rainfall all year while the remainder has maximum precipitation in the winter months. Little manufacturing is carried on; most of the inhabitants are farmers. Farms are small and tenancy rates run above 40%. Rice, corn, sweet potatoes and cassava are all important local food crops; coconuts, abacá, tobacco, bananas and sugar cane are raised for cash. Fishing is important, particularly along the northern coast.

The island is composed of the province of Leyte (area 3,084 sq.mi., which includes Biliran and Maripipi islands off the north coast). Pop. (1960) 1,172,972. Tacloban city, pop. (1960 mun.) 53,551, capital of Leyte province, is an important trading centre on a good harbour at the southern end of the narrow San Juanico strait which separates Leyte and Samar. On Oct. 20, 1944, U.S. forces commanded by Gen. Douglas MacArthur landed at Palo, about 10 mi. south of Tacloban city on the east coast—the beginning of the campaign to liberate the Philippines from the Japanese during World War II. MacArthur city, pop. 10,647, is also an important trading centre as well as a minor rice and corn milling centre. Other trading centres are Barugo and Carigara on the north, Baybay on the west and Burauen on the east. Maasin, pop. (1960) 39,185, is an agricultural centre of southern Leyte. For the battles of Leyte and Leyte gulf *see* World War II: *The War in the Pacific.* (R. E. He.)

LEZGIAN (Lesghi, Lezghian, Lezgin), a people inhabiting the mountain region of the northeastern Caucasus (*q.v.*) in the U.S.S.R. Numbering about 223,000 in the 1960s, they inhabit the river valleys of southeast Dagestan (*see* Dagestan Autonomous Soviet Socialist Republic) and neighbouring parts of the northern Azerbaijan Soviet Socialist Republic, U.S.S.R. In their religion they adhere to the Sunnite sect of Islam. Traditionally their economy has been based on the breeding of cattle and some mountain-valley agriculture; notable Lezgian crafts are metalworking and the weaving of tapestries.

The term Lezgian also has been applied to all mountain peoples of Dagestan and even to the indigenous peoples of the north Caucasus generally. Aside from the ethnic designation, the term covers both the language of about 200,000 Lezgians proper, and a larger linguistic grouping that includes the tongues of neighbouring peoples. The Lezgian group of languages includes, in addition to Lezgian itself, the Agul, Tabasaran, Rutul, Tsakhur, Budukh and Dzhek languages. Also known as Samurian (after the Samur river) this group is related to other language groups of the north Caucasus, but has no recognized linguistic affiliation elsewhere. *See* also Caucasus, Peoples of.

See B. Geiger *et al., Peoples and Languages of the Caucasus* (1959). (L. K.)

LHASA (La-Sa), the capital of Tibet, lies in 29° 39′ N., 91° 6′ E., 11,830 ft. above sea level. Because of the inaccessibility of Tibet and the political and religious exclusiveness of its government, Lhasa was long closed to western travelers, all of whom during the latter half of the 19th century were stopped in their attempts to reach it. It was popularly known as the Forbidden City. But its chief features were known from the accounts of Roman Catholic missionaries who lived there early in the 18th century and from the investigations of agents of the Survey of India; they were described in greater detail by British officials after the limited "opening" of Tibet which began with the Younghusband expedition of 1903–04, and by officials, travelers and scholars who were allowed to visit Tibet from 1935 onward. With its cluster of vast monastic establishments, Lhasa was the mecca of Tibetan Buddhism (*q.v.*) prior to the Chinese annexation of Tibet (1950–51). The streets and public places swarmed with pilgrims from every part of the Himalayan plateau, and before 1920 the faithful came from all the steppes of Asia between Manchuria and the Balkhash lake. If the monastic establishments in its near neighbourhood are included, the metropolis had an

estimated population of 50,000, fully a third of whom were members of religious orders. According to Chinese reports, in the 1960s Lhasa had a population (not including military personnel) of more than 85,000, of whom 20,000 belonged to religious orders; Tibetan refugees, however, reported the population of the city had declined except for Chinese settlement and military occupation and the great monasteries were almost deserted (*see* also *History,* below). Arable land in Tibet was divided into feudal estates, either owned by the state, the church or the nobility. Almost all the noble families, who, together with monk officials, conducted the administration, resided at Lhasa. There were traders and craftsmen from Nepal, Ladakh and China proper. Skilled craftsmen, mostly Nepalese, created Buddhist images, butter lamps, canopies with elaborate designs for the temples and exquisite headdresses, bracelets and amulet boxes.

Traders from western China brought every variety of silk stuffs, tea and chinaware; from Sining came silk, gold lace, brocades, carpets, furs, horses and a breed of fat-tailed sheep; from eastern Tibet, musk in large quantities which eventually found its way to Europe through India; from Sikkim and Bhutan, rice; a variety of manufactured goods, iron, copper, cotton cloth, sugar and dried fruits from India and Nepal; and saffron from Ladakh and Kashmir. The largest trading market coincided with the Tibetan new year festival, usually the first two weeks of February. After the Sino-Indian border dispute, the mountain passes were sealed and the trade with India dwindled to a trickle.

Setting.—The city stands in a level plain, which is surrounded on all sides by hills. Along its southern side, about ½ mi. S. of Lhasa, runs a considerable river called the Kyi Chhu (Kyichu, Kichu or Kyi), flowing there from the east-northeast, and joining the great Brahmaputra (Tibetan Tsangpo, "the purifier") about 38 mi. to the southwest. The hills around the city are barren. The plain, however, is fertile, though in parts marshy. Gardens scattered over it around the city are planted with fine trees. The city is screened from view from the west by a rocky ridge, lofty and narrow, with summits at the north and south, the one crowned by the majestic buildings of Potala, the chief residence of the dalai lamas, the other by the temple of medicine. Groves, gardens and open ground intervene between this ridge and the city itself for a distance of about one mile. A gate through the centre of the ridge gives access from the west; the road from there to the north part of the city throws off a branch to the Yutok sampa or turquoise-tiled covered bridge, one of the noted features of Lhasa, which crosses a former channel of the Kyi Chhu and carries the road to the centre of the town.

The old city was walled in the latter part of the 17th century, but the walls were destroyed in 1722 during the Chinese occupation. The chief streets were fairly straight, but generally of no great width. There was no paving, nor any drainage system, so that the streets were dirty and in parts often flooded. The inferior quarters were rife with smells and overrun with dogs. Many of the houses were of mud brick, but those of the richer people were of massive stone. They were generally whitewashed, the doors and windows being framed in black. In the suburbs there were houses entirely built of the horns of sheep and oxen set in clay mortar. This construction was in some cases roughly carried out, but in others it was solid and highly picturesque. Some of the inferior huts of this type were inhabited by the Ragyaba, or scavengers, whose chief occupation was that of disposing of corpses according to the practice of cutting and exposing them to the dogs and carrion birds. The houses generally were of two or three stories. The ground floor of many houses was given over to shops opening on the street, others usually were occupied by stables and similar accommodations; above these rose tiers of large windows with or without projecting balconies, and over all were flat roofs at varying levels. In the better houses there were spacious and well-finished apartments, and the principal halls, the verandas and terraces were often highly ornamented in brilliant colours. In every house there was a chapel or shrine, carved and gilt, on which were set images and sacred books.

The historic roads of the Tibetan highlands converge on Lhasa. These are the Tsinghai–Tibet road (linking Lhasa to Sining), the Sikang–Tibet road to Chamdo (Ch'ang-tu), the road connecting Lhasa to Kalimpong, India, and the West Tibet road through the Brahmaputra valley via Gartok to Ladakh.

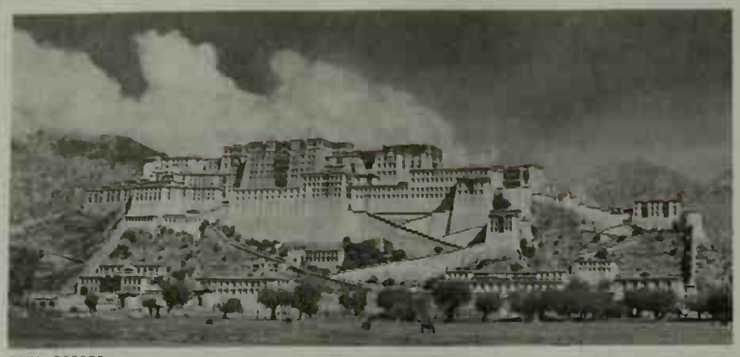
Temples and Monasteries.—In the centre of the city is an open square which forms the chief market place. There is the great temple of the "Jo" or Lord Buddha, called the Jokhang, regarded as the centre of all Tibet, from which all the main roads were considered to radiate. This was the great metropolitan sanctuary and church centre of Tibet. It is believed to have been founded by Songtsen Gampo about 640, as the shrine of one of those two very sacred Buddhist images which were associated with his conversion and with the foundation of the civilized monarchy in Tibet. The exterior of the building is not impressive; it rises little above the level of other buildings which closely surround it, and the effect of its characteristic gilt roofs, though conspicuous and striking from afar, is lost close at hand.

The main building of the Jokhang is three stories high. The entrance consists of a portico supported on timber columns, carved and gilt, while the walls are decorated with religious frescoes, and a great prayer wheel stands on one side. Massive doors, ornamented with scrollwork in iron, lead to an antehall, and from this a second gate opens into a courtyard surrounded by a veranda with many pillars and chapels, and frescoes on its walls. On the left is the throne of the grand lama, laid with cushions, together with the seats of other ecclesiastical dignitaries, variously elevated according to the rank of their occupants. An inner door with enclosed vestibule gives access to a quadrangular court, its centre open to the sky, where services may be held. On either side of it are three chapels, and at the extremity is the rectangular "holy of holies," flanked by two gilded images of the coming Buddha and screened by latticework. In it is the shrine on which sits the great image of Sakyamuni, set about with small figures, lamps and a variety of offerings, and richly jeweled, though the workmanship of the whole is crude. In the second and third stories of the temple are shrines and representations of a number of gods and goddesses. Before the flight of the dalai lama (in 1959) the temple contained a vast accumulation of images, gold and silver vessels, lamps, reliquaries and precious bric-a-brac of every kind. The daily offices were attended by crowds of worshipers, and a sacred way which leads around the main building was constantly traversed by devotees who performed the circuit as a work of merit, always in a particular direction. The temple was dusty and infected with strong odours from the fumes of butter lamps and incense. The buildings grouped about the Jokhang were occupied by the civil administration, such as treasuries, customs office, courts of justice, etc., and there were also private apartments for the grand lama and other high functionaries. No woman was permitted to pass the night within the precinct.

In front of the main entrance to the Jokhang, in the shadow of a sacred willow tree, stands a famous monument, the Doring monolith, which bears the inscribed record of a treaty of peace concluded in 822 between the king of Tibet and the emperor of China. Before this monument the apostate from Lamaism, Langdharma (Lang Darma), brother and successor of the king, is said to have been standing when a fanatic recluse, who had been stirred by a vision to avenge his persecuted faith, assassinated him (842).

Another great and famous temple is Ramo-che, at the north side of the city. This is also regarded as a foundation of Songtsen Gampo, and was sometimes said to contain the body of his Chinese wife (although old records stated she was buried at the royal burial grounds several miles away) and the second of the primeval palladia, the image that she brought with her to the snowland; from which it is known as the "small Jokhang." This temple was noted for the practice of magical arts.

Another monastery within the city is that of Meru, also on the north side, remarkable for its external order and cleanliness. It was famous as a school of orthodox magic; it was noted also for the printing house in the convent garden. This convent was the temporary residence of the regent during the British invasion in 1904 led by Col. (later Sir) Francis Edward Younghusband (*q.v.*). Other monasteries in or near the city are the Tsomoling or Tshomoling, the Chomoling and the Kundeling, about 1 mi. W.



PAUL POPPER

THE POTALA, FORTRESS PALACE OF THE DALAI LAMAS, LHASA

of the city. These three monasteries together with the Tengyeling were known as the "Four Lings." From their inmates the dalai lama's regent, during his minority, was formerly chosen. Three miles south of the city, beyond the river, is the Tsemchog Ling, or Tsecholing. The temple of medicine (Chakpori, or Chagpo-ri) crowns the summit at the end of the ridge west of the city, opposite to that on which stands the Potala. It was natural that in a country possessing a religious system like that of Tibet the medical profession should form a branch of the priesthood. In 1905 L. A. Waddell wrote in his *Lhasa and Its Mysteries,* "The treatment of disease, though based in some measure upon a judicious use of the more common simple drugs of the country, is, as was inevitable among so superstitious a people, saturated with absurdity."

Potala.—The famous Potala hill, covered by the palace of the dalai lamas, forms a majestic mountain of building; with its vast inward-sloping walls broken only in the upper parts by straight rows of many windows, and its flat roofs at various levels, it is not unlike a fortress in appearance. At the south base of the rock is a large space enclosed by walls and gates, with great porticoes on the inner side. Before the Communist Chinese occupation this swarmed with monks and with beggars. A series of staircases, broken by intervals of gentle ascent, leads to the summit of the rock. The whole width of this is occupied by the palace. The central part of this group of buildings (for the component parts of Potala are of different dates) rises in a vast quadrangular mass above its satellites to a great height, terminating in gilt canopies similar to those on the Jokhang. There on the lofty terrace was the grand lama's promenade, and from this great height he looked down upon the crowds of his votaries far below. This central member of Potala is called the red palace from its crimson colour, which distinguishes it from the rest. It contains the principal halls and chapels and shrines of past dalai lamas. There is in these much rich decorative painting, with jeweled work, carving and other ornament, but the interior of Potala as a whole cannot compare in magnificence with the exterior. Part of the Potala has been opened to the public as a museum. Among the numerous other buildings of note on or near Potala hill, one is distinguished by the Chinese as one of the principal beauties of Lhasa. This is a temple not far from the base of the hill, in the middle of a lake which is surrounded by trees and shrubberies. The temple is circular in form, with a loggia, or portico, running all around and adorned with paintings. Its name, Naga-kang (or Lu-kang: "the serpent house"), comes from the tradition of a serpent or dragon which dwelt there and which must be propitiated lest it should cause the waters to rise and flood Lhasa.

Drepung, Sera and Ganden.—These are three great monasteries in the vicinity of Lhasa. Ganden claims to have been founded by Tsong-khapa (*c.* 1358–1419), the medieval reformer and organizer of the modern orthodox Tibetan Buddhism, and Drepung and Sera (or Se-ra) by his disciples.

Drepung, or Debung ('Bras-spuns), is 6 mi. W. of Lhasa at the foot of the hills which flank the plain on the north. It was one of the largest monasteries in the world and had about 8,000 monks. On the southwest side rises a kind of pavilion, brilliant with colour and gilding, which was occupied by the dalai lama when he visited Drepung once a year and expounded to the inmates. The place was frequented by the Mongol students who came to Lhasa to graduate, and it was known in the country as the Mongol convent. Not far from Drepung was the seat of the state oracle of Tibet, the Nechung Chos-kyong, a building picturesque in itself and in situation.

Sera is 3 mi. N. of the city on the acclivity of the hills and close to the road by which pilgrims entered from Mongolia. From a distance the crowd of buildings and temples, rising in amphitheatre against a background of rocky mountains, forms a pleasing picture. In the recesses of the hill, high above the convent, are scattered hermitages for meditation. The chief temple of Sera, a highly ornate building, has a special reputation as the resting place of a famous magic dagger (*phurpa*), the symbol of the *vajra* or thunderbolt, the strong and indestructible.

Ganden (dGa'-ldan) is a great convent about 25 mi. E. of Lhasa, on the other side of the Kyi Chhu. It is the oldest monastery of the Gelugpa (dGe-lugs-pa; nicknamed Yellow Hat) order, having been founded by Tsongkhapa and having had him for its first superior. There his body is said to be preserved with miraculous circumstances; his tomb is there, with a great shrine said to be of gold, and there are other relics of him, such as the impression of his hands and feet.

Samye.—This is another famous monastery intimately connected with Lhasa, said to have been used as a treasury by the former Tibetan government. It lies about 36 mi. S.E. on the left bank of the Brahmaputra. It was founded in the 8th century and was the first monastery in Tibet. It is surrounded by a high circular stone wall, 1½ mi. in circumference, with gates facing the four points of the compass. On this wall Nain Singh of the Indian survey, who was there on his journey in 1874, counted 1,030 votive piles of brick. The principal temple occupies the centre, and around it are four smaller temples. Many of the images are said to be of pure gold, and the wealth is very great. The temple interiors are covered with beautiful writing in enormous characters, which the common people believe to be the writing of Sakyamuni himself.

History.—The widespread anti-Chinese feeling arising out of the political and military seizure of Tibet in 1950–51 culminated in the Lhasa uprising that began March 17, 1959, and spread throughout the highlands. There were several days of fighting in and around Lhasa before suppression by Chinese troops. This led to the flight of the dalai lama to India, and to the announcement by the communist-sponsored Tibetan Autonomous committee of a reform program under the chairmanship of the Chinese military governor and the acting-chairmanship of the panchen lama.

The Chinese Communists dominated Lhasa to a far greater extent than had been sought by the Manchu (Ch'ing) dynasty in the 18th century. Chinese troops were seen there for the first time since 1912 and they were supplied with modern arms and equipment. The greatest change was brought about in communications. Where there had not even been wheeled traffic, motor vehicles were introduced. The Kyi Chhu river was bridged near Lhasa and roads were constructed between the city and China. The houses of several nobles were taken over for the use of Chinese officials; military barracks were built; and Chinese schools and hospitals were established. Experimental farms and some small-scale industries (tanning, wool processing) were started outside the old city limits. The electric supply was improved and work was begun on a large-scale hydroelectric plant.

From 1951 until 1959 the Tibetan government continued to function under the control of Chinese administrators. Although there was Tibetan resistance to the Chinese attempts at reform and innovation—roads were sabotaged, completion of the hydroelectric plant was considerably delayed, Tibetans, to a large extent, kept away from the schools—still during this period the city of Lhasa was not entirely dissimilar from what it had been.

After the uprising of 1959 the whole picture changed. The old Tibetan government was abolished; the majority of the noble class disappeared; and the landed property of nobles and of monasteries was confiscated. The great monasteries near Lhasa were practically closed and the population of monks reduced to a handful. Able-bodied men were drafted for forced labour on a railroad be-

tween China and Lhasa and the greater part of the population that remained was made to work on various road-building and construction projects, on a very scanty allowance of food. From reports of refugees up to the end of 1960, it appeared that Lhasa was more or less a slave city dominated by a Chinese Communist military dictatorship. After that time, reports indicated that because of the near famine prevailing in Tibet as well as China some relaxation was introduced and many Tibetans were released from prison (some immediately fled to India).

Lhasa has become barely recognizable as a Tibetan city and its religious life, which was indeed its whole life, has been virtually abolished. Occasional religious set pieces are staged for the benefit of visiting Communists. *See* TIBET for the history and customs of Lhasa; *see* also TIBETAN ART; TIBETAN BUDDHISM.

(T.-L. S.; X.)

L'HOSPITAL, MICHEL DE (*c.* 1505–1573), French statesman, lawyer and humanist, chancellor of France from 1560, was born at Aigueperse in Auvergne. After studying law at Toulouse, he had to go into exile because of his father's association with the traitor Charles de Bourbon and continued his studies at Padua and Bologna. About 1534 he was able to return to France, and in 1537 he became a councilor in the *parlement* of Paris. The death of Francis I giving him more chance of promotion, he was sent as Henry II's envoy to the council of Trent then sitting at Bologna (1547). He became chancellor to the king's sister, Margaret, duchesse de Berry, in 1550 and as such promoted legal studies at Bourges. About 1553 he was made master of requests on the recommendation of Charles, cardinal de Lorraine, and in 1555 he was appointed first president of the *chambre des comptes*. On the accession of Francis II (July 1559) he was admitted to the king's privy council through the influence of the Guises, to whom he had dedicated verses. While he was accompanying the duchesse de Berry to Nice on the occasion of her marriage to Emmanuel Philibert of Savoy, he was appointed chancellor of France (April 1560).

L'Hospital played a prominent part in the political events of the 1560s. The Edict of Romorantin, which ensured that cases of heresy should be tried by the bishops, not by the Inquisition, had been drawn up before he returned to the French court, but he must have approved of its contents. As the Huguenots and Catholics prepared to fight each other, L'Hospital advocated the policy of religious toleration favoured by the regent Catherine de Médicis. He presented the government's case at the assembly of Fontainebleau (Aug. 1560) and at the estates-general of Orléans (Dec. 1560) and of Pontoise (Aug. 1561). But the failure of the colloquy of Poissy (Sept. 1561) and the outbreak of the first religious war (1562) were defeats for Catherine's government. L'Hospital drew up the famous Edict of Jan. 1562, which granted a large measure of religious freedom to the Huguenots, and the slightly less generous Edict of Amboise (March 1563). At the assembly of Moulins (Jan. 1566), he attacked the maladministration of justice, and in Feb. 1566 he drew up an ordinance to remedy this. In Sept. 1567 civil war broke out again, and Catherine lost confidence in the policy of toleration. L'Hospital, seeing that he had lost favour, asked to be dismissed in May 1568 and finally retired in September to his estate of Vignay. He died on March 13, 1573.

L'Hospital's political influence has been exaggerated. His collaboration with Catherine de Médicis was so close that it is difficult to separate his influence from hers, but she would not have kept him in his functions as chancellor for eight years if his views had not coincided with hers. Moreover, as chancellor he was not sufficiently important to determine policy: his chief duty was to be the mouthpiece of the royal council, and his speeches reflected Catherine's views at the time. His pronouncements made him unpopular with the extremists of both sides, who asked for his dismissal, but the policy which he defended was not of his own making. Yet, if L'Hospital was less influential or original than some historians have assumed, his speeches and writings, notably the *Traicté de la réformation de la Justice,* which has been attributed to him, and his *Mémoire sur la nécessité de mettre un terme à la guerre civile* (*c.* 1570), were the most complete presentation of the case for toleration. He argued that the king's duty was not to favour one religion rather than another but to safeguard the welfare of his subjects as a whole. While he favoured unity of religion, he did not believe that persecution was the best way to achieve it. L'Hospital disapproved of rebellion and loathed tyrannicide: he regarded the king as divinely instituted and as the supreme lawgiver, but believed that he should remain in close touch with his subjects by summoning the estates-general frequently. His *Oeuvres complètes* have been edited by P. J. S. Dufey, five volumes (1824–26).

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LIABILITY INSURANCE: *see* CASUALTY INSURANCE.

LIANG CH'I-CH'AO (1873–1929), Chinese scholar, literary journalist and political figure, was born near Canton on Feb. 23, 1873. He became a disciple of the scholar K'ang Yu-wei (*q.v.*), who invoked the Confucian classics, in novel and imaginative fashion, to sanction sweeping innovations in Chinese culture along generally western lines. China's humiliating defeat by Japan (1894–95) brought K'ang's constitutional-monarchist reform group into prominence, and Liang's brilliant editorial activity was influential in ushering in the Hundred Days of Reform (summer 1898). These ended with the *coup d'état* of the empress dowager, who placed K'ang, Liang and others under sentence of death. Liang fled to Japan and remained out of China until 1912, after the establishment of the republic.

As a founder of the Chinputang (Progressive party) Liang sided with Pres. Yüan Shih-k'ai against Sun Yat-sen's Kuomintang, but Liang was a leader of the successful resistance to Yüan's imperial ambitions (1915–16). Thereafter Liang's political influence was negligible (though his advocacy of China's entrance into World War I was persuasive). In the 1920s he reached the peak of his eminence in formal scholarship, but his general intellectual influence was never again so pervasive as in his years of Japanese exile, two decades before, when his wide-ranging, stylistically brilliant, iconoclastic and nationalistic journalism powerfully affected a whole generation. In all his intellectual activity, though with different emphases in different periods, he sought to interpret the past and prescribe for the present in such fashion as to preserve a sense of Chinese continuity while appreciating the force of western influence on all of modern culture. Liang died on Jan. 19, 1929.

Among Liang's chief works available in English are *History of Chinese Political Thought During the Early Tsin Period* (1930) and *Intellectual Trends in the Ch'ing Period* (1959).

See Joseph R. Levenson, *Liang Ch'i-ch'ao and the Mind of Modern China* (1953; rev. ed., 1959). (J. R. LN.)

LIAONING (LIAO-NING SHENG), the southernmost province of the Manchuria region, north China. The area was variably organized as the region of early Chinese settlement in Manchuria. Known as Shengking during Manchu times, the area was redefined in 1903 and named Feng-t'ien. In 1928 the boundaries were altered and the name Liaoning applied. From 1949 to 1954 there were two provinces, Liaohsi and Liaotung. In 1954 a northern zone was detached, and a single province was renamed Liaoning, to which a portion of Jehol was added in 1956, giving an area of 58,301 sq.mi. Pop. (1957 est.) 24,090,000.

A long occupied zone with a heavy agricultural population, the staple crops are soybeans, sorghum, millet and corn (maize), plus the Manchurian production of cotton, tobacco, fruit, castor beans and silk. The area from Dairen to Mukden (*qq.v.*) is the second ranking industrial zone of China, with heavy urban concentrations around Mukden, Fushun, Pen-ch'i and Anshan (*qq.v.*). Coal, iron ore, synthetic petroleum, ferro-alloys, and nonferrous and refractory minerals provide the raw materials for a highly developed heavy industrial complex begun under Japanese control, but greatly expanded since 1950.

See MANCHURIA. (J. E. SR.)

LIAO-YANG, a Chinese city located 35 mi. south of Mukden in Liaoning province, southern Manchuria region. Pop. (1958 est.) 169,000. Liao-yang is an early Chinese settlement site, and was the easternmost of the five imperial capitals set up by the Turco-Mongol Ch'i-tan people, who founded the Liao dynasty in the 10th century. In later centuries the city was often a regional capital. Liao-yang is situated in the valley of the Liao river and resembles other old Chinese cities rather than the newer industrial cities of Manchuria. The region around Liao-yang is an important producer of such staple crops as sorghum, soybeans and wheat, and also notable for cotton, fruit, and silk.

The city, a regional transport and trade centre, is located on the main rail line leading from Mukden to the port of Dairen. It did not become one of the early centres of modern industry as its surrounding area lacked mineral resources. Some light industry and cotton milling developed there, but Liao-yang was overshadowed by the growth of nearby industrial centres An shan, Fu shun and Mukden. The Chinese Communists stimulated the development of light industry and agricultural processing and, in the late 1950s, the city began to change its functions and to grow in population as a suburban satellite of Mukden (*q.v.*). For the battle of Liao-yang *see* RUSSO-JAPANESE WAR. (J. E. SR.)

LIAPCHEV, ANDREI (1866–1933), Bulgarian statesman who as prime minister from 1926 to 1931 had some success in restoring good order at home and prestige abroad, was born on Nov. 30, 1866, at Resen in Macedonia. He received his secondary education at Monastir, Salonika, and Plovdiv and his university education at Zürich, Berlin, and Paris. As a student he took a prominent part in the movement for the unification of Bulgaria and Eastern Rumelia of 1885. After editing jointly with D. Rizov the papers *Khristo Botev* and *Mlada Bulgaria,* he founded and edited a paper expounding the cause of Macedonia. In 1896 he joined the staff of *Zname* and later that of the *Priaporets,* the organ of the Democratic Party, of which he eventually became editor. A competent economist and financier, Liapchev took particular interest in the cooperative movement, of which he was a pioneer, and was regularly elected to the post of president of the Supreme National cooperative council.

Liapchev sat in parliament almost uninterruptedly after 1908. He held successively the posts of minister of agriculture and commerce and minister of finance in Aleksandr Malinov's Democratic cabinet of 1908–11. It was he who signed the treaty establishing Bulgaria's independence in Istanbul in 1908. During World War I he became finance minister in Malinov's second cabinet (from June 1918); and it was he who signed the armistice at Salonika after the collapse of Bulgaria's Macedonian front (Sept. 1918). In Nov. 1918 he became the first civilian to hold the ministry of war in Bulgaria. Imprisoned in 1922 by Aleksandr Stamboliski (*q.v.;* prime minister from Oct. 1919), he was released on Stamboliski's fall in June 1923. He then became chairman of the governmental majority in the new parliament.

On Jan. 4, 1926, Liapchev succeeded Aleksandr Tsankov as prime minister. He shared with Tsankov and Atanas Burov the leadership of the Democratic union, in which several earlier groups were merged. His policy of conciliation in internal and Balkan affairs inspired confidence abroad and helped to secure financial assistance from the League of Nations for the settlement of the refugees and for the financial and economic reconstruction of Bulgaria, and he remained prime minister till June 1931. Liapchev died in Sofia, on Nov. 6, 1933. *See* also BULGARIA: *History.*

LIAQUAT ALI KHAN (1895–1951), first prime minister of Pakistan, was born at Karnal on Oct. 1, 1895, the son of a landowner. He was educated at Aligarh, Allahabad, and Exeter College, Oxford. A barrister by profession, like his leader, Mohammed Ali Jinnah (*q.v.*), he entered politics in 1923, being elected first to the provincial legislature of the United Provinces and then to the central legislative assembly. He joined the Muslim league and soon became closely associated with Jinnah, who quickly perceived his marked administrative gifts and complete mastery of detail. His quiet and self-effacing personality might have debarred him from prominence but for the steady support of Jinnah, who entrusted him with tasks of increasing importance. By degrees he won first the respect and then the admiration of the Muslim community for his share in the struggle for Pakistan; when victory was won, and Jinnah became the first governor general, Liaquat was the obvious choice as prime minister. In this post his achievements were outstanding. If Jinnah founded Pakistan, Liaquat established it, laying down the main lines of policy, domestic and foreign, which afterward guided the country. After Jinnah's death, the whole weight of responsibility fell upon Liaquat, who discharged it brilliantly; he was acclaimed as *qaid-i-millet* ("leader of the country"). His assassination at Rawalpindi on Oct. 16, 1951, at the instance of fanatics who resented his steady refusal to contemplate war with India, left his country deprived of effective leadership until 1958, when the revolutionary government headed by Mohammed Ayub Khan set itself to resume his work of building a nation. (L. F. R. W.)

LIBANIUS (314–393), Greek sophist and rhetorician, whose orations and letters are a major source for the political, social and economic life of Antioch and of the eastern part of the Roman empire in the 4th century, was born at Antioch, the capital of Syria. He studied at Athens and taught with great success at Constantinople and Nicomedia before settling permanently at Antioch (354). His school there soon became famous and many of his pupils (*e.g.,* John Chrysostom) were prominent in later years. His voluminous writings include an apology of Socrates, and declamations and rhetorical exercises (some of which are attributed to Libanius). Devoted to the classical authors in both teaching and writing, Libanius tried to maintain the Greek tradition in the face of the rise of Rome, and as a friend of the emperor Julian he attempted to live and write as though Christianity did not exist, though he knew and esteemed individual Christians. His works give valuable pictures of contemporary education.

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LIBBY, WILLARD FRANK (1908–), U.S. chemist whose technique for determining the age of archaeological specimens by radiocarbon dating (*q.v.*) won the 1960 Nobel Prize for Chemistry, was born on Dec. 17, 1908, in Grand Valley, Colo. He received B.S. and Ph.D. degrees in chemistry from the University of California at Berkeley in 1931 and 1933 and taught chemistry there from 1933 until 1945. In 1941–45, while a member of Manhattan project of the U.S. corps of engineers, he helped develop the gaseous-diffusion method of separating isotopes of uranium. From 1945 to 1959 he was a member of the Institute for Nuclear Studies and the department of chemistry of the University of Chicago. During this period he and his students developed the carbon-14 dating technique and made notable contributions to radiochemistry and to electron exchange reactions in aqueous solution. In 1955 Libby became a member of the U.S. Atomic Energy Commission and served until 1959, when he became professor of chemistry at the University of California at Los Angeles.

He was a fellow of the Guggenheim Memorial Foundation in 1941 and 1951, and won the following awards: Research Corp. award, 1951; Chandler Medal of Columbia University, 1954; Willard Gibbs Medal, 1958; Albert Einstein Award, 1959. His publications include the book *Radiocarbon Dating,* 2nd ed. (1955).

LIBEL: *see* DEFAMATION.

LIBERAL ARTS. In the medieval university the seven liberal arts were grammar, rhetoric and logic (the *Trivium*), and geometry, arithmetic, music and astronomy (the *Quadrivium*). In modern U.S. colleges and universities the liberal arts include the study of literature, languages, philosophy, history, mathematics and science as the basis of a general or liberal education, as compared with professional, vocational or technical education. Sometimes the liberal arts curriculum is described as comprehending study of three main branches of knowledge: the humanities (literature and language, philosophy, the fine arts and history); the physical and biological sciences and mathematics;

and the social sciences. *See* EDUCATION, HISTORY OF; HIGHER EDUCATION; HUMANITIES. *See* also COLLEGE.

LIBERALE DA VERONA, ANTONIO (*c.* 1445–1526/29), a well-known Italian painter and illuminator, so called from his native city of Verona, where he is mentioned for the first time in 1465. Trained in Verona as a miniaturist and panel painter, he was influenced initially by Andrea Mantegna and by the Mantegnesque miniaturist Girolamo da Cremona, with whom he worked between 1467 and 1469 illuminating choir books for the monastery of Monte Oliveto in Tuscany. One of these is preserved in the sacristy of the cathedral at Chiusi. From 1470 till 1474 he was engaged on illuminations for the choir books of Siena cathedral, now preserved in the Piccolomini library there. He is last mentioned as being in Tuscany in 1476. Liberale's illuminations in the Piccolomini library are some of the finest and most ornate Italian miniatures of their time, and their calligraphic style and richly inventive imagery exercised a deep influence in Siena, above all on the paintings of Matteo di Giovanni and Francesco di Giorgio. About 1488 Liberale returned to Verona, where he executed (*c.* 1490) some frescoes in the Cappella Bonaveri in Sta. Anastasia, and was assessed for taxation in 1492. An altarpiece in the Kaiser Friedrich museum, Berlin, dates from 1489. Two of Liberale's most important paintings are panels of St. Sebastian in the Kaiser Friedrich museum, Berlin, and the Brera gallery in Milan. A notable group of paintings also exists in the Castelvecchio museum at Verona, and a panel of the "Death of Dido" is in the National gallery, London. Though the "Lamentation Over the Dead Christ" at Munich reveals Liberale as a forceful and expressive artist, his panel paintings seldom approach the quality of his illuminations, and in his later works he degenerates into a flaccid style, which had some local influence.

See R. Brenzoni, *Liberale da Verona* (1930). (J. W. P.-H.)

LIBERALISM. Liberalism is the creed, philosophy and movement which is committed to freedom as a method and policy in government, as an organizing principle in society and as a way of life for the individual and community. As a term it took its origins from the "Liberales," a Spanish political party in the early 19th century, but received its widest currency in the English language. As an idea and philosophy it predates its use as a term and can be traced back to the Judaeo-Christian-Greek intellectual world, along with the idea of liberty itself with which it is closely linked.

Confusion of Terms.—Some of the confusions about liberalism arise from the various stages of meaning through which the term passed during a history of several centuries, and from the wide diversity of uses to which it has been put. There were in the second half of the 20th century a number of political parties, in Great Britain, Italy, Germany and elsewhere, called by the name of the "Liberal party" or some variant of it; there was a party of the same name active in the politics of New York state; and even a Liberal International which served as a clearinghouse for liberal political movements throughout the world. But while these parties expressed the liberal outlook, that outlook was not limited to them. Their emphasis was on an economic program and policy which minimized state intervention and control, and which sought to carry out the philosophy of economic freedom under the difficult conditions of modern industrial organization. They thus expressed the outlook of a liberal capitalism on the defensive against various forms of socialism and communism on one side, and against conservatism and the totalitarianisms of the right on the other. "Liberal" political parties tended thus in practice to be caught between the upper and nether millstones, and their appeal was for that reason constricted to a middle ground position.

Yet liberalism as a dynamic philosophy was not at the end of the road. Just as it had its modern origin in the revolutionary movements attending the emergence of the business class to power and enlisted the most radical energies of the 18th and 19th centuries, so it showed a capacity to absorb many of the ideas of the revolutionary movements which challenged that class. What gave it this resiliency was its master idea of freedom as a method and a credo, this master idea being one of the great seminal revolutionary ideas of world history, not limited to any one economic program nor to the social power of any one class.

Liberalism is thus a basic approach to individual and collective living in the modern world. Its locus has been largely the west, since it has come out of the intellectual and institutional history of the great western nations. Its golden age may be dated roughly between 1750 and 1914; *i.e.,* between the era of the French *philosophes* and the start of World War I. But there is nothing inherent in it to limit it thus either in time or place. It proved pervasive enough to penetrate to some degree into every 20th-century society and social climate. It was associated with revolutionary movements in England, France, Germany and Italy, but it was also an active force in tsarist Russia, opposing both tsarist reaction and communist totalitarianism. It became a force in political systems as diverse as post-World War II Japan, Israel, Turkey, Greece and a number of Latin-American nations. It was an ingredient (the extent of which was widely debated) in the democratic socialist movements of Great Britain, Germany, France, the Netherlands, Belgium, Austria and the Scandinavian countries, and of the "welfare state" in the U.S. The term has also been applied to certain "liberal" elements of conservatism (as in the phrases "liberal Republicanism" or "liberal Toryism"), and to the internal struggles within the U.S.S.R. and the communist bloc, as in the phrase "liberal Communist elements."

History.—In its history as an idea liberalism is closely linked with the idea of liberty or of liberation, since the essence of the liberal idea is to aim at freeing—and thereby expressing and fulfilling—the human spirit in the individual. The idea can be pushed back to Socrates and his quiet insistence on holding to his truth even at the cost of his life. But it was the Stoics who, in an era of expanding world horizons, were able to break away from the idols of the organic tribe or city-state and universalize man as an individual, as something apart from his civic pattern. It was Christianity which, by giving a religious sanction to man's dignity as an individual, gave the movement to fulfill it a passionate quality.

In the early phases of modern Europe such 17th-century thinkers as Descartes, Milton and Spinoza served as the conduits through which the long-preparing stream of liberal thought came into European experience. Descartes shaped the instrument of rationalism; Spinoza forged the links between the life of reason and the values of an emerging liberal outlook; and Milton directed powerful assaults on the repressive engines of censorship, which kept men from access to what might be the liberating truth. Together they applied to everything, including the powerful institutions of state and religion, the shattering method of critical inquiry. The way had indeed been prepared for them by the Protestant Reformation, which stressed the role of individual private judgment even in religious concerns. But far more powerful was the scientific revolution, whose preparatory phase was the Renaissance, opening new vistas of time and place and turning men from the next world to the present one. The grand centuries of this scientific revolution were the 16th and 17th, when man's growing knowledge and control of his environment and the rise of a new economic class to exploit it revolutionized the life claims and life prospects of the intellectuals in Europe and those in whose name they wrote and spoke.

All these streams of thought and tendency converged in the great explosive movement called variously the Enlightenment (*q.v.*) or the Age of Reason (in France the age of the *philosophes,* in Germany the *Aufklärung*), which spread throughout western Europe and even across the seas into the new world, and whose great voices were Voltaire, Locke, Goethe and Thomas Jefferson, Rousseau, Hume and Kant, Diderot, Lessing, Adam Smith and Giovanni Vico, Condorcet, Montesquieu and Benjamin Franklin. These were the miners and sappers of the intellectual and institutional life of a society of feudal ties, monarchical and church authority and aristocratic and clerical privilege. They also had the prevision of a new intellectual and cultural structure the outlines of which were still obscure because the political, economic and social cement necessary to build the structure and hold it together was still in formation. That cement was to come with the great political revolutions (the English, American and French, which

took place within the century between 1688 and 1789) and with the rise to power of the new middle and business classes that used the revolutions to capture and consolidate their position. On their road to power they struck alliances—loose, often unconscious, but nonetheless real—with the intellectuals, each partner to the alliance using and being used by the other, and both of them helping to bring to fruition the master ideas of the liberal system of thought.

Leading Concepts.—To list some of these master ideas is an artificial process, since they were tied together in an ideological web, and each loses much of its meaning when torn from this web. Yet even a listing may suggest the richness of the intellectual armoury of liberalism.

Central to the whole is the idea of liberty itself—not absolute liberty ("No government allows absolute liberty," wrote Locke), but the maximizing of the individual's freedom to think, to believe, to express and discuss his views, to organize (associate) in parties, to find employment, to buy and sell commodities (including his own labour) freely and to keep the rewards, to choose his rulers as well as his form of government and to change both—by revolution, if necessary. So crucial is the idea of liberty that liberalism might be quite summarily defined as the effort to organize liberty socially and to follow out its implications.

As for where this right to maximal liberty comes from, liberalism's answer was nature. "The laws of Nature and of Nature's God," as Thomas Jefferson denominated them in the American Declaration of Independence, formed the true religion of liberalism, and on it they built what the 20th-century U.S. historian Carl Becker called "the heavenly city of the 18th-century philosophers." The 18th century carried on a love affair with nature, in religion, law, politics, metaphysics and landscape painting. Rousseau in France and Locke in England were the principal 17th- and 18th-century protagonists of the idea that men had rights rooted in nature, which governments must protect and which must be defended even against government.

Bills of rights, petitions of right, declarations of the rights of man and of the citizen—these became the watchwords of the era. Since they were based on nature and on natural law, they were universalized, abstracted and made absolute—"indubitable, inalienable, and indefeasible," as the Virginia constitution put it in describing the natural right of revolution. Actually this notion of natural law came less from theology than it did from Sir Isaac Newton and his colleagues in the scientific revolution, who showed that the operation of the universe could be explained rationally in terms of the laws of nature without bringing in any external divine intervention.

As a result even God became nature's God, and religion was universalized into a deism, thus diluting the rigours of revealed religious certitude and emphasizing tolerance toward the variety of forms in which nature's God might be worshipped. The Renaissance, the scientific revolutions, the march of technology, the rising living standards, all contributed to a growing rationalism in thinking and attitudes and to a secularism of belief. The axis of men's concerns shifted from the next world to this one, and from what had been laid down by tradition in the past to what men could achieve for themselves in the present and future. In place of the idea of sin men began to talk of the idea of progress, in place of predestination they caught a glimpse of the vision of men's perfectibility. Everything seemed possible in the "best of all possible worlds." The test of institutions became the question not of whether they were in the service of God but whether they ministered to the happiness of men.

Armed with these weapons of secularism, progress and happiness, liberalism was able to turn a withering fire on institutions. "Man is born free," wrote Rousseau in the *Contrat social*, "yet he is everywhere in chains." And in *Émile:* "God makes all things good; man meddles with them and they become evil." It was a basic assumption of the liberal thinkers that man is endowed with reason and goodness, and that only the institutional frame into which he is born corrupts and enslaves him. The enemy was custom, tradition, institutions, social habit. The French *philosophes,* the English utilitarians, the philosophic radicals, the Italian patriot-intellectuals were the "angry young men" of their time, blasting away at the establishment of their day—the church, the feudal order, the aristocratic classes, the dynastic state, the educational system, the censorship. Always they sought to lift from men what Jefferson called the "dead hand of the past."

If it was man's meddling with the natural order that caused all the mischief, then it follows that the best human course is to leave things alone. This powerful nexus linked the liberal intellectuals with the emerging business class, who wanted free markets, the removal of crippling restrictions upon economic activity and the chance to amass wealth and property.

But *laissez faire* (*q.v.*) in itself was not the whole of the liberal program. To it was added republicanism, popular sovereignty and education—especially the last. The removal of governmental restrictions and the toppling of tyrannical institutions would provide the freedom for reason to function: but reason needed tools with which to function, and education would provide them. Since the liberals believed in man's goodness, they believed also in his perfectibility, and education was the instrument by which it could be furthered. Some of the more realistic liberal thinkers, however, saw the darker side of the moon as well: that if men were by nature good, they were also ruled by ambition, greed for power and the political passions. Hence it was necessary to curb the majority will by a concern for the protection of minorities. And it was especially necessary to provide in government for the separation of powers (*q.v.*), so that the legislative and executive powers would not be fused into a single tyranny, and the judiciary could remain independent of both.

Thus the liberal image of the state came to mirror the equilibrium physics that the scientific revolution had made familiar. And the liberal image of the human mind came to stress the primacy of self-interest as a drive (egoism), the primacy of reason as an instrument (intellectualism) and the ultimate value of individual efforts toward self-realization (progress, happiness) or of individual nonefforts (*laissez faire,* quietism) in a state of nature.

Men had by the mid-20th century become more aware of some of the weaknesses of this liberal outlook that characterized the vanguard thinking of liberalism's golden age. They knew about its oversimplifications, about its atomism, its primitivism, its utopianism, its naïve cults of nature, progress and happiness. But it is well to remember that in its emergence liberalism was an exciting new movement of thought that released the energies and enlisted the loyalties of men. For a historic moment they caught a vision of human possibility, and this vision armed them for their encounters with what they regarded as the powers and principalities of darkness.

The Battlefields of Liberalism.—These encounters were fought out chiefly on five national battlefields—Great Britain, France, Italy, Germany and the United States. In each country liberalism as a political and social movement took on the salient aspects of the national character.

Great Britain.—In Great Britain, the birthplace of modern liberalism, it moved from the revolution of 1688 to the 20th-century welfare state without grand generalized formulations, without sharp breaks and with a minimum of violence; it moved mainly by gradual and piecemeal yet organic and continuous reforms, so that each generation absorbed the gains and victories of the previous one. In France the nobility fought tenaciously for its privileges, and the Bourbon monarchy—after making concessions to the revolutionary clamour—finally threw in its lot with the clergy and nobility and was overthrown; in England, on the other hand, from the time of Magna Carta, the aristocracy fought for its own privileges, which were then generalized into the liberties of all classes and men; it was able to retain its vigour through the 18th century and continued to absorb into itself elements from business, the professions and even some of the leaders of the labour movement. The English monarchy, after a futile effort under the Tudors and Stuarts to set up absolutism against the growing pressures for parliamentary rights, accepted its modern constitutional position as spokesman and symbol of the continuity of British history. This continuity was able to absorb the parliamentary reform acts, the religious toleration acts, factory legislation, free

trade, educational reform and the transformation of the British empire into a commonwealth of federated autonomous states.

Many of these reforms were accomplished under the 19th-century Whigs and later under the Liberal leadership of William E. Gladstone and David Lloyd George; but some were accepted and even furthered under Tory governments, while some of the unfinished work of liberalism had to wait for Labour governments under the rubric of the initial work of democratic socialism. The moving spirits in the intellectual history of British liberalism, after Locke and Adam Smith, were Jeremy Bentham and the utilitarians; James Mill and his school of philosophic radicals; John Bright and Richard Cobden and the Manchester free-trade group; John Stuart Mill, who sought to develop a political and economic theory which would serve as a basis for the fulfillment of the individual within a social frame; the liberal philosophical school of T. H. Green and L. T. Hobhouse; and the sharply different school of Harold J. Laski, which set for itself the same goals as the liberals did but was contemptuous of liberal methods and called for socialist means to attain the humanist ends of liberalism.

It is within the British historical frame that the sequence of stages in the development of liberalism as a pattern of thought and social action can be seen with greatest ribbed clarity. The first stage, mainly one of intellectual preparation, was in essence a revolutionary one, justifying and even preaching the "natural right" of revolution, more so in the French setting than in the British, but with some revolutionary elements in every national setting. The second stage was that of middle-class constitutionalism, which laid the foundations of representative government and established the dominance of the business middle class. The third, closely related to this, became known as "classical" liberalism. Its champions in England were the classical economists, from Adam Smith through David Ricardo, Thomas R. Malthus and Nassau Senior; its banners were those of *laissez faire*, free trade and the weak state. This stage in turn gave way to the stage of democratic liberalism, when *laissez faire* was replaced by a stronger and more affirmative state, when trade-union organization brought with it a shift of the class base for liberal militancy and when the emphasis shifted to mass education ("Now we must educate our masters," as the phrase went after the Reform act of 1832) and to economic security. This stage in turn developed into welfare (or social) liberalism, which operated with large-scale governmental intervention for social security and created the mixture of welfare capitalism and welfare socialism applying (with a differing emphasis on the ingredients) in the 20th century in most of western Europe and the United States.

France, Italy and Germany.—In the case history of French liberalism, the first stage was far more revolutionary than in Great Britain, and led to the "liberty, equality and fraternity" of the French Revolution, and the violence and bitterness as well as the sweeping reconstructions of that movement. In the first half of the 19th century the French experimented with middle-class liberalism, in the intervals of further revolution and reaction. With the advent of the third republic, Leon Gambetta became the spokesman for a democratic liberalism (the French came to call it, characteristically, "radical socialism"), as Alexis de Tocqueville had been its precursor, both of them affirming a faith in the inevitable triumph of the democratic mass through the leverage of political reform. Yet the history of French liberalism under the third and fourth republics was a stormy one, with its effectiveness largely crippled by governmental weaknesses and the slowness of constitutional reform.

In the Italian case the emergence of liberalism was almost wholly linked with the rise of the movement for national liberation and unity, and its champions were therefore Cavour, Garibaldi and Mazzini, especially the last, for whom the three basic pillars of liberalism were universal suffrage, free education and the security of having work to do. But there was no class base in Italy broad enough or strong enough to move from Mazzini's vision of a liberal democracy to the actuality of democratic liberalism, and Italy had to go through the bitter experience of class war, followed by a fascist interlude, before it could move toward a telescoped version of the democratic and welfare stage of liberalism.

The German experience was even stormier. National unification, when it came, carried with it an authoritarian monarchy; the middle-class and democratic phases of liberalism were elided (the German middle class supported the authoritarian state, as it later supported Nazi totalitarianism); the army caste and the big landowners proved to be reactionary forces; paternalistic welfare legislation was pushed through under Bismarck, in order to anticipate and defeat the emerging socialist energies; the Weimar Republic, in the interval between World War I and Naziism, expressed a constitutional liberalism which lacked a strong leadership, a strong class base and a civil liberties tradition, and it fell victim to the Nazis. In West Germany, after World War II, a liberal reawakening went along with an economic revival. The West Germans, who had borrowed the technology of the Industrial Revolution from the British without their accompanying liberal democracy, attempted to telescope into a brief period the historic phases leading to a democratic and welfare liberalism.

The United States.—In the case of the United States the obstacles that loomed so large in the path of continental liberalism, especially in Germany and Italy, were largely absent. There were no feudal institutions to overthrow, no encrusted traditions, no entrenched landowning aristocracy or monarchy, no oppressive burden of clericalism. The revolution against British imperial controls, once achieved, laid open a path for U.S. development in its own terms. Born in the early centuries of the liberal impulse in Europe, and with its own characteristic institutions shaped during the liberal Enlightenment, the U.S. became the most striking expression of a liberal government and society.

Since the United States is so largely a middle-class society, and since liberalism began and flourished mainly as a middle-class movement, it is not surprising that it should have found its greatest successes in America, from the middle-class liberalism of the constitution itself, through the democratic liberalism of Thomas Jefferson, Andrew Jackson and Abraham Lincoln and the progressive liberalism of Woodrow Wilson, to the welfare liberalism of Franklin Roosevelt, Harry Truman and John F. Kennedy.

International Character.—To examine how the liberal movements fared in each of these major countries should not, however, obscure the fact that it was a broad movement of ideas and programs that cut across national boundaries. Its great landmarks were the English revolution of 1688, the American Revolution, the French Revolution, the failure of the 1848 revolutions on the continent (the failures in the history of liberalism are as important as the successes), the unification of Italy, the liberation of the serfs in Russia, the American Civil War, the victory of the *Dreyfusards* in France, the emergence of the British welfare state, the U.S. New Deal and the victory of civil rights in the supreme court school decision of *Brown* v. *Board of Education*. Whenever in modern history and wherever in the world men have shown the capacity to act together to ensure the welfare of the many by methods that fortify the freedom of the individual and enable him to fulfill his potentials, there liberalism as a whole has won a victory. The U.S. experience, for example, came out of the liberal revolutionary energies of Europe, and its success in turn strengthened the liberal spirit in Europe and caught the imagination of the world. On the other hand, the persistence of the problem of Negro status in America, the cyclical fluctuations of prosperity and depression in the capitalist economies of the west, the failure of nerve on the eve of Italian and German fascism—these events cast doubt on the validity of the liberal idea and the survival value of its program.

Liberalism in the Second Half of the 20th Century.—A number of 20th-century observers spoke at mid-century of the decline of liberalism, both as a system of thought and as an organization of government and society, but they may have been reading a funeral service over a corpse that refused to die. It might certainly be said that the classical and largely negative phases of liberalism had gone with the winds of history. What was not clear was whether this applied also to the democratic and welfare phases of the affirmative liberal state.

The central dilemma of liberalism is that it must emphasize the method of freedom, which tends toward the diffusion of the national energies and the fragmentizing of the collective purpose;

at the same time it must compete with collectivist creeds and totalitarian systems for the allegiance of the world's uncommitted peoples. To meet this dilemma, 20th-century liberalism tended to make freedom responsible rather than anarchic; to move away from the relativism and pragmatism with which the later historical liberalism had been associated; to rekindle the fires of religious belief; and increasingly to invoke equality as a goal and slogan, as well as liberty. There were in the second half of the 20th century many liberals who would agree with Hobhouse's remark that "liberty without equality is a name of noble sound and squalid meaning" (L. T. Hobhouse, *Liberalism,* Oxford University Press, Inc., New York, 1911). Hence the emphasis on the economic and social context within which the struggle for freedom is set, and hence also the experiments with economic regulation and controls which made some of the champions of classical liberalism prophesy that democracy was traveling the "road to serfdom."

More striking than the signs of decline in liberalism was the fact that, in the face of battering from wars, depressions and the attack from totalitarianisms of the right and left, liberalism was able to survive as it had. It had to meet and absorb drastic changes within capitalism itself. It encountered communism, fascism and those intensely nationalist and antilibertarian internal movements which have been called the "radicalism of the right." It came under fire from the revolutionary nationalist movements of the middle east, the far east and Africa, which associated European and American liberalism with the imperialism of some of the western powers.

Its ordeal was all the more difficult because the fanaticisms which accompanied the various post-World War II independence movements everywhere more and more excluded any middle ground. This was particularly true of the colonial-nationalist movements in Africa and the middle east: in the name of liberation, in many instances, they inaugurated programs of racist chauvinism, economic constriction and political intolerance. Heirs to the liberation tradition of the west, they did not always apply it. Yet it was not clear whether these movements, even after the achieving of independence, might not have to grapple with the problems of freedom, and might not then have to rediscover some of the liberal solutions that had been slowly recognized, after centuries of political experiment and experience, and at a high cost in courage.

What still kept liberalism a viable system were some of the elements that made possible an open society and a relatively good life: the "career open to talent"; the principle not of equality as such, but of access to equal opportunity for all; the basing of decisions on consent, so that when crises come the people as a whole respond to them in a more organic way than the imposed response under totalitarianism; the winning of ever greater economic security without the sacrifice of freedom; the channeling of what might otherwise become deep class and social conflicts into political conflicts, whose results are accepted even in defeat; and finally, as at the start, the principle that every man has in him a potential which he must have a chance to fulfill.

See DEMOCRACY; INDIVIDUALISM; NATURAL RIGHTS; *see* also references under "Liberalism" in the Index.

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(M. LR.)

LIBERALISM, THEOLOGICAL, is a form of religious thought that establishes religious inquiry on the basis of a norm other than the authority of tradition. A representative expression of this mode of thought is found in the writings of the German Protestant theologian Friedrich Schleiermacher (*q.v.*), who is commonly spoken of as the father of modern theology. Schleiermacher is a summit point in the history of liberal theology, but understanding of the movement becomes restricted when confined to this phase of its development. Theological liberalism then tends to be identified exclusively with romanticism.

Origins.—The defining trait of the liberal character is a will to be liberated from the coercion of external controls and a consequent concern with inner motivation. So conceived, the liberal temper of mind appears as early as the 8th century B.C. in biblical history, and even among Egyptians antedating the Hebrew writers. It is evident in modified form in the Greek theologians Clement of Alexandria and Origen. This temper of mind erupted among certain movements in the late medieval period, becoming more pronounced in the time of the Renaissance and the Reformation. The liberal impulse is especially evident in Renaissance curiosity about natural man and its zeal for appreciating the human spirit. However, the note of liberation was the exception rather than the characteristic expression of Renaissance thinking. In men like Erasmus and Sir Thomas More, or even in Michelangelo, a conforming temper of mind may be detected along with their innovating talents. The Reformers presented a similar ambiguity, lifting up the freedom of man to assert his rebellious will, yet affirming the necessity of God's grace to recall him from his sin. Nevertheless, the authenticity of real selfhood was given in this Reformation view of man, despite the notion of depravity that denied any ultimate goodness to human nature save as it is redeemed through the Holy Spirit.

The modern consciousness first took clear and decisive form in Leonardo da Vinci, Copernicus, Francis Bacon, Galileo and Johannes Kepler. The modern period of liberalism began in earnest with Descartes, in whose philosophy, especially in his *Discourse on Method* (1637) and *Meditations* (1641), there occurred a radical shift toward the anthropocentric imagery that was to become formative in modern thinking (*see* DESCARTES, RENÉ). Furthermore, in designating the thinking self as the primary substance, from which belief in the existence of other realities were to be deduced (except that of God), Descartes initiated a mode of thinking that was to remain in force through the 19th century and to lay the ground for what were to become the presuppositions of this modern consciousness, namely: (1) confidence in human reason, (2) the primacy of the person, (3) the immanence of God, (4) meliorism, or belief that human nature is improvable and is improving.

Enlightenment.—The modern historical period of liberal religious thought embraces three stages: The first phase, designated rationalism, or the Enlightenment (*see* ENLIGHTENMENT), extends from about the middle of the 17th to the middle of the 18th century, reaching a terminal point in Hume's *Natural History of Religion* (1757). Along with Descartes, Sir Isaac Newton is a towering figure, whose mathematical and metaphysical achievements provided the image of nature that was to dominate scientific and philosophical thinking for more than two centuries (cf. the *Principia,* 1687). This image, giving a mechanistic turn to the notion of orderliness in nature, posed the problem of faith in a distinctive way, and, in large measure, determined the strategy of thought by which liberal theologians subsequently addressed themselves to that problem. Other dominant figures who influenced religious thought in this period were Spinoza, Leibniz, Lessing, the Cambridge Platonists (*q.v.;* especially Ralph Cudworth and Henry More), John Tillotson, John Locke and Samuel Clarke. This phase reached its climax and point of decline in the work of the deists (*see* DEISM), of whom Matthew Tindal and John Toland are representative.

If Descartes and Newton were the architects of this rationalist period of liberalism, John Locke (*q.v.*) was its master builder. He, more than any other thinker of the period, put its theories and ideas to work, in their application both to human understanding (cf. *Essay Concerning Human Understanding,* 1690) and to the understanding of the Christian religion (cf. *The Reasonableness of Christianity,* 1695). Though an empiricist in his theory of

knowledge, Locke retained a vivid sense of "the judgment of Holy Scripture" upon human reason, even as he insisted upon heeding the claims of one's own integrity in the use of reason. In reading Scripture, he wrote, the integrity of one's own understanding is as much involved as the hearing of the Word. And the reasonableness of the Word of God, he insisted, must be apprehended so that the reasonableness of man's own understanding can be brought into correlation with it.

Locke was among the first to formulate the essence of Christianity on the basis of its reasonable core. This concern with distilling the essence of faith was to become a prevailing strategy of thought in liberalism, though it was not always the rationalistic understanding of reasonableness that was employed.

Romanticism.—The second stage of theological liberalism, the romanticist phase, extends from the late decades of the 18th century to the end of the 19th century. This period is marked by the discovery of the uniqueness of the individual and of access to its concrete reality through individual experience. The individual person was regarded as a threshold opening into the infinite reality. To the notion of universal order, so dominant among rationalists, following Newton, were thus added the notions of individuality and diversity of experience, from which was to arise the idea of historical relativism. The uniqueness of the person and the consequent significance of individual experience as a distinctive source of infinite meaning placed a premium upon personality and upon individual creativity exceeding every other value. The release of the individual person from every form of coercion, save the coercion of his own individual will and reason, thus loomed as a prior spiritual event. The American and French Revolutions provided the symbol of this spirit of independence and dramatically exemplified it in political action. Any list of the dominant voices of this era of liberalism must include, along with those of Rousseau and Kant: Goethe, Schiller, Herder, Fichte, Schelling, Hegel and Schleiermacher; Wordsworth, Coleridge and Carlyle; William Ellery Channing, Horace Bushnell and Ralph Waldo Emerson; and later, R. Hermann Lotze.

Jean Jacques Rousseau and Immanuel Kant (*qq.v.*) were the architects of this period of liberalism; in theology, Schleiermacher was its master builder. Rousseau, in his *Confessions,* according to Kant, "discovered universal human nature" and thereby pointed to "the peculiar law to which the inner life responds" (Ernst Cassirer). In this he contrasts with Newton, "who discovered the order and regularity in the universe around us." Kant, it was, however, who in his *Critique of Pure Reason* (1781), *Critique of Practical Reason* (1788) and *Critique of Judgment* (1790) demonstrated the primacy of inner experience in the realm of faith and fashioned the strategy of thought that was to accord with its presuppositions. Schleiermacher was at once responsive and rebellious toward Kant. Philosophically he was more attuned to Plato and Spinoza (cf. *On Religion: Speeches to its Cultured Despisers,* 1799; and *Monologues,* 1800); but, theologically, he was constrained to work within bounds set by the Kantian *Critiques.* This impelled him to centre attention upon the religious consciousness as the source of data for religious inquiry (cf. *The Christian Faith,* 1821–22). Unlike Kant, however, who saw in moral will the clue to man's higher nature, Schleiermacher seized upon the feeling of absolute dependence as being simultaneously that which "signifies God for us" and that which is distinctive in the religious response. Thus, self-consciousness in this deep religious sense becomes God-consciousness. The Christian, said Schleiermacher, is brought to this deeper vein of self-consciousness through the man, Jesus, in whom the God-consciousness had been perfected. Jesus Christ could thus be represented as the archetype of human fulfillment as well as Redeemer, in relations with whom man's God-consciousness is evoked and strengthened. This nurture of God-consciousness in relation to Jesus Christ, Schleiermacher believed, is what led to the creation of the church as a fellowship of believers. Schleiermacher had said, "In . . . Christianity the consciousness of God is always related to the totality of action states in the idea of a Kingdom of God." In so saying, he was pointing up the teleological character of the Christian religion. Albrecht Ritschl (*q.v.*) was to seize upon this suggestion and to make it formative in this theological system. Thus, the ethical note became dominant in Ritschlian theology and influenced subsequent liberal theology in the direction of stressing moral idealism.

Ritschl, the dominant figure in liberal Protestant theology after Schleiermacher, became the centre of a school of thought known as Ritschlianism. Wilhelm Herrmann and Adolf von Harnack (*qq.v.*), the most prominent of the Ritschlians, influenced American liberal theology more than Ritschl. Harnack's *What is Christianity?* has been called the classical statement on liberal Christianity. In France, Auguste Sabatier (*q.v.*), also a Ritschlian, was influential.

Liberal theology in America had its own indigenous sources as well, though, in part, they can be traced back indirectly to the influence of Kant. Horace Bushnell (*q.v.*), the most significant of the American liberal theologians, was influenced at an early age by Samuel Taylor Coleridge's *Aids to Reflection,* through which he encountered the "practical reason." His *Christian Nurture* (1847) and *God in Christ* (1849), containing the "Dissertation on Language," are landmarks in American liberal theology. Next to Bushnell, the most representative U.S. liberal theologians were Channing, William Newton Clarke, Borden P. Bowne and, especially, Walter Rauschenbusch (*q.v.*), leader of the Social Gospel movement.

Modernism.—The modernist phase of theological liberalism, dating from the mid-19th century through the 1920s, is marked by the discovery of the significance of historical time and an emphasis upon the notion of progress. The decisive events stimulating these interests were the Industrial Revolution and the publication of Darwin's *Origin of Species* (1859). The romantic movement had awakened a new historical interest, and, through Herder, human history came to be understood as natural history (Rudolf Bultmann); but, following the acceptance of the theory of evolution, the historical interest assumed greater proportions, giving rise to a concern with development of new forms in various fields. In the wake of this new interest, studies in the history of religions, of religious doctrine, of social and religious institutions, morals and customs began appearing. Science, in co-ordination with technological industry, intruded into western culture, particularly in the United States, a new and formidable drive toward modernization. This gave impetus to stressing the primacy of the present. There thus emerged a determined course among modernists to bring religious thought into accord with modern knowledge and to direct their zeal toward solving issues raised by modern culture. It was during this period that philosophy and the sciences assumed new importance in the defining of theological method, which progressively changed the character of theology. The study of Christian doctrine was transformed into the psychological study of religious experience, into the sociological study of religious institutions and customs and the philosophical inquiry into religious knowledge and value. Some of the men who helped shape this modernizing phase of liberalism were Charles Darwin, Thomas Huxley, Herbert Spencer, John Fiske, E. B. Tylor, William Graham Sumner, G. Stanley Hall, William James, John Dewey, Max Weber, Ernst Troeltsch, Edward Scribner Ames, George Coe, Shailer Mathews and Harry Emerson Fosdick.

Summary.—Viewing the whole of the modern period of theological liberalism, from the 17th century to the present, the lines of development and reaction appear to form a single drama of Christian thought. Four cycles of change and reconception become apparent, three of them defining theological liberalism through the 19th century, the final one describing the type of Protestantism emerging in the 20th century. The first cycle marks the triumph of reason in religion and a gradual relinquishment of the doctrine of revelation. The second cycle marks transitions in theological thought in which the religion of ideals progressively displaces the doctrine of redemption. The third cycle marks developments in which the authority of the Bible in theology wanes as philosophy and various sciences assume ascendancy in the interpretation of religion. The fourth cycle marks a renewal of concern with the major themes of the Christian faith, following from a critique of certain historical liberal presupposi-

tions and theological methods (*see* NEO-ORTHODOXY).

See also ENGLAND, CHURCH OF: *Liberalism or Modernism;* MODERNISM, ROMAN CATHOLIC; PHILOSOPHY, HISTORY OF.

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(B. E. ME.)

LIBERAL PARTY (BRITISH), in Great Britain the lineal successor of the historic Whig party. (*See* WHIG AND TORY; LIBERALISM.) The party has always included various schools of thought, united only by a desire for progress toward emancipation. The following formulation probably covers all shades of Liberal opinion: Liberalism is a belief in the value of human personality, and a conviction that the source of progress lies in free exercise of individual energy; it produces an eagerness to emancipate all individuals or groups so that they may freely exercise their powers, so far as this can be done without injury to others; it therefore involves a readiness to use the power of the state for the purposes of creating the conditions within which individual energy can thrive, of preventing abuses of power, of affording to every citizen the means of acquiring mastery of his own capacities and of establishing equality of opportunity. These aims are compatible with an active policy of social reorganization, involving a great enlargement of the functions of the state. They are not compatible with socialism, which, strictly interpreted, would banish free individual initiative and responsibility from the economic sphere.

The evolution from Whiggery to Liberalism extended roughly from the year of Waterloo (1815) until the second half of the 19th century. Liberals and Radicals (*see* RADICAL) came into the house of commons to strengthen, and sometimes to become impatient with, the Whigs. After the Reform act of 1832 the Whig aristocrats may still have manned the ministries, but Liberals and Radicals, composed of the industrialists, nonconformists, Benthamites and economists, were the driving force. By 1839 Lord John Russell repeatedly referred to "the Liberal party" in his daily letters to Queen Victoria. The history of the party in these years can be gleaned from the lives of its great political figures, Lord Melbourne, Russell and Lord Palmerston, and its ardent social reformers, such as Richard Cobden and John Bright. The foundations for later social reforms were laid in legislation covering factory employment, administration of the poor law, public health and the police. The conversion of the party to free trade in 1846 under the pressure of the Anti-Corn-Law league meant the downfall of protection.

The Gladstone Period: 1865–95.—A second period (1865–95) was the Gladstonian era, so dominated by the personality of William Gladstone that Liberalism almost became Gladstonianism. In this period the catchword "peace, retrenchment and reform" pre-eminently expresses the character of Liberal policy. Gladstone was profoundly pacific: in a famous speech at West Calder (1878) he laid down the principles of foreign policy in terms that almost anticipated the ideas of the League of Nations. He and his foreign ministers strove to avoid foreign entanglements; "splendid isolation" became the note of British foreign policy. Nevertheless, Gladstone retained a passionate sympathy with struggling nationalities (*e.g.*, in the Balkans). He had little interest in imperial affairs and distrusted the school of radical imperialists, represented in this period by W. E. Forster, Sir Charles Dilke and Joseph Chamberlain. He disliked imperial expansion; held aloof from the race for African possessions; adopted a magnanimous but misunderstood policy of withdrawal in South Africa; and though he was drawn into Egypt, hated the entanglement and bungled the situation. In India, under Lord Ripon and Lord Lansdowne, the first steps were taken toward a system of self-government. Gladstone's main interests lay in finance, where he established exacting standards of economy under treasury control, and in constitutional reform. From 1868 to 1894 he was preoccupied with Ireland, where he strove to heal an agelong sore. This crusade severed from the Liberal party most of the Whig aristocrats who had hitherto clung to it and who now united with the Radicals under Joseph Chamberlain (*q.v.*) to form the Liberal Unionist party, which in 1895 joined the Conservatives in a coalition (*see* CONSERVATIVE PARTY [BRITISH]). Gladstone was justified by events, however. One aspect of his Irish policy—the Land acts—involved a sweeping departure from *laissez faire* in the establishment of rent-fixing courts. The period of his dominance also saw the establishment of a national system of education (1870); the introduction of ballot voting (1872) and the enfranchisement of the agricultural labourers (1884); the legalization of trade unions (1871); a reconstruction of the army and the abolition of purchase of commissions; a complete reorganization of the judicial system; and the abolition of religious tests in the universities.

Decline and Revival.—Before the end of the Gladstonian regime the long ascendancy of the Liberal party was waning. Apart from the short and embarrassed ministry of 1892–95, there was a continuous period of Conservative government from 1886 to 1905. A fresh inspiration was needed. An educated democracy was beginning to resent its position in the industrial order. The service of liberty demanded not merely the removal of restrictions but the creation of positive conditions for the healthy development of individual faculty. The stir of ideas led, on the one hand, to the organization of the Labour party and, on the other, to a steady change in the orientation of the Liberal party. The third period in the history of liberalism (1895–1914) was pre-eminently a period of social reorganization.

The Liberals returned to power with an overwhelming majority in 1906, largely as a result of Chamberlain's campaign against free trade and in favour of tariff reform, and the next eight years were perhaps the most strenuous in the history of British politics. The whole period was overhung by the menace of Germany, and though Sir Edward Grey strove resolutely for peace, Britain was forced out of its traditional isolation and drawn into the vortex of European politics. At the same time a remarkable reorganization of the navy and the army was carried out. Without Lord Haldane's work in the creation of the expeditionary force, of the territorial army, of the imperial general staff and of the officers' training corps, Britain could not have played its part in the coming struggle. In imperial affairs the action of Sir Henry Campbell-Bannerman (who first gave currency to the phrase "British Commonwealth of Nations") in granting autonomy to the Boer states made possible the Union of South Africa, and in India the Morley-Minto reforms marked a long advance toward self-government. The self-governing members of the empire were drawn closely together—and in the series of conferences which began in 1907 their representatives were for the first time admitted to the arcana of foreign policy and imperial defense. But the main work of these years was one of social reorganization in a series of novel enactments that included universal workmen's compensation, a system of old-age pensions, state insurance against sickness and unemployment, the establishment of a network of labour exchanges, the institution of trade boards for the fixation of wages in sweated trades, the creation of a large system of small holdings, and the conferment upon municipalities of large powers and duties for housing and town planning. A system of progressive taxation of the rich, through graduated income tax, super-tax and death duties, provided the money required. The taxation involved aroused bitter opposition, which culminated when the budget of 1909 not only tightened the screw at many points but threatened an attack upon the existing land system through taxes on land values. Its rejection by the house of lords led to an acute constitutional crisis, which (after two general elections in 1910) brought about the destruction of the lords' veto by the Parliament act (1911). The first use made of this act was to pass the Home Rule bill for Ireland, against fierce opposition.

World War I and After.—The Liberal party had never been

more confident than in 1914, but the war and the events that followed shattered it. The party was hopelessly split when, in 1916, David Lloyd George displaced H. H. Asquith from the premiership, and when at the election of 1918 those who stood aloof from Lloyd George were destroyed by the "coupon"—an endorsement given by the prime minister and Andrew Bonar Law, the Conservative leader, to candidates guaranteeing to support the coalition. The small remnant of independent Liberals were so obsessed by their grievance that they made themselves appear querulous and negative; they had no constructive policy to preach, and this was a grave weakness at a time when millennial expectations were being created and immense promises made to the electorate. After the breakup of the coalition in 1922, there were for a time two mutually distrustful Liberal groups in parliament. They reunited in 1923 to resist a new attack upon free trade and returned as a solid body of 158. But they were substantially smaller than the Labour party, and with no party having a majority, their tactical blunder of putting the Labour party into office without conditions ended in the disaster of the election of 1924, which returned only 40 Liberal members to the house of commons, though with 3,000,000 votes the party would on a proportional basis have had 110. Renewed internal dissension regrettably gave "a windy night a rainy morrow." On the occasion of reunion Lloyd George had created some bitterness by refusing to put into a common fund the large financial resources separately acquired by him in earlier years. The bitterness was intensified in 1926 when a difference between Asquith and Lloyd George in regard to the general strike of that year led to a formal excommunication of the latter, which the bulk of the party refused to accept.

The continued mental vigour of the party was indicated by the production of three reports, *Coal and Power* (1924); *The Land and the Nation* (1925); and *Towns and the Land* (1926). The year 1927 saw an improvement in the party's position. By-election successes seemed to portend growing influence and, with Sir Herbert (later Viscount) Samuel in charge of the party organization, reunion was effected with Lloyd George and his followers. One of the first results was the setting up of a committee to advise on industrial policy; it included such outstanding authorities as Sir Herbert Samuel, Walter (later Lord) Layton, J. M. (later Lord) Keynes and Philip Kerr (later marquess of Lothian). The committee produced *Britain's Industrial Future,* often referred to as the Liberal yellow book, in Feb. 1928, and it may fairly be claimed that this report exercised far-reaching influence on the later political thought and action of all parties. In a sense it was a formal interment of *laissez faire,* though that doctrine had been extensively diluted in Liberal practice for nearly a century. The report represented an explicit acceptance of the responsibility of the state for the general control of the nation's economic life through credit and budget policy, and the national ownership of certain services or industries which both by the amount of capital they required and the number of men they employed were of primary importance in securing stability of employment.

In the general election of 1929, 59 of the 512 Liberal candidates were elected. The Labour party had a plurality of 26 seats over the Conservatives and took office with a promise from Lloyd George of support for measures which were not socialist in principle. In the short period before the collapse of the government and the formation of the national government in Aug. 1931, the unemployment problem overshadowed everything and the Liberal party was critical of the government's failure to produce a constructive policy.

In the national government the Liberal party was represented in the cabinet by Sir Herbert Samuel and the marquess of Reading, and in the government formed after the general election of 1931 Sir Herbert Samuel, Sir Donald Maclean, Sir Archibald Sinclair and Sir John (later Viscount) Simon were among those who held office. But the old divisive tendencies were again at work; Sir John Simon had already nailed protectionist colours to his mast, while the party as a whole remained unalterably attached to free trade. In the new house of commons Sir Herbert Samuel had a following of 33 and Sir John Simon of 35. When in 1932 the government took steps to introduce a general tariff, Sir Herbert Samuel and his followers were pressed and consented to remain in the government, while being entitled, by a startling constitutional innovation, to speak and vote against protection. But there was no holding them when the Ottawa agreements, which appeared to set the seal upon protection as a permanent fiscal system, were signed. Sir John Simon and his Liberal Nationals remained within the government and thereafter played a role indistinguishable from that of the Liberal Unionists half a century earlier. The Liberal party did not go formally into opposition until the following year, actuated by what it regarded as the government's complacent ineffectiveness in dealing with the enduring problem of unemployment. It was further critical of the government's failure either to secure any measure of general disarmament or to maintain parity of air power; it also doubted the sincerity of the government's devotion to collective security. But the apparently wholehearted acceptance of collective security and all that it implied in the way of sanctions against aggression carried the government back to power in 1935 with a vast majority; only 17 Liberals were returned to the house in the general election of that year. This resounding defeat was followed by a partial reorganization of the party machine and the institution of a democratic assembly of the rank and file.

World War II and After.—Between 1935 and the outbreak of World War II, foreign affairs dominated parliament. The Liberal party, having urged general disarmament until it was a lost cause, became ever more critical of a government that started by shocking public opinion with the draft Hoare-Laval proposals for ending the war in Abyssinia and then, by a series of retreats before aggression. Under the leadership of Sir Archibald Sinclair, Liberals found themselves protesting with Winston Churchill against failure to provide adequate defense forces. The Liberal party joined the coalition government of 1940, in which Sir Archibald Sinclair was minister of air.

After the defeat of Germany in 1945, in the early general election, the Liberal party could enter only 307 candidates, of whom only 12 were elected. The obvious determination of the electorate to pronounce against the Conservative party and the equally obvious fact that not enough Liberal candidates could be elected to govern told heavily against Liberalism; but it is noteworthy that 2,225,000 votes were cast for the cause in less than half the constituencies. And once again Liberal thought, expressed in Lord Beveridge's books on social security and full employment, had left an indelible imprint on both the other parties. In the new parliament Liberal members, acting in complete independence, gave general support to all progressive measures, while criticizing numerous legislative and administrative actions that seemed to them infringements of fundamental rights of the individual.

In 1946 the party machinery was drastically overhauled. At the general election of Feb. 1950 more than 400 Liberals stood for parliament, of whom 9 were elected. In Oct. 1951 only 6 Liberals were elected, receiving 730,551 votes of the 28,602,323 cast. Clement Davies, leader of the party in the house of commons, was offered a post in Winston Churchill's government but refused it. In the 1955 election the party gained no more seats but increased slightly its share of the total poll. The following year Joseph Grimond succeeded Davies as leader. By-elections showed a continuous growth in the proportion of Liberal votes cast, and in March 1958 M. Bonham-Carter won Torrington from the Conservatives, the first Liberal by-election victory in 29 years. At the general election of Oct. 1959 the number of Liberal seats remained 6, but the party increased its share of the poll from 2.7% to 6%. This trend accelerated in 1962 and brought about a spectacular by-election gain from the Conservatives at Orpington. There was also an increase in the number of Liberals successfully contesting local elections, an important factor in maintaining local party organizations. There were more than 470 Liberal councilors in 1959, more than 1,000 in 1961 and in the 1962 elections the Liberals had a net gain of 349 borough seats. The year 1963 saw a further gain of 167 but 84 were lost in 1964. At the election in Oct. 1964, 365 Liberals stood for parliament and 9 were elected. The Liberal share of the poll rose to 11.2%. Although the Labour government made no overtures to the Liberals, their importance

when the government had an overall parliamentary majority of only 4 was enhanced. In the general election of March 1966 there were 311 Liberal candidates; 12 seats were won, but the share of the poll fell to 8.5%. In January 1967 Grimond resigned as party leader and was succeeded by Jeremy Thorpe.

See also references under "Liberal Party (British)" in the Index.

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(R. MU.; A. MCF.)

LIBERAL PARTY (U.S.), a minor U.S. political party in New York State, was launched in May 1944 by leaders of the right wing of the American Labor Party (*q.v.*) in revolt against the alleged infiltration of that party by Communists. Membership was refused to a person who advocated totalitarianism. The party introduced scores of liberal bills in the state legislature and made a vigorous fight for civil rights, a strengthened United Nations, and strong alliances with other democracies. It appealed to educators, religious leaders, white-collar workers, and those who distrusted what they saw as both the big-business dominance in the Republican Party and the conflicting interests of Dixiecrats and city machines in the Democratic Party. The party lacked effective organization but, through generous donations of businessmen, distributed quantities of pamphlets and used radio time. The party at one time had 100 clubs in New York City, a committee-at-large, a trades union council, a Spanish-speaking division, and a youth division.

The party's 329,000 votes helped to carry the state for Franklin D. Roosevelt in 1944. It supported the Republican candidate for mayor in 1945 when the Labor Party endorsed the Democratic candidate, William O'Dwyer. The party helped nominate and elect Herbert H. Lehman as U.S. senator in 1949 and Averell Harriman as governor in 1954; it elected its own candidate, Rudolph Halley, president of the New York City Council in 1951 and polled 500,000 votes for him for mayor in 1953. It supported its own candidate, George Counts, for U.S. senator in 1952 and elected its first mayor, in Oswego, in 1957. It supported Adlai E. Stevenson for president in 1952 and 1956. In 1958 the party endorsed Democratic candidates for all state offices except that of attorney general; all except the candidate for comptroller went down to defeat along with Harriman. In that election 80% of the party's 300,000 votes came from the city of New York. More than 400,000 Liberal votes were cast for John F. Kennedy for U.S. president in 1960, but in subsequent elections the party's strength declined somewhat. In the early 1960s its position as the state's third largest party was threatened by the newly founded Conservative Party, an offshoot of the Republicans. Although the Liberal Party supported Democratic candidates for mayor of New York City in 1961, governor in 1962, and U.S. president in 1964, it began to endorse liberal Republicans for state and local office more frequently than in the past. In 1965 it endorsed Republican John V. Lindsay for mayor of New York City. Lindsay received more than 250,000 Liberal votes, but the party's greatest contribution to his winning campaign probably was that its endorsement enabled him to run as a fusion candidate. In 1966, however, the party put up its own candidate for governor, Franklin D. Roosevelt, Jr., who ran a poor third after Republican Nelson Rockefeller (the winner) and Democrat Frank O'Connor.

The party has been responsible for the election of liberal Democrats to Congress and to the state legislature and of Democrats and Liberals to the judiciary. Because of its leadership, which included many nationally known intellectuals, and because of its contacts with liberal congressmen and leaders of organized labour, the party has exerted influence on progressive thinking in Washington and on segments within the major parties. (H. F. TT.)

LIBER AND LIBERA, a pair of Italian deities of uncertain origin. The name Liber is probably connected with the adjective *liber,* "free," less likely with the root of *libare,* "to pour drink offering." Both etymologies were current in antiquity; modern authorities differ. Liber, though an old and native Italian deity, came to be identified with Dionysus, and the triad Ceres (*q.v.*), Liber and Libera (his female counterpart) represent in Rome, from fairly early times, always under Greek influence, the Eleusinian Demeter, Iacchus-Dionysus and Kore (Persephone). At the festival of the Liberalia, held at Rome on March 17, the *toga virilis* was commonly assumed for the first time, with appropriate ceremonial, by boys who were of age; cakes (*liba*) were provided in the service of Liber by old women who sat in the streets and sacrificed on behalf of anyone who bought their wares; and meals were taken in the open air. At Lavinium a whole month was consecrated to Liber, and at this and other country towns a festival was held, comprising a procession, the garlanding of a phallus, and all manner of songs and jokes were used; all this was supposed to make the seeds grow. It closely resembles Greek ritual but may be a parallel Italian development.

See A. Bruhl, *Liber pater* (1953); F. Altheim, *Terra mater* (1931).

LIBER DIURNUS ROMANORUM PONTIFICUM, a collection of formulae of ecclesiastical documents, principally papal documents, which is an important source for the administration and discipline of the Western church from the 6th to the 9th century. The collection is preserved in three 9th-century manuscripts and is of Italian, perhaps Roman, origin but is probably a private compilation. The *Liber* was discovered at Rome in 1646 by Lucas Holstenius, but for political and polemical reasons his edition was not made public till 1685. In the meantime, in 1680, J. Garnier had published it according to a second manuscript. A third manuscript was discovered in 1889. The authenticity of the formulae in the collection is not disputed, although their dates are difficult to determine.

See H. Leclercq in *Dictionnaire d'archéologie chrétienne et de liturgie,* vol. ix, pp. 243–344. (E. A. R.)

LIBEREC, a city of North Bohemia *kraj* (region), Czech., lies in the valley of the Nisa (Ger. Neisse), enclosed by wooded mountains, and is 108 km. (67 mi.) N.N.E. of Prague by road. Pop. (1961) 67,180. Until the expulsion of the Germans following World War II, the people of the city (Ger. Reichenberg) and of the surrounding districts were mainly German. Liberec dates from the 13th century and has been a centre of textile production since the 16th century. Besides a church and castle of that period the most notable buildings are the "Reichenberg houses" built by wealthy German textile merchants in the late 18th and 19th centuries, with graceful gables and elaborately ornamented façades. The city contains the north Bohemian museum with a collection of medieval tapestries, an art gallery, a school of music, and botanical and zoological gardens.

The local textile industry suffered severely in the depression of the 1930s and the city remained the stronghold of the German minority in Czechoslovakia. A Liberec citizen, Konrad Henlein, led the political union of the Sudeten Germans whose activities culminated in the Munich crisis of 1938. After World War II the expulsion of the Germans was followed by Czech resettlement and the revival of industry. Liberec's speciality in textile production is cotton weaving.

LIBERIA, a republic on the west coast of Africa, is bordered by Sierra Leone on the northwest, Guinea on the north, and Ivory Coast on the east. The area of the country is 43,000 sq.mi. (111,370 sq.km.), and the population, by the 1962 census, was 1,016,443. The capital is Monrovia (*q.v.*).

PHYSICAL GEOGRAPHY

Physiography.—The Liberian terrain is varied. The low, sandy coast is backed in places by long, narrow lagoons and is interrupted at intervals by rocky promontories, the sites of early Americo-Liberian settlement. Away from the coast the land becomes rolling plain with many small hills. Inland the western part is densely forested, mountainous terrain trending northeast-southwest, culminating in Mt. Wutivi, 4,528 ft. (1,380 m.). The central hinterland, roughly between the St. Paul and Cess rivers, is a low inland plateau, with heights ranging between 600 and 2,000 ft. (180 and 610 m.). Characterized by small hills encircled by many sinuous, poorly drained swamps, the plateau is set off from the coastal plain in places by vivid escarpments, the most notable being at Reputa, 65 mi. (105 km.) NE of Monrovia. The eastern

section of the country is rugged and forest covered.

Climate.—The climate, warm all the year round, has marked wet and dry seasons. The 205-in. (5,210-mm.) annual rainfall at Robertsport decreases southeastward to 100 in. (2,540 mm.) at Cape Palmas and diminishes inland to about 70 in. (1,780 mm.) on the central plateau. On the coast and in the western half of the country, from 75% to as much as 88% of the rain falls in May–October. The coast is humid and uncomfortable all the year, but the interior has pleasant days and cool nights during the dry season. The dry and dusty winds of the harmattan (*q.v.*), blowing from the Sahara, penetrate even to the coast during December. Southeast Liberia is covered much of the time by clouds, whereas the inland plateau has a sunny dry season.

Vegetation.—Liberia's vegetation is essentially tropical rain forest, with some trees attaining heights of 200 ft. (60 m.). The seasonal rhythm of the rains gives the inland forests a semideciduous regime. The magnificent gloomy evergreen forests of the basin of the Cavalla River and the impressive stands in the Gola Forest thin out inland, giving way, on the Guinea border, to savannas with forests only on steep slopes and along streams. Similar parkland savanna, burned annually by the Africans for their cattle, has developed on the poor sandy soils along the coast. Many trees of commercial value occur, although natural stands of a single species are rare. As a result, forestry operations to be economic must be based on a number of scattered species. Many timber species, such as red ironwood (*Lophira alata*) and whismore (*Tarrietia utilis*), are suitable for construction. There are also beautiful cabinet and veneer woods, including several African mahoganies: *Lovoa klaineana, Khaya ivorensis,* and *K. anthotheca.* Timber reserves, though enormous, are not easily exploited. Furthermore, African farmers cut and burn 50,000 ac. (20,235 ha.) of high and secondary forest each year. To preserve the forests, the government passed in 1953 a forest conservation act which provided for national forests. A number of trees which figure in agriculture and commerce flourish in Liberia. These include rubber (*Hevea brasiliensis*), oil palm (*Elaeis guineensis*), a raffia palm from which piassava is obtained, cacao, kola, and coffee (especially *Coffea robusta* and the indigenous *C. liberica*).

Animal Life.—By African standards the fauna of Liberia is neither rich nor abundant. Centuries of hunting have kept game levels low. Several species of monkey and chimpanzee are hunted, as are duiker, other small antelopes, and a miscellany of rodents. Among the more interesting mammals are the pygmy hippopotamus and several types of scaly anteater. There are many reptiles, including ten poisonous snakes. The most respected of these are the green and black mambas, a black cobra (*Naja nigricollis*), and the *Causus* viper. Large and small scorpions abound. Lizards, three types of crocodiles, leopards, some unusual species of bats, and birds too numerous to mention are found. Fish, formerly in plentiful supply, are scarce in some districts because of the use of poison in streams and dynamite in the lagoons. In the early 1960s pond-fish culture was being encouraged. (P. W. Po.)

THE PEOPLE

The indigenous tribes represent four linguistic groups. The Vai and Mandingo (*qq.v.*) are part of the Mande-tan group and are largely Muslim. Vai country is in the northwest, on the Sierra Leone border. Many Mandingo are Guinea immigrants, but there are several established Mandingo chiefdoms in Liberia. Kpelle (*q.v.*), Loma (Buzi), Gbande, and Mano, who occupy most of the northern and central parts of the interior, belong to the Mande-fu group. The Gola resemble in their culture the Vai, who are their northern neighbours, but are linguistically classified as West Atlantic. Kru (*q.v.*), Bassa, Grebo, and De, on the seacoast, and Sikon, Sapo, Putu, and Padebu, in the interior, occupy most of the southern half of the republic and have been linguistically classified as semi-Bantu. All tribes practise patrilineal descent and have more or less decentralized political organizations. Important cultural features of the Vai, Kpelle, and Gola are the Poro society, which has educative, legal, political, and religious functions; and its female equivalent, the Sande. The Kru and Grebo have military age sets (*q.v.*). (Me. F.)

The leading citizens of Liberia are the Americo-Liberians, descendants of the American Negroes who founded the republic. Lebanese are prominent in commerce and Europeans in industry. The official language is English.

The distribution of population closely corresponds to certain of the country's physical aspects. Most of the people live in a broad belt stretching across the country from the Monrovia-Lower Buchanan coast northeastward over the low plateau. A finger of populated land crosses the upper St. Paul River near the Guinea border and swings in an arc along the margins of the northernmost bulge. Population density averages 24 per square mile (9 per square kilometre) but varies considerably over the country. (P. W. Po.)

HISTORY

Knowledge of the west coast of Africa began with the reports of Necho, the Egyptian pharaoh who sent a Phoenician fleet round the coast of Africa in 600 B.C., and of Hanno, the Carthaginian navigator, who sailed along the west coast to Cameroon Mountain *c.* 500 B.C. Between A.D. 1364 and 1413 merchants from Dieppe established settlements at Grand Dieppe and Petit Dieppe, where the towns of Buchanan and Greenville are now located. A Portuguese sailor, Pedro de Cintra, reached the Liberian coast in 1461 and named Grand Cape Mount, Cape Mesurado (Montserrado), and Cape Palmas, all prominent coastal features. The area became known as the Grain Coast because grains of Melegueta pepper, then as valuable as gold, were the principal item of trade. In 1663 the British Royal Company of Adventurers built two trading posts on the Grain Coast at Mesurado and Grand Sesters. These stations, however, were destroyed by the Dutch in 1664.

It was not until the beginning of the 19th century that interest in the Grain Coast revived. The tide was beginning to rise in favour of the abolition of slavery, and the Grain Coast was suggested as a suitable home for freed slaves. In 1816 two U.S. government agents and two officers of the American Colonization Society (founded 1816) visited the Grain Coast. After abortive attempts to establish settlements there, an agreement was signed in 1821 between the officers of the society and local African chiefs granting the society possession of Cape Mesurado. The first American freed slaves landed in 1822 at Providence Island in the mouth of the Mesurado River; the site was designated a national shrine in 1963. They were shortly followed by Jehudi Ashmun, a white American, who became the real founder of Liberia. He was joined for a short time in 1824 by Ralph Randolph Gurley, who suggested the names Liberia for the territory and Monrovia for the town which was being founded on Cape Mesurado. By the time Ashmun left in 1828 the territory had a government, a digest of laws for the settlers, and the beginnings of profitable foreign commerce. Other settlements were started along the St. John River inland from Grand Bassa, Bassa Cove, Sinoe, Greenville, and Maryland. In 1836 Thomas Buchanan (a cousin of James Buchanan, 15th president of the United States) went to Liberia as governor. On his death in 1841 he was succeeded by Joseph Jenkins Roberts, an octoroon, born free in Virginia in 1809; Roberts enlarged the boundaries of the territory and improved economic conditions.

The Early Republic.—When the American Colonization Society intimated that Liberia should cease to be dependent upon it, Roberts proclaimed it an independent republic in 1847. Independence was recognized in 1848–49 by most of the great powers, though formal recognition by the United States did not come until 1862.

At the time independence was declared, a constitution based on that of the United States was drawn up. But the attempt to found a state comprising the immigrants from the United States and their descendants, who then numbered fewer than 3,000, was not at first successful. Some of the coastal tribes adopted Protestant forms of Christianity and learned English, but most of the indigenous Africans retained their traditional religion and way of life. Roberts, who had been elected the first president of the republic, retained that office until 1856. It was during this period that the slave trade, hitherto illicitly carried on from various

nominally Liberian ports, was ended by the activity of the British Navy.

From about 1856 there was a notable increase in the importance of the Whig Party, which distrusted Europeans and sought development on national lines and, later, cooperation with the indigenous peoples. In 1871 the first foreign loan was raised, being negotiated in London nominally for £100,000. The loan was unpopular, and still more unpopular was the president, E. J. Roye, who was deposed and imprisoned at Monrovia. He escaped but was drowned while attempting to reach a British ship in the anchorage. Roberts, the former president, was called back to office. He served until the end of 1875 and died in 1876.

During the early days of Liberia there were constant frontier troubles with the French on the Ivory Coast and the British at Sierra Leone. The Liberians tried to extend their authority inland, although they were still unable to control all the coastal area they claimed. Efforts to end the frontier disputes resulted in treaties with Great Britain in 1885 and with France in 1892. In 1904 Pres. Arthur Barclay, a Negro born in Barbados, initiated a policy of direct cooperation with the tribes. Having obtained a loan from London in 1907, he made real efforts at reform. However, the foreign debt was a burden and the government was unable to exert effective authority over the interior for more than 20 mi. inland. In 1919 an agreement was signed transferring to France 2,000 sq.mi. (5,200 sq.km.) of hinterland which Liberia had claimed but could not control.

Outside Intervention.—In 1909 a commission appointed by Pres. Theodore Roosevelt of the United States investigated political and economic conditions in Liberia and recommended financial reorganization. A loan of $1,700,000, secured by customs revenue, was raised by an international consortium of bankers in 1912, and a receivership of customs was set up, administered by appointees of the British, French, and German governments and a U.S. receiver-general. A frontier police force was organized by officers of the U.S. Army, with the result that Liberian authority was better maintained. Unfortunately, this promising new regime was upset by World War I. Revenues dropped to one-fourth of normal, and the financial situation steadily deteriorated.

In the 1920s the Firestone Tire and Rubber Company began an investigation of rubber-growing possibilities in Liberia and, finding the environment favourable, obtained a concession of 1,000,000 ac. (400,000 ha.) of land in 1926. At the same time, a loan of $5,000,000 was arranged through the Finance Corporation of America. With this private loan, only half of which had been taken up by 1945, the Liberian government consolidated and bonded all its external and internal debts and placed the country's finances on a relatively stable basis. Administration of the customs and internal revenue was placed in the hands of a U.S. financial adviser, assisted by five fiscal experts, with certain powers over the Liberian budget and expenditures.

An investigation by the League of Nations of forced labour and slavery in Liberia, involving the shipment of Africans to the Spanish plantations in Fernando Pó, brought about the resignations of Pres. Charles King and Vice-Pres. Allen Yancy and the election of Edwin Barclay to the presidency in 1931. Liberia appealed to the Council of the League of Nations for financial aid, and a commission of inquiry was established. The next three years were marked by unsuccessful attempts to work out a plan of assistance involving the appointment of foreign administrators, the declaration of a moratorium on the Firestone loan and suspension of diplomatic relations with Great Britain and the United States. After the League Council had finally withdrawn its plan of assistance, the Liberian government reached an agreement with the Firestone Company along lines similar to the League's recommendations, and a fresh start was made under the progressive administration of President Barclay.

World War II and After.—The new significance of Liberia became apparent after the outbreak of World War II in 1939. During the war Liberia's rubber plantation was the only source of natural latex rubber available to the Allies, apart from plantations in Ceylon. In 1942 Liberia signed a defense agreement with the United States for the operation of strategic airports and military protection of the installations. This resulted in the undertaking of a program of strategic road building, the construction of the airport now known as Robertsfield International Airport about 50 mi. (80 km.) E of Monrovia, and the completion of a deep-water harbour at Monrovia. U.S. money was declared legal tender in Liberia in 1943, replacing British West African currency. In 1943 William V. S. Tubman was elected to his first term as president. Liberia declared war against Germany and Japan in January 1944 and in April signed the declaration of the United Nations. In December 1960 Liberia became a member of the UN Security Council and from that time took an active part in African and international affairs. Liberian troops served with UN forces in the Congo, and Liberia became a member of the UN Trusteeship Council in 1963. It has been a member of the Organization of African Unity since the organization's inception in 1963.

(D. R. P.; X.)

In 1963 also W. V. S. Tubman was elected to serve his fifth term as president. After his inauguration in January 1964, a new cabinet post, that of chief of the cabinet, was created; the first occupant of the post was President Tubman's eldest son, William Tubman, Jr. In May of that year the U.S. and Liberia signed an agreement providing for the transfer of the free port of Monrovia to the government of Liberia. A fiscal crisis occurred in 1962–63 as a result of a 50% drop in the prices of iron ore and rubber; by an austerity program at home and a reduction in annual debt payments abroad a satisfactory recovery occurred.

A strike of rubber workers in February 1966 led to the president's being accorded emergency powers for 12 months to deal with "subversion" by persons said to be infiltrating the country.

Liberia joined with Ethiopia in 1960 in filing a complaint with the International Court of Justice against South Africa's administration of its mandate over South West Africa. In July 1966 the court rejected the plea on the ground that Liberia and Ethiopia had insufficient legal interest. (*See* INTERNATIONAL COURT OF JUSTICE; SOUTH WEST AFRICA.) (X.)

ADMINISTRATION AND SOCIAL CONDITIONS

Government and Administration.—Liberia has a republican form of government patterned after that of the U.S. and divided into legislative, executive, and judicial branches. The Legislature is bicameral. In 1964 the Senate had 18 members and the House of Representatives 45. The president and vice-president are elected for eight-year terms and may be reelected for additional four-year terms.

For administrative purposes Liberia is divided into two regions, the coastal and the interior (or hinterland). The coastal region is divided into five counties—Cape Mount, Montserrado, Grand Bassa, Sinoe, and Maryland—and four territories—Marshall, River Cess, Sasstown, and Kru Coast. The interior region is divided into four counties—Loffa, Bong, Nimba, and Grand Gedeh.

The constitution provides for a Supreme Court served by five justices who are appointed by the president and who serve during good behaviour. Subordinate courts, established by legislative enactment, serve the five coastal and four hinterland counties. In the hinterland the tribal people are allowed, insofar as is possible, to govern themselves according to their customary law.

Cultural and economic factors have long separated the Americo-Liberians (who have constituted an upper class) from the indigenous peoples. In 1944, in the first administration of W. V. S. Tubman, a national unification program was inaugurated to speed the assimilation of the indigenous populace into the rest of the community. All citizens have the vote (with a property qualification), but the tribal people take little part in political life. Citizenship is restricted to persons of African descent. Liberian politics have generally been characterized by True Whig Party rule with strong executive control. The Reformation Party (formed in 1951) and the Independent True Whig Party (formed in 1954) were both banned in 1955.

Taxation.—The tax structure of Liberia has been specifically designed to attract foreign companies and capital to the country, making available long-term leases of large tracts of undeveloped land. The flow of capital and dividends out of the country is in

(TOP) J. D. STUDIOS LTD., (ABOVE, LEFT AND RIGHT) J. ALLAN CASH

(TOP) CRUSHER STATION AT AN IRON MINE ON MT. NIMBA. (ABOVE LEFT) A TYPICAL RURAL VILLAGE WITH MUD HUTS ROOFED WITH PALM FRONDS. (ABOVE RIGHT) A MAIN STREET IN MONROVIA, THE CAPITAL CITY

no way restricted, and special duty-free imports of machinery for new industries are readily allowed. A graduated income tax law enacted in 1951 assessed a tax both on individuals and on corporations. In 1959 a new method of valuing iron ore was adopted which more than doubled governmental revenues from this source. Customs revenues and income tax continued to be the government's chief sources of revenue, although by the 1960s the profit sharing on iron ore exports accounted for about one-fifth of the total. The traditional hut tax, formerly a basic source of income, had declined in importance.

Living Conditions.—Living conditions throughout Liberia have improved since World War II. Increasingly the hinterland farmers have added to their subsistence livelihood with such cash crops as coffee, rubber, and, to a lesser extent, cacao. As a result, the money economy continued to extend itself gradually throughout the tribal interior.

By the early 1960s the total labour force was estimated at more than 300,000. Of these, around 60,000 were employed on the various plantations and in iron-mining enterprises. Minimum wage laws were in effect: on the rubber plantations, 64 cents a day plus from 15 to 25% in fringe benefits; in mining, 15 cents an hour for unskilled labour, though the usual rate was 25 to 35 cents an hour for semiskilled and 35 to 50 cents for skilled labour; for unskilled construction workers, 15 cents an hour. Many of the concessionaires provide free medical and educational facilities and partially subsidize the distribution of rice to their employees.

Education.—Formerly supplied mostly by missions, education was greatly expanded by the government after 1945. Total enrollment (all levels) was approaching 80,000 in the mid-1960s (about 500 in higher education), nearly four times that in 1944. About one out of every ten children of school age was receiving instruction. Advanced training is provided at the University of Liberia at Monrovia, the Booker Washington Agricultural and Industrial Institute at Kakata, and Cuttington College and Divinity School at Suakoko. Grants from the United Nations and elsewhere enabled Liberia to attract teachers from Europe and the U.S. to assist in teaching economics and science. The UN also supported the government's national literacy campaign. At least ten major tribal tongues had written scripts by the 1960s.

Health Services.—Despite much progress, conditions of health and sanitation remain primitive. In 1956 the incidence of malaria was estimated at 100%; yaws 35%; leprosy 5%. Dysentery and malaria are thought to be the most important causes of the tragically high infant mortality rate—500 in 1,000 up to the age of one year in some areas. Also prevalent are schistosomiasis, elephantiasis, trypanosomiasis (sleeping sickness), and tuberculosis. Hernias and intestinal worms are common. The diet is generally very deficient in protein. The government, with World Health Organization help, supported a nationwide malaria-yaws project which dramatically reduced the occurrence of these diseases. New clinics and hospitals were built; 1955–56 saw the construction of a 50-bed tuberculosis sanatorium and, at Voinjama, a sleeping sickness hospital. After 1952 the Liberian Institute of the American Foundation of Tropical Medicine conducted research on tropical diseases.

Defense.—A constabulary of about 500 men comprises the national police force. In addition a frontier force of more than 2,000 men is maintained at various strategic points, and a small fleet of patrol cutters functions as a coast guard. The militia, a volunteer body of officers and men numbering about 25,000, constitutes a reserve force. A national military academy was founded in 1965.

THE ECONOMY

Liberia is economically underdeveloped. About 80% of the population gains its living from subsistence agriculture, based on the shifting cultivation of upland rice. Comparatively few wage earners are employed on plantations, in mines, and in construction crews, but there are limits to the number of labourers that can be drawn from the body of healthy adult men still on farms without decreasing the agricultural output. As it is, Liberia must import about 10% of its annual rice requirement.

Agriculture.—Tropical soils at best form a fragile and difficult basis for agriculture. The Liberian way of using, yet conserving,

these soils is to fell forest, burn it, plant to rice for a year or two and then allow it to revert to forest to lie fallow for about 20 years. In the permanent kitchen gardens which surround hinterland villages grow peppers, okra, tomatoes, eddoes, mangoes, soursop, avocados, oranges, grapefruit, limes, papaw, pineapples, bananas, and plantains. Important crops grown for local use are oil palm, sugarcane, cotton, and peanuts.

The approximately 100,000 ac. (40,500 ha.) planted to rubber on the Firestone plantations at Harbel and on the Cavalla River by the mid-1960s formed the most important single agricultural operation in Liberia. A replanting program to develop higher-yielding varieties of trees was started in the 1950s. Independent Liberian plantations cover about half as much land.

In the early 1950s the government liberalized the conditions under which foreign investors might operate concessions. This attracted many concessionaires, among the more important being the Liberia Company at Cocopa, whose acreage was planted mostly to rubber, cacao, and coffee; the B. F. Goodrich Company, which in 1954 was granted an 80-year concession to produce rubber; the United States Rubber Company, granted a concession in 1966; and a German fruit company that was producing bananas. However, there was difficulty in obtaining sufficient labour.

Mining.—In 1951 the first high-grade iron ore (68% iron) was shipped from the Bomi Hills. A decade later, iron ore was drawing even with rubber in value of production. An $11,000,000 beneficiation plant inaugurated in 1958 at the Bomi Hills increased capacity by 800,000 long tons. Production at this mine by 1960 was more than 3,000,000 long tons. In 1956–57 the Liberian American-Swedish Minerals Company (LAMCO) discovered huge deposits of very pure iron ore (66% iron) on the slopes of Mt. Nimba in north central Liberia. Two other iron-mining companies were active in the 1960s, on the Mano River and on the large ore reserve in the Bong Mountains about 50 mi. (81 km.) NE of Monrovia.

Industries and Power.—Liberia has a small amount of light industry which mainly serves the local market. Important gains were made in the 1950s, stimulated largely by a boom in construction activity. Significant among the products manufactured are bricks, tiles, cement blocks, lumber and furniture, soap, soft drinks, ice cream, beer, and rubber sandals. Completion of the Mt. Coffee hydroelectric project in 1966 added 30,000 kw. of power to the country's previous capacity of 50,000 kw.

Trade.—For many years rubber entirely dominated Liberia's exports. After 1951, however, iron ore shipments became increasingly important and in 1961 took the lead; iron and rubber together account for almost 90% of Liberian export trade. Other exports are diamonds, palm kernels, cacao, coffee, and piassava. Liberia's imports include machinery and transport equipment, classified manufactures, food, beverages, tobacco, miscellaneous manufactured goods, mineral fuels and lubricants, and chemicals. The U.S. is Liberia's principal trading partner, followed by the western European countries.

Finance and Banking.—The two decades following the end of World War II were boom years for Liberia. Governmental revenues, which averaged $650,000 annually in the 1930s and $2,020,000 in the 1940s, climbed rapidly in the 1950s, exceeding the $20,000,000 mark for the first time in 1957. In 1965 governmental revenues reached about $46,000,000. About half of the public debt in the 1960s was owed to the Export-Import Bank of Washington.

Banking activities are headquartered in Monrovia, where the Bank of Monrovia, an affiliate of the First National City Bank of New York, and several other banking institutions are located. In 1965 the Liberian Bank for Industrial Development and Investment was established, using governmental earnings and royalties on iron ore to finance both private and public development projects. The basic monetary unit of Liberia after 1943 was the U.S. dollar, although coins of Liberian design have long been in circulation.

Transport and Communications.—The late 1950s and early 1960s brought an unprecedented improvement in transport and communications in the country. By the mid-1960s there were about 1,200 mi. (1,900 km.) of all-weather roads, of which about 170 mi. (270 km.) were paved. In 1959 a road was completed which finally linked the northwest with the rest of Liberia. Hitherto this isolated area was accessible by vehicle solely via Guinea. This road stimulated trade and the planting of cash crops, and a shift away from a former orientation toward Sierra Leone and Guinea. In 1961 for the first time it was possible to drive from Monrovia to Robertsport, on the coast to the northwest, and to Tchien, in Grand Gedeh County.

Liberia's first railway line, about 45 mi. (72 km.) of track, was opened in 1951, connecting the free port of Monrovia with the Bomi Hills mine. There are two other lines, from the Bomi Hills to the Sierra Leone border; and between Buchanan and Mt. Nimba. All the railways are owned by the mining concessionaires and are used for transporting their ore and freight.

The free port of Monrovia, opened in 1948, is the main seaport of Liberia. Its facilities include marginal wharf, for passenger liners and general cargo vessels; three ore-loading finger piers; a landing stage for oil tankers; and storage and transit sheds. In 1963 a second deepwater port, for the shipment of iron ore, was opened at Buchanan; when facilities are completed, general commercial cargo also will be handled. Smaller ports at Harper and Greenville mainly export agricultural products and timber.

Liberia's principal airport, Robertsfield, is served by international airlines. Internal services are provided by the Liberian National Airways and air taxi companies. In 1960 the U.S .government agreed to finance the modernization of Robertsfield, and the runways were extended to accommodate jet traffic.

In 1962 the Liberian government signed an agreement with the Radio Corporation of America for the installation of local and international telephone and telegraph hook-up.

As Liberia charges only a small registration fee and does not maintain control over ships flying a Liberian flag, the total registered tonnage is high, over 14,500,000 in the mid-1960s.

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(P. W. Po.; X.)

LIBERIUS, (d. 366), pope from 352 to 366, succeeded Julius I. His pontificate, which fell in the turbulent days of the Arian ascendancy under emperor Constantius, was mainly preoccupied with the problem of preserving the faith of Nicaea. His first act was to write to Constantius, at the request of the Italian episcopacy, asking that a council be called at Aquileia with reference to the affairs of Athanasius (*q.v.*); but the emperor, instead of cooperating with Liberius, compelled his legate, Vincent of Capua, to condemn Athanasius. In 355 Liberius was one of the few bishops who refused to sign the condemnation of Athanasius which had been imposed at Milan by imperial command upon all western bishops. The consequence of this refusal was Liberius' exile to Beroea and the consecration of the Arian Felix II as antipope. After some years the emperor recalled him to Rome, possibly because he signed an unorthodox formula. The history of the matter is so confused that it is impossible to determine precisely the

concessions which Liberius may have made to Constantius. As the Roman see was officially occupied by Felix, a year passed before Liberius was sent to Rome. It was the emperor's plan that Liberius should govern the church jointly with Felix, but on the arrival of Liberius, Felix was driven out by the Roman people. Neither Liberius nor Felix took part in the council of Rimini (359), and after the death of Constantius (361), Liberius annulled the decrees of that assembly. He died on Sept. 24, 366.

(R. E. McN.)

LIBER PONTIFICALIS, or "Book of the Popes," is a compilation of papal biographies, from Peter to the popes of the 15th century, which gives valuable information on the origins and birthplaces of the popes, their dogmatic and disciplinary decrees, important religious and civil events connected with their pontificates, the duration of their reigns, deaths and burials. The treatment of the different popes varies in length from mere mention of their names to small monographs. The work as a whole is of very uneven historical value, and each portion must be evaluated on its own merits; though much of it is historically sound, it must be used with caution, for it reflects throughout the various tendencies, aspirations and pretensions of the papacy at each phase of its history. Shortly after the death of Felix IV (530), a Roman priest, using the *Catalogus Liberianus*, a list of the bishops of Rome from Peter to Liberius (d. 366), compiled the first part of the work, which reaches from Peter to Felix IV. The second part runs from Felix IV to Conon (d. 687) and the third part from Conon to Stephen VI (V) (d. 891), with whom the original *Liber pontificalis* closes. After this period the work contains great lacunae and only occasional, brief notices until Leo IX (1049–54), with whom the detailed biographies are again resumed. There are notices up to the pontificate of Pius II (d. 1464).

The text was edited critically by L. Duchesne, *Liber pontificalis: Texte, introduction et commentaire*, 2 vol. (1886–92), and later *Additions et corrections de Msgr. L. Duchesne* were edited by C. Vogel (1957). An English translation, *The Book of the Popes*, by L. R. Loomis was published in 1916. (R. E. McN.)

LIBERTAD (La Libertad), a coastal department of northeastern Peru (area, 8,973 sq.mi.), bounded north by Cajamarca, Lambayeque and Amazonas, east by San Martín, south by Ancash and Huánuco and west by the Pacific. Pop. (1961) 587,891, chiefly Indian and mestizo. The department is watered by the rivers Jequetepec, Chicama, Moche, Virú, Chao and Santa, the last-named with its tributary, the Tablacacha, forming the southern boundary with Ancash. Libertad contains the seaports of Pacasmayo, Huanchaco and Salaverry. Railways of the department, totaling about 250 mi., link Pacasmayo to Chilete (Cajamarca) with a branch to Guadalupe, Salaverry to Trujillo with branches from Trujillo to Menocucho and from Chicama to Cartavis; a railway links the sugar estate of Casa Grande, the largest in the Chicama valley, with Puerto Chicama. Motor roads leading from Pacasmayo and Trujillo connect with the interior towns of Otusco, Usquil, Santiago de Chuco, Huamachuco, Cajabamba and the gold mine of Pataz. Cajamarca, capital of Cajamarca department, and Chachapoyas, capital of Amazonas, may also be reached by road. The Pan-American highway follows the coastal plain the length of Libertad department.

The department is made up of an arid sandy coastal zone lying between the Western cordillera and the Pacific, and the eastern sierra zone, an Andine valley region drained by the Marañón, lying between the Western and Central cordilleras. Agriculture, mining and the industries of Trujillo are the principal economic activities of the department. Coastal agriculture is carried on in valleys irrigated by streams flowing westward from the cordillera. Crops grown in the coast provinces are sugar cane, cotton, rice, coffee and coca. The Chicama valley is Peru's foremost producer of sugar. In the cool sierra zone, cereals, maize and potatoes are cultivated, and cattle and sheep are grazed. Important mineral resources worked in the department include copper, gold, silver, tin and coal.

Trujillo, pop. (1961) 99,808, capital and principal city of the department, lies at 197 ft. above sea level, on the Rio Moche. Local industries include food-processing plants, tanneries, and manufactures of ponchos, carpets and cotton textiles. The Universidad de la Libertad (University of Liberty), founded in 1824, is the leading Peruvian educational institution north of Lima. (*See* also Trujillo.)

The ruins of Chan Chan (*q.v.*), capital of the Chimu empire (absorbed into the Inca empire about A.D. 1400), lie 4 mi. west of Trujillo. These have yielded quantities of fabrics, pottery, weapons and objects of art, many of which are in the Larco Herrera and other museums at Lima. (J. L. Tr.)

LIBERTADOR: *see* Dajabón.

LIBERTARIANISM, in ethics, the doctrine which maintains the freedom of the will, as opposed to necessitarianism or determinism (*q.v.*). It has been held in various forms. In its extreme form it maintains that the individual is absolutely free to choose this or that action indifferently but most libertarians admit that acquired tendencies, environment and the like exercise control in a greater or less degree. *See* Free Will.

LIBERTAS, the Roman deified abstraction of liberty and freedom. From about 238 B.C., she had a temple on the Aventine where she probably was worshiped in connection with Jupiter. On coins she appears as a matron, often holding the pileus, the cap of freedom. The altered role which the goddess had to play under the empire was mirrored in the coin representations. Late in the republic she had still indicated resistance to tyrants (*e.g.*, Caesar); during the empire she was reduced to celebrating the replacement of a despotic by a more benevolent emperor (*e.g.*, Domitian and Nerva).

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LIBERTIES, CHARTERS OF, the general name given to a series of documents in England in the 12th and 13th centuries by which the king, with the full support of his barons, attempted to define the rights and obligations of feudal law. Feudalism, though usually clear in principle, was frequently imprecise in its specific application and the barons felt anxious about the effects of the incursions of an efficient royal bureaucracy, backed by the most powerful monarchy in Europe. The earlier charters were granted when the king himself needed to bid for baronial support; later, the initiative was taken by the barons. The first, the coronation charter of Henry I, aimed to secure support against his elder brother Robert, duke of Normandy, by offering general principles of government and promising changes from the methods of William II. It was later frequently cited as the standard statement of law and model for later charters. Stephen and Henry II also issued similar charters. All these were an expansion of the vague expressions of good government made in the coronation oath. John did not issue such a charter but soon after, at Northampton, made a general promise of feudal justice. John's personality and the political disasters on the continent contributed to the production of the most comprehensive of the charters of liberties, Magna Carta (*q.v.*), which was sealed in June 1215. Magna Carta, through its later reissues, especially that of 1225, became the accepted statement of law which touched on the sensitive spots in a system of lordship and mutual obligation.

None of these charters created rights or duties, but they attempted to define existing law. They were accepted as the standard of good government and were later appealed to as such, but their statements of principle needed to be followed up by specific inquiries which were carried on in inquests and assizes and, under Edward I, by a comprehensive reappraisal of the legal, social and tenurial system. Government and society were becoming progressively more complex and, with time, written statements of law, narrower in scope and more detailed in incidence, developed out of these charters and ultimately supplanted them. Charters of liberties were the first stage in an attempt to state the law in general terms in documents that could be readily consulted and that provided the principles of good government. *See* also English Law.

LIBERTY, as a state of freedom, is especially opposed to political subjection, imprisonment or slavery. Its two most gen-

erally recognized divisions are civil and political liberty. Civil liberty is the absence of arbitrary restraint and the assurance of a body of rights, such as those found in bills of rights, in statutes and in judicial decisions. Such liberty, however, is not inconsistent with regulations and restrictions imposed by law for the common good. Political liberty consists of the right of individuals to participate in government by voting and by holding public office.

Because of the proletarian or socialist movement and the economic dislocations after World War I, liberty has been increasingly defined in terms of economic opportunity and security. In Anglo-American countries liberty has often been identified with constitutional government, political democracy and the orderly administration of common-law systems.

In a more particular sense, a liberty is the term for a franchise, a privilege or branch of the crown's prerogative granted to a subject, as, for example, that of executing legal process; hence, the district over which the privilege extends. These liberties are exempt from the jurisdiction of the sheriff and they have separate commissions of the peace. In the U.S. a franchise is a privilege, the term liberty not being used in such cases. The concept of liberty as a body of specific rights found in English and U.S. constitutional law contrasts with the abstract or general liberty enunciated in the French Revolution and in the French Declaration of Rights. However, modern liberty involves in theory both the support of specific rights of the individual, such as civil and political liberty, and the guarantee of the general welfare through democratically enacted social legislation.

See CIVIL LIBERTIES; DEMOCRACY; BILL OF RIGHTS, ENGLISH; and BILL OF RIGHTS, UNITED STATES.

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LIBERTY, STATUE OF, a colossal statue in New York harbour, commemorating the birth of the United States and the continuing friendship of the peoples of the French and American democracies. The idea of such a monument was first conceived in France, and the cost of the statue itself, about $250,000, was contributed in France. Funds for the granite and concrete pedestal, about $350,000, were raised in the United States. The sculptor was Frédéric Auguste Bartholdi. Bartholdi recommended the 12-ac. Bedloe's Island (officially renamed Liberty Island in 1960) as a site, and congress authorized its use. The statue was dedicated on Oct. 28, 1886. After several changes in jurisdiction, it was placed under the national park service in 1937, the area being classed as a national monument.

BY COURTESY OF THE PORT OF NEW YORK AUTHORITY

STATUE OF LIBERTY

The height of the statue alone (the figure of a woman, with a torch in the raised right hand) is 151 ft.; with pedestal, 305.5 ft. The covering is made of more than 300 copper sheets, $\frac{3}{32}$ in. thick. The observation platform in the figure's head is 260 ft. above sea level and affords a splendid view of New York harbour. On the pedestal is inscribed part of the sonnet "The New Colossus," by Emma Lazarus, which reads, in part:

> Give me your tired, your poor,
> Your huddled masses yearning to breathe free,
> The wretched refuse of your teeming shore,
> Send these, the homeless, tempest-tossed, to me:
> I lift my lamp beside the golden door.

Boats leave Battery park, Manhattan, for the Statue of Liberty hourly through most of the day. The distance is about 1.6 mi.

(J. E. CL.)

LIBERTY LOANS, the name given to the four loans floated by the United States government during World War I. A fifth loan, floated after the Armistice, was called officially the Victory Liberty loan, but more generally the Fifth Liberty loan. The total amount accepted by the department of the treasury from all the loans was $21,435,370,600.

The first bond drive, for $2,000,000,000, was presented in 1917 to an American public unaccustomed to investing in bonds. The U.S. department of the treasury, aided by banks, stock and bond brokers, newspapers and local volunteer committees, launched a nationwide campaign that secured more than 4,000,000 subscribers to over $3,000,000,000 of Liberty bonds. These bonds were an attractive financial investment; they paid interest at the rate of $3\frac{1}{2}\%$ and were tax-exempt, except for estate and inheritance taxes. In subsequent drives the government improved its techniques of mass salesmanship. The speakers bureaus of the department of the treasury and the committee on public information contributed their services, and the department of state released information calculated to increase anti-German sentiment. Posters by prominent artists, parades and pleas by movie stars gave added impetus to the drives. Later bond issues were exempted from only the basic federal income tax, but the interest rate rose to $4\frac{1}{4}\%$ on the fifth loan.

The Fourth Liberty loan was the largest single loan of the war issued by a belligerent. It totaled nearly $7,000,000,000, and was subscribed by more than 22,000,000 persons, or about one-fifth of the population of the United States.

Between 1927 and 1935 all these loans were paid off or were converted into loans with a lower rate of interest.

Summary of Liberty Loans

Loan	Subscribers	Amount asked	Subscriptions	Acceptances by treasury
First (1917)	4,000,000	$2,000,000,000	$3,035,226,850	$1,989,455,550
Second (1917)	9,400,000	3,000,000,000	4,617,532,300	3,807,865,000
Third (1918)	18,376,815	3,000,000,000	4,176,516,850	4,175,650,050
Fourth (1918)	22,777,680	6,000,000,000	6,993,073,250	6,964,581,250
Fifth (Victory, 1919)	11,803,895	4,500,000,000	5,249,908,300	4,497,818,750

(A. R. BN.)

LIBERTY PARTY, a political party organized in 1839–40 in the United States to oppose the spread and restrict the political power of slavery. It was the lineal precursor of the Free-Soil and Republican parties. James G. Birney, to whom more than to any other man belongs the honour of founding and leading the party, began to define the political duties of so-called abolitionists about 1836, but for several years thereafter, in common with other leaders, he continued to disclaim all idea of forming a political

party. In state and local campaigns, however, nonpartisan political action was attempted through the questioning of Whig and Democratic candidates. The utter futility of seeking to obtain in this way any satisfactory concessions to antislavery sentiment was speedily and abundantly proved. There arose, consequently, a division in the American Anti-Slavery society between those who were led by William Lloyd Garrison and advocated political nonresistance, and those who were led by Birney and advocated independent political action. The sentiment of the great majority of abolitionists was, by 1838, strongly for political action. Accordingly, the political abolitionists held a founding convention in Nov. 1839. A nominating convention at Albany, N.Y., in April 1840 launched the Liberty party and nominated Birney for the presidency. In the November election he received only 7,069 votes, or the support of less than one-tenth of the professed abolitionists.

After 1840 the attempt began in earnest to organize the Liberty party thoroughly and unite all antislavery men. The northwest was the most promising field, but though participation in state and local campaigns gave morale to the party, it made scant political gains. It could not convince the people that slavery should be made the paramount question in politics. In 1844, however, the Texas question gave slavery precisely this pre-eminence in the presidential campaign, and the Liberty men again nominated Birney. He received 62,263 votes—many more than enough in New York to have carried that state and the presidency for Henry Clay, had they been thrown to his support. The Whigs, therefore, blamed the Liberty party for Democratic success and the annexation of Texas; but—quite apart from the issue of political ethics—it is almost certain that though Clay's chances were injured by the Liberty ticket, they were injured much more outside the Liberty ranks by his own quibbles.

After 1844 the Liberty party made little progress. Indeed, no party of one idea could hope to satisfy men who had been Whigs or Democrats. At the same time, antislavery Whigs and Democrats were segregating in state politics, and the issue of excluding slavery from the new territory acquired from Mexico afforded a golden opportunity to unite all antislavery men on the principle of the Wilmot Proviso (1846). The Liberty party reached its greatest strength (casting 74,017 votes) in the state elections of 1846. Thereafter it rapidly became ineffective.

In Oct. 1847, at Buffalo, the party held its third and last national convention. John P. Hale—whose election to the United States senate had justified the first successful union of Liberty men with other antislavery men in state politics—was nominated for the presidency. But the nomination by the Democrats of Lewis Cass shattered the Democratic organization in New York and the northwest; and when the Whigs nominated Gen. Zachary Taylor and showed hostility to the Wilmot Proviso, the way was cleared for a union of all antislavery men. The Liberty party, then, abandoning its independent nominations, joined in the first convention and nominations of the Free-Soil party (*q.v.*), thereby practically losing its identity.

See T. C. Smith, *Liberty and Free Soil Parties in the Northwest,* Harvard University Historical Studies (1897); E. E. Robinson, *The Evolution of American Political Parties* (1924).

LIBIDO, originally used by Sigmund Freud (*q.v.*) to signify physiological energy associated with sexual urges, and later to embrace all constructive human urges (Eros, his so-called life instinct). Psychiatric symptoms were held to involve misdirected libido. As narcissistic libido it was self-oriented; when directed toward other people and things it was object libido. C. G. Jung (*q.v.*) used the word to encompass all life processes in all species, while such related terms as drive or tension underlie theories of motivation in the 1960s. For these and similar concepts *see* PSYCHOANALYSIS; MOTIVATION; CREATIVE EVOLUTION.

LIBITINA, Roman goddess of funerals. She had a sanctuary in a sacred grove (perhaps on the Esquiline), where by an ordinance of the legendary Roman king Servius Tullius a piece of money was deposited whenever a death took place. There the undertakers (*libitinarii*), who carried out all funeral arrangements by contract, had their offices, and everything necessary was kept for sale or hire; there all deaths were registered for statistical purposes. The word Libitina then came to be used for the business of an undertaker, funeral requisites and, by poets, for death itself.

By antiquarians Libitina was sometimes identified with Persephone, but more commonly (partly or completely) with Venus Lubentia or Lubentina, an Italian goddess of gardens—a mere confusion. The similarity of name and the fact that Venus Lubentia had a sanctuary in the grove of Libitina favoured this idea. Further, Plutarch mentions a small statue at Delphi of Aphrodite Epitymbia (Aphrodite of Tombs = Venus Libitina), to which the spirits of the dead were summoned. Libitina may have been originally an earth goddess, connected with luxuriant nature and the enjoyments of life; then, all such deities being connected with the underworld, she also became the goddess of death, and that side of her character predominated in the later conceptions.

LIBRA (the BALANCE), in astronomy, a constellation and sign of the zodiac (*q.v.*). The constellation was pictured as a pair of scales; its stars are faint and present little of interest to the naked eye. The name suggests the equality of day and night when the sun arrives at the autumnal equinox and enters the sign Libra. The sign itself has been shifted westward into the adjoining constellation Virgo by the earth's precessional motion.

(R. H. BR.)

LIBRARY. A library (from Lat. *liber,* "book") is a collection of written, printed or other graphic material (including films, slides, phonograph records and tapes) organized for use. In this article the general term "books" is used to denote collectively the varied forms taken by the contents of libraries, unless a particular form, *e.g.,* manuscripts, films, requires to be specified. Libraries may be roughly classified in two ways: by ownership or purpose, *e.g.,* national, county or municipal, university, research, school, industrial, club, private, etc.; or by contents, *e.g.,* general, special (including medical, legal, theological, scientific, engineering, music, etc.).

General libraries frequently contain special collections or departments. Organization ranges from the complex system of a great library, with catalogues, indexes and a large staff, to the simple arrangement or listing which may suffice for the owner of a small private library. Faced with an ever increasing quantity of scientific and technical information, modern libraries have developed mechanical and electronic means of indexing which have both widened the librarian's horizon and increased his organizational problems (*see* further INFORMATION PROCESSING). (F. L. K.)

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I. HISTORY

A. The Ancient World

As with civilization itself, libraries appear first in populous centres with an active commercial and social life which depends on writing. Almost all the earliest records of the Babylonian, Phoenician, Minoan and Mycenaean periods were of an administrative or commercial nature; *i.e.*, archives rather than books. The great collection of cuneiform texts assembled by Ashurbanipal (669–630 B.C.) at Nineveh (now in the British museum), though largely archival, was however sufficiently general to merit its description as a national or royal library. It was soon realized that the written word exercised a magic power over the tribe, serving to bind its members together into a unity. This apparently divine power was commonly focused in some central grove, holy place, temple or oracle; and it is no accident that almost all institutional libraries in early times were associated with temples, just as in Christian times—at least till the 18th century—they were associated with the church. Indeed books have always been the most potent weapons of offense and defense in the armoury of the church. Libraries have also always followed on the heels of literary production and scholarship, and these in their turn depend on the availability and cheapness of their raw material; *i.e.*, papyrus and parchment in the classical period and parchment and paper in later centuries.

1. Greece.—Most of the larger temples probably possessed libraries from quite early times; many certainly had archive repositories. Apart, however, from two late, but possibly accurate, references to royal libraries in the 6th century B.C., the first known important institutional libraries in Athens came in the 4th century with the great schools of philosophy. Of these schools, the Stoics owned no property and so had no library. The schools of Plato at the Academy and of Epicurus possessed libraries, and though details are lacking their influence continued for many centuries. The most famous of them however was that of the Peripatetics, founded by Aristotle to serve the new aim of scientific research. Aristotle's library passed to Neleus, who took the cream of it back to his home in Scepsis in the Troad; there it was hidden to prevent its appropriation by the library at Pergamum, in whose territory the Troad lay. During its absence, Peripatetic studies at Athens suffered severely; but in the 1st century B.C. it was rediscovered and taken by Sulla to Rome, where the texts of Aristotle were arranged and edited by Tyrannio and Andronicus of Rhodes; upon this edition all present texts are based.

The schools of Athens took shape in the 3rd century B.C., and similar institutions appeared in cities of the eastern Mediterranean during the succeeding centuries. That some of these (including Athens, Rhodes and Cos) possessed libraries is attested by inscriptions. An active book market existed in Athens at least from the 5th century B.C., and private collections of books must have become common. Evidence of these has survived in only a few cases (*e.g.*, Euripides, Xenophon's Euthydemus, the historian Polybius, and in imperial times Plutarch and the sophist Herodes Atticus), but it is reasonably certain that they were widespread.

2. Alexandria and Pergamum.—All the successors of Alexander the Great in the divided empire established royal or state libraries in their respective areas, Macedonia, Pergamum, Antioch and Alexandria. Of these, the libraries at Pergamum and Alexandria were perhaps the most famous in classical antiquity. The great research institute of the Alexandrian museum and library was founded and maintained by the long succession of the Ptolemies in Egypt from the beginning of the 3rd century B.C. The initial organization was the work of Demetrius Phalereus, who was familiar with the achievements of the Peripatetic school and library at Athens. The first Ptolemy invited him to Alexandria, where he was given the chance to plan a great international school and library. Both museum and library were organized in faculties, with a president-priest at the head, and the salaries of the staff paid by the king. A subsidiary "daughter library" was established, *c.* 235 B.C., by Ptolemy III in the temple of Sarapis, the main museum and library being in the palace precincts, in the district known as the Brucheium. It is not known how far the ideal of an international library, incorporating not only all Greek literature but also translations into Greek from the other languages of the Mediterranean, the middle east and India, was realized. Certainly the library was in the main Greek: the only translation recorded was the Septuagint. The names of several of the earlier directors and departmental heads are known, all of them distinguished schol-

ars and writers, perhaps the most famous being Callimachus (*q.v.*). They faced for the first time the problems of organizing a really large collection, possessing perhaps half a million or more volumes, and they saw that two preliminary steps were needed: (1) a comprehensive bibliography of Greek literature must be compiled; and (2) the texts that had been acquired, which were probably in a confused state, needed editing and copying in a standard form of roll suitable for easy reference and for storage on a large scale. The editorial program included the establishment of the Alexandrian canon of Greek poets, the division of works into "books" as they are now known (probably to suit the standard length of rolls) and the gradual introduction of systems of punctuation and accentuation. The compilation of the national bibliography was entrusted to Callimachus, who did not however become head of the library. Though now lost, it survived into the Byzantine period as a standard reference work of Greek literature, and a few extracts from it are quoted by Athenaeus, *c.* A.D. 200. The museum and library survived for many centuries. It may have been damaged when Caesar besieged Alexandria in 47 B.C., but it was not destroyed then as some early legends relate. The end of the main library came in the civil war that occurred under Aurelian in the late 3rd century A.D.; the "daughter library" was destroyed by the Christians, A.D. 391.

The library at Pergamum was generally held to rival that at Alexandria, but it was not in fact founded by the Attalid dynasty till the early 2nd century B.C. Little is known of its work. Its first head was Crates of Mallus (*q.v.*); and there is some evidence that it published a bibliography or catalogue similar to that of Callimachus at Alexandria. The remains still survive of four rooms believed to have been part of the library in the temple of Athena. Plutarch records a rumour that Antony sacked the library and gave its 200,000 volumes to Cleopatra for the Alexandrian library, but the tale is doubtful.

3. Rome.—In the middle of the 2nd century B.C. the Roman general Lucius Aemilius Paulus brought to Rome the Macedonian royal library after the victory of Pydna; Crates of Mallus, the Stoic head of the library at Pergamum, visited Rome to lecture; and the Scipionic circle was formed to encourage an interest in Greek literature and the production of Latin works. The history of Roman libraries hardly starts however before 86 B.C., when Sulla brought the Aristotelian collection from Greece; Lucullus brought another great collection from the east in 63 B.C. to form the basis of the famous library at his villa at Tusculum. The most striking feature of Roman libraries was perhaps the spread of private villa collections, about which much information is given in the letters of Cicero and the younger Pliny. From Cicero's time onward the possession of a private library became a necessity to every scholar, teacher, writer and man of affairs. In the 1st century A.D. Seneca, and in the 2nd century Lucian, complained bitterly of the upstarts who were collecting libraries merely for display. Some of these libraries were surprisingly large; in the 3rd century one of 62,000 volumes is reported.

Under Augustus a series of state libraries, all in temples, was launched. The names of seven or eight are known, though 26 are said to have been eventually established. None of them grew to any size, or made great contribution to scholarship, though the Ulpian library, adjoining the temple of Trajan, survived well into the 5th century, when Sidonius Apollinaris, bishop of Arverna, describes how his own books and his statue were installed there.

In the second century A.D., a policy of educational provision was set on foot throughout the empire, and the establishment of schools at both large and small towns was encouraged and often subsidized from imperial funds. Libraries as always tended to follow schools, and there is reason to believe that most cities of the empire possessed municipal libraries. Identifiable remains of these exist at Timgad in Numidia and at Ephesus, and several writers refer to them; *e.g.*, Pliny the younger describes the library at Brusa in Bithynia, and also his own foundation at Como; Aulus Gellius mentions one at Tibur (Tivoli); Apuleius pays a tribute to those at Oea (Tripoli) and Carthage; and Sextus Julius Africanus refers to one at Aelia Capitolina (Hadrian's non-Jewish colony at Jerusalem). Romano-British towns such as Uriconium, Calleva Atrebatum and Verulamium may have possessed libraries.

4. Early Christian Libraries.—Christianity has always been distinguished as a bookish religion, and it was closely associated with the important change in book production that occurred in the 1st and 2nd centuries A.D., when the roll was being gradually replaced by the modern form of book or codex. The roll was awkward to handle, reference backward and forward was difficult and it was wasteful of space in libraries. Many separate rolls were needed for example for the New Testament, but this (or indeed the whole Bible) could be fitted into a single codex. The change affected Christian writings probably as early as the 1st century, but it did not spread to pagan works till the 3rd or 4th century.

It must have been normal practice almost from the first for churches to own small collections, even if these were mainly service books. A library is recorded at Jerusalem, founded by Bishop Alexander (d. 250), but the first great library in the history of the church was established about the same time by Origen at his school at Caesarea. In the west, church libraries are recorded by St. Jerome, St. Augustine and Paulinus of Nola; and in Rome the Papal Record office was set up in the late 4th century. Villa libraries, possessing pagan as well as Christian works, became common in the cultured society of 5th century Gaul described by Sidonius Apollinaris. But the two libraries that had a really enduring influence on all later church history were those of the community of Vivarium, in southern Italy, founded by Cassiodorus, and of the abbey of Monte Cassino, founded by St. Benedict, both in the 6th century. Together these set the pattern for all the schools, scriptoria and libraries of later monasticism in the west.

In the east, the Christian library tradition passed from Caesarea to Constantinople. It was probably at Caesarea that Constantine the Great's order for 50 copies of the scriptures was carried out. Under Constantine himself, Julian and Justinian, the imperial, patriarchal and university libraries at Constantinople amassed large collections, and their real significance is that for a thousand years they preserved, through generations of uncritical teachers, copyists and editors, the treasures of the schools and libraries of Athens, Alexandria and Asia Minor. Losses occurred, but these were mostly due to the habit, noticeable especially in the 9th century, of replacing original texts with epitomes. By far the greater part of the Greek classics however was faithfully preserved, and handed on to the schools and universities of western Europe, and for this there is a debt owed to the great libraries and the rich private collections of Constantinople.

The links with classical Greece provided by Constantinople were supplemented by the libraries of Islam, which incorporated Arabic versions of Greek medical, mathematical and scientific works, including Aristotle. From the 9th century richly equipped libraries existed throughout the Islamic world, including Baghdad under Harun al-Rashid, Cairo, Alexandria and also Spain, where there was an elaborate system of public libraries centred on Córdoba, Toledo and Granada. Arabic works from these libraries began to reach western scholars in the 12th century, about the same time as Greek works from Constantinople were filtering through to the west.

B. Middle Ages and Renaissance

The medieval period may be taken as extending from St. Benedict's foundation of Monte Cassino (529) to the 15th century. During this period the libraries of western Europe were almost exclusively ecclesiastical, belonging either to the religious houses and the cathedrals or, in the later years, to the new universities. Almost the only private libraries were the official collections of bishops. The clergy were the only literate class for most of this period, and even in their ranks literacy was often at a very low level. The tradition of schools and libraries was however maintained by the church, to enable the faithful to understand the scriptures and the prescribed offices. Here and there teaching went beyond these narrow limits, and though some frowned on the pleasures that Virgil and Ovid could provide, others claimed them as a useful introduction to the Latin of the church and found moral values in writers such as Seneca, while a few inevitably came to enjoy the Latin classics for themselves alone.

1. Monasteries and Medieval Universities.—The tradition of organized teaching and libraries which began with St. Benedict and Cassiodorus had earlier roots in the work of the mystics and eremites and loosely knit communities of Egypt in the 3rd and 4th centuries. The new movement was introduced to western Europe when Cassianus founded his two houses at Marseilles, *c.* 415; but Cassianus made no provision in his rule for educational work, and it was left to St. Benedict to make reading and writing (and therefore the school and the library) essential features of monastic discipline. The Benedictine rule spread quickly throughout the west, and became the basis of all later monastic rules.

In the expansion that took place in the early period both Ireland and England played a notable part. Irish monastic houses took root in the 5th century, under the influence of St. Patrick and probably also of exiles from southern Gaul, and many with famous scriptoria and libraries were established. From Ireland, the movement spread in the late 6th century to Scotland and Northumbria, and to France, Switzerland and northern Italy, where Irish foundations such as Luxeuil, St. Gallen and Bobbio, with their famous libraries, were set up. In the late 7th century the equally famous houses and libraries of Jarrow and Wearmouth, where Bede worked, were founded; and in the early 8th century St. Boniface set out on his missionary campaign in Frisia and Germany, founding the house and library of Fulda in 744. Soon afterward the school and library at York were founded—probably the best-equipped library in western Europe outside Italy. Its praises were sung by Alcuin, who in 782 went to the court of Charlemagne at Aachen to become head of the palace school. Just as Irish books went to St. Gallen and English books to Fulda, so books were taken from York to St. Martin of Tours, where Alcuin ended his days. From the 9th to the 11th century monastic education and libraries spread vigorously in France and Germany. The centre of early monastic culture in Germany was St. Gallen, the home of Notker Balbulus, Ekkehard I and Ekkehard IV, and the neighbouring Reichenau, where Reginbert was librarian. Rabanus Maurus Magnentius, who carried on Alcuin's educational work, was at Fulda; other famous centres were Corbie, established from Luxeuil, and its daughter house of Corvey in Saxony. The 10th-century Benedictine reformation had its roots at Cluny (founded 910), and in the next two centuries more than 300 religious houses were attached to the Benedictines of Cluny, all with organized libraries, large or small.

The 9th century in England was dark, in spite of Alfred the Great's campaign in favour of a literate clergy and his translations into English; in the 10th St. Dunstan led the monastic revival in England, and by the Norman Conquest a fair number of houses, some beyond doubt provided with schools and libraries, existed in England south of the Trent, and finely illuminated manuscripts were being produced. The Conquest brought an influx of great churchmen from Normandy, and a rapid extension of monastic houses. Lanfranc's exposition of the Benedictine rule, based on the Customs of Cluny, served as a guide to English Benedictine practice, and the monastic schools and libraries began to take their final shape.

None of the monastic libraries was large by modern standards; most possessed not more than a few hundred volumes. The largest collections were at Canterbury and Bury St. Edmunds (about 2,000 volumes each) and at the late Brigittine foundation of Syon (1,450 volumes); at the dissolution the latter was probably the richest of all the English monastic libraries. The books were not usually all kept in one place; service books would be near the sacristy, schoolbooks near the school, books for reading in the refectory near that place. The general library would be in *armaria* (bookcases) in a sheltered corner of the cloister, where reading and study were carried out. In the 13th century the larger houses began to instal carrels, or carols (enclosures), in the cloisters for the greater protection of readers. Not till the 15th century were special library rooms, made necessary by the gradually accumulating stocks, provided at the greater houses such as St. Albans, Canterbury, Durham, Cîteaux and Clairvaux. The contents of the libraries reflected a fairly general pattern of theological and biblical works, canon and civil law, standard classical texts and some medical, historical and other miscellaneous works. They are important because they preserved many classical texts, and they produced chronicles such as those of William of Malmesbury and Matthew Paris which are often of supreme importance as historical sources for contemporary events.

In the 13th and 14th centuries the rise of new universities, including Bologna, Paris, Oxford, Cambridge, Salamanca, Prague and Vienna, the rediscovery of Aristotle from Arabic and Byzantine libraries, and the coming of the friars who were responsible for much of the teaching at the universities, altered the picture. The concentration of higher education at the universities took away part of the *raison d'être* of the monastic libraries, which began to lose their first vitality. The new universities and colleges set up their own libraries almost from the beginning but did not grow rapidly, and their books were not available for young students, who relied mostly on copying their own texts from exemplars. The Franciscans established important libraries; the Greyfriars' libraries in Oxford, London and Cambridge were probably the richest collections in 14th-century England, including as they must have done the works of Robert Grosseteste, Roger Bacon and the schoolmen. To the work of the friars are owed two notable developments. One was the production of Bibles and other works of small size, written on fine vellum, which could be easily carried about by mendicants and students: books in the monastic libraries tended to be ponderous and unwieldy. The other was a location list of works in English monastic libraries, the *Catalogus librorum Angliae,* compiled by the Franciscans late in the 13th century. Early in the 15th century this was greatly expanded by John Boston of Bury, probably to serve as a bibliographical guide in the reorganization of the library at Bury St. Edmunds.

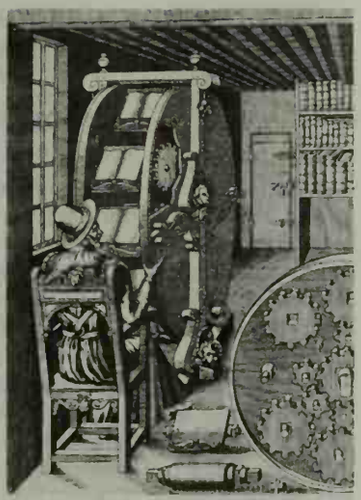
Private collections among the clergy were extremely limited before the 15th century. The library of Richard Aungerville, bishop of Durham (d. 1345), the first English bibliophile, was quite exceptional: it may have amounted to 1,500 volumes. His aims and methods in collecting it are described in his *Philobiblon.*

The end of the monastic libraries in England came in 1536–40 in one of the most tragic events of English library history, when the religious houses were suppressed and their treasures dispersed. Even greater destruction came in 1550 when university libraries, churches and schools were purged. In all, the losses were incalculable.

2. The Renaissance.—The rediscovery of many lost Latin texts and the arrival of Greek texts from Constantinople in 14th- and 15th-century Italy fostered the spread of humanism and a new interest in book collecting both as the handmaid of scholarship and as an end in itself. Petrarch and Boccaccio set the pattern for the working library of the scholar. Wealthy patrons followed, such as Cosimo de' Medici in 15th-century Florence, who with his librarian Niccolo de' Niccoli founded the Medicean library and his grandson Lorenzo the Laurentian library. With their help the search for lost or forgotten manuscripts, especially in the decaying religious houses, was prosecuted by Niccoli and Gian Francesco Poggio Bracciolini, and from Constantinople and Mt. Athos collectors, including Giovanni Aurispa and John Lascaris, brought rich stores to swell the libraries. Florence became the centre of the rising trade in books, and the bookseller Vespasiano produced volumes on a large scale for collectors including Cosimo, Matthias Corvinus of Hungary and Federigo da Montefeltro, duke of Urbino. In France the Sorbonne had an important library from its beginning in the 13th century, and in the 14th century the royal library of Charles V in the Louvre and the Papal library at Avignon, founded by Pope John XXII, are notable; the latter was dispersed before the return to Rome, and the Vatican library was founded in the 15th century. Elsewhere in Europe the academic libraries at Prague (founded under Charles IV in 1348) and the court library in Vienna (established in 1526) are important; and the demands of the newly literate middle classes in Germany in this period resulted in the establishment of municipal, or quasi-municipal, libraries, sponsored by the professional or mercantile classes. It is noteworthy that the Reformation, destructive as it was to the older libraries, encouraged the spread of town libraries in Germany; Luther's letter of 1524 to the German cities had

stressed the need for good libraries in the larger cities.

In England, apart from the new interest in classical studies marked by collectors such as Humphrey, duke of Gloucester, and John Tiptoft, earl of Worcester, who took many volumes from Italy to England in the 15th century, various factors lay behind the changes that took place. Lay professions, law being the first, slowly emerged and there was a substantial expansion of lay literacy. The idea of nationhood arose and the new interest in history was inspired by the need to establish the authentic origins of the Church of England, and the genealogy of the new landowners. The dispersed monastic collections were salvaged by the Elizabethan antiquaries and the aristocratic collectors of the 17th and 18th centuries. The expansion of commerce and navigation produced a new interest, not merely in literacy but in subjects such as mathematics, surveying, cartography and astronomy. Supremely important for libraries was the replacement of parchment by comparatively cheap paper, and the discovery of movable type, which made possible the mass production of books for general use. The great flowering of Elizabethan literature followed naturally. In the first century of printing, however, a very large proportion of the new printed books were religious or devotional, reflecting the new interest of ordinary layfolk in reading, and the new power of the printed word in influencing their thinking.



COUNCIL ON LIBRARY RESOURCES, INC.

BOOKWHEEL DEVELOPED BY AGOSTINO RAMELLI IN PARIS DURING THE 16TH CENTURY

From the middle of the 16th century to 1753 when the British museum was founded, there was a constant succession of plans put forward for establishing a national library in England, based usually on historical or religious grounds. In some degree Sir Thomas Bodley's library at Oxford (opened in 1603) served this purpose; so to a lesser extent did the Lambeth palace library founded by Archbishop Bancroft. This was an age when new national and university libraries were springing up all over Europe, and later private collectors such as Robert and Edward Harley, the first and second earls of Oxford, and Sir Hans Sloane, amassed even larger collections of printed books and manuscripts. For the first time since the days of the Alexandrian library, the problem of arranging large quantities of books was faced. Books were usually laid on desks or lecterns and chained for security to a horizontal bar. This was found easiest if they stood upright on the shelves with the fore-edge to the front; and the same fore-edge arrangement became usual in all libraries when shortage of space demanded an upright position. As the books increased the accommodation was augmented by one or two shelves erected above the desks, each bay being lighted by its own window. There were no chains in the library of the Escorial, erected in 1584, which was the first library to dispense with bays and arrange its books in cases lining the walls. The change to the present arrangement with the spines of the books to the front began in France, probably with the library of the historian Jacques Auguste de Thou (d. 1617). The problems of organizing large collections produced, in 1627, the first modern work on library economy, the *Avis pour dresser une Bibliothèque* by Gabriel Naudé, who in 1642 was appointed by Cardinal Mazarin to the charge of the great library that bears his name. This work was translated into English by John Evelyn in 1661, and it must have had a considerable influence on the wealthy collectors and scholars of the Restoration period. In a true sense Evelyn's translation of Naudé marks the transition in England to the age of the modern library, which was heralded almost at once by the library of Samuel Pepys, organized and arranged with meticulous care and beautifully housed, which can be seen at Magdalene college, Cambridge.

THE MASTER AND FELLOWS OF MAGDALENE COLLEGE, CAMBRIDGE

THE PERSONAL LIBRARY OF SAMUEL PEPYS, DATING FROM THE 17TH CENTURY, PRESERVED IN MAGDALENE COLLEGE, CAMBRIDGE UNIVERSITY

C. Post-Renaissance

Naudé's treatise, and the practical demonstration he was able to give of his principles and ideals in his organization of the Mazarin library (which was planned not as a collection of rarities but as a working library), bore fruit. This great library of 40,000 books was despoiled during the Fronde, but though Mazarin restored it, Naudé did not live to return to his post. Nevertheless the idea of a scholarly library, systematically arranged, displaying the whole of recorded knowledge and open to all students without fear or favour, took root. In England two royal librarians, John Dury in 1650 and the classical scholar Richard Bentley at the century's end, saw the possibility of the royal library's developing along these lines. More clearly than anyone, however, G. W. Leibniz, the greatest librarian of that age, understood the problems that the rapid advance of knowledge was setting. During his stay in Paris Leibniz absorbed not only Naudé's ideas but the principles of historical research developed by the Jesuits and the Maurists, and these were the basis of his scheme for a national bibliographical organization which would give the scholar access to all that had been written on his subject and enable him to meet or correspond with fellow students and become acquainted with current research. In particular Leibniz realized that scientific progress depends primarily on the ease of communication between scholars, and that the purpose of great libraries and museums is to provide and keep open the channels of communication.

In the 18th century the boundaries of knowledge were expanding rapidly, especially in the field of historical studies and the new "experimental philosophy." Book collecting became fashionable and great private libraries abounded; some no doubt were based on ostentation but many were the work of genuine scholars, such as for example Count Heinrich von Bünau in Germany and Sir Hans Sloane in England. These were often accessible to scholars in general, and many found an eventual home in one of the royal, national or university libraries. The academic libraries tended to grow more slowly and less systematically; the most notable was perhaps Göttingen University library which under G. A. von Münchhausen and Johann Gesner was based on Leibniz's ideals and was moreover closely linked with academic teaching. Not till the 19th century did the university libraries as a whole reorganize their methods to meet modern demands. The Counter Reformation had its scholarly and constructive side. The Vatican library was founded in the 15th century, and under the guidance of scholars such as its first librarian, Bartolomeo Platina, and later librarians such as Caesar Baronius (1538–1607), Rome with its libraries and archives, its colleges and publishing facilities, became the headquarters of Roman Catholic learning. During the 17th century a new impetus was given to historical research by both the Jesuits and the Benedictines. At Antwerp the Bollandists were basing the *Acta Sanctorum* on genuinely scientific criticism of material that

was often legendary, and even more important work was being done by the Maurists in France, under Jean Mabillon (1632–1707), the founder of the science of paleography and diplomatics; at St. Germain-des-Prés an academy for Benedictine studies was established, with a great library of the charters and archives of the order. In England many cathedral libraries were restored and enlarged. A good example is that at Westminster, which was established in the dorter of the abbey in 1623; contemporary writers were inclined to describe it as a public library, though it was scarcely public in any true sense. On the whole, bequests of collections tended to flow toward the academic rather than the ecclesiastical libraries. On the continent the anti-clerical movement which found expression in the French Revolution sealed the fate of many monastic and church libraries; in France for example these were expropriated in 1789, in Germany in 1803 and in Spain in 1835. The dispersal was however better organized than that of the English monastic libraries under Henry VIII, and in general the spoils were gathered into national and university libraries including those in Paris, Munich, Barcelona and Valencia.

The development of popular libraries was equally slow. The municipal libraries that had been established in Germany were ill-supported and many were all but dormant. In England a few town libraries and many parochial libraries were founded in the 17th century; the most notable of the latter was perhaps Archbishop Tenison's library, established at St. Martin-in-the-Fields in 1684 with the help and encouragement of Evelyn and Wren, and finally dispersed by auction in 1861. The efforts of Thomas Bray and the Society for Promoting Christian Knowledge led to the act of 1708–09 "for the better preservation of parochial libraries," and the opening of many more; most of these had a short life. The 18th century was particularly notable for the gradual extension of literacy and the habit of reading among all but the humblest classes throughout Europe. Apart from the increasing output of printed books, there was much evidence of this: the spread of popular schools, the multiplication of periodicals and pamphlets, the rise of coffeehouses and similar centres of discussion, the new popular interest in politics, the increasing profits of authorship, which lessened the need for literary patronage, and the development of literary criticism. The appearance of society and subscription libraries, some devoted to special interests such as Dr. Williams' library in London, some belonging to the increasing number of learned societies, some quite general and even popular, was a notable feature of this century. The new "experimental philosophy" was subdividing itself into its many special sciences, each with its own following of experts and its own proceedings and publications. It is noteworthy that the new societies owed much of their support to nonconformist scholars who were denied the use of the academic and ecclesiastical libraries. The clearest evidence of the spread of literacy however lies perhaps in the rapid growth of commercial circulating libraries in the last half of the 18th century. They appeared on the continent of Europe early in the century; Rousseau in his boyhood had patronized one at Geneva. In England their popularity dates from about 1740, after which they spread in almost every town of any size and especially in holiday resorts such as Bath. They coincided with the appearance of popular novels in quantity, and though many of the circulating libraries contained much besides fiction, novels were their staple diet, and it was to these they owed their profits. There is little doubt that the majority of their clients were women of the middle classes who had acquired the habit of novel reading; they served much the same purpose for women as the coffeehouses did for men, being meeting places and centres of gossip as well as libraries, and often located in the shops of milliners or drapers. The success of William Lane's Minerva press, which supplied books to these libraries, attests their universal popularity at this time. As literacy and the thirst for knowledge spread beyond the middle classes, the demand for books led to the formation of mechanics' institutes and libraries in industrial centres, the chief inspirer of this movement being George Birkbeck (1776–1841). By 1850, the date of the first Public Libraries act, there were about 800 of these institutes; many of these were quite small, but at least 50 had libraries with 3,000 books or more. Though their finances were inadequate and their organization often haphazard, they provided the basis for the system of municipal libraries that emerged later in the country. (R. Ir.)

II. MODERN LIBRARIES

A. The United States

Although the free, tax-supported, municipal library is regarded as the characteristic library in the United States, this type is a rather late development. The earliest and for long the more important libraries in the American colonies were the private libraries of men of scholarly interests. A library was planned for the Henrico college in Virginia in 1620, but the small collection was dispersed when plans for the institution were abandoned after 1622. The first "public" or institutional library actually to come into existence was that of Harvard college, when John Harvard left his collection of 260 volumes to the new college in Cambridge in 1638. Other college libraries of the colonial period were William and Mary (1693), Yale (1701), Pennsylvania (1755), Princeton (1755), Columbia (1757), Brown (1764) and Dartmouth (1770).

About 1700, through the efforts of the Rev. Thomas Bray (*q.v.*), parish libraries for the use of ministers and congregations were established in a number of Anglican parishes, particularly in the southern colonies. The first subscription library in the colonies was founded by Benjamin Franklin in 1731 to meet the need for books experienced by the Junto, a debating society he had started a few years earlier. This was the Library Company of Philadelphia, afterward administered by the free library. Other early subscription libraries were the Redwood library, Newport, R.I. (1750); the Charleston (S.C.) Library society (1748); the Providence (R.I.) Athenaeum (1753); the New York Society library (1754); and the Portland (Me.) Library society (1765).

Libraries have increased so that the 1962 edition of the *American Library Directory* listed 13,019 libraries or library systems in the country and omitted approximately 2,800 as too small to warrant inclusion. Of those listed, 5,770 are public, 1,379 university and college, 645 junior college, 3,473 special, 434 law, 755 medical, 462 armed forces and 101 institutional libraries.

1. College and University Libraries.—The need for libraries as the central part of institutions of learning has been recognized since 1638 when John Harvard's gift of his books, as well as his money, led to his name being given to the first American college. The founding of Yale was also connected with a gift of books to create a library for the new institution. But until the latter part of the 19th century college libraries were small and usually contained only books connected with the restricted curriculums of the period, predominantly concerned with the education of men for the clergy. For more general materials the students themselves, through their various literary, debating and other undergraduate societies, created libraries of their own. These reflected the interest of the students in history, travel, politics, modern literature and other subjects largely ignored in the official courses of instruction. In many cases these society libraries were not only more varied but also larger than the official college libraries. As the literary societies were supplanted in the last half of the 19th century by the social fraternities, their libraries were absorbed by the college libraries, leading to a great increase in the resources of the institutions.

In the 20th century the college libraries developed rapidly as instruments of teaching, as emphasis in instruction swung from textbooks through assigned sections of several books to free research in the available literature. The older institutions have large and diversified collections supporting all parts of the curriculum and requiring normally about 5% of the college budget for maintenance. New community and junior colleges are in general less well equipped since even if money is available the creation of a good working library takes years of steady effort.

Universities have developed great libraries to support the research to which they are devoted. In 1961 there were 27 universities with more than 1,000,000 volumes each, led by Harvard with nearly 7,000,000. In that year Harvard, Michigan, California at Berkeley and California at Los Angeles each added more than 100,000 volumes, followed by Stanford, Cornell and Indiana with

more than 90,000. A striking aspect of university library development has been the growth of the great state universities, particularly in the middle west and far west. Of the 50 largest university libraries in 1961, 26 were connected with state institutions.

With the growth in the number of students as well as the great size of university libraries, many institutions have established separate undergraduate libraries, of which the Lamont library (1948) at Harvard is perhaps the best-known example. In addition to separate libraries for special schools, many universities have organized their collections around divisional reading rooms which provide the basic collections for broad academic disciplines. Although it is not always feasible for the largest collections, and especially for those located in urban centres, many universities and most colleges have opened their bookstacks so that students can have direct access to the collections.

2. Endowed Libraries.—The gift or bequest of great private libraries or of large sums of money for the erection of library buildings and the organization and maintenance of libraries for free public use became a frequent object of philanthropy in the 19th century United States. John Jacob Astor and James Lenox were the founders of libraries bearing their names which in 1895 were consolidated with the Samuel J. Tilden trust of $2,000,000 to form the New York Public library. In 1901 Andrew Carnegie gave $5,200,000 for the erection of circulating libraries throughout New York city. One of the great libraries of the world, the New York Public library, in the 1960s operated 83 branches and contained more than 7,000,000 volumes. The Enoch Pratt Free library (1886) of Baltimore and the Providence Public library (1878) are typical of the numerous endowed public libraries, many of which are supported also by municipal appropriations.

Famous libraries open to the public which were also established by individuals include the Pierpont Morgan library and Frick art reference library, New York; John Crerar and Newberry libraries, Chicago; Henry E. Huntington Library and Art gallery, San Marino, Calif.; Hoover Library on War, Revolution and Peace (now the Hoover Institution on War, Revolution and Peace), Stanford university; and Folger Shakespeare library, Washington, D.C. University libraries were the recipients of many great private collections, but the Chapin library of Williams college, Williamstown, Mass., is perhaps unique in being a collection of the great works in all fields of a liberal arts curriculum which was created solely to be given to the college.

At the head of library benefactors stands Andrew Carnegie, whose first library gift was made in 1881 to his native Dunfermline in Scotland. His second gift was made in 1890 to Allegheny, Pa. Pittsburgh received a large central building in 1895 and later eight branches. The total amount given by Carnegie and the Carnegie corporation for library buildings in the United States and Canada was $42,665,000. In addition to the Carnegie corporation, several other foundations, including the General Education board, the Rockefeller foundation and the Julius Rosenwald fund, gave generously through endowments and special grants for the furtherance of libraries. In 1956 the Ford foundation established the Council on Library Resources with a grant of $5,000,000, followed in 1961 by a further $8,000,000, to assist, through research, development and demonstration, in solving problems of technological and methodological development in library operations.

3. Library of Congress and Other Governmental Libraries.—Founded in Washington, D.C., on April 24, 1800, the Library of Congress became in fact if not in name the national library of the United States and one of the greatest libraries in the world. It first occupied its own building in 1897, having previously had quarters in the capitol. In 1939 a five-story annex was added. In addition to serving members of congress and other officers of the government, it developed into an institution outstanding among the learned institutions of the world, with magnificent collections of books, manuscripts, music, prints and maps. It provides lectures and concerts, serves as the national centre for service to the blind, provides through the legislative reference division for the needs of congress, houses the national union catalogue and issues printed catalogue cards for the use of subscribing libraries and institutions. In 1962 it had 41,879,000 books, pamphlets, manuscripts, microfilms, recordings, music, photographic prints, moving pictures, etc.; of this number about 12,500,000 were printed books and pamphlets, including 5,600 books printed before 1501. Through deposits under the copyright law, exchanges with foreign governments and learned societies and purchase it was adding 500,000 pieces to its collections each year.

Although each of the executive departments and most of the bureaus, as well as the supreme court and other courts, have their own libraries, the two outstanding institutions which share with the Library of Congress the rank of national libraries are the National Agricultural library of the department of agriculture and the National Library of Medicine, administered by the department of health, education and welfare, in Bethesda, Md. The library services branch of the office of education, established in 1938, maintains contacts between the federal government and libraries throughout the country and, after 1956, supervised the distribution of governmental funds for the support and improvement of libraries under the Library Services act.

4. Public Libraries.—The modern public library maintained by the municipality or some other unit of local government from the proceeds of taxation was scarcely known before 1850. It developed for the most part after the formation of the American Library association in 1876. J. H. Shera in *Foundations of the Public Library* pointed out that "there have been many claimants to the distinction of having created the first truly public library in the United States, but this antiquarian controversy is rooted not in ignorance of historical fact but in uncertainty as to the precise definition of terms. . . . If the custodianship of a common collection of books by public authorities be the criterion, then the institution may truthfully be said to have begun in 1629 when the Massachusetts Bay Company authorized the shipment to Salem of those books assembled by the Rev. Samuel Skelton." (J. H. Shera, *Foundations of the Public Library,* The University of Chicago Press, 1949.) However, the Bingham Library for Youth, established in 1803 at Salisbury, Conn., represented the first instance in which a municipal governing body contributed active financial assistance to public library service. This was the earliest real recognition by a municipality that aid to library development was a proper function of the town. The oldest existing public library is the Peterborough (N.H.) town library, established in 1833. The great impetus to the expansion of the public library movement followed the establishment of the Boston Public library in 1852.

Michigan in its constitution adopted in 1838 made provision for public libraries, while New Hampshire with its law for the "Establishment of Public Libraries" (1849) appears to have been the first state to pass specific public library legislation. By the 1960s all states had legislation on libraries and after 1956 the federal government made regular appropriations for library extension and demonstration. Each state had its state library and library commission or similar body, to assist public libraries, and most cities controlled and supported their libraries through powers given them by state enabling laws. The governing body of the municipal public library is generally a board of trustees, either elected or appointed by the city authorities. Under the board is the chief librarian, who supervises and administers the library or library system and its activities.

Public libraries in the United States are characterized by great similarities in function and basic services, and by wide differences in size, structure and variety of activities in which they engage. Most of them derive their support, entirely or largely, from local taxes; they provide a book stock which is diversified and selected to appeal to the interests of their particular patrons; the books are classified by subject matter and are listed in a comprehensive catalogue arranged to show authors, titles and subjects. The service is free to all local residents and is usually available to others at a slight charge. The differences among them spring largely from the size of the community or area served, and reflect the individual character of each community. Thus, one library may be unusually strong in its technological collection, another in its commercial or industrial or professional holdings. Because of the need for a large and diversified collection if adequate service is to be given, library systems apart from those of the larger cities normally cover coun-

BY COURTESY OF THE PETERBOROUGH HISTORICAL SOCIETY

READING ROOM OF THE PETERBOROUGH, N.H., TOWN LIBRARY, *c.* 1900. THIS LIBRARY, ESTABLISHED IN 1833, IS THE OLDEST EXISTING PUBLIC LIBRARY IN THE UNITED STATES

ties or other convenient areas. The large city or county library, in addition to its main central stock of books which may number hundreds of thousands of volumes, maintains numerous branches, each of them a smaller replica of the central library, as well as smaller book installations in community centres, schools, hospitals, prisons, etc. It may also operate bookmobiles to distribute books to areas where permanent branches do not exist. Through a well-organized system of loans between the central library and its outlets, anyone may borrow any book that the library owns, or he may even obtain books on interlibrary loan from other cities and other libraries.

Though the library is still primarily concerned with the preservation and distribution of books, it has increasingly recognized an obligation to provide important nonbook materials for home and group use. In 1891 the Denver Public library established a circulating picture collection and in 1904 the Newark (N.J.) Public library began the circulation of framed prints and paintings, both under the inspiration of John Cotton Dana. Phonograph records were added to other library materials by the St. Paul (Minn.) Public library in 1914 and are today an important part of many library collections. Book talks, discussion groups, film showings and record concerts are arranged by public libraries as part of their regular activities in the field of adult education and recreation. The Louisville (Ky.) Public library established its own radio station in 1950 to extend its services to its public.

According to the *American Library Directory* (23rd ed., 1962) there were in that year 5,770 public libraries and library systems in the country with budgets of more than $2,000 a year. The library services branch of the U.S. office of education, in preparing for a survey of public libraries in the country, estimated the total number of libraries in 1962 as 8,200. Of the 1960 population of 179,323,175 persons, 173,500,000 were estimated to have library service of some kind available to them, although perhaps only one-third of this number had really adequate service. The American Library association recommended that, in order to give good service, library systems should have at least 100,000 volumes and should add 4,000–5,000 volumes annually. The recommended annual expenditure is a minimum of $3 per capita. Since only 51 cities of more than 35,000 population met this figure in 1960, it was evident that a great deal of additional support, as well as an extensive consolidation to meet the standard number of volumes, was necessary to give the kind of library service needed.

In spite of these deficiencies the large municipal libraries, such as those in New York, Boston, Chicago, Cleveland, Baltimore, Los Angeles and San Francisco, had collections which in variety and inclusion of specialized material compared not unfavourably with many university libraries. The great need for improvement, aside from those regions totally lacking in library services, lay in the many independent town and village libraries which could never hope, except by merging into more widespread systems, to have resources to meet even minimum requirements. One of the benefits visible from the Library Services act of 1956 was the encouragement of the spread of county and area library service.

5. Children's Libraries.—Special libraries and library services for children have been a part of the U.S. library system since the beginning in Salisbury, Conn., in 1803. The first fully tax-supported library for children was established in Arlington, Mass., in 1837. After 1900, separate children's rooms or other facilities were a normal part of public library operations, with specially trained librarians to give skilled and sympathetic guidance in the use of books and periodicals. Juvenile circulation frequently amounts to one-half of the total circulation in public libraries. After 1950 there was a general tendency to separate the "teen-age" group and to establish a "young adult" department between the children's services and the adult services.

6. School Libraries.—In their modern form, U.S. school libraries are a development of the 20th century, as curriculums required a variety of books, pamphlets and magazines. Secondary school libraries, especially those in schools with enrollments of 200 or more, usually include a selected collection of printed materials chosen with the needs of the specific group and community in mind. Some schools include film strips, films and recordings among their collections, and serve as the school's materials centre.

Growth in elementary school library service has been marked in such cities as Chicago, Detroit, Oakland and Denver and in many suburban and medium-sized communities. Trained school librarians or teacher librarians, normally certified by the state education departments, are assigned to direct the school library service, usually assisted by student library assistants.

Although some rural schools, especially those in consolidated school districts, have excellently equipped libraries, the typical pattern is for such schools to receive library services from the county library or directly from the state library, through long-term deposits and periodic visits by a bookmobile. Most rural children, however, are still without school library service (and frequently without public library service) and the quality of school library service in many urban schools is still too low.

7. Special Libraries.—Specialization in all fields necessarily has its counterpart in library service and, while public libraries have built up many special collections, there was an insistent demand for the library devoted to a specific subject area. Specialized libraries in law and medicine, such as the great collections of the Association of the Bar of the City of New York library, the National Library of Medicine and the Boston Medical library, have a long history, but the term "special library" has come to denote more usually libraries maintained by international organizations, corporations, banks, newspapers, advertising and insurance agencies, and organizations in the fields of business, technology, social welfare, art and science. These have flourished particularly since

the organization of the Special Libraries association in 1909. In the 1960s it had 5,300 members, with branches in most of the principal cities of the country.

8. Library Co-operation.—No library, no matter how extensive, can ever have all of the materials that may be needed by its patrons. Libraries have consequently worked out methods of co-operation in their efforts to provide every reader with the material he needs. These include bibliographies showing in which libraries materials can be found, such as the *Union List of Serials* and other union lists both national and regional, M. B. Stillwell's *Incunabula in American Libraries* (1940) and other censuses of special materials, and the printed *National Union Catalog*, giving selected locations for books published after 1952 and supplemented by the National Union catalogue on cards in the Library of Congress for earlier materials. The Library of Congress regularly circulates to the larger libraries a list of unlocated titles that are needed by scholars throughout the country.

A well-developed system of interlibrary loans enables libraries to borrow items from each other, although the growth of cheap photographic methods of reproduction has reduced the volume of loans and also has made it possible to reprint many standard works and sets of journals, either in full size or in one of the forms of microreproduction, so that the many new and rapidly growing libraries of the country can secure copies of these works which would be unobtainable in their original forms. Among other such materials available are microcopies of U.S., UN, British and other documents, microfilms of many newspapers and copies of all books published in the United States before 1800.

Co-operative storage of little-used materials is the purpose of the Mid-West Inter-Library centre in Chicago, the Hampshire Inter-Library centre (including Amherst, Mount Holyoke and Smith colleges and the University of Massachusetts) in Amherst, Mass., and the New England Deposit library in Boston. The first two also carry out co-operative acquisition programs for their constituent libraries. There are also bibliographic centres maintaining union catalogues of particular states and regions, the best-known being the Pacific Northwest Bibliographic centre at the University of Washington in Seattle, the Bibliographic Center for Research–Rocky Mountain Region at the Denver Public library and the Union Library Catalogue of the Philadelphia Metropolitan Area at the University of Pennsylvania, all established in the 1930s.

9. Library Associations of the United States.—Founded in 1876, the date at which modern librarianship is generally considered to begin, the American Library association is the national organization of librarianship, the agency through which the profession speaks with most authority. It maintains its headquarters in Chicago. It has more than 25,000 members and an endowment capital of more than $3,000,000. It is financed by membership dues, endowment income and occasional grants for special projects. Its activities are devoted to increasing the use and usefulness of books through improving and extending library service to all people and to raising the standards of the library profession. Its work is carried on through six divisions devoted to various types of libraries—American Association of School Librarians, American Association of State Libraries, American Library Trustee association, Association of College and Research Libraries, Association of Hospital and Institution Libraries and Public Library association—and seven devoted to types of library services—Adult Services division, Children's Services division, Library Administration division, Library Education division, Reference Services division, Resources and Technical Services division and Young Adult Services division.

One area in which the association has been particularly outspoken is that of free access to reading materials of all kinds and for all people. Under the leadership of its Intellectual Freedom committee the association adopted a Library Bill of Rights (1948, amended 1961) to set forth its own convictions and to encourage its members to uphold these freedoms in their own institutions. The major elements in the Library Bill of Rights are:

1. As a responsibility of library service, books and other reading matter selected should be chosen for values of interest, information and enlightenment of all the people of the community. In no case should any book be excluded because of the race or nationality or the political or religious views of the writer.

2. There should be the fullest practicable provision of material presenting all points of view concerning the problems and issues of our times, international, national, and local; and books or other reading matter of sound factual authority should not be proscribed or removed from library shelves because of partisan or doctrinal disapproval.

3. Censorship of books, urged or practiced by volunteer arbiters of morals or political opinion or by organizations that would establish a coercive concept of Americanism, must be challenged by librarians in maintenance of their responsibility to provide public information and enlightenment through the printed word. . . .

. . .

5. The rights of an individual to the use of a library should not be denied or abridged because of his race, religion, national origin or political views. . . .

. . .

In addition to the American Library association there are a number of specialized associations representing different types of libraries and serving to bring together the librarians interested in the special problems of these libraries. These include the American Association of Law Libraries, American Documentation institute, Association of American Library Schools, Association of Research Libraries, Catholic Library association, Council of Planning Librarians, Educational Film Library association, Medical Library association, Music Library association, Osteopathic Library association, Special Libraries association and Theatre Library association. Each of these is active in its own field, and they exchange information and co-ordinate activities of common interest through a Council of National Library Associations formed in 1942. The diversity and specialization of library interests are attested by the large number of local and state library clubs and associations to be found all over the country; and many libraries, public and academic, receive support and assistance from groups known as Friends of Libraries. (W. E. Wr.)

B. Canada

The Canadian federal government established a national bibliographic centre in 1950 and laid the foundation for the collections of the national library in Ottawa in 1953. The library contains the major Canadian collection, having received much material from libraries in the dominion. It also contains the National Union catalogue holding more than 4,000,000 cards and representing all important Canadian libraries. Associated with the national library are the historical manuscript, map and book collections of the national archives and the library of parliament. Other major collections in Ottawa include those of the national gallery, the national museum, the National Research council, and the federal departments of labour and agriculture. The library of the supreme court of Canada functions as the national legal library.

The increase in the number and size of Canadian universities from the 1950s provided a stimulus to the development of reference and research collections in the major university centres. The largest libraries are those of the University of Toronto, McGill, Laval, British Columbia, Alberta and Queen's university. Older government libraries include the Legislative library in Halifax which incorporates that of the Nova Scotia Historical society (1878), the Bibliothèque St. Sulpice, Montreal, and the legislative libraries of Quebec city, Toronto, Winnipeg, Saskatoon, Edmonton and Victoria.

In the larger public libraries are many specialized services and collections. Chief among them are those of the public libraries in Toronto, Vancouver and Montreal. Throughout Canada, in 1960, 875 public libraries with more than 2,500,000 registered borrowers circulated 46,000,000 books from a book-stock of about 13,000,000 volumes. About 78% of the funds for public libraries were derived from local taxes, 15% from provincial governments and 7% from other sources. Total expenditure for public libraries in 1960 in Canada was $19,400,000 or .053% of the Canadian gross national expenditure. All provinces provide regional or traveling library services to persons in remote areas.

Many Canadian business firms have developed special libraries, as have the government departments in all the provinces. School library services on the elementary and secondary level are well

developed in most of the major Canadian cities. Montreal, Toronto, Winnipeg, Edmonton and Vancouver each have a stock of 150,000 volumes or over to serve pupils enrolled in school classes. (H. C. Ca.)

C. Latin America and the Caribbean

Library services are quickly developing in Brazil, Argentina, Uruguay, Chile, Mexico, Colombia and Cuba. Scientific and industrial progress is so great in these countries, and the urge for well-organized documentation is so strong, that the necessary technical and scientific information is becoming organized. Plans are designed to supply public library services to adults and children, and universities and research organizations are improving their library services.

In some Latin-American countries there are governmental organizations specially established to look after library service projects on a national basis. In Brazil there are three such organizations: the Instituto Nacional do Livro (1937), the Serviço Nacional de Bibliotecas (1961), both under the ministry of education and culture, and the Instituto Brasileiro de Bibliografia e Documentação (1954), under the National Research council. In Argentina there is the Comisión Protectora de Bibliotecas Populares (1870). In Costa Rica there is the Dirección General de Bibliotecas, Archivos y Museos, and in Guatemala the Dirección General de Bibliotecas Nacionales.

1. Documentation Centres and Special Libraries.—The Latin-American committee of the International Federation for Documentation was created in 1960 to foster the exchange of scientific information and to organize documentation, and special and university libraries are developing co-operative projects to establish regular exchange of this information. The Brazilian Institute of Bibliography and Documentation acts as a national centre for scientific information, co-ordinating the work of ten regional centres of bibliography and documentation which supply scientific information and compile the National Union catalogue for the institute.

With the assistance of UNESCO a Centro de Documentación Científica y Técnica has been established in Mexico, Uruguay instituted its Centro de Documentación Técnica y Económica and Chile has created its Centro Nacional de Información y Documentación.

In Turrialba, Costa Rica, there is the Servicio de Intercambio Científico (SIC) of the Instituto Interamericano de Ciencias Agrícolas, a specialized agency of the Organization of American States (OAS). The Centro Interamericano de la Vivienda (CINVA), in Bogotá, Colombia, also supported by the OAS, specializes in housing and planning. In Bucaramanga, Colombia, the Centro de Documentación e Información provides information services on engineering.

In Argentina the Consejo Nacional de Investigaciones Científicas has sponsored, since 1958, the publication of the *Catálogo de Publicaciones Periódicas Científicas Técnicas,* issued for the first time in 1942.

Special libraries include the library of the Instituto Oswaldo Cruz (1900), in Rio de Janeiro, Braz., which specializes in medicine; the library of the Institute of Mathematics of the Engineering School of Montevideo, Urug.; and the library of the Universidad Nacional Mayor de San Marcos, in Lima, Peru; the library of the faculty of medicine, National University of Uruguay (1884), which maintains a bibliographical research and scientific information service, and the library of the National Autonomous university of Mexico (1956). The Library of Córdoba National university (1614), Argentina, and the library of the St. Benedict monastery (1600), Rio de Janeiro, Braz., are among the oldest in Latin America. The Institute of Jamaica, Kingston, Jamaica, has a general library as well as a West India reference library.

2. National Libraries.—One of the most important national libraries is the Biblioteca Nacional do Rio de Janeiro (1810), containing fine collections of incunabula and engravings as well as rare Portuguese books on Brazil. Other national libraries include the Biblioteca Nacional de Argentina (1810), the Biblioteca Nacional del Uruguay (1816), the Biblioteca Nacional de Chile (1813) and the Biblioteca Nacional de México (1833), part of the National University of Mexico. The library of the University of the West Indies, Kingston, Jamaica, is a copyright repository of West Indian official publications.

3. Public Libraries.—Brazil has been in the lead in establishing public libraries, followed by Argentina, Chile and Colombia. Brazilian public libraries are open in Rio de Janeiro, Recife, São Luís, Curitiba, Belo Horizonte and São Paulo. There are also public libraries in Medellín (Colombia), Havana (Cuba), Buenos Aires (Arg.) and La Paz (Bol.). The Central Library of Trinidad and Tobago is one of the largest libraries in the Caribbean area (206,000 books). Trinidad Public library, Port-of-Spain (1851), is the oldest library in the West Indies. The central public library in Kingston, Jamaica, operates mobile units.

4. Children's Libraries.—The Municipal Children's library, São Paulo, Braz., can be compared with the best library services for children anywhere. Also in Brazil is the Carlos Alberto Children's library, Rio de Janeiro. (L. de Q. S.)

D. Spain and Portugal

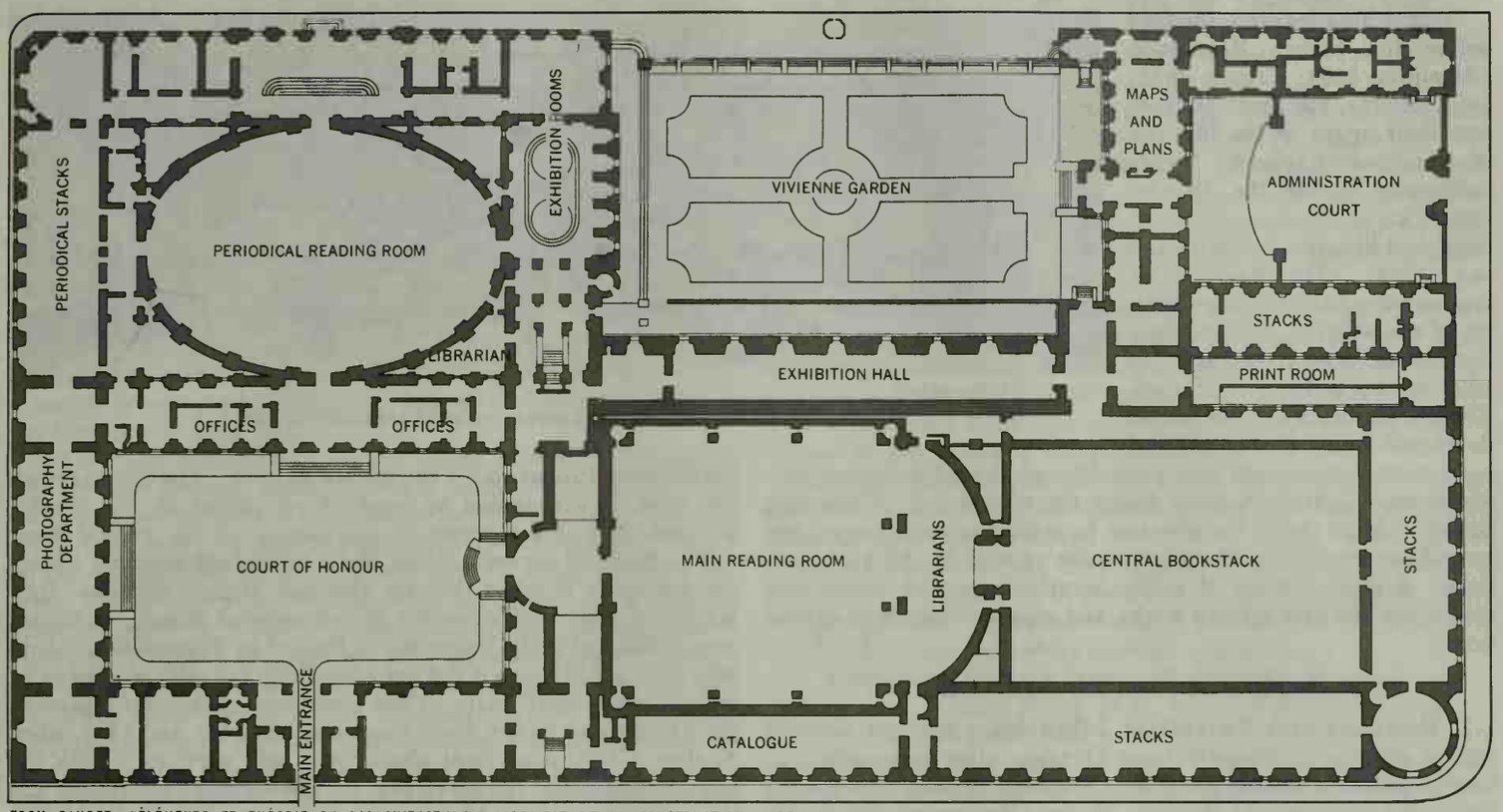
1. Spain.—All the state and university libraries of Spain have government support. They all use the same cataloguing rules and the Universal Decimal classification, and they are staffed by librarians of the Cuerpo Facultativo de Archiveros, Bibliotecarios y Arqueólogos. The most important are the Biblioteca Nacional, Madrid (1712), with a national bibliographical centre, and those of the royal national academies (de la Lengua, Historia, Legislación, Medicina, Bellas Artes y Ciencias), together with the university libraries of Madrid, Salamanca, Barcelona, Seville, Valencia, Granada, Santiago, Valladolid, Saragossa and Palma. The Biblioteca Nacional is particularly strong in theology, canon law and history. Also of great importance are the archival libraries including Simancas, Indias, Histórico, Nacional and Corona de Aragón, and the royal palace library in the Escorial (with a fine manuscript collection), the Colombina (Seville), the Biblioteca de Menéndez y Pelayo (Santander); also the private libraries of some of the Spanish aristocratic houses including Alba and 't-Serclaes. Spanish libraries are rich in collections of manuscripts, incunabula, and early printed books on Latin America. An interesting development is that of the "Casas de la cultura" and their libraries. (J. L. de la V.)

2. Portugal.—The Biblioteca Nacional, Lisbon (1796), is the largest and most important Portuguese library. Its collections include manuscripts, incunabula, prints and drawings. It specializes in Portuguese subjects, has the largest collection of newspapers and magazines and a large series of editions of Camões' works. The library of the University of Coimbra (1591) is the oldest and the second in size. The royal library, in the Palacio da Ajuda, Lisbon, includes a precious collection of manuscripts, including a 17th- and 18th-century music collection. Part of the library was transferred to Brazil in 1808 during the Napoleonic invasion and formed the nucleus of the Rio de Janeiro national library. The Biblioteca Pública Municipal, Oporto (1833), and the library of the Academia das Ciências, Lisbon, both contain libraries of convents suppressed in the 19th century. These, together with the public library, Braga, have large holdings, including important collections of manuscripts. (M. S. E.)

E. France

An important group of French libraries is controlled by the Direction des bibliothèques de France (1945), a department of the ministry of national education. It comprises the Bibliothèque Nationale, Paris, the libraries of the great scientific establishments (Institut de France, 1795, Bibliothèque Mazarine, 1643, Bibliothèque du Musée National d'Histoire Naturelle, 1635, Musée de l'Homme, École Nationale des Langues Orientales Vivantes, Académie Nationale de Médecine), the university libraries, municipal libraries, provincial central lending libraries (mobile rural libraries set up after 1945) and the Phonothèque Nationale.

The libraries of certain scientific schools or institutions such as the École Normale Supérieure and the Collège de France depend on the department of higher education, the library of the Conserva-



FROM GAUDET, "ÉLÉMENTS ET THÉORIE DE L'ARCHITECTURE," LIBRAIRIE DE LA CONSTRUCTION MODERNE

FIRST FLOOR PLAN OF THE BIBLIOTHÈQUE NATIONALE, PARIS

toire National des Arts et Métiers (1794) on the department of technical and professional education, the libraries of primary, secondary and technical education establishments on the various corresponding departments. Several administrative or technical libraries, sometimes combined, are dependent on other ministries or major state offices; *e.g.*, the library of the École des Mines (ministry of public works), the library of the École Polytechnique (ministry of armed forces), the library of the ministry of foreign affairs, the library of the council of state. In another category are the parliamentary libraries of the national assembly and the senate.

There are a large number of official or private specialist libraries or documentation centres: Fondation Nationale des Sciences Politiques (1945), Institut National de la Statistique et des Études Économiques (1951), Institut National d'Études Démographiques (1945), Institut Pédagogique National, Paris Chamber of Commerce and Industry, the Centre National de la Recherche Scientifique (1940) and many technical centres.

1. Bibliothèque Nationale.—The first royal library dates from the reign of Charles V, who installed 1,200 manuscripts in the Louvre. This library was dispersed. Under Louis XI another library was created, the first librarian being Laurent Paulmier. Charles VIII endowed it with many fine manuscripts and with most of the library of the kings of Aragon from Naples. Louis XII added the Orléans library from Blois. In 1544 Francis I moved the library to Fontainebleau and from 1537 it received a copy of every French publication. The library was moved to Paris between 1567 and 1593. The first real catalogue was made in 1622 and Nicolas Clément prepared another catalogue in 1684 according to the arrangement still in use (23 classes, each designated by a letter of the alphabet). First opened to the public (twice a week) in 1692, the library was renamed the Bibliothèque Nationale by the Convention in 1795 and benefited by confiscations of the revolutionaries and later by Napoleon I's acquisitions. The organization of the library, together with that of other public libraries, was laid down in 1839. In 1926 a consortium was established consisting of the Bibliothèque Nationale, the Mazarine (1643, later part of the Nationale and from 1945 attached to the Institut de France), the Arsenal (national and public in 1797), the Sainte-Geneviève (1624, a constituent library of Paris university library) and the library of the Musée de la Grande Guerre (1917, attached to the Bibliothèque de Documentation Internationale Contemporaine). The consortium in the 1960s comprised the Bibliothèque Nationale, the Arsenal library, and the libraries of the Opéra and of the Conservatoire National de Musique.

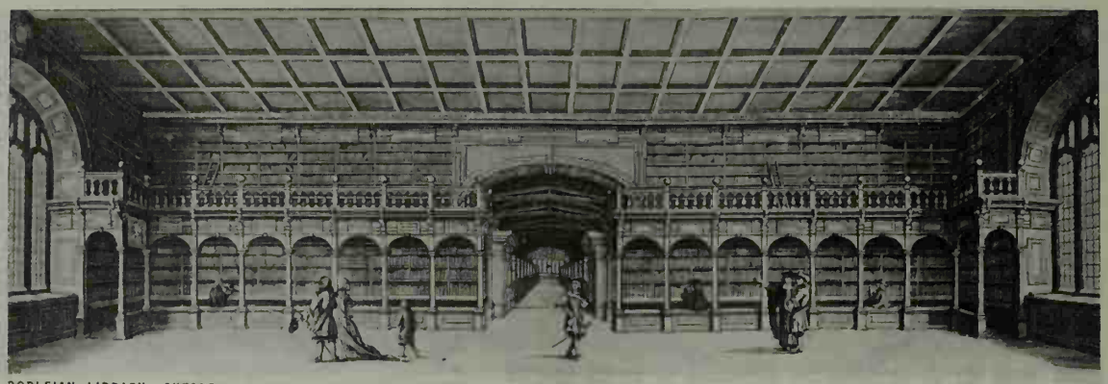
The Bibliothèque Nationale is divided into nine departments: printed books, acquisitions, periodicals, manuscripts, prints, coins, maps and plans, music and the Bibliothèque de l'Arsenal (literature, theatre and history). The Bibliothèque Nationale is the most important library in France and one of the oldest in the world. It keeps a copy of every publication printed in France (copyright deposit) and publishes the *Bibliographie de la France*. Its foreign acquisitions are strong in the humanities.

2. University Libraries.—With a few exceptions the university libraries were established toward the end of the 19th century. The University library in Paris comprises: the Bibliothèque de la Sorbonne (1762, arts and science), the Bibliothèque d'Orsay (1962, science), the Bibliothèque de la Faculté de Droit (1876), the Bibliothèque de la Faculté de Médecine (1733), the Bibliothèque de la Faculté de Pharmacie (1570), the Bibliothèque Sainte-Geneviève (philosophy, theology, medicine, law, science), the Bibliothèque de Documentation Internationale Contemporaine (1917), the Bibliothèque d'Art et d'Archéologie (1918) and the Bibliothèque Universitaire Centrale des Étudiants Malades (1955, for students in all parts of the country).

There are university libraries at Aix-en-Provence (1879), Besançon (1880), Bordeaux (1879), Caen, Clermont-Ferrand, Dijon (1880), Grenoble, Lille (1880), Lyons (1896), Montpellier (1890), Nancy (1855), Nantes, Poitiers (1879), Rennes (1855), Strasbourg (1872), Toulouse (1879). These libraries are usually divided into faculty sections, some of which may be in another town.

With the exception of the Bibliothèque Nationale et Universitaire at Strasbourg, which has civil status and financial independence, the university libraries are under the jurisdiction of the rector of the university and receive a subsidy from the Direction des Bibliothèques de France. Since 1878 the book stocks have been classified by size and by order of entry (running numbers) but the universal decimal classification has become commoner for modern books (except for medicine).

3. Municipal Libraries.—Municipal libraries, of which there are about 500, have a municipal budget but are under state control and irregularly receive state subsidies. There are 43 libraries which by reason of their antiquity are directed by state librarians.



BODLEIAN LIBRARY, OXFORD

BODLEIAN LIBRARY AT OXFORD UNIVERSITY AS IT APPEARED IN 1675

Several libraries were founded before the French Revolution (Besançon, 1694; Troyes, 1651; Dijon, 1701), but most of them owe their origin to the libraries of *émigrés* and religious houses confiscated during the Revolution. One of the most important municipal libraries is that of Lyons (1693). The municipal libraries were linked to the ministry of education in 1832 and their first statute dates from 1839. In 1897 this control was reinforced. The use of libraries by the public developed late in France and did not become general until the 1930s although the *bibliothèques populaires* were fairly numerous during the second half of the 19th century. Most public libraries now have lending departments and some have branch and mobile libraries as well as children's sections. A great number of public libraries have rich manuscript collections and rare printed works, and most of them hold exhibitions. (PA. P.)

F. United Kingdom and Republic of Ireland

1. National and University Libraries.—National libraries can be grouped into legal deposit libraries, other state public libraries and state private libraries. The legal deposit libraries are the British museum, the Bodleian library (University of Oxford), Cambridge University library, the National Library of Scotland, the library of Trinity college, Dublin, and the National Library of Wales. The British museum receives one free copy of all books published in Great Britain and in the Republic of Ireland. The other five libraries only receive books if they ask for them, the National Library of Wales obtaining free copies of books of Welsh interest and certain other books only. For books published in the Republic of Ireland there are four more legal deposit libraries, each entitled to one free copy: the National Library of the Republic of Ireland and the university colleges of Dublin, Cork and Galway.

The British Museum library is one of the world's great national libraries. The department of printed books and the department of manuscripts are outstanding, the latter containing large collections of seals, papyri and other materials, as well as manuscripts. The department of oriental printed books and manuscripts is also a fine collection. Everything except newspapers is at the museum in Bloomsbury, London. Newspapers are in the museum repository library at Colindale, northern London. The British museum was founded in 1753 by the acceptance of the bequest of the collections of Sir Hans Sloane. At the same time the Harleian and Cottonian collections of manuscripts were acquired and, in 1757, George II presented the royal library of the kings of England, which brought with it the right of a free copy of all books entered at Stationers' hall. The second royal library, that of George III, was purchased from George IV in 1823.

The library is a nonlending library for reference purposes only and, although there are subject indexes to parts of its collections, the main and only complete catalogue is an author catalogue. The collection of European manuscripts includes a rich series of charters (with those of the Anglo-Saxon kings) and papers ranging from the 3rd century B.C. to modern times. To the *Codex Alexandrinus* of the Bible, which formed part of the royal library, was added in 1933 the *Codex Sinaiticus* bought from the government of the U.S.S.R. for £100,000. The manuscript collections of Sir Robert Cotton and Robert Harley, earl of Oxford, helped to make the museum rich in early Anglo-Saxon and Latin codices. The Lindisfarne Gospels (A.D. 700) contain the earliest extant Anglo-Saxon gloss of the Latin gospels. Other illuminated manuscripts are the Bedford Hours, and the Bedford and Luttrell Psalters. The department of oriental printed books and manuscripts includes the library of C. J. Rich, the Chambers collection of Sanskrit manuscripts and a library of Hebrew manuscripts.

The building in which the library is housed was designed by Sir Anthony Panizzi (*q.v.*) and opened in 1857. The circular reading room is surrounded by book stores placed in iron stacks. Readers have direct access to the presses on the ground floor.

The Bodleian library, Oxford, and Cambridge University library are university libraries that are also legal deposit libraries: they are indeed older than any other British national library. A library was established in the University of Oxford by Thomas de Cobham who died in 1327, but it did not come fully into the possession of the university until 1410. Then Humphrey, duke of Gloucester, gave books and money for a room between 1411 and 1447, when he died. The room, built about 1450, still survives. With the impoverishment of the university, the development of printing and the growth of college libraries, the university library declined in importance, and in 1550 Edward VI's commissioners withdrew what books were left and, soon after, the shelves were also dismantled. About 50 years later the library was restored by Sir Thomas Bodley and re-opened in 1602. By agreement with the Stationers' company in 1610, the Bodleian has been entitled to receive a free copy of all books printed in England. It became formally a legal deposit library by the Press Licensing act of 1662 confirmed by subsequent acts. Like the British museum the Bodleian is a great nonlending reference library, strong in early books and manuscripts, and a research library for the scholar. It is particularly rich in oriental manuscripts, and also has fine collections of English literary and local history and of early printing. Bodley added new buildings, and surrounding university buildings were taken over and additions made at various times down to the 19th century. A new additional building, connected with the old buildings by an underground way and designed by Sir Giles Gilbert Scott, was opened in 1946.

Cambridge University library was founded before 1424 when a catalogue recorded that it had 122 books. There was a librarian in 1463 with an annual salary of 40 *s.*, and in 1473 there were apparently 330 books, although only 175 in 1556. Whereas the Bodleian is purely for reference, Cambridge lends to senior members of the university, including all graduates and certain senior undergraduates. Unlike the Bodleian, it gives unrestricted open access to the stacks. It has an important collection of manuscripts and of early printed books. A new library building was opened in 1934.

Other Legal Deposit Libraries.—First of the other legal deposit libraries in order of foundation is Trinity college, Dublin, founded by Queen Elizabeth I in 1591 and its library established by a gift of money from the English army in Ireland in 1601. In 1657 Archbishop Usher's library of 10,000 books was bought for the college, again by the English army, and the library has had the right of legal deposit since 1801. It has a famous collection of Irish manuscripts including the Book of Kells. The National Library of Scotland has developed from the library of the Faculty of Advocates in Edinburgh which was formally opened in 1689. After the union (1707) the Copyright act of 1709 gave the right of legal deposit. In 1922 the faculty, finding the maintenance of the library increasingly onerous, offered it to the government and the library was transferred in 1925. The faculty retained the law section. Of the special collections the most important are the Astorga (Spanish) purchased in 1824; the Thorkelin (chiefly

history and antiquities of the northern nations); the Dietrich collection of German pamphlets and dissertations; and the Barnbougle Scottish collection. Manuscripts relating to Scottish church history include the collections of Spottiswoode, Wodrow and Calderwood. Sir James Balfour's collection and the Balcarres papers consist largely of original state papers of James V, Queen Mary and James VI. The National Library of Wales was founded in 1907 at Aberystwyth. It is of rather more narrow national interest than the other national libraries, and has outstanding collections of Welsh books and manuscripts. The National Library of Ireland, Dublin, developed from the library of the Dublin society which was founded in 1731. The library was opened to all serious readers in 1836 and was taken over by the government in 1877 as the official national library. Since 1927 it has received by legal deposit a copy of all books published in the Republic of Ireland.

Other state libraries open to the public include the library of the Natural History museum, which until 1963 was administratively a part of the British museum, but by the British Museum act of that year it became independent; the National Art library in the Victoria and Albert museum (1837) which includes the Dyce, Forster and Jones libraries; and the library of the Science museum, which is devoted to pure and applied sciences and is especially strong in periodicals. The National Lending Library of Science and Technology was opened in 1961 at Boston Spa, Yorkshire, under the auspices of the Department of Scientific and Industrial Research and with much material transferred from the Science Museum library. Mention may also be made of the Imperial War Museum library (1917), a great collection covering both world wars; the scientific and technical library of the Patent office (1855), which is particularly strong in periodicals; and the Public Record office (1838), the national archives.

There are also many state libraries which, although for the most part available for serious students, are not open to the public in the same way as those mentioned above. These include the libraries of the house of commons and the house of lords, and the libraries of the foreign office, war office, admiralty, board of trade, ministry of education and all other government departments.

University Libraries.—Cambridge University library and the Bodleian at Oxford have already been dealt with. There are faculty libraries at both universities mainly for the use of undergraduates. The Radcliffe Camera, the Radcliffe Science library, the Indian Institute library and Rhodes House library form a group associated with the Bodleian. Also at Oxford are the Taylor institution (for modern languages) and the Ashmolean museum (1683), containing the art and archaeological collections of the university. In addition many of the colleges have important libraries; at Oxford, All Souls (1443), for instance, is strong in law, Magdalen has scientific and topographical collections, Merton has the earliest surviving college library building; at Cambridge, Trinity College library is particularly noteworthy, Magdalene college has Samuel Pepys' library and Corpus Christi possesses Anglo-Saxon and illuminated manuscripts presented by Archbishop Matthew Parker in 1575.

In the University of London, the University library, a central library (1837) and the largest of the modern university libraries but smaller than the Bodleian or Cambridge, includes the Goldsmiths' library of economic literature. The library of University college (1824) is also a general library, and the other colleges in the university have their own libraries, the British Library of Political and Economic Science at the London School of Economics being the chief library in its field in the British Isles. The library of the School of Oriental and African Studies is one of the most important libraries on these subjects. The Imperial College of Science and Technology has a good scientific library. In medicine the libraries of the teaching hospitals and of the London School of Hygiene and Tropical Medicine and the medical institutes are outstanding. The university institutes have important libraries in their respective fields, those of the Courtauld institute and the Warburg institute being particularly noteworthy.

Other important university libraries are, in England, Leeds, Manchester and Birmingham; in Scotland, St. Andrews (1456), Glasgow (1451), Aberdeen (1494) and Edinburgh (1580); in Wales, University College of North Wales, Bangor (1884); in Northern Ireland, Queen's University of Belfast (1848); in the Republic of Ireland, University college, Cork (1849). In all there are about 300 libraries in the British universities and university colleges. Even those universities that consist of a single unit have separate departmental libraries. Many are special libraries primarily for research, but all the central and general college libraries provide for undergraduates as well as building up research collections. All universities have extramural libraries for adult education classes.

2. Higher Education and School Libraries.—In addition to universities, institutes of higher education have libraries. These include teacher-training colleges, colleges of advanced technology (in England and Wales) and central institutions (in Scotland). One of the most important theological libraries is that of Sion college (1630), which is rich in liturgiology.

The older schools, such as Winchester, Eton, Dulwich college, Guildford grammar school and Stonyhurst, have long-established libraries, some of them rich in early printed books. Grammar and secondary schools usually have adequate libraries and there have been great developments in provision for primary and secondary modern schools. There has been an increase in the service to schools by public and county libraries (*see* below).

3. Public and County Libraries.—Mainly through the efforts of three men, William Ewart, M.P., Joseph Brotherton, M.P., and Edward Edwards, an assistant in the British museum, the first Public Libraries act was passed in 1850. This allowed town councils to levy not more than one halfpenny in the pound for libraries, but not for books, which were to be provided voluntarily. The first libraries were set up in 1852, the first towns to adopt the act and establish libraries being Norwich, Manchester, Liverpool, Bolton, Oxford and Winchester, although Warrington had established a library in 1848 under the Museums act of 1845. By 1870, the year of the Elementary Education act, only 35 towns had established libraries and in 1919 there was still a limit of one penny on the rate allowed for libraries, and the county councils were not authorized to adopt the acts. For England and Wales these anomalies were removed by the Public Libraries act of 1919 and from that date the expansion of municipal libraries and the development of county libraries was rapid. But, although increased, the rate limitation was not abolished in Ireland until 1947 and in Scotland until 1955. The acts remain permissive only but all local authorities have now adopted them, the last having done so in 1962. In 1911 the percentage of the population in England and Wales that had access to a public or county library service was 62.5%. By 1926 it was 96.3% and in the 1960s it was 100% for the British Isles including the Republic of Ireland.

A great and continuing impetus to the establishment and development of public libraries came from the formation of the Library association in 1877 and from the extensive and informed aid given by Carnegie grants. Andrew Carnegie, and later the Carnegie United Kingdom trust, gave money for buildings up to 1919 and during 1925–35 for other purposes including catalogues, especially union catalogues, and books. In 1962 more than 52,500,000 persons were served by 562 library authorities in the British Isles (excluding the Republic of Ireland). In addition to 562 central libraries, there were about 1,780 full-time branches, 22,000 part-time branches, centres, etc. (including 730 hospital and 114 prison libraries), and 18,199 school libraries. There were 327 mobile library vans and 131 phonograph record libraries. They possessed 77,200,000 books and, during the year, made 460,504,572 loans of books and spent £24,431,191. They had a total staff of 15,521. The average number of books lent per person was 8.8 and the cost per head was 9*s.* 3*d.* These libraries cater not only for the popular reader but also for the student, the technician and industrialist and for children. Most local libraries contain the best collections of the history of their locality, many have good technical and commercial libraries and libraries in the arts and in music—including loan collections of pictures and phonograph records—as well as other special collections. They all give an information service, particularly on bibliographical

matters, and are open to inquiries in person, by letter or by telephone. Many have a documentary reproduction service and a few have their own binderies. Many have extension services to schools, prisons, hospitals and other institutions. The great municipal libraries such as Birmingham, Manchester and Glasgow and many other public libraries have research collections; *e.g.*, the Shakespeare collection in Birmingham.

The services of county libraries, including extension services, are similar to those of public libraries. The origin of the present county libraries is entirely due to the Carnegie United Kingdom trust, formed in 1913. This set out, as its first library task, to investigate the problems involved, and to establish libraries in rural areas. Staffordshire was one of the first counties to accept aid from the trust, but even earlier the trust had organized a successful scheme in the Orkney and Shetland isles. Then after 1919, but with continuing aid from the trust, the movement rapidly spread. The trust made grants for county libraries totaling £263,785 in the period 1915–27. Some of the county libraries vie in size and activity with the largest municipal library. Lancashire has more than 1,500,000 books, 60 full-time and 331 part-time branches, 292 staff and it spent £508,477 in 1962.

The Guildhall Reference library maintained by the Corporation of the City of London should be mentioned here, although it is not tax-supported under the Public Libraries act. The library includes a rich collection on all aspects of London history, the Solomons Hebrew and Rabbinical library and the National Dickens library.

In the Republic of Ireland the municipal and county libraries are aided by state grants made under the guidance of a library council set up by the Publications act in 1947, but it was not until 1961 that a grants scheme was announced. There are only seven municipal library systems, and all urban districts except one have surrendered their library powers to the county councils, which have all adopted the library acts. But in the year ended March 1962 only £250,335 was spent on the 25 county libraries, and £169,373 on all municipal libraries. However, the municipal and county libraries give an effective service although this is naturally restricted by lack of funds.

4. Other Libraries.—One of the greatest of the semi-private libraries is the John Rylands library, Manchester (1899), a reference library rich in early printed books and manuscripts, both western and oriental; but, like all endowed libraries, it suffers because its income decreases in purchasing power. Chetham's library, also in Manchester, was founded in 1653. In London are Dr. Williams's library (theology, philosophy, history and literature), a nonconformist library founded by Dr. Daniel Williams in 1716. Lambeth Palace library, founded in 1610, is a great library of theological and historical works including a magnificent collection of manuscripts and of archives. It is the main library for the history of the Church of England. All cathedrals have libraries and many contain manuscripts and early printed books. St. Paul's Cathedral library (1707) has a good collection of early Bibles and Testaments. The library of Christ Church, Oxford, which belongs alike to the college and cathedral, is rich in theology. Durham Cathedral library dates from monastic times and has some early manuscripts. That of Exeter was founded in the 11th century and contains many Saxon manuscripts given by Bishop Leofric, including the *Exeter Book* of Old English poetry. Lincoln Cathedral library was refounded at the Restoration, in a building by Sir Christopher Wren. Salisbury (1445) is rich in incunabula, and Ripon Cathedral library (1608) has many incunabula and some books printed in the 16th and 17th centuries. The library at Hereford is an old monastic chained library. In Scotland the library of Dunblane cathedral (1684) is the only cathedral library of any historic interest. In the middle ages it was a common practice to keep books in parish churches, and some of these parochial libraries have survived. The missionary societies (*e.g.*, the Church Missionary society) and the British and Foreign Bible society have their own libraries. There are Roman Catholic libraries at Brompton oratory and the Society of Jesus, and libraries at the Baptist union, the Congregational union and the Society of Friends, all in London.

The libraries of the learned societies and institutions are numerous and important. The libraries of the inns of court (Gray's Inn, Lincoln's Inn, Inner Temple, Middle Temple) date from the 15th–16th centuries. Together with the Inns of Court Bar library and the library of the Law society they are the main centres for the study of law in London. Other special libraries include the Society of Antiquaries (1707), the Royal Geographical society (1830), Royal Commonwealth society (1868), the British Drama league (1925), the British Institute of Recorded Sound (1955), the Library association (1877), the National Book league (1925), the National Library for the Blind (1882), the Royal Academy of Music (1823), Royal Anthropological institute (1843), Royal Asiatic society (1823), Royal Institute of British Architects (1834), Royal Institute of International Affairs (1920), the Royal Institution of Great Britain (1803), the Royal Society (1667), Royal College of Physicians (1518), St. Bride Printing library (1895), Society of Genealogists' library and Wellcome Historical Medical library. All the above are in London; but in most cities and large towns there are special libraries and societies, museums and art galleries with libraries. In Stratford-upon-Avon are the libraries at Shakespeare's birthplace and the Memorial theatre; at Hawarden, near Chester, is St. Deiniol's library in the humanities founded by W. E. Gladstone in 1895. There is the library of the National Museum of Wales at Cardiff, and the Signet library (*c.* 1722) in Edinburgh, of law, Scottish and historical literature. In Belfast the Linen Hall library (1788), and in Dublin the libraries of the Royal Irish academy (1786) and the Royal Dublin society (1731) are important. Special scientific and technical libraries include the Chartered Insurance institute (1912), Institute of Bankers (1879), Royal Agricultural society (1838), Royal Horticultural society (1804), Royal Entomological society (1833), Zoological society (1835), Royal Botanic gardens (1853), Linnean society (1788), Royal Statistical society (1834), Chemical society (1841), Institution of Civil Engineers (1818), London Mathematical society (1865), Royal Astronomical society (1820), Royal Society of Medicine (1805), Institute of Physics (1918), Institute of Fuel (1927), Iron and Steel institute and Institute of Metals joint library (1938), Royal Aeronautical society (1866), and Textile institute (1910), in Manchester.

All government departments and research centres have libraries concerned with research and many also have other research units. The co-operative industrial research associations were started by the Advisory Council for Scientific Policy in 1918; they are financed by groups of firms with similar (but competitive) interests, aided by government grants made through the Department of Scientific and Industrial Research. Private enterprise is responsible for a few development associations which are similar to the industrial research associations but are not government aided, such as the British Electrical Development association, and the Lead, Zinc, Copper and Aluminium Development associations. Many firms have their own research libraries and laboratories and there are a few private organizations which carry out research for payment. There are also many trade associations concerned with commercial and legal matters of groups with allied trading interests. They are financed by member firms.

Subscription libraries were an important feature of social life in the 18th century. Some of these libraries survive, together with the libraries of literary and philosophical societies and similar organizations. Most clubs, such as the Athenaeum (1824), also have libraries. By far the largest private library of this kind is the London library (1841), founded largely at the instance of Thomas Carlyle. This library, chiefly of the humanities, is an example of informed book selection. There are also numerous commercial subscription libraries.

5. Co-operation Between Libraries.—In 1916 the Central Library for Students was started by and for the adult education service. Because there was no national general lending library this developed, changing its name to the National Central library, into an organization for arranging interlibrary loans, and in conjunction with it have developed regional library systems for interlibrary lending. There are ten regional systems covering Great Britain (excluding the Republic of Ireland), with central offices

and union catalogues in all but one, and there is a central library in the Republic of Ireland. Applications for interlibrary loan are settled within each region if possible, and, if not, are sent to the National Central library, or to the Scottish Central library in Edinburgh. There are several other local co-operative systems, including the agreement for specialization between the London borough libraries started in 1947 whereby each undertakes main responsibility for one group of subjects. There are also various local schemes between libraries of research associations, local firms and public libraries for interlending and subject specialization of material, particularly periodicals, in science and technology. The National Lending Library of Science and Technology has already been mentioned.

6. British Library Activities in Other Countries.—The British council, founded as a voluntary association in 1934 and established as a body corporate in 1940, has established libraries in many countries, ranging from small collections of about 1,000 books to libraries of 50,000. Since 1959 the English-Speaking union has collected and distributed books to educational establishments in the Commonwealth. (J. H. P. P.)

G. Belgium and the Netherlands

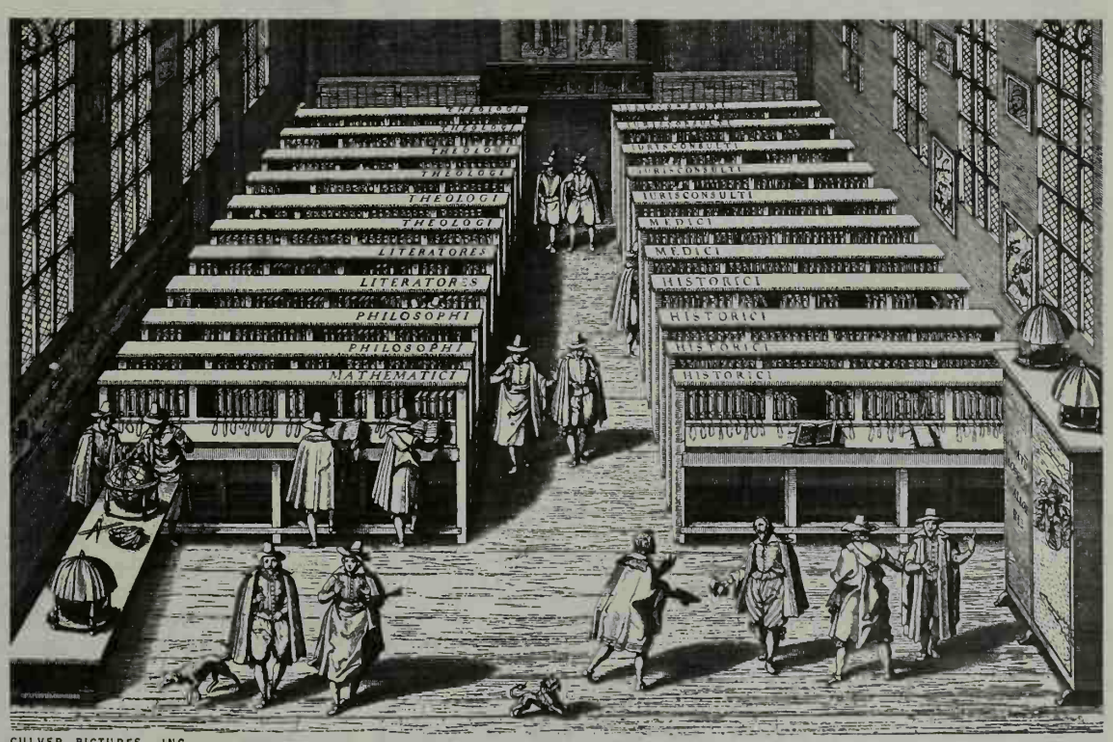
1. Belgium.—Many older libraries in Belgium owe their present status to the secularization of abbeys and convents after the French Revolution. This is true of the national library (Bibliothèque Royale de Belgique) in Brussels. The history of the collections is however much older and goes back to the library of the dukes of Burgundy, famous book collectors, founded by Philip the Good. Later Philip II established the first "royal" library in Brussels. Under various political regimes, among them the enlightened period of the Austrian empress Maria Theresa, the library had many vicissitudes. After the French Revolution the collections were dispersed under various authorities, until the new Belgian state created the present library in 1837. It was organized similarly to the Bibliothèque Nationale in Paris and has national responsibility for books, manuscripts, prints, maps and coins. Since 1960 it has been housed in a new building. Among the libraries that grew up out of the monastic suppressions at the end of the 18th and the beginning of the 19th century are those of the state universities at Ghent and Liège, and city libraries including Antwerp, Bruges, Mons, Namur and Tournai. The library of the Catholic University of Louvain (1636) was twice burned down during World Wars I and II. It has once again an important collection. Even a short survey of Belgian libraries must stress the unique Plantin-Moretus museum in Antwerp, which is housed in the famous 16th-century print shop and which has, besides invaluable Plantin archives and material, an outstanding collection of 16th- and 17th-century books. Among the more recent special collections is that of the Musée de Mariemont, bequeathed to the state by a private collector, R. Warocqué, and the library of the Société des Bollandistes (1640), one of the world's outstanding theological libraries. The public library system is organized in accordance with a law of 1921. (He. L.)

2. Netherlands.—The pillars of the Netherlands library system are the research libraries, on account of both .their holdings and their close co-operation with public and special libraries. The national library, housing the National Union catalogue, is the Koninklijke Bibliotheek at The Hague (1798), which has a fine collection of books on chess, and of illuminated manuscripts, Dutch incunabula and Spinozana. The library of the state university of Leiden (1575) has important collections of maps and western and oriental manuscripts. The state university library of Utrecht (1584) contains the Utrecht Psalter (the oldest text of the Athanasian creed). The state university library of Groningen (1615) includes a copy of Erasmus' New Testament with marginal annotations by Luther. The university library of Amsterdam began in the 16th century as a city library. It has an important Hebrew section and the best medieval collection in the Netherlands. Other noteworthy libraries are those of the Roman Catholic university at Nijmegen (1923); the institutes of technology at Delft (1842) and Eindhoven (1957); the school of economics at Rotterdam (1913); and the college of agricultural sciences at Wageningen (1918). The public library system is extensive and well developed. (Lt. B.)

H. Germany

German libraries and librarianship have a long tradition of scholarship and bibliographical achievement. Most of the German states had important royal or other libraries, such as the Prussian state library, Berlin (1661), the Bavarian state library, Munich, founded by Duke Albert V (1550–79), and the royal library of Saxony, Dresden (16th century). The Deutsche Bücherei, Leipzig, was founded in 1912 to act as a copyright library for the whole of Germany; it had a central cataloguing service and issued the national bibliographies. Interlibrary lending throughout Germany was instituted by a law of 1924. Popular libraries (Volksbüchereien) were first proposed in 1839, and four were founded in Berlin in 1850. The Prussian cataloguing rules (*Instruktionen für die alphabetischen Kataloge der preussischen Bibliotheken*) long served as a model not only for Prussia but also for libraries in other German-speaking areas, and influenced countries using other Germanic languages; not until the International Conference on Cataloguing Principles, Paris, 1961, were any substantial modifications accepted in the interests of international co-operation.

After World War I the university libraries formed a co-operative purchase scheme. Bonn collected Romance languages and literature; Göttingen, English; Kiel, Scandinavian; Heidelberg, art and archaeology; Königsberg (now Kaliningrad, U.S.S.R.), philosophy; Leipzig, Italian and oriental; Tübingen, theology and oriental; Berlin, German and foreign theses, etc.; Greifswald, Low German. Most of the university libraries may be used by



CULVER PICTURES, INC.

THE INTERIOR OF THE LIBRARY AT THE UNIVERSITY OF LEIDEN, THE NETHERLANDS, AS IT APPEARED IN THE 16TH CENTURY. WOODCUT BY JAN CORNELIUS

the general public and are included in the national lending system.

The destruction of German libraries in World War II and the subsequent partition of Germany wrought many changes, and the state of libraries in the two republics will be considered separately.

(F. L. K.)

1. Federal Republic of Germany.—By 1963 damage caused by World War II had been almost made good (except for rare books that had been destroyed) and the library system re-established. The libraries fall into various categories, the main distinctions being between learned (state and university) libraries and popular libraries. This distinction was always very sharp, though a number of popular libraries represent yet a third type, the "Einheitsbücherei," having also learned collections. The state and university libraries (including libraries of specialized technical colleges) are under state control; the popular libraries belong mostly to municipalities. There are also special libraries established by state or municipal authorities, firms and associations.

According to the constitution of the Federal Republic of Germany (West Germany), cultural affairs are governed by the ten *Länder*, or states, and West Berlin. There is no central ministry, so that the laws of copyright deposit cover the individual areas only. Accordingly, as a collecting centre for all books published in Germany or written in German elsewhere since 1945, and for the purpose of issuing the national bibliography (*Deutsche Bibliographie*), the Deutsche Bibliothek (Frankfurt am Main) was founded in 1946. It has almost completely taken over the functions of the Deutsche Bücherei in Leipzig (German Democratic Republic) as the national library of West Germany.

In the late 1940s interlibrary lending was reorganized. A new Leihverkehrsordnung für die deutschen Bibliotheken, drafted in 1950 by the Verein Deutscher Bibliothekare and accepted by the states of West Germany, allows (as the former law did not) the popular libraries to take part. The learned libraries were aided by the Deutsche Forschungsgemeinschaft, Bad Godesberg, which set up a plan for collecting foreign literature (dividing the whole field of knowledge among the libraries) and gave financial assistance for acquisitions. Seven regional union catalogues were established (West Berlin, Frankfurt, Göttingen, Hamburg, Cologne, Stuttgart and Munich) covering the whole area of West Germany. Unfortunately, the *Gesamtkatalog der preussischen (deutschen) Bibliotheken* begun by the Prussian state library in 1931 was stopped by World War II at volume 14 (beginning of the letter B). The manuscript has been lost.

Important learned libraries in West Berlin include that of the Free university and the America Memorial library (1951), a gift of the American people. Collections of the former Prussian state library (now East Berlin), dispersed for safety during World War II to western Germany, are re-assembled in the Staatsbibliothek (formerly West-deutsche Bibliothek), Marburg. Among the most important libraries elsewhere in West Germany are: the state and university library, Hamburg (public since 1648); the technical information library and the library of the Technische Hochschule, Hanover; the Lower Saxony Staats- und Universitätsbibliothek, Göttingen (1736); the university libraries in Cologne, Bonn, Frankfurt am Main, Heidelberg (the oldest German university library, founded in 1386, with valuable manuscripts and papyri) and Tübingen; the Bavarian state library including a large collection of incunabula, many from the monastic libraries closed in 1803, and an important collection of oriental manuscripts; the university library (founded at Ingolstadt in 1472), Munich; the Herzog-August Bibliothek at Wolfenbüttel, founded in the 16th century and exceptionally rich in incunabula; and the Staats-und Stadtbibliothek, Augsburg.

The public libraries have been greatly strengthened since 1948. Small municipal libraries have extended to large systems with several branches and bookmobiles, including those of West Berlin, Hamburg, Cologne, Frankfurt am Main and Stuttgart. The government gives administrative advice and if necessary financial support. In North Rhine-Westphalia, with its large population and numerous popular libraries, a special interlibrary lending system was established in 1960. The larger municipal libraries began to collect scholarly works, thus building up a self-sufficient system and relieving the burden of the learned libraries.

(Lu. S.)

2. German Democratic Republic.—The library system of the German Democratic Republic (East Germany) consists of two main branches: research libraries (wissenschaftliche Bibliotheken) and public libraries (allgemeine öffentliche Bibliotheken). There are general and special research libraries. All general research libraries, *i.e.*, the Deutsche Staatsbibliothek, Berlin, the Deutsche Bücherei, Leipzig, seven university libraries (East Berlin, Greifswald, Halle, Jena, Leipzig, Rostock and Dresden), six regional libraries and about 80 special libraries of technical and economic colleges are under the Staatssekretariat für das Hoch- und Fachschulwesen. This library system is completed by about 700 research libraries belonging to academies, universities, learned societies, organizations and industrial establishments. There is a copyright deposit.

In Dresden the Sächsische Landesbibliothek was founded in the 16th century. It specializes in history and literature. The ducal library of Gotha, now the Thüringische Landesbibliothek, established by Duke Ernest the Pious in the 17th century, has a large and important collection of oriental manuscripts.

The Deutsche Bücherei (1912) collects books produced in Germany, German books published abroad and translations of German books into foreign languages; also literature dealing with Germany and the Germans. It issues the German national bibliography (*Deutsche Nationalbibliographie*) and maintains a central cataloguing service. The largest general research library is the Deutsche Staatsbibliothek (prior to World War II Preussische Staatsbibliothek), founded and made public by the "Great Elector," Frederick William, in 1661. Part of its collection was evacuated during World War II and stored at Marburg (West Germany) where it now forms the nucleus of the West German Staatsbibliothek. The East German Staatsbibliothek acts as the centre of the national lending and international exchange systems. In 1905 a special department, the Auskunftsbüro der deutschen Bibliotheken, was founded to give information about the location of any book. It maintains the *Zentralkatalog der Auslandsliteratur* (*ZKA*), a union catalogue of foreign monographs acquired by the Staatsbibliothek and 438 other research libraries of East Germany after 1945. There is also, since 1962, a corresponding union catalogue of periodicals, the *Gesamtverzeichnis ausländischer Zeitschriften* (*GAZ*). Also compiled by the Staatsbibliothek is the *Gesamtkatalog der Wiegendrucke* (union catalogue of incunabula).

The second branch of the library system comprises the public libraries directed by the ministry of culture and the numerous libraries of the trade unions. In the 1960s there were nearly 10,000 public libraries with branch libraries and delivery stations, with a corresponding children's library service, administered by the Zentralinstitut für Bibliothekswesen, Berlin. (Ho. K.)

I. Switzerland and Austria

1. Switzerland.—Of great historical interest are the monastic libraries of Sankt Gallen (founded in 816 and possessing a famous collection of Irish, Carolingian and Ottonian manuscripts), Einsiedeln (950) and Engelberg (1150). The seven university libraries, of which the more important are Basel (1460), Zürich, Bern and Geneva, are also rich in historic collections. The library of the Eidgenössische Technische Hochschule in Zürich is an outstanding technical library. The Landesbibliothek (Bibliothèque Nationale) in Bern (1895) collects all material published in or concerning Switzerland. There is no legal but only a voluntary deposit of books. In Geneva there are several important libraries of international organizations, including the United Nations, the International Labour office and the World Health organization. Switzerland has a highly developed system of cantonal, communal and traveling libraries, and an interlibrary loan system connecting 350 public, administrative and industrial libraries by means of the Swiss Union catalogue at the national library.

(P. Bo.)

2. Austria.—Austria, a long-established home of libraries, can look back on an unbroken tradition of more than a millennium.

Numerous monastic libraries founded in the middle ages, including St. Peter (Salzburg), Kremsmünster, Admont and Melk, possess valuable collections of manuscripts and early printed works, and still fulfill an important function in the intellectual life of the country.

The national and public library system is a product of the enlightened absolutism of Maria Theresa and Joseph I. Book stocks from suppressed monasteries and duplicates from the court library formed the basis of the then newly established national university and college libraries, which in the Austrian provinces gained the standing of central libraries with copyright privileges.

Austria's largest and most eminent library is the Nationalbibliothek in Vienna (1526), which until 1918 was the imperial court library. Its wealth of manuscripts, incunabula, maps, music, papyri, photographs and newer printed works (especially on the arts) puts it among the outstanding libraries of the world. The printed books collection is rich in German and Slavonic literature from the whole of the former Austrian empire. Apart from a fine collection of western, oriental, Greek and Slavonic manuscripts, the papyri of Archduke Rainer, a collection of documents in ten languages, is remarkable. The universities of Vienna, Graz and Innsbruck have general and departmental collections.

Outstanding subject libraries belong to technical and other specialized colleges and the central administrative authorities. The public library system, not yet extensively developed, is growing.

The arrangement of books since about 1880 has followed the fixed-location system by accession number; cataloguing is by means of author, subject and (more rarely) classified catalogue.

(H. Al.)

J. Italy and the Vatican

1. Italy.—Italy is the home of some of the oldest extant libraries. The separate states, which impeded unification, preserved many libraries which would have been lost under a centralized government. The Italian library system is based on the 34 governmental public libraries, which are administered on a unified plan, and on a growing number of town and provincial libraries which are increasingly coming into line with the government ones in their procedures and services. Fifteen regional offices of the ministry of education superintend bibliographical procedures and promote assimilation of and co-operation between all types of library. The ministry has started an experimental extension of public reading service to small centres hitherto without libraries.

The 34 governmental libraries are administered under a regulation of 1907. They comprise the national central libraries of Rome (Vittorio Emanuele II) and Florence; the national libraries of Bari, Milan (Braidense), Naples, Palermo, Turin and Venice (Marciana); the government libraries at Cremona, Gorizia and Lucca; the Marucelliana, Medicea-Laurenziana and Riccardiana at Florence; the Estense at Modena; the Palatina at Parma; the Angelica, Casanatense, Vallicelliana, Biblioteca di Archeologia e Storia dell' Arte, Biblioteca di Storia Moderna e Contemporanea, music library of the Conservatorio Santa Cecilia and medical library, all in Rome; the university libraries of Bologna, Cagliari, Catania, Genoa, Messina, Modena,. Naples, Padua, Pavia, Pisa, Rome and Sassari. The national central library, Florence, publishes the *Bibliografia nazionale italiana;* that of Rome publishes the *Bollettino delle opere moderne straniere acquistate dalle biblioteche governative.* A union catalogue of Italian libraries and a catalogue of incunabula in Italian libraries are in progress.

Rome.—The Biblioteca Nazionale Centrale (1875) contains the Biblioteca Maior o Secreta of the Jesuit college of Rome and the cloister libraries of the Provincia Romana, and has copyright privileges. Noteworthy among the manuscripts are the Farfensi and Sessoriani, some of these last being of the 6th to 8th centuries. The Biblioteca Casanatense, founded by Cardinal G. Casanate in 1700, is rich in theology and medieval history. The Biblioteca Angelica, founded in 1614 by Angelo Rocca, was the first library in Rome to be opened to the public. The Alessandrina, founded by Alexander VII in 1661, with the greater part of the printed books belonging to the dukes of Urbino, is now the library of the University of Rome. The Vallicelliana (1581) has some important manuscripts; the Lancisiana (1711) is valuable for its medical collections; the Corsiniana, founded in 1730 by Clement XII and from 1884 part of the Accademia Nazionale dei Lincei, is rich in incunabula and old prints. Among the parliamentary and administrative libraries the most important are the library of the senate, first established at Turin in 1848, rich in the history and statutes of Italian cities, and that of the chamber of deputies (1848), specializing in modern history, law and politics.

Florence.—The Biblioteca Nazionale Centrale was formed by the union of A. Magliabecchi's library with the Palatina. The Magliabecchiana became public in 1747, and in 1861 the Palatina (formed by Ferdinand III, grand duke of Tuscany) was combined with it. (The entire Magliabecchiana, the larger volumes of the Palatina, and other books were affected by the flood of 1966.) Since 1870 the Nazionale has enjoyed copyright privileges. The manuscripts include the most important extant codices of Dante and other Italian authors, the Galileo collection of more than 300 manuscripts, and autographs of Boccaccio, Machiavelli, Alfieri, Leopardi and others. The world-famed Biblioteca Medicea-Laurenziana was formed from the collections of Cosimo the Elder, Piero and Lorenzo the Magnificent, all members of the Medici family. It was made public by Clement VII, who commissioned Michelangelo to construct a suitable building, opened in 1571. Its chief importance lies in its 10,000 manuscripts, more than 700 earlier than the 11th century. Some are among the most valuable codices in the world—the famous Virgil of the 4th or 5th century, the *Pisans Pandects* of the 6th, a Horace of the 10th and other very early classical and biblical texts, about 100 codices of Dante, a *Decameron* copied by a contemporary from Boccaccio's own manuscript and Benvenuto Cellini's manuscript of his autobiography.

Milan.—The Biblioteca Nazionale (Braidense), founded in 1770 by Maria Theresa of Austria, contains letters of Galileo, autographs and letters of Manzoni, and a fine series of Italian illuminated liturgical manuscripts, 12th to 16th centuries. Among the great nongovernmental libraries, the most important is the Ambrosiana, founded in 1609 by Federico Cardinal Borromeo. Its manuscripts include a Greek Pentateuch of the 5th century, a Josephus on papyrus, supposed to be of the 5th century, several palimpsest texts and a 7th-century copy of St. Jerome's commentary on the Psalms, Gothic fragments of Ulfilas and a Virgil with notes in Petrarch's handwriting.

Naples.—The Biblioteca Nazionale was founded in 1734 and opened in 1804. The manuscripts include 1,700 papyri, palimpsests (3rd–5th century), many illuminated books and autographs of Leopardi. Annexed to it is the Officina dei Papiri Ercolanesi. The university library, established by Joachim Murat in 1812, was transferred to the Royal university and opened in 1827.

Palermo.—The Biblioteca Nazionale, founded from the Jesuits' libraries in 1782, is rich in Sicilian 16th-century books, many being unique.

Turin.—The Biblioteca Nazionale e Universitaria originated in the private library of the house of Savoy, given in 1720 to the university by Vittorio Amedeo II. The fire of 1904 destroyed about 2,000 manuscripts, but some of the most ancient (8th to 10th century) manuscripts from Bobbio abbey were preserved.

Venice.—The Biblioteca Nazionale Marciana, or library of St. Mark, traditionally founded in 1362 by Petrarch's gift of manuscripts (all since lost) and opened in 1558, has more than 1,000 Greek codices given by John Cardinal Bessarion, and collections on Venetian history, music and theatre and on early geographical research.

Other Italian Libraries.—Among the university libraries, already listed above, the first in historical importance is that of Bologna (1605), enlarged and reconstituted as a public library by Benedict XIV in 1756. The Biblioteca Estense was founded by the Este family at Ferrara in the 14th century and transferred to Modena by Cesare d'Este in 1598. The Biblioteca Palatina di Parma was founded in 1769 by the grand duke Philip. It contains several thousand manuscripts, including Giovanni Bernardo de Rossi's biblical and rabbinical manuscripts and almost all the prints of G. B. Bodoni.

Some communal and municipal libraries are of great extent and

interest: Bergamo (1760); the Archiginnasio (1801) at Bologna; the Civica Queriniana (1747), Brescia; the Ariostea (1753), Ferrara; Mantua; the Trivulziana, Milan; Palermo (1760); the Augusta (1582), Perugia; the Classense (1707), Ravenna; Siena (1758); Trieste (1796); Verona (1792); the Bertoliana (1708), Vicenza.

Religious Libraries.—The foundation of the monastery of Monte Cassino (529) was a result of the efforts of St. Benedict. The chief glory of the library is the archive; this includes more than 30,000 bulls and other documents, besides 1,000 manuscripts dating from the 6th century onward. At Verona, the Biblioteca Capitolare (6th century) contains a 5th-century palimpsest of the Institutes of Gaius and fragments of Justinian (6th century). The Biblioteca Capitolare, Vercelli, comprises nothing but manuscripts, all of great antiquity and value, among them an evangeliarium of St. Eusebius (4th century) and a famous codex of Anglo-Saxon homilies. The library (11th century) of the Abbazia della SS. Trinità, at Cava de' Tirreni, Salerno, includes manuscripts from the 8th to the 14th centuries, among them a codex of the laws of the Lombards, dated 1004, 100 Greek manuscripts and about 1,000 charters beginning with the year 840. (O. Pi.)

2. The Vatican.—The Biblioteca Apostolica Vaticana is the direct heir of the first library of the Roman pontiffs. Very little is known of the early library up to the 13th century although there is an inventory of the time of Pope Boniface VIII (1294–1303). Even the library gathered together during the Avignon period (1309–76) mostly got scattered. The present library derives from the one founded at Rome during the 15th century under the special patronage of Nicholas V (1447–55), who opened it to the public. In the 15th and 16th centuries the library was enriched with manuscripts and printed works and was organized in general much as it is now. At the end of the 16th century Domenico Fontana built it new premises (which it still occupies); and the Rinaldis rearranged the manuscripts. The two chief collections then formed, Vatican Latin and Greek, are open to new accessions. The special bequests form one of the world's richest manuscript deposits. It is to this inheritance that the Vatican library owes its exceptional importance in the history of learning. The chief of these bequests (apart from the Vatican one, which has 17 sections) are the Palatino (1622); the Urbinate (1657); the Reginense (1690); the Capponiano (1746); the Ottoboniano (1748); the Borghesiano (1891); the Barberiniano (1902); the Chigiano (1923); the Ferraioli (1926); the Patetta (1945); and the Cerulli (1955).

EWING GALLOWAY

INTERIOR OF THE VATICAN LIBRARY WHICH WAS FOUNDED IN 15TH CENTURY

Bequests in store include those of the Archive of St. Peter's; those of the Sistine chapel; the Borgiano and the Rossiano. The library also possesses a quantity of incunabula and a valuable deposit of printed works, among them the original Prima Raccolta. In the 19th century the library received considerable stimulus on its scientific and organizational side from its prefects F. Ehrle and G. Mercati. (C. L. Le.)

K. Scandinavia and Finland

1. Denmark.—The major research libraries in Denmark are the Royal library (Kongelige Bibliotek) founded *c.* 1661 by Frederick III, and opened to the public in 1793, which has copyright privileges and fine collections of Icelandic and oriental manuscripts; Copenhagen university library (1482), also with copyright privileges, containing the Arne-Magnean Icelandic collection; the State library in Aarhus (1902), with copyright privileges. The country is served by 1,300 public libraries established, after the first public libraries act of 1920, by local authorities and receiving government grants distributed by the state library inspection. Research, special and public libraries co-operate as one system. The Danish library school (1956) and the Library bureau (1939, for central cataloguing, etc.) cover the whole country.

2. Iceland.—In Iceland the Landsbókasafn Íslands (1818) is the national library. A public libraries act was passed in 1955. (O. Ko.)

3. Norway.—The national library of Norway is the Royal University library in Oslo founded in 1811 by Frederick VI with duplicates from the Royal library at Copenhagen. Besides its extensive collections of non-Norwegian books it is the legal deposit library of the country. Other major research libraries are the University library (1948, incorporating the Bergens Museums Bibliotek, 1825), Bergen; the Kongelige Norske Videnskabers Selskabs Bibliotek (1760), Trondheim, and the Technical University library (1916), Trondheim. In accordance with the Library act there is a library in every community and school, collaborating with a central library in each *fylke* (county). The oldest and most important of the municipal libraries is the Deichmanske Bibliotek in Oslo founded by Carl Deichmann in 1780 as a free library. (H. L. Tv.)

4. Sweden.—There are four major research libraries in Sweden, the Royal library, Stockholm (the national library), and the university libraries of Uppsala, Lund and Göteborg. All enjoy full rights to receive free copies of printed matter. The Royal library originated in the private collections of the kings of the house of Vasa in the 16th and 17th centuries. It suffered in the 17th century, particularly in the fire that destroyed the Royal palace in 1697. Noteworthy manuscripts are the *Codex Aureus Holmiensis* and the *Gigas Librorum* or "Devil's Bible." The Bibliographical institute publishes the national bibliographies. Uppsala University library, the largest library in Sweden, was founded in 1620, when King Gustavus Adolphus presented remnants of the foremost medieval libraries as well as the collection left by King John III. The manuscripts include the famous *Codex Argenteus,* containing the Gothic gospels of Ulfilas. Lund University library was founded in 1671, when the old chapter library was taken over by the university. Its greatest treasures are two vellum manuscripts of the 12th century: the *Necrologium Lundense* and the *Liber daticus Lundensis vetustior.*

Special libraries include those of the Royal Caroline Medico-Chirurgical institute (1810), the Royal Swedish Academy of Music (1771), the Royal Swedish Academy of Science (1739), the Royal Institute of Technology (1826), all in Stockholm, and the library of the Chalmers Institute of Technology, Göteborg (1829). There is a well-organized public library service. Nearly all cities, boroughs and rural communes have public libraries. The Library service (*Bibliotekstjänst*) supplies Swedish libraries with library equipment and is a centre of bibliographical activities. (G. O.)

5. Finland.—The Helsinki University library, the national library of Finland, was in Turku from 1640 to 1827. It was destroyed by fire and re-established in Helsinki in 1828. It has had copyright privileges since 1707 (including Russian publications, 1820–1917). Special collections include A. E. Nordenskiöld's

BY COURTESY OF THE STATE AND UNIVERSITY LIBRARY, AARHUS

MAIN READING ROOM OF THE STATE AND UNIVERSITY LIBRARY, AARHUS, DENMARK, COMPLETED IN 1962

cartographic library, and Russian and Baltic literature. Other important copyright deposit libraries are the library of parliament (1872), Turku University library (1919), Åbo Academy library (1918) and Jyväskylä University library (1912). The first Finnish public libraries were founded in the 1840s. Each community has a municipally owned library. Under the library law of 1961, the state pays a large part of the cost. The first central (provincial) library was founded at the beginning of 1963. (J. V. V.)

L. Eastern Europe

1. Poland.—Polish libraries suffered enormous losses during World War II. In 1939 their total collections amounted to more than 21,000,000 volumes, in 1945 to only 7,000,000. This destruction was deliberate. All books from school libraries were pulped, and the Warsaw libraries were burned together with the city. The restoration of the library service was begun as early as the spring of 1945, but it was only with the passing of the library decree of 1946 that its legal basis was established. The chief state library is the national library in Warsaw, founded in 1928, and the copyright deposit library. The library incorporated the Zaluski collection restored to Poland by the U.S.S.R. and the Rapperswil collection created by the Polish *émigrés*. This library is the main centre of bibliographical and library information, the centre of research in bibliography and library science, and the publisher of the national bibliography. It is administered by the ministry of culture and art together with the public libraries maintained by local authorities, which have developed extensively since World War II, when they came under state control. Libraries in higher educational institutions are run by autonomous school boards, but financially they are state supported. The Polish Academy of Sciences in Warsaw has general libraries and a number of specialized ones. School and pedagogical libraries connected with the education system are under the ministry of education. Scientific information centres for economics and technology maintain the special libraries. Finally, there are educational libraries run by trade unions, and church and monastic libraries supervised professionally by the library of the Catholic University of Lublin. Military libraries form a separate system, the largest being the Central Military library. The oldest Polish library is the Jagiellon University library in Cracow, founded in 1364, which acts as the national library for books printed before 1800.

Library training is given in the state centre at Jarocin and by two-year courses for secondary school graduates. Higher education in librarianship is provided by departments of librarianship at Warsaw and Wroclaw universities. (Bo. H.)

2. Czechoslovakia.—The origins of Czechoslovak librarianship go back to the early middle ages. The University library in Prague was founded by Charles IV at the same time as Charles university (1348), and is the oldest library of its kind in central Europe. This library, which is rich in material on the social and natural sciences, now forms part of the State Library of the Czechoslovak Socialist Republic, which includes also the national library (1925; archives of Czech and Slovak literature), the Slavonic library (1924; literature on the Slav nations and the U.S.S.R.), Central Economics library (1951; formerly State Library of Social Sciences) and the Centre for Scientific Research in Librarianship (1953). A library act of 1919 required the establishment of public libraries in each town and village. The Unified Library System act of 1959 ensured co-ordination of the activities of all types of libraries. Other important libraries are the Slovak national library (1863), Martin, the State Technical library (1718), Prague, and the State Research libraries at Brno, Bratislava and other provincial towns. (Jo. V.)

3. Hungary.—The national bibliography, the union catalogues and the general catalogue of accessions are produced by the National Széchényi library (1802), which is the largest library in the country and has a large manuscript collection. The largest and earliest university library is that of Budapest (1585). The library of the Hungarian Academy of Sciences (1826), which has an important oriental collection, acts also as the headquarters of the libraries of its institutes. The Libraries act, 1956, provided that every major branch of learning should have a central library linked with a documentation centre. The National Central Technical Library and Documentation centre and the National Agricultural Library and Documentation centre have such systems.

The earliest libraries are ecclesiastical. The most important Catholic libraries are those of the Benedictines at Pannonhalma (1093), Esztergom cathedral (1397) and the archdiocesan library at Eger (1781). Among the Protestant ecclesiastical libraries are those of the Reformed colleges at Debrecen (16th century) and Sárospatak (1531), and the Ráday library, Budapest (1711).

The first municipal library, founded by Ervin Szabó (1877–1918) in Budapest in 1904, has 45 branches. After 1945 all places of some size were provided with public libraries. The trade unions maintain libraries in the factories. There are also libraries for children and young persons, as well as school libraries. (J. Sz.)

4. Yugoslavia.—The main libraries in the six Yugoslav republics are: Serbia, the National library, Belgrade (1832), destroyed in an air raid in 1941 and afterward restored; Croatia, the National University library, Zagreb (about 1607), which contains a collection of rare Yugoslav books and of Croatian manuscripts; Slovenia, the National and University library, Ljubljana (1774); Bosnia-Hercegovina, the national library, Sarajevo (1945); Macedonia, the National and University library, Skopje (1944), part of which was destroyed by earthquake in 1963; Montenegro, the Central National library, Cetinje (1946). All these receive copyright deposit copies from the whole country. There is also a University library in Belgrade (1921). The lack of a Yugoslav national library is partly compensated by the Yugoslav Bibliographic institute, Belgrade (1948), which publishes the national bibliography and is organizing a union catalogue of foreign material in Yugoslav libraries. (Mo. R.)

5. Rumania.—In Rumania there were 23,300 libraries of various kinds in 1963, as compared with about 2,000 in 1940. The two national libraries in Bucharest are the library of the Rumanian

academy (1867) and the Central State library (1955). Both are equally charged with collecting and organizing Rumanian and foreign publications, and they co-operate in bibliographical, administrative and professional activities.

There are university libraries in Bucharest (1891) and in Iaşi (1835) and Cluj (1872; strong in material relating to Rumania). The library of the Calvinist college in Tîrgu Mureş, founded in 1557, has a good collection of ancient Hungarian books, manuscripts and incunabula.

Other libraries, in the mid-1960s, include 42 in establishments of higher education, 5,200 in schools, 12,600 regional, town and village public libraries, including those of trade unions and handicraft co-operatives, and 4,800 special libraries. (A. P. Br.)

6. Bulgaria.—The largest libraries in Bulgaria are the national library, Sofia (1878), which is the copyright deposit library, and includes foreign books and periodicals as well as Slavonic, a large collection of oriental manuscripts and archives of the Bulgarian Renaissance; the University library, Sofia (1888); the library of the Bulgarian Academy of Sciences, Sofia (1869); and the Ivan Vazov public library, Plovdiv (1882).

In 1963 there were 609 scientific libraries and 7,966 public libraries, organized in separately administered library systems. Technical guidance and control over libraries is in the hands of the committee for culture and arts assisted by the national library. (G. K. M.)

7. Albania.—The largest library in Albania is the national library in Tiranë, established in 1922. There is also the State University library in Tiranë. Public libraries have been opened in Shkodër, Elbasan and other towns. (X.)

M. U.S.S.R.

The present library system in the U.S.S.R. is a product of the Revolution of 1917. According to the statistics for 1913, Russia at that time possessed 76,000 libraries, of which 14,000 were public libraries. Most of the rest were small collections belonging to church schools. Total holdings were given as 46,000,000 volumes, an average of about 600 per library. At that period three-quarters of the population was illiterate.

Lenin, working for many years in libraries both in Russia and in western Europe, devoted much study to library problems. In 1913, on reading the report of the New York Public library for 1911, he wrote an article "What can be done for the people's education," in which he said that what is important is "to perceive the pride and glory of a public library not so much in its rarities, or in its possessing certain 16th-century publications or 10th-century manuscripts, but in its ability to allow the widest possible circulation of books among the people, in how many new readers libraries have had, in how quickly a demand for a given book may be satisfied, in how many books are distributed to a given house, in how many children are drawn to reading and using a library." It was Lenin who signed the principal legislative acts defining the principles of library organization under the new social order: briefly, these are general accessibility, planned distribution, organized acquisitions and participation of the population itself in library work. The network of new libraries created by the Soviet government has been a powerful help in raising educational standards, abolishing widespread illiteracy and furthering scientific development.

In spite of the setback during World War II, when many important libraries in the occupied territories (such as Kiev, Minsk, Orel, Rostov-on-Don, Smolensk and Voronezh) and countless smaller collections were destroyed, an energetic program of reconstruction more than restored the position. In the early 1960s there were 381,000 libraries with a stock of 2,000,000,000 volumes, including many new ones established in national republics such as Kazakhstan, Uzbekistan and Armenia, some of which had not previously possessed even a written language of their own.

The largest public libraries are the Lenin State library, Moscow, and the Saltykov-Shchedrin public library, Leningrad. The Lenin State library, incorporating the Rumyantsev museum collection, has a large collection of early printed books and manuscripts including ancient Slavonic codices. After the Revolution of 1917 it received many confiscated libraries. The Saltykov-Shchedrin public library was formerly the Imperial public library. It originated in the books brought by Peter the Great from Courland in 1714. Each republic has its own state public library. Most of the local public libraries (92,000) belong to the state; the rest (41,000) to trade unions, collective farms and other organizations. Children are served by school libraries (187,000), special libraries for children (5,200) and by some of the rural and trade union libraries. The library system aims to cover all populated areas—in many regions this aim has been attained and in others it approaches realization. While book sales to individuals are increasing rapidly, the number of readers in libraries is increasing also, and the public libraries alone serve about 80,000,000 readers.

The special or research library system is headed by the State Public Scientific-Technical Library of the U.S.S.R., Moscow, and includes 50,000 libraries. About 16,000 of these belong to ministries, state committees, the Council of the National Economy (Sovnarkhoz), industrial concerns and scientific research institutes. There are 20 central scientific-technical libraries in the separate branches of economic and technical study, and each republic has its own scientific-technical library. Also in this group are the academic and medical libraries of higher and secondary educational institutions. Of these the largest are the libraries of the Academy of Sciences of the U.S.S.R., Leningrad, and the Siberian section of the Academy, Novosibirsk; the Main Library of Social Sciences of the Academy, Moscow; the Central Library of Agricultural Science and the State Central Medical library, Moscow. Important university libraries include those of Moscow, Leningrad, Saratov, Kazan, the Urals, Tomsk and Irkutsk. Each republican capital has its own academy of sciences, university, and agricultural and medical libraries. All these are open to the general public. Each republic possesses an organization which coordinates and develops its libraries as a whole.

Four great libraries act as administrative centres: the Lenin State library, for public libraries; the State Public Scientific-Technical library, for research libraries; the Central Library of

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MAIN READING ROOM IN THE LENIN LIBRARY, MOSCOW, BUILT IN 1930

Agricultural Science and the State Central Medical library, for agricultural and medical libraries. The task of each centre is to advise individual libraries and co-ordinate readers' services, acquisitions, cataloguing and technical processes. The provincial and republican libraries co-operate in supervising the work of libraries in their own areas. The national bibliographical research centre is the Lenin State library; national and state bibliographies are in the hands of the All-Union book chamber and the book chambers of the individual republics. International exchange is highly developed: the Lenin State library alone receives books from more than 100 countries.

Professional training receives careful attention in four library institutes and the library schools of many of the universities. There is a system of incentives to encourage outstanding professional achievement, including the award of titles, medals and badges, both for individuals and for institutions.

The public plays an increasing part in library work. Each library has a council elected by its readers; towns, provinces and other administrative areas have interdepartmental councils which define projects of library service and the role of each library in carrying them out. The national co-ordinating body for this work is the Library council of the ministry of culture, which consists of representatives of state departments and public organizations to which the libraries belong.

Since 1959 many libraries have been established which are staffed not by state employees but by workers from some public or social body. Such libraries are to be found especially in factories and collective farms, and include particularly the mobile libraries serving remote places. In the early 1960s there were about 300,000 of these, playing an important part in the circulation of books to the public. It would be hard to overestimate the value of libraries to the social, political, cultural and economic life of the U.S.S.R. The state acknowledges their importance by the amount of financial support it gives. In the program laid down by the 22nd congress of the Communist Party of the Soviet Union, the development of book publishing and the extension of the library system were designated as being among the most urgent requirements for further cultural growth. (N. P. A.)

N. Eastern Mediterranean

1. Greece and Cyprus.—A library tradition founded in antiquity was re-established after the liberation of Greece by the national library (1828), now in Athens, which collects Greek publications and works on Greek civilization. The library of the chamber of deputies (1845) is also important. The country possessed in 1963 more than 350 libraries open to the public. Among special libraries are those of the faculties, technical schools and museums, particularly at Athens and Salonica, and the academies and archaeological schools. Of the monastery collections, those in the monasteries on Mt. Athos are the most noteworthy and are rich in manuscripts.

In Cyprus, the most important library is that of the Pan-Cyprian gymnasium, Nicosia. Famagusta, Limassol, Paphos and Nicosia have municipal libraries. (E. P. P.)

2. Turkey.—Modern librarianship is a comparatively new development in Turkey, but libraries as institutions go far back in history. Turkey has some of the richest manuscript collections in the world, among which the Süleymaniye library in Istanbul is one of the most important. The mosque libraries have large collections of Arabic manuscripts, and the universities also have considerable libraries. The Turkish national library at Ankara (1946) is on modern lines. In 1963 there were 154 separate children's libraries in addition to those which form part of the numerous public libraries. There were 48 Library Friends' associations supporting the development of libraries and librarianship. (Z. E.)

3. Israel.—The largest and most important library in Israel is the Jewish National and University library, Jerusalem, housing the largest collection of Hebraica and Judaica in the world. As the central library of the university and the state, it collects works in all fields of study. Its bibliographic quarterly *Kirjath Sepher* contains, among other material, the current national bibliography, based on the legal deposit law. Affiliated to the library are the institutes for Hebrew bibliography and for microfilms of Hebrew manuscripts. The Technion, Haifa, and the Weizmann institute, Rehovot, have modern research libraries. Parliament, various ministries and religious institutions have specialized libraries. New libraries of natural and applied sciences have been set up. The Israel National Council for Research and Development sponsors documentation services.

The ministry of education, municipalities, local authorities and the General Federation of Labour foster the development of public and school libraries. The largest public library is that of Tel Aviv. (C. D. W.)

O. Arab States

Arab library history consists of two widely different main streams, which have latterly begun to merge: the influence of a common religious and linguistic heritage; and that of the numerous institutions of western origin. Technological progress has combined with emergent Arab independence to synthesize these streams into a distinctive regional librarianship, in which modern western library techniques are being adapted to the bibliographic control of both traditional Arab scholarship and modern political, economic and scientific thought. UNESCO held three regional seminars on library development in the Arab states (Damascus, Syria, 1955; Beirut, Lebanon, 1959; Cairo, U.A.R., 1962), which resulted in progress in national and public libraries, exchange of publications, documentation services, and the standardization of cataloguing and classification. UNESCO, the Ford foundation, the British council and other agencies have also aided by sending experts or awarding fellowships throughout the region. Many states have national libraries, most of them founded or developed by the French. Noteworthy are those of Cairo, with a large manuscript collection; Algiers (Algeria); Rabat (Morocco); Tunis (Tunisia), with Arabic and oriental manuscripts; Beirut, a copyright deposit library; and Damascus. Among important university libraries are those of al-Azhar, Cairo (collection of Arabic manuscripts); Cairo university; Alexandria (U.A.R.); Algiers; the American university and the Université Saint Joseph in Beirut; Baghdad (Iraq); and Khartoum (Sudan). Public library systems exist in Iraq, Tunisia, the United Arab Republic and a few other states and are being developed in Jordan, Kuwait, Libya and elsewhere; and most states, though handicapped by shortage of trained staff, are establishing library services in schools and rural community centres. Libraries of all kinds other than those of private institutions are normally controlled by national ministries of education.

Industrialization has fostered the establishment of many technical libraries, both governmental and privately owned, notably in the United Arab Republic, which possesses scientific and educational documentation centres in Cairo; in Lebanon; and in the oil fields. The Arabian American Oil company has a technical library and an Arabian research library at Dhahran, Saudi Arabia. Another large group of special libraries is that of learned societies and archaeological schools such as the Institut d'Égypte (Cairo), the Arab academy and Institut Français, Damascus, and the Institut Français d'Archéologie, Beirut. Yet a third group, containing valuable collections, is that of the monasteries and other religious institutions, of which the monastery of St. Catherine on Mount Sinai, with Greek and Arabic manuscripts, is the most famous. A large Islamic library was established at Riyadh (Saudi Arabia) in 1960. Finally, there are many private libraries, some containing manuscripts of great value.

Few states produce national bibliographies or possess library legislation suited to present-day needs. Among notable exceptions are Tunisia and the United Arab Republic.

P. Africa

1. East, Central and West Africa.—Most of the libraries of this vast region originated in the colonial period and consequently follow either the British or the French tradition. Since attaining independence, some states have achieved considerable further development. The University of East Africa (1963) includes the colleges at Kampala (Uganda), Dar es Salaam (Tanganyika) and

Nairobi (Kenya), all with libraries. In west Africa, the University of Ghana opened a new library building at Legon in 1959. The University of Ibadan (Nigeria) has a library with a specialist collection of west African history and ethnology. It is the copyright deposit library for Nigeria. Smaller university libraries exist at Monrovia, Liberia; Dakar, Senegal; Elisabethville and Léopoldville, Republic of the Congo; and Addis Ababa, Ethiopia. Among important special libraries is that of the Institut Français de l'Afrique Noire, Dakar. Noteworthy public library systems are those of Ghana and Eastern Nigeria. A few national libraries exist in the former French West African territories; *e.g.,* Conakry, Guinea; but the best developed national library in the area is that of Ethiopia (Addis Ababa). (F. L. K.)

2. South Africa.—The South African public library, containing the library of J. N. Dessin, was founded in Cape Town in 1818. It serves as the national bibliographic centre. This and the State library in Pretoria (1887) are the two national and copyright libraries, the latter also serving as the national interlibrary lending centre. The Johannesburg and Cape Town public libraries are the largest municipal libraries, with branches and traveling libraries. In the Cape, Transvaal, Orange Free State and Natal are provincial library systems, each covering its province outside urban centres and divided into regional areas. The South African Council for Scientific and Industrial Research in Pretoria maintains the central library for science and technology. Some provision is made for library services for Coloured, African and Indian race groups.

University libraries have been reorganized since 1945. They are the University of Cape Town library, the oldest; Stellenbosch; Witwatersrand; Pretoria; and five others. In all four provinces, the provincial education departments have appointed school library organizers, and in the Transvaal education department there is a headquarters school library organization. (R. F. M. I.)

Q. South and Southeast Asia

1. India.—Ancient India has a proud record of Buddhist monastic libraries in such centres as Taxila and Nalanda. The royal houses of many of the princely states of India also had rich collections of manuscripts and other material. The political impact of Great Britain, during the viceroyalty of Lord Curzon, created the Imperial library which was to fulfill the sentiments expressed in the famous Minute on Indian Education by Macaulay, that the "natives" were to be familiarized with the best thought and feeling of the European classics. The foresight and initiative of Sir William Jones established the oldest oriental research centre in the world, the Royal Asiatic Society of Bengal (1784), which continues the scholarly tradition as the Asiatic society. Its library is most choice and rare. The private initiative of princely collectors resulted in the collections of the Manuscripts library at Rampur, the Saraswati Mahal library at Thanjavur (Tanjore) (with about 18,000 manuscripts), the Safdar Jang collection at Hyderabad, the Khuda Baksh library at Patna and the Buhar library at Calcutta. Among them, these libraries hold a wealth of Persian, Arabic, Sanskrit and other Indian language manuscripts. They are open to the public and supported by government subvention. Private libraries like those of the maharajas of Travancore, Mysore and Udaipur are not accessible to the public. The Oriental Manuscripts library in Madras and the Manuscripts library in Travancore university also have considerable holdings. The Jain monasteries in the eastern region and many of the religious establishments contain uncatalogued material.

In 1948 the Imperial library became the national library, housed in the former governor general's residence at Calcutta. In 1954 it became the deposit library of India.

The *Indian National Bibliography,* comprising all the publications in all the languages in India, started publication in 1957. The national library also publishes retrospective bibliographies on various aspects of Indian culture. The Sahitya Akademi, a literary organization devoted to the promotion of the Indian literatures, published in 1962 the first volume of the *Bibliography of Indian Literature* covering the years 1901–53. The Roman script has been used in all these bibliographies.

The government of the state of Madras passed legislation in 1948 enabling public libraries to be provided by statutory funds. The first public library was opened, with the help of UNESCO, in Delhi in 1951. UNESCO also helped to establish the first Asian Centre for Scientific Documentation. The Indian National Scientific Documentation centre (INSDOC) was established in 1952 in Delhi to provide not only bibliographies but also translations from foreign languages into English and photocopies of material.

2. Afghanistan.—The library of the ministry of education (1920), the largest library in Kabul, also serves as a national library. The Kabul public library, organized with UNESCO's help in 1958, has a children's section and a periodical department.

3. Burma.—The national library of Rangoon (1952) contains periodicals and prints as well as books. The Burma Translation society runs a free public library. Another important library is Rangoon University library (1929). UNESCO has helped the Union of Burma Technical Information centre of the Applied Research institute to organize its services.

4. Ceylon.—The National Museum library at Colombo is a depository library for copyright publications. The Colombo public library (1925) is the largest public library in Ceylon and is maintained by the municipality. There is also the Ceylon Institute of Scientific and Industrial Research library (1955). The Ceylonese National Bibliography began publication in Roman script using the decimal classification.

5. Indonesia.—In Indonesia is the Central Library for Natural Science (1842) at Bogor. There is a public library in Jakarta, a state library in Jakarta and university libraries. UNESCO assisted library development by surveying school libraries, university libraries, public libraries and special libraries, and by appointing experts in every branch of library development.

6. Iran.—The Imperial library of Teheran has an important collection of manuscripts. The national and Parliament libraries are both in Teheran. There are five university libraries, of which that of the University of Teheran is the biggest.

7. Malaysia.—The national library at Singapore (1844) provides reference and lending library facilities. It has powers for undertaking centralized cataloguing and for compiling a national bibliography. The libraries of the University of Malaya in Singapore and in Kuala Lumpur are well organized. Nanyang University library in Singapore is also important.

8. Pakistan.—In 1949, soon after the formation of the new state, the Pakistan government created the directorate of archives and libraries under the ministry of education. This directorate was to organize the National and Central Secretariat library. Technical programs of various foreign agencies largely contributed to the development of libraries in Pakistan; and under the Colombo plan an Australian librarian advised on the development of the library service.

A central public library has been established by the government of East Pakistan at Dacca. The government of West Pakistan has set up a separate library division in the department of education. In 1951 the Liaquat public library was established in Karachi. Later it was merged with the national library to become the Liaquat National library.

Of the six universities, Karachi, Peshawar and Rajshahi were founded after 1950 and their libraries possess excellent collections. Among the older university libraries, the library of Panjab university (1882) is the largest in Pakistan, and is rich in Arabic, Persian, Urdu and Sanskrit manuscripts. The University of Dacca has a fine manuscript collection, mostly in Sanskrit. The library of Sind university (1947) is also important.

Although there is no free public library system, there are 96 public libraries, of which the Panjab public library (1884) at Lahore is the largest. There are also several specialist scientific and technological libraries.

There is an active Pakistan bibliographical working group in Karachi which owes its existence to the International Conference on the Improvement of Bibliographical Services held in Paris in 1950 under UNESCO auspices. The Asia foundation and several other U.S. foundations have liberally assisted library development

in Pakistan. In 1956 UNESCO helped the government of Pakistan to start the Pakistan National Scientific and Technical Documentation centre (PANSDOC) at Karachi. Its services are similar to those provided by INSDOC in India.

9. Thailand.—The national library of Thailand originated in three royal libraries established in 1783, 1881 and 1900. After their amalgamation in 1905 the public was admitted. Important donations have been those of King Prajadhipok (1925) and Prince Damrong Rajanubhab (1947). There are 14 special libraries attached to government departments and 5 university libraries.

10. The Philippines.—Most of the Philippines libraries were either heavily damaged or destroyed during World War II. The Division of Documentation, National Institute of Science and Technology (formerly the Bureau of Science), possessed one of the largest collections of scientific and technical publications in the far east. It was burned during the war. After reorganization the Division of Documentation received technical assistance from UNESCO in 1957. The Philippines national library at Manila is another important library. The library of the University of Santo Tómas has an excellent collection of Filipiniana and rare and ancient books. The University of Manila library (35,000 volumes) and the Far Eastern University library provide good services.

The Bibliographical centre in the University of Philippines issues an annotated bibliography of the Philippine social sciences. The Institute of Public Administration in this university has published a union list of serials in government libraries and also an index to Philippine periodicals.

R. Far East

1. China.—China has a library tradition dating back to the 6th century B.C. The early invention of printing from wooden types was a great step in the development of libraries in the country. The dynastic system of rule resulted in each dynasty having its own imperial library. According to tradition Lao-tzu, the celebrated philosopher, was once a keeper of books in one of these dynastic libraries. National collections of books in the modern sense, however, originated with the attempts made to recover the books scattered or destroyed by the so-called "First Emperor" in 220 B.C. Many catalogues of the dynastic libraries survive. By the middle of the 20th century there were 14 large private libraries with, it is said, as many as 2,000,000 volumes in each.

The national library of Peking (1912) contains the imperial collections of the southern Sung, Ming and Ch'ing dynasties, 5th-century manuscripts and 9th-century wood-block prints. The Nanking library, founded in 1933, was enlarged by the addition of the Sinological library of Kiangsu province. Peking, Chinan (Canton), Amoy and Nanking universities have large collections of Chinese and western books. The old *Ssu-K'u* system of classifying Chinese books into four categories, classics, history, philosophy and belles-lettres, has been modified under the influence of the universal decimal and the Library of Congress classifications. The first public library was opened in Hunan in 1905.

Since the establishment of the People's Republic of China, there has been a concentrated effort to establish libraries on an extensive scale. By the end of June 1958 there were 490 public libraries under the ministry of culture, 2,657 libraries under cultural clubs, 25,419 libraries under labour unions, 29,326 libraries in rural areas, 3,847 run by the people, in addition to 235 collegiate libraries under the ministry of education and 101 libraries under the Chinese Academy of Sciences. There are libraries exclusively for children as well as adult libraries with children's reading rooms.

The national library of Peking, the larger provincial libraries and the libraries of the Academy of Sciences provide extensive bibliographical service. The national library of Peking and the library of the People's university are co-operating in centralized cataloguing for new books. Peking university and Wu-han university offer courses on library science. The Academy of Sciences has an institute for scientific information.

2. Formosa (Taiwan).—The national central library of Taiwan, established in 1954, includes a rare Chinese collection brought from the mainland. The largest provincial library is that of T'ai-pei which has a rich collection of southern Asian books. Public library development has been very encouraging and there were 429 libraries in Taiwan in 1963. The biggest library is the National Taiwan University library founded in 1928.

3. Japan.—Rich private collections brought together by the initiative of ruling noblemen were established in ancient Japan. In 1872 the Imperial library was founded in Tokyo and was reorganized into the National Diet library in 1948. Its organization was influenced by the Library of Congress and a new building was opened in 1961. Since 1950 printed cards for books received under the copyright law have been issued. The Diet library publishes the annual Japanese national bibliography and monthly indexes to periodical articles. The Diet library is the deposit library for Japanese publications and the Centre of International Book Exchange. Prior to the promulgation in 1950 of the Japanese Library law there were nearly 3,400 public libraries. In 1963 there were only 725 recognized public libraries receiving government grants.

The Japanese Information Centre of Science and Technology was established in Tokyo in 1957 to collect, store and retrieve information from foreign and domestic sources. The information received is classified according to the universal decimal classification and there are mechanical devices for information retrieval. The centre undertakes on request bibliographical and documentation research work and translations from Japanese into English and from the foreign language into Japanese. It also services microfilms.

4. Korea.—The Democratic People's Republic of Korea has its State Central library at P'yŏngyang. Since 1948 it has served as the national library and it offers training in librarianship. There are eight provincial libraries and 185 public libraries. The Republic of Korea has its national library at Seoul (1925). There is also a National Assembly library in Seoul (1952). Seoul National University library (1926) is also important. (B. S. K.)

S. Australia and New Zealand

1. Australia.—The publication in 1935 of the Munn-Pitt report (*see* bibliography) marks a turning point in the development of libraries in Australia. Libraries of various kinds had been established in the preceding century but services as a whole were far from adequate. The report stimulated state governments and institutions, both public and private, to take legislative and administrative action to bring Australian libraries into line with the best European and American standards.

The national library, established in 1902 as the library of the Commonwealth parliament, was separated from the parliamentary library in 1960. It is the copyright library for Australia and has important holdings of Australiana. The state libraries of Victoria (1853), New South Wales (1869), Tasmania (1870), South Australia (1884), Western Australia (1887) and Queensland (1896) provide full reference services in their capital cities and various lending facilities in urban and rural areas. Public library services generally, including children's libraries and traveling libraries, are provided in each state by its library board. Among the most important libraries are those of the universities, many of which have buildings erected since 1950. (Ja. J. G.)

2. New Zealand.—Following the publication of the Munn-Barr report (1934), the reconstituted New Zealand Library association and the National Library service (1938) established a co-ordinated development of book resources, bibliographic services, interlibrary loans, a training and registration system for librarians, and the service's circulating book stock for country and school libraries. The 1959 census listed 131 municipalities with libraries: 19 still subscription, 112 giving free service supplemented by recreational pay collections.

Apart from the National Library service, the main libraries are those of the Department of Scientific and Industrial Research, the Parliamentary library, the Alexander Turnbull library, Wellington (strong in Pacific material), and the university and public libraries in Auckland, Wellington, Christchurch and Dunedin. (R. N. O'R.)

LIBRARY

Principal Libraries of the World

(It is difficult to compare sizes and values of libraries because of the varying interpretations of statistical bases; *e.g.*, the possible inclusion of duplicates and of pampblet material among book totals. Numbers of volumes may include manuscripts, and also incunabula, without differentiation.)

Country	Library	Approximate number of volumes	Manuscripts
Albania	National Library, Tiranë	276,000	
Algeria	Bibliothèque Nationale, Algiers	500,000	
	Bibliothèque de l'Université, Algiers	500,000	
Argentina	National Congress Library, Buenos Aires	300,000	
	Biblioteca Nacional, Buenos Aires	682,800	
	Public Library of La Plata National University	360,000	
Australia	National Library, Canberra	675,000	
	National University Libraries, Canberra	250,000	
	Victoria State Library, Melbourne	900,000	
	Library Service of Western Australia, Perth	400,000	
	Sydney University Library	720,000	
Austria	Nationalbibliothek, Vienna	2,000,000	70,000
	Städtische Bücbereien, Vienna	330,000	
	Vienna University Library	1,500,000	
	Vienna City Library	320,000	158,000
Belgium	Bibliothèque de l'Institut Royal des Sciences Naturelles de Belgique, Brussels	700,000	
	Bibliothèque du Parlement, Brussels	300,000	
	Bibliothèque Albert Ier, Brussels	2,000,000	
	Université Libre de Bruxelles	300,000	
Bolivia	Congress Library, La Paz	15,000	
Brazil	Biblioteca Nacional, Rio de Janeiro	1,000,000	600,000
Bulgaria	National Library, Sofia	734,000	4,830
	Sofia University Library	630,000	
Burma	National Library, Rangoon	12,000	
	Rangoon University Library	55,000	
Cambodia	Bibliothèque Nationale, Phnom Penh	27,000	
Canada	National Library, Ottawa	1,000,000	
	University of Ottawa Library	325,000	
	Toronto Public Library	1,000,000	
	University of Toronto Libraries	1,500,000	
	Vancouver Public Library	500,000	
	National Research Council Library, Ottawa	500,000	
	Montreal City Library	570,000	
	McGill University Library, Montreal	774,000	
	Montreal University Libraries	490,000	
Chile	Congress Library, Santiago	200,500	
	Biblioteca Nacional, Santiago	700,000	640
	Central University Library, Santiago	100,000	
China, People's Republic of	National Library, Peking	4,400,000	
	Nanking Library	2,290,000	
	Liaoning Library, Mukden	1,310,000	
Colombia	National Library, Bogotá	200,000	500
Congo, Democratic Republic of the	University of Lovanium Library, Kinsbasa	150,000	
Cuba	National Library, Havana	800,000	
	Havana University Library	100,000	
Czechoslovakia	State Library, Prague	3,194,000	
	National Museum Library, Prague	1,300,000	
	Public City Library, Prague	1,327,000	
	State Technical Library, Prague	500,000	
	Academy of Sciences, Prague	1,000,000	
Denmark	Royal Library, Copenhagen	1,300,000	36,000
	Copenhagen University Library	1,230,000	
	State and University Library, Aarhus	640,000	
East Africa	University of East Africa. Libraries of Makerere College, Kampala, Uganda; the Royal College, Nairobi, Kenya; University College, Dar es Salaam, Tanganyika	130,000	
Ecuador	National Library, Quito	50,000	
	Central University Library, Quito	45,500	
	Cuenca University Library	53,130	
Ethiopia	University College Library, Addis Ababa	28,000	
	National Library, Addis Ababa	52,000	
Finland	Library of Parliament, Helsinki	290,000	
	Helsinki University Library	1,000,000	2,000
	Library of Scientific Societies, Helsinki	300,000	
	Turku University Library	550,000	1,000
	Åbo Academy Library, Åbo	450,000	
Formosa (Taiwan)	National Central Library, T'ai-pei	240,000	
	National Taiwan University Library, T'ai-pei	700,000	
France	Bibliothèque Nationale, Paris	6,000,000	155,000
	Bibliothèque de la Sorbonne, Paris	1,500,000	
	Bibliothèque Sainte-Geneviève, Paris	1,500,000	4,000
	Bibliothèque de l'Arsenal, Paris	1,200,000	13,000
	Bibliothèque de l'Assemblée Nationale, Paris	400,000	1,600
	Bibliothèque Mazarine, Paris	350,000	5,800
	Bibliothèque Universitaire Centrale, Nancy	1,000,000	
	Bibliothèque Nationale et Universitaire, Strasbourg	3,000,000	5,179
Germany, West	Amerika-Gedenkbibliothek (Berlin Central Library)	265,000	
	Staats- und Universitätsbibliothek, Hamburg	800,000	3,000
	Bayerische Staatsbibliotbek, Municb	2,000,000	50,000
	Universitätsbibliothek, Bonn	735,000	
	Universitäts- und Stadtbibliothek, Cologne	1,200,000	
	Hessische Landes- und Hochschulbibliothek, Darmstadt	850,000	
	Deutsche Bibliothek, Frankfurt am Main	605,000	
	Staatsbibliothek, Marburg	2,000,000	34,500
Germany, East	Deutsche Bücherei, Leipzig	2,900,000	
	Universitätsbibliothek, Jena	1,500,000	4,300
	Universitätsbibliothek, Leipzig	1,700,000	
	Deutsche Staatsbibliothek, Berlin	—	
	Sächsische Landesbibliothek, Dresden	770,000	
Gbana	University of Ghana Library, Legon	140,000	
Great Britain and Northern Ireland, United Kingdom of	British Museum Library, London	6,000,000	60,000
	University of London Library	800,000	
	Cambridge University Library	2,500,000	12,000
	Bodleian Library, Oxford	2,250,000	50,000
	London Library	700,000	
	Manchester Public Libraries	1,164,000	
	Birmingham Reference Library	1,700,000	
	Liverpool Public Library	1,595,000	
	Lancashire County Library, Preston	1,865,000	
	Essex County Library, Chelmsford	1,826,000	
	Central Public Library, Belfast	456,000	
	Queen's University Library, Belfast	310,000	
	Public Library, Armagh	40,000	
	National Library of Scotland, Edinburgh	2,000,000	
	National Library of Wales, Aberystwyth	2,000,000	30,000
	Cardiff Public Libraries	675,000	
	Edinburgh Public Libraries	903,000	
	Glasgow Public Libraries	1,650,000	
Greece	National Library, Athens	1,000,000	
	Library of the Chamber of Deputies, Athens	960,000	
Guatemala	National Library	75,000	
Hungary	National Széchényi Library, Budapest	1,680,000	
	Academy of Sciences Library, Budapest	571,000	209,000
	Hungarian Central Technical Library, Budapest	170,000	
	Ervin Szabó Municipal Library	700,000	
	Budapest University Library	600,000	
India	National Library, Calcutta	1,030,000	2,100
	Delhi Public Library	200,000	
	Madras University Library	210,000	
	Parliament Library, New Delhi	212,000	
Indonesia, Republic of	Library of the Museum of the Institute for Indonesian Culture, Jakarta	500,000	500
	Central Library for Natural Science, Bogor	152,000	
Iran	National Library, Teheran	55,000	4,200
Ireland, Republic of	National Library, Dublin	500,000	3,000
	Trinity College Library, Dublin	900,000	
	Cork University Library	480,000	
	Dublin Public Library	540,000	
Israel	Jewish National and University Library, Jerusalem	1,000,000	6,350
	Municipal Library, Tel Aviv-Jaffa	145,600	

Principal Libraries of the World—Continued

Country	Library	Approximate number of volumes	Manuscripts
Italy	Biblioteca Nazionale Centrale Vittorio Emanuele, Rome	1,970,000	
	Biblioteca Nazionale, Naples	1,440,000	28,000
	Biblioteca dell' Accademia Nazionale dei Lincei, Rome	370,000	4,000
	Biblioteca Ambrosiana, Milan	800,000	35,000
Japan	Kyoto University Library, Kyoto	2,087,000	
	National Diet Library, Tokyo	1,363,000	
	Tenri Central Library, Tenri City	705,000	
Korea, Democratic People's Republic of	State Central Library, P'yŏngyang	1,000,000	
Korea, Republic of	National Library, Seoul	370,000	
	National University Library, Seoul	600,000	
Lebanon	National Library, Beirut	100,000	2,500
Malaysia	National Library, Singapore	170,000	
	University of Malaya Library, Singapore div.	300,000	
Mexico	Biblioteca Nacional, Mexico City	500,000	112,000
	Congress Library, Mexico City	50,000	
Netherlands	Koninklijke Bibliotheek, The Hague	800,000	30,000
	Amsterdam University Library	1,500,000	62,000
	Library of the Technological Institute, Delft	300,000	
	Leiden University Library	1,600,000	15,500
New Zealand	General Assembly Library, Wellington	275,000	
	National Library Service, Wellington	675,000	
	Alexander Turnbull Library, Wellington	100,000	15,000
	Auckland Public Library	400,000	
Nicaragua	State Library, Managua		
	Central American Library, Managua		
Nigeria	University of Nigeria Library (Ibadan, Enugu)	38,000	
Norway	Royal University Library, Oslo	1,400,000	
	Library of the Technical University of Norway, Trondheim	260,000	
Pakistan	Liaquat National Library, Karachi	40,000	100
	Panjab University Library, Lahore	165,000	17,800
	Dacca University Library	120,000	50,000
	National Library, Asunción	12,000	
Paraguay	Library of the Paraguayan Scientific Society, Asunción	30,000	
	Biblioteca Nacional, Lima	400,000	180,000
Peru	National Library, Manila	792,000	
Philippines, Republic of the	National Library, Warsaw	2,000,000	8,000
Poland	Warsaw Public Library	1,300,000	2,541
	Warsaw University Library	1,400,000	1,755
	Jagiellonian Library, Cracow	1,115,000	
	Biblioteca Nacional, Lisbon	1,000,000	15,200
Portugal	Library of the Academia das Ciências, Lisbon	400,000	3,000
	Ajuda Library, Lisbon	100,000	35,000
	Oporto Municipal Library	860,994	1,700
	University of Coimbra Library	1,000,000	3,126
Rumania	Central State Library, Bucharest	2,200,000	
	Central University Library, Bucharest	1,000,000	
	Cluj University Library	890,000	
	Academy of the Rumanian People's Republic Library, Bucharest	3,800,000	
South Africa, Republic of	South African Public Library, Cape Town	350,000	
	University of Cape Town Library	310,000	
	Pretoria State Library	300,000	
	Transvaal Provincial Library, Pretoria	1,400,000	
Spain	Biblioteca Nacional, Madrid	1,500,000	
	Madrid University Library	408,000	
	Biblioteca Central de la Diputación Provincial de Barcelona	470,000	
Sweden	Royal Library, Stockholm	900,000	14,000
	Royal Swedish Academy of Science Library, Stockholm	250,000	4,000
	Göteborg Municipal and University Library	800,000	
	Lund University Library	900,000	
	Uppsala University Library	1,200,000	27,000
Switzerland	Landesbibliothek, Bern	1,000,000	
	Basel University Library	1,725,000	
	Geneva Public and University Library	1,100,000	10,000
Switzerland (con't.)	Lausanne Cantonal University Library	600,000	
	United Nations Library, Geneva	600,000	
	International Labour Office Library, Geneva	650,000	
	Swiss Federal Institute of Technology Library, Zürich	530,000	
Syria	National Library, Damascus	65,000	8,000
Thailand	National Library, Bangkok	89,000	42,400
Tunisia	National Library, Tunis	500,000	6,000
Turkey	National Library, Ankara	400,000	
	Ankara University Library	350,000	
	Istanbul University Library	170,000	17,750
U.S.S.R.	Lenin State Library, Moscow	20,000,000	2,500,000
	Library of the Central House of the Soviet Army, Moscow	3,000,000	
	A. M. Gorki Scientific Library, Moscow University	6,000,000	
	(All-Union) State Library of Foreign Literature, Moscow	2,500,000	
	Central State Medical Library, Moscow	1,000,000	
	Main Library of Social Sciences of the Academy of Sciences, Moscow	6,000,000	
	State Public Historical Library, Moscow	2,500,000	
	Library of the Academy of Sciences of the U.S.S.R., Leningrad	6,000,000	
	A. M. Gorki Scientific Library of Leningrad University	3,200,000	
	Saltykov-Shchedrin State Public Library, Leningrad	13,000,000	
	Library of the Ukrainian Academy of Sciences, Kiev	5,500,000	
	Latvian Public Library, Riga	3,000,000	
United Arab Republic	National Library, Cairo	800,000	
	Alexandria University Library	1,200,000	
	al-Azhar University, Cairo	80,000	20,000
United States	Library of Congress, Washington	12,600,000	18,000,000
	Henry E. Huntington Library and Art Gallery, San Marino, Calif.	230,000	
	John Crerar Library, Chicago	1,000,000	
	National Library of Medicine, Bethesda, Md.	1,000,000	
	University of California Libraries	5,000,000	
	University of Chicago Library	2,210,000	
	Columbia University Library, New York	3,000,000	
	Harvard University Library, Cambridge, Mass.	6,900,000	
	University of Illinois Library, Urbana	4,000,000	
	Massachusetts Institute of Technology Library, Cambridge, Mass.	640,000	
	University of Michigan Library, Ann Arbor	2,700,000	
	University of Pennsylvania Library, Philadelphia	1,745,000	
	Princeton University Library, Princeton, N.J.	1,300,000	
	Yale University Library, New Haven, Conn.	4,300,000	
	Los Angeles (Calif.) Public Library	2,800,000	
	Chicago Public Library	2,500,000	
	Boston (Mass.) Public Library	2,170,000	
	New York Public Library	5,800,000	
	New York State Library	3,000,000	
	Cleveland (O.) Public Library	3,000,000	
Uruguay	Biblioteca Nacional, Montevideo	250,000	
Vatican	Biblioteca Apostolica Vaticana	900,000	60,000
Venezuela	National Library, Caracas	350,000	
Yugoslavia	National Library, People's Republic of Serbia, Belgrade	500,000	570
	Svetozar Markovič University Library, Belgrade	720,000	4,200
	Library of the Yugoslav Academy of Science and Art, Zagreb	110,000	
	National Library of the People's Republic of Bosnia and Hercegovina, Sarajevo	380,000	

(P. W. P.)

III. LIBRARY ORGANIZATION

A. Government, Purposes and Financing of Libraries

1. National Libraries.—At the head of the library system of most countries is the national library, which receives copies of all newly published books for registration under copyright laws. Many national libraries have been started by, or have benefited from, the deposit of a distinguished private library, such as the Royal library, given to the British museum by King George II, and the library of Thomas Jefferson, given to the Library of Congress. Sometimes, as in the case of the Library of Congress and the National Diet library (Japan), the national library also serves as the library of the legislature; but the British museum and many others do not have this function, and there are separate libraries for the house of lords and the house of commons. National libraries are financed mainly by direct state grants and are administered by boards of governors or trustees assembled from leading scholars and men of affairs. They may also administer funds or distribute extra copies of books to other specialist libraries. This function has been carried for some years by the Bibliothèque Nationale in Paris, and the pattern has been followed by many socialist countries; in some the national library has a number of copies to distribute to regional libraries as well as to those specializing in particular subjects.

The purposes of national libraries may thus vary somewhat from country to country, but basically they pursue the ideal of Sir Anthony Panizzi: to have the finest collection of works published in their own countries and a first-class collection from every other country, freely available for scholars from all parts and in all disciplines. Under the stresses of modern civilization, however, there is not infrequently a retreat from the ideal, in both collecting and making available.

More and more national libraries are producing the national bibliography. Since copyright laws require the deposit of at least one copy of every printed work in the library, it seems but natural for it to publish the list of books received. The *British National Bibliography* compiled at the British museum consists of weekly parts cumulated at intervals, and has served as a model for several other countries.

2. University Libraries.—University libraries form a group very similar throughout the world. They are the descendants of the most ancient libraries, and are assembled for the benefit of a group of scholars and students who come together for the pursuit of learning. They cover a wide range of subjects in great detail to support the university's own teachers and research workers, but many of them have a status not unlike that of a national library, attracting scholars from all over the world and benefiting from magnificent donations. Some, like the Bodleian library (Oxford) and Cambridge University library, also receive deposits under the copyright laws. Some, like the Royal University library, Oslo, are also national libraries.

BY COURTESY OF YALE UNIVERSITY NEWS BUREAU; PHOTO BY EZRA STOLLER

THE GLASS-ENCLOSED BOOKSTACK OF THE BEINECKE RARE BOOK AND MANUSCRIPT LIBRARY AT YALE UNIVERSITY DESIGNED TO HOLD 160,000 VOLUMES

University libraries often receive outstanding gifts and bequests, but their main source of finance is the university itself, which appoints a library committee, often with the librarian as chairman or secretary, representing the academic departments, which thus have a voice in acquisitions and development policies.

3. Learned Society Libraries.—Scholarly libraries maintained by private bodies such as professional and learned societies usually specialize in one subject or a closely allied group, and many of them have the finest collections in their speciality. Since they were founded by the members for their own use they usually have restricted access; but the close relations between the library and its members that this makes possible has often led to the donation, to a society library, of a distinguished collection of private papers. The Royal Society of London, the Zoological Society of London and the American Philosophical society are examples of famous collections of members' manuscripts, diaries and correspondence. Perhaps the heyday of the learned library is over; many societies find it increasingly difficult to raise the funds necessary to keep pace with the present vast increases in publication. But they will no doubt continue to play a vital part in supplying the needs of their members.

An increasingly popular modern variation of this type of library is the setting-up, often by government action, of an academy of sciences—a network of research institutes covering all major fields of learning. Each institute has a library which is the leading specialist library in its field, and may receive books distributed by the national library from the copyright deposits. This pattern is found in most of the socialist countries, following the example of the U.S.S.R. Such libraries can often overcome currency difficulties by arranging exchanges of new publications with libraries in other countries. In countries such as the Federal Republic of Germany, where the academy is an official but nongovernmental body, the institutes may receive state financial grants.

4. Public Libraries.—Public libraries are probably the best known of all libraries, and are of the widest access. A few have existed for hundreds of years, having been established by a town council for the use of councilors and citizens, for information, recreation and as a repository for the town archives; most have fine collections relating to their local history. A great extension of public libraries took place in Great Britain and the United States during the late 19th and early 20th centuries, stimulated by generous donations from wealthy philanthropists such as Andrew Carnegie and Passmore Edwards. The state was persuaded to help by passing laws enabling money to be spent out of local rates and taxes; but little money has been given as direct grants, and central governments have in general exerted little direct influence on local administration.

Public libraries are usually governed by a committee appointed by the town or county council, which may include co-opted scholars and experts living in the district as well as councilors. Sometimes the library service may be closely linked with the education service, and the committee a subcommittee of the local education committee itself. In developing countries the central government has sometimes taken more direct action. In the early days of the U.S.S.R., V. I. Lenin promulgated a decree establishing public libraries with state financial aid. Hungary has a central library council responsible directly to the government. Ghana and Sierra Leone have library boards whose function is to foster development of local services and to fill in gaps, for example with mobile libraries in thinly populated areas; a similar role is performed by the state library in Western Australia.

The ideal of the public library movement—to provide access to all knowledge for all men regardless of race, creed or colour—has rarely been realized. All too often overt or hidden forms of

censorship have intervened—moral, political and religious. But these libraries have made an inestimable contribution to the progress of civilization, and their importance continues to grow.

5. Special Libraries.—During and since World War II there has been a remarkable growth of specialized libraries serving private organizations, particularly in science and technology. These organizations include industrial firms with their own private resources and purposes; the most notable industrial libraries are to be found in countries with an advanced technology—Great Britain, the United States, France and the Federal Republic of Germany. Many government and semi-government organizations, such as those doing research on atomic energy, equip themselves with libraries. The British Department of Scientific and Industrial Research and the U.S. National Science foundation have done much to foster such libraries. Some countries have a more centralized system based on an academy of sciences, a trade union movement, or an institute sponsoring and organizing research, such as the Centre Nationale de la Recherche Scientifique in Paris.

The function of these libraries is not merely to collect and store documents, but to exploit them by disseminating their contents to the research worker. The value of their contribution to industrial progress may be seen from the rapid development of these services. (*See* also *Special Libraries,* below.)

B. Technical Processes

The extension of library service into securing the flow of information to the right people has led to parallel development of techniques. The library is now concerned with information, in whatever form: books, pamphlets, reports, the publications of societies and even of private organizations. While booksellers are still the main source of acquisitions, many documents have to be obtained from the originator and not through the usual trade channels. This creates many difficulties: often it is hard to discover the mere existence of a document, or the address of its publisher. To overcome this, libraries have begun to exchange documents among one another to obtain this kind of material.

1. Cataloguing and Classification.—All new acquisitions are catalogued to provide the reader with a record of the library's stock. The catalogue entry must show sufficient detail to identify a work: this usually means its author, title, date and publisher. More information such as the nature of binding, size and order of pagination may be required for rare works, and a series number for certain types of document such as patent specifications or atomic energy reports. The entry must also show the work's location in the library, its classification number or shelf number; and the number of copies and editions. Several types of catalogue are widely used: the best-known is the card index, but the great national libraries and a growing number of specialist libraries have printed their catalogues in book form, and these are valuable as bibliographical aids for other libraries.

When access to the bookshelves was restricted, there was no special demand for systematic arrangement, provided that good catalogues were maintained. Many libraries, especially in Germany and Austria, adopted—and still use—the system of arrangement by order of acquisition and by size. The pioneers of classification by subject were the booksellers and bibliographers, including the 16th-century Swiss doctor Konrad von Gesner and the group in the 18th century known as "the Paris booksellers." The introduction of unrestricted or "open" access into college and public libraries led to a need for detailed subject classification. The Library of Congress began to publish in 1902 the schedules of its own system, which has since been adopted by many academic libraries in English-speaking countries. The pioneer Melvil Dewey produced his decimal classification for Amherst college in 1872, and its widespread adoption elsewhere, particularly in English-speaking countries, has led to many new editions. Partly in response to demand for quick, agreed development in rapidly expanding branches of knowledge (*e.g.,* physics, modern history and politics) and for classifying highly specialized material (*e.g.,* reports and articles in periodicals), the universal decimal classification was internationally developed from the Dewey classification. The U.D.C. is available in a number of languages. The Indian librarian S. R. Ranganathan was the originator of a technique of subject analysis into "facets" and "phases" (the Colon classification), which had considerable success in India, and inspired much thought and research into the theory of classification and indexing.

2. Documentation.—The vast increase in publication and dissemination of knowledge has raised problems of storage and use. Filming to save space is widespread and many newspapers and reports series can be bought on microfilm. The Technological University of Delft, Neth., has made popular the microfiche, a transparency the same size as an index card, for interlibrary lending; in conjunction with Telex transmission of requests this speeds up supply considerably. Fremont Rider's microcard, an opaque microfiche, has been used for publication as well as copying.

The most important material for documentation is the periodical. Research workers in the 17th century exchanged letters announcing their results, and these led to collections of articles published at regular intervals, containing small quantities of information. These two factors have led to new techniques for keeping track of information grouped in collections, as in a set of a periodical and not document by document. The scatter of articles on a given topic over a wide range of periodicals makes systematic scanning necessary, and detailed subject analysis and indexing.

Attention has also been turned toward the use of high-speed machines of the punched card and computer types for scanning large indexes and extracting information relevant to an inquiry. These can also be used for printing, and eventually they may enable more libraries to return to the practice of printing their catalogues and so contributing to improving subject bibliography.

(D. J. Fo.)

C. Special Libraries

The expansion of research activity, particularly in science and technology, has led to a phenomenal increase in scientific literature. Publication on an ever-expanding scale of the results of research and details of new materials and processes has made it impossible for the individual to keep abreast and has made it a prime concern of technical libraries to provide the published results of recent advances. Therefore periodical articles are normally more important to them than books since the information they contain is more up-to-date. In some fields such as aerospace the research report is more valuable than the periodical. Patents, standard specifications, preprints, trade catalogues and technical press handouts form a substantial part of the stock. Some libraries collect films, tape recordings, slides and other audio-visual material. The information must be produced as quickly as possible and extensive and detailed subject indexes are maintained; new techniques of subject analysis have been evolved, some of which use special equipment such as punched cards and computers. Most of these libraries not only collect material and organize it for use but also disseminate information and provide translating and document-copying services. A few libraries have specialized entirely in particular types of material, such as the National Film archive, London, and the Phonothèque Nationale, Paris.

In countries where scientific research is highly centralized, scientific libraries are often subject to central control, and contribute to centrally published abstract journals. In the Soviet Union the Institute for Scientific Information publishes journals of abstracts (13 publications) in collaboration with a large number of scientific institutes. A similar system exists in the German Democratic Republic. In France a single central organization, the Centre National de la Recherche Scientifique, covers a whole range of scientific subjects in its *Bulletin Signalétique,* based on the work of its own library. In some organizations, such as the Centre Européen de Recherche Nucléaire, Geneva, the library is a section of an information department which, besides being responsible for disseminating specialized information, may produce the organization's publications.

Many learned and professional societies have had libraries since their foundation. They exist primarily to help members of the

society to study a particular subject. Some of these societies have historical collections of early works in their field, and their comprehensiveness is one of their most important characteristics. Some societies maintain unpublished indexes of articles in periodicals for the use of their members. Two of the world's best abstracting and indexing services—*Chemical Abstracts*, published by the American Chemical society, and the *Engineering Index*, issued by the Engineering Societies' library in New York—are based on libraries of this kind, though this is the exception, not the rule. Unfortunately the practice of publishing printed catalogues of society libraries has almost come to an end, though the catalogue of the British Drama league is among those still being produced. Some professional society libraries concerned with more recently developed fields, such as the Commission Générale d'Organisation Scientifique, Paris, offer a documentation service similar to those of research associations, to be described later.

Some special libraries are in universities attached to departments or special institutes. Most of them meet the needs of both teaching and research but some institute libraries, such as that of the Institute of Historical Research of the University of London, serve the needs of research workers only. In a few cases, as at the University of Moscow, the main university library is highly departmentalized and functions virtually as a series of special libraries. Some of these special university libraries maintain specialized indexes, such as the site index of the library of the Institute of Archaeology of the University of London and the monumental Index of Christian Art of the department of art and archaeology, Princeton university, Princeton, N.J. A few of these special libraries in universities have attained the status of national libraries, a good example being the British Library of Political and Economic Science at the London School of Economics which issues a printed catalogue, *A London Bibliography of the Social Sciences*, a bibliographical tool of the highest order.

Libraries of government departments often contain valuable historical material as well as current literature, and a few government departments maintain important bibliographical services, such as the *Bibliography of Agriculture* published by the U.S. department of agriculture and the *Index Aeronauticus* issued by the British ministry of aviation. Some of these libraries are open to the public and a few have the status of national libraries—the Armed Forces Medical library, Washington, D.C., became the National Library of Medicine in 1956, and the patent office library, London, was to form the nucleus of a new National Reference Library of Science and Invention in the 1960s. International organizations such as the United Nations and its specialized agency the International Labour organization have libraries similar to parliamentary libraries, though wider in scope.

Libraries working in support of scientific research and developments are found in various organizations. Some are departments of research associations that conduct co-operative research with the financial support of their member firms and the government. Their library and information services are available to their own research staffs and to member firms. Their bulletins, *e.g.*; the *Instrument Abstracts* of the British Scientific Instrument Research association, are often the most significant abstracting journals in their field. Other co-operative industrial organizations, although not directly concerned with research, run similar information services. In the United Kingdom, for example, the Zinc and Lead Development associations possess a joint library which compiles two abstracting journals, *Zinc Abstracts* and *Lead Abstracts*. In some sections of industry the U.K. government has set up its own research stations controlled by the department of scientific and industrial research. Among these is the Road Research laboratory which issues *Road Abstracts*. (L. Wi.)

D. Services to Readers

Assistance to readers has developed in two main ways: the extension of library service to every part of the community and the provision of advice on what to read and where to find information. As a first step toward extension, public libraries established branches in outlying areas, university libraries authorized departmental collections and special libraries set up subsidiaries in factories, research laboratories and branch offices. Library resources were later extended to shipping, prisons, schools, training establishments and lighthouses, and the remotest areas were reached by mobile libraries in many different forms—trucks, river steamers and even pack animals. Interchange systems were established enabling readers registered at one library to use their tickets at others while traveling on business or on vacation. Many countries developed interlibrary co-operation, enabling regional or national resources to be made available anywhere by means of interlibrary loans or photocopying services. In a number of countries, libraries have overcome their limited individual ability to meet specialist demands by voluntarily co-operating in forming comprehensive collections on particular subjects or groups of subjects, so that within a state or area the specialist reader might hope to find at least one library able to offer him all the material needed within his field. In many countries library services to patients in hospitals and to the blind were well established by the beginning of the 20th century; developments after World War II included book delivery and collection services for old and bedridden people, talking books for the blind, and large-print books for the partially blind. Increasingly generous public library expenditure stimulated the expansion of children's libraries and school library services. The need for special provision for adolescents, for the very young and for mentally retarded children was occupying the attention of librarians at mid-20th century.

The second form of assistance to readers comprised advice both on what to read and on where to find information. It has always existed—Cassiodorus guided his monks in their reading in the 6th century—but most methods used have been developed in the 20th century. As libraries grew in size and complexity it was clear that expert help was necessary. The specialized post of readers' advisor developed gradually from the time when every member of staff helped to recommend books and to compile bibliographies on special subjects. Reference library services always included the provision of information; but the extent to which their staffs will undertake research on behalf of readers has reached the stage where research workers may be presented with material ready marked at the relevant sections, and more extensive and expert investigation may be carried out for a fee. Notable developments have included the establishment of commercial and technical information services, and the perfection of techniques in quick-reference telephone inquiry work. But readers' services go still further: lectures, films and practical instruction on the use of books, libraries and bibliographies are provided in schools and colleges; book and library weeks, exhibitions, radio and television talks (some libraries have their own broadcasting stations), newspaper articles and advertisements, are used to help readers. Libraries publish annotated guides to reading, and professional associations issue a wide range of similar reading aids. Co-operation between librarians, publishers and booksellers has increased in recognition of their mutual interests, and in most countries they co-operate in producing the national bibliography and in other methods of helping the reader to obtain as quickly as possible the specific items that he needs. (Ro. L. C.)

E. Planning and Architecture

Up to the 19th century, the planning of libraries was a simple architectural problem, involving the storage of a limited number of books accessible to a few readers. The plan from the 17th century onward usually took the form of an alcoved and galleried room with accommodation for readers in the alcoves. Aesthetically the early libraries were most satisfying, notable examples being the Bodleian library at Oxford, evolved from Duke Humphrey's library, and the Vatican library in Rome. As the number of books increased with the invention of printing, and the number of readers with the spread of literacy, books and readers could not be encompassed in a single room, and the plan was evolved of a large reading rooms, containing some books for quick reference, with storage rooms grouped around and below. One of the best-known examples is Panizzi's circular reading room at the British museum (1852), which has accommodation for 430 readers. Books are requested after consultation of the catalogue, and are brought

from the bookstacks by messenger. The Library of Congress, Washington, has a similar plan.

The size of libraries continued to increase, and the lending of books further complicated the problem of quick access and adequate reading space. One solution was the "open stack," with reading areas interspersed, as at the Baker Memorial library at Dartmouth, Mass. (1928). A refinement of the "open stack," using modular construction based on a standard shelf length, enabled stack or reading areas to be created at will. Another solution was the use of the subject department, as at Cleveland Public library (1925), and Los Angeles Public library (1926), where the library, instead of being a single unit, is broken into departments according to subject, lending and reference books being shelved together. Catalogues are usually housed in a central hall, and a central issue desk controls the loans. The constant pressure for more compact storage space led to the introduction of the tower stack, either at the core or rear of the building. The steel frame of the tower stack provides the vertical support for bookcases, and each floor is planned to a maximum height of about eight feet. Maximum storage and economy is thus achieved, but modern fire regulations in some countries prevent full exploitation. Modern large libraries may use any or all of these principles. For maximum storage, sliding and swinging bookcase units are often used, with conveyer belts and booklifts for quick delivery. Where basement storage is used, access at several points is made, as in the American Memorial library in West Berlin (1952).

The development of the public library in the late 19th century, particularly in the United States and Europe, presented another set of problems, requiring provision not only for the student, but for lending of books in quantity from libraries near readers' homes. Early public libraries aped academic libraries in their furniture and fittings, and were planned as "closed libraries," where readers asked for books at a counter, but early in the 20th century readers gained access to the shelves. The almost universal division of public libraries into rooms for children, newspaper reading, lending and reference, imposed severe limitations on architects. By mid-20th century architects and librarians had broken away from such restrictions, and many colourful and informal small libraries were built in the United States and Europe. The idea of the "family library" based on a single-floor open plan has given a new opportunity, and is to be seen at its best in Denmark. In Scandinavia generally some striking architectural trends can be observed in large public libraries. In 1930, Alvar Aalto designed at Viipuri in Finland a new public library of striking design, with a "well" below ground level, and a gallery surrounding it at entrance level. This library was destroyed in World War II, but the same architect designed a library at Wolfsburg, Federal Republic of Germany (1962), with similar features. This original design gave rise to the "Frederiksberg" plan (from the library of that town in Denmark), in which the feature is a gallery running around the main library, with the space underneath enclosed for administration and shelving. This design has been widely followed in Scandinavia, and in a modified form in England at Holborn, London (1960), and Luton (1962).

The main requirements posed by the librarian to the architect have always been flexibility for changing needs and space for expansion. Modular construction, abandonment of natural light, partitioning and demountable steel shelving have helped the architect; and new technical achievements such as electric underfloor heating and air conditioning have been quickly put to use. Special arrangements have been devised to meet tropical and other severe climatic conditions. Nevertheless the constant increase in production of print tends to outstrip the most foresighted provision, and the use of microfilm and other miniaturization is only a partial solution. However lavishly new libraries are planned, provision for expansion must always be a consideration. (F. M. GA.)

F. Library Associations and Training

1. Associations.—The development of library services and the rapid growth of public libraries in Britain and the United States in the second half of the 19th century led to a natural desire of librarians to unite in the furtherance of their aims. The American Library association (A.L.A.) was born at a conference of librarians in Philadelphia in 1876, and the following year saw the establishment of the Library Association of the United Kingdom at the first international conference of librarians in London. The A.L.A. is the largest of the national library associations, with a membership in 1962 of more than 25,000. Its object is to promote library service and librarianship in the United States and throughout the world. It has an extensive publishing program and holds annual national conferences.

The Library Association of the United Kingdom, renamed the Library association (L.A.) in 1896, was granted a royal charter in 1898 "to unite all persons engaged or interested in library work; to promote the better administration of libraries and (*inter alia*) to hold examinations in librarianship and to issue certificates of efficiency." It is governed by an elected council. Total membership in 1962 was more than 14,500 (nearly 2,000 overseas), of whom 6,066 were chartered librarians, *i.e.*, fully qualified professional members. In 1962 the L.A. was reorganized and became fully professional. It publishes books and pamphlets, a *Year Book* and the official *Library Association Record*. Both the association and its subformations hold annual conferences.

Aslib (formerly the Association of Special Libraries and Information Bureaux) was formed in 1924 to cater primarily for technical and industrial libraries. Later its scope was widened to include other types of libraries both in the United Kingdom and overseas. Its membership is predominantly institutional.

In 1928 librarians in the Republic of Ireland set up the Library Association of Ireland. The older British Commonwealth countries all have national associations: Australia (1937), New Zealand (1933), Canada (1946), India (1933), Pakistan (1954), West Africa (1953). In France the Association des Bibliothécaires Français was formed in 1906 to promote library reform. The Federal Republic of Germany has the Verein Deutsche Bibliothekare (1900) for academic librarians and the Verein Deutsche Volksbibliothekare (1922) for public librarians. Belgium has several associations, the Association des Archivistes et Bibliothécaires (1907) being the oldest. Among others are the Association des Bibliothécaires Suisses (1897), the Associazione Italiana per le Biblioteche (1930) and the Spanish Asociación Nacional de Bibliotecarios, Archiveros y Arquéologos (1949). There are several associations in the Netherlands, Norway, Sweden, Denmark and Finland and at least one each in Austria, Cyprus, Czechoslovakia, Greece, Hungary, Israel, Japan, Lebanon, Poland, Rumania, Tunisia, Turkey, the U.S.S.R., the United Arab Republic and Yugoslavia.

2. Training and Status.—In Great Britain the L.A. is the recognized professional examining body. Training is undertaken at ten full-time schools of librarianship (one year for graduates, two years for nongraduates). There is also a postgraduate diploma course (one year) at the University of London school of librarianship and archives. In the Commonwealth of Nations there are university schools in Canada, Australia, New Zealand, India, Pakistan, Ghana, Nigeria and Malaysia. There are also several university schools in South Africa.

In the United States there are one- and two-year postgraduate courses at university library schools. These and the schools in Canada are accredited by the A.L.A.

In France there is a school at the Bibliothèque Nationale, and the École Nationale des Chartes issues a diploma in archive work. In Germany and Sweden learned librarians and public librarians are trained in separate schools. Switzerland has a library school at Geneva. In the Netherlands training is controlled by the Central Society for Public Libraries, which holds a four-year course. Norway, Denmark and Finland each have a library school and professional certification.

The U.S.S.R. has a highly developed training system of government-controlled schools. In Poland, examinations are controlled by the ministry of education. There are library schools in Czechoslovakia and Hungary, where qualifications are regulated by law. Turkey, Israel, Iran, Thailand, the United Arab Republic, Senegal and Japan have library schools. In Latin America there

are schools in Brazil, Colombia, Cuba, Mexico, Peru, Uruguay and Venezuela. Successive regional seminars on library development held by UNESCO in Asia, Africa and Latin America have consistently urged governments to increase training facilities.

The status of librarians varies in different countries. An inquiry undertaken by the International Federation of Library Associations in 1958–59 indicated that in Europe it was highest in Great Britain and Sweden, where there is reasonable parity with the teaching profession at all levels. In the U.S.S.R. it is high and in postwar years it has risen appreciably in the United States and Canada. Status is undoubtedly a reflection of the value placed on library services by the public at large and will increase wherever those values rise. (D. D. H.)

G. International Organizations

The International Library committee was established in 1927. On the foundation of the International Federation of Library Associations (IFLA), in 1929, this committee continued to exist as the council of IFLA, being composed of one delegate from each member association. It met regularly until 1939 and from 1948. International library congresses were held in Rome (1929), Madrid (1935) and Brussels (1955). An international committee meeting is held in a different country each year. The work of IFLA included an agreement on an international interlibrary loan system, arrangements concerning the limitation of prices of periodicals, and co-operation with UNESCO and other international organizations in practical matters of international librarianship. Independent regional library organizations include the Asian Federation of Library Associations (1957) and the Inter-American Bibliographical and Library association (1930).

The International Federation for Documentation (FID) was founded in 1895 as the Institut International de Bibliographie. Its chief project was a universal card catalogue of the world's great libraries, of which about 14,500,000 cards had been compiled in Brussels by 1934; little progress, however, has been made since then. The Institut became a federation in 1938; after its first postwar congress (16th, Paris, 1946) it devoted itself to problems of documentation, classification (especially the universal decimal classification), document reproduction, information services, and, later, mechanical and electronic storage and retrieval of information. In this specialized field, the International Federation for Information Processing (IFIP) was founded in 1959; it held a congress in Munich in 1962. IFLA and FID co-operate closely with the International Organization for Standardization (ISO) in promoting the international standardization of bibliographical references, abbreviations of titles of periodicals, transliteration and other technical matters.

Special international associations include those of agricultural librarians and documentalists, law libraries and music libraries, and the International Council on Archives. The medical libraries have no association, but two congresses on medical librarianship (London, 1953; Washington, 1963) gave medical librarians opportunities of discussing common problems.

The work begun by the International Institute of Intellectual Co-operation set up by the League of Nations was in part revived by UNESCO after World War II. UNESCO began with four main objects: improvement of bibliographical services; promotion of public libraries; promotion of international conventions facilitating the free flow of all forms of information; and development of the international exchange of publications. Immediate tasks of postwar reconstruction included the restocking of war-damaged libraries and the establishment of a "coupon" scheme enabling libraries to buy foreign material despite currency restrictions. Although the program developed to suit changing conditions, changes flowed logically from one or more of the original aims. Thus, the improvement of bibliographical services led to the establishment of national libraries and bibliographical centres; development of bibliography and documentation in education, the natural and social sciences and specialized subject fields; co-operation with ISO and FID in international bibliographical standardization; encouragement of national copyright laws; and improvements in cataloguing practice. The International Conference on Cataloguing Principles (Paris, 1961), held at UNESCO under the auspices of IFLA with financial support from the Council on Library Resources, Washington, brought together representatives of more than 60 library associations and international organizations who achieved remarkable progress toward an internationally agreed cataloguing code. Public library development, promoted partly by means of regional seminars and partly through "model" or "pilot" public libraries established by UNESCO and national governments (of which the first was set up in Delhi in 1951), led to the encouragement of national library legislation and numerous advisory missions on library services. Other types of library necessary to underdeveloped or newly independent states were not forgotten; UNESCO assisted in establishing a number of national scientific, technical and educational documentation centres, and fostered the study of such special topics as terminology and translation. UNESCO's work is carried out chiefly by direct action; by aid to member states or groups of states; by co-operation with the United Nations and its other agencies, IFLA, FID and other international organizations; and by subventions to organizations, associations and institutions to carry out particular tasks. Methods adopted include the sponsoring of international conferences and meetings of experts; the convening of regional seminars and study groups; the provision of experts and advisors; the establishment of "pilot projects"; the promotion of international agreements; and the collection and dissemination of information, including issue or sponsorship of publications.

The Council on Library Resources, established by the Ford foundation in 1956, gave financial support to a number of international projects—notably the International Conference on Cataloguing Principles already referred to, and the International Association of Music Libraries for the production of a new international inventory of music sources. (F. L. K.)

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International Organizations: L. Carnovsky (ed.), *International Aspects of Librarianship* (1954); International Federation of Library Associations, *Actes du comité international des bibliothèques* (1930–); *Documentatio universalis* (1895–1932); succeeded by *Revue (internationale) de documentation* (1934–); *Libri* (1950–); *UNESCO Bulletin for Libraries* (1947–).

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LIBRETTO, the text that is set to music by the composer of an opera or operetta, whether printed separately or surviving only in the score; the term is less commonly used of works not intended for the stage. The word is a diminutive of the Italian *libro* ("book") and derives from the practice of printing the texts of Venetian operas (from 1637 onward) in a miniature format (about three-quarters the size of a modern miniature score). It originally applied simply to a published text of this kind but by a natural transference acquired the broader meaning defined above. In the course of the 19th century it became an international term, except that the French preferred their own diminutive, *livret.* In Germany a printed libretto is normally called a *Textbuch.* A libretto may be in verse or in prose; it may be specially designed for a particular composer or provide raw material for several; it may be wholly original or an adaptation of an existing play or novel; it may even, in certain cases, be the actual text of a play, either in the original language or in translation.

Origins in Early Opera.—The earliest operas, beginning in

Italy with Ottavio Rinuccini's *Dafne* (1597), set by Jacopo Peri, were court entertainments and the printing of the words was intended more as a commemoration of the festivity than as a convenience for the aristocratic audience. Once opera became a public spectacle, in Venice, 1637, the printed libretto served a very practical purpose and was often used by the audience to follow the performance—a practice that was made easier by the fact that the auditorium was not plunged into darkness when the curtain rose. There was a further difference in style. The earliest librettists regarded their works as poetic dramas, which might offer occasional opportunities for lyricism and for choral episodes but which for the most part the composer was expected to set with a faithful regard for the accents, as well as the mood, of the text. The same attitude was observed in France when opera was established on a permanent footing by J. B. Lully and his librettist, P. Quinault, in 1673. Lully's operas, which included a prologue in honour of Louis XIV, were described as *tragédies mises en musique*. In Venetian opera great stress was laid on the dramatic spectacle, but the growing tendency toward a lyrical treatment of a substantial part of the text affected the relationship between the librettist and the composer. The composer was no longer merely providing music for a poetic drama; he was using the libretto as the material for creating something new. On the other hand, the librettist had the satisfaction of seeing his name in print, often without any reference to the composer, and he could count on a steady remuneration from the sale of copies, whereas the complete score of an opera was rarely published. Since operas were often modified for revivals, fresh librettos had to be printed, and this provided the author with an additional source of income. For the modern historian printed librettos are a valuable source of information, since they generally give full details about the occasion for which they were published, the performers who took part and the various scenes in the course of the work—details that are rarely found in the composer's scores.

Emergence of Historical Subjects and Dramatic Style.—The early 17th-century librettists had developed their material out of the pastoral drama of the 16th century, which dealt with mythological subjects. It was no accident that Orpheus, representing the power of song, was the subject of Rinuccini's *Euridice* (1600), set by Peri (also by G. Caccini), and of Alessandro Striggio's *Orfeo* (1607), set by Claudio Monteverdi. The Venetian opera public, however, did not share this enthusiasm for classical mythology. Hence the appearance of G. F. Busenello's *L'Incoronazione di Poppea* (1642), set by Monteverdi, which deals with incidents in the life of Nero. From this time historical subjects became increasingly popular in Italy, and no one worried about the superimposition of details for which there was no authority. Such subjects could be treated in a way that would appeal both to the man in the street and to princely patrons. The aristocratic appeal was important in a good many opera centres that, unlike Venice or Hamburg, were largely dependent on royal favour. The public could enjoy the love intrigues that became an indispensable feature of the text, while authority was flattered by the representation of rulers remarkable for their magnanimity: the best-known example is Pietro Metastasio's *La clemenza di Tito,* which was set to music by some 20 composers, beginning with Antonio Caldara in 1734 and ending with Bernardo Ottani in 1798 (Mozart's setting of an adaptation of the text dates from 1791).

This flattery was practised particularly in Vienna, where Apostolo Zeno (1668–1750) was poet to the imperial court from 1718 to 1729, followed by Metastasio (1698–1782) from 1730 till his death. Zeno aimed at raising the standard of the contemporary libretto by excluding comic characters from serious opera and by creating a poetic drama nearer to the style of French tragedy. It was he who established one of the most curious conventions of late baroque opera, according to which a character who has sung an aria immediately leaves the stage. Metastasio had similar ideals and cultivated an elevated style that made his librettos equally suitable for performance as spoken drama. He also had the advantage of being a practised musician and in his arias adopted a relatively simple style that appealed to a very large number of composers. There was, however, a strong feeling among many 18th-century critics that opera of this kind was unnatural and even, in the case of the *da capo* aria, accepted as a convention, absurd. The pursuit of a more dramatic style can be observed in the operas of Niccolò Jommelli and Tommaso Traetta but is most noticeable in the works of Gluck. When J. A. Hasse was about to write *Attilio Regolo* (1750), Metastasio sent him a good deal of detailed advice; but he had not written the libretto expressly for him. Raniero de'Calzabigi (1714–95) also advised Gluck on the setting of *Orfeo ed Euridice* (1762); but in this case he had the composer in mind when he wrote the libretto, and the two men worked together in close collaboration. It is noticeable that in this work Calzabigi reverted to Greek mythology, which had for long been the staple fare of French opera. Several of Gluck's later operas are on subjects drawn from this source, but there was a growing tendency in the late 18th century to turn aside from material so remote from the contemporary world. Comic opera had always dealt with scenes from everyday life, even if they were treated with a certain artificiality. These now became the background for works that were largely serious in intention, even though in France they still retained the name of *opéra comique* (*q.v.*), on account of the use of dialogue. The heroism of ordinary men and women and resistance to tyranny were subjects that acquired an even stronger significance after the outbreak of the French Revolution and inspired Beethoven to write *Fidelio* (1805).

19th-Century Influences.—Nineteenth-century romanticism encouraged the setting of texts dealing with medieval history or legends of the supernatural, *e.g.,* Helmina von Chézy's *Euryanthe* (1823) and Friedrich Kind's *Der Freischütz* (1821), both set by Weber; and even in Italy, which was virtually untouched by romanticism, librettos were concocted from the works of Schiller and Sir Walter Scott. Meanwhile in France "historical" subjects were popular in *grand opéra,* for example in the librettos written for Meyerbeer by Augustin Eugène Scribe (1791–1861). Composers were often as critical of their librettists as Mozart had been and just as often accepted texts that were devoid of any literary quality. It was partly dissatisfaction with the ordinary librettos of his time and partly egotism that decided Wagner to write his own texts, as Berlioz did in the case of *Les Troyens* (1859) and *Béatrice et Bénédict* (1862). Comparatively few later composers followed their example, and not always with the happiest results. The ideal solution is for librettist and composer to work together, as Calzabigi and Gluck did. Examples of such close collaboration are Arrigo Boito and Verdi (*Otello,* 1887, and *Falstaff,* 1893); Hugo von Hofmannsthal and Richard Strauss (*Elektra,* 1909; *Der Rosenkavalier,* 1911; *Ariadne auf Naxos,* first version 1912, second version 1916; *Die Frau ohne Schatten,* 1919; *Die ägyptische Helena,* 1928; *Arabella,* produced 1933, though Strauss collaborated with Hofmannsthal before his death in 1929); Montagu Slater and Benjamin Britten (*Peter Grimes,* 1945); and W. H. Auden, Chester Kallmann and Igor Stravinsky (*The Rake's Progress,* 1951). In such cases temperamental differences between librettist and composer are less important than a common desire to create a work of art. The setting of existing plays demands particular care from the composer in abridgment and, if necessary, adaptation. Successful examples of such treatment are rare: Debussy's setting of Maeterlinck's *Pelléas et Mélisande* (1902) and Strauss's of a German translation of Oscar Wilde's *Salomé* (1905) are exceptions to the general rule that music does not readily accommodate itself to a text designed to be spoken.

Modern Status.—Since the latter part of the 19th century there has been an increasing demand for librettos of a high literary quality. This has affected the way in which operas are described on the title page. Berlioz described his own libretto for *Les Troyens* as a *poème lyrique*; *Der Rosenkavalier* is entitled "Komödie für Musik von Hugo von Hofmannsthal: Musik von Richard Strauss." This does not mean that the wheel has come full circle from the early 17th century, but it does indicate a more serious view of the librettist's function than was accepted by many 19th-century composers. At the same time the growth of realism in spoken drama has had a corresponding influence on opera, which, from the time of Bizet's *Carmen* (1875), based on

Prosper Mérimée's novel, has frequently represented neurotic situations and scenes of savage violence. Puccini's *Tosca* (1900) and Alban Berg's *Wozzeck* (1925), on a libretto that was an abridged form of the play by G. Büchner, belong to this category. The success of Gian Carlo Menotti's operas, notably *The Medium* (1946) and *The Consul* (1950), was largely due to the fact that the librettos were the work of the composer.

The librettist not only has to see that his text, whether verse or prose, is worth setting; he also has to ensure that it should be heard as clearly as the composer will allow. Elaborate literary artifices, particularly inversions, have no place in a libretto, because they present the audience with unnecessary problems. The English and German languages have a wealth of monosyllables, which are much easier to catch in the theatre than more elaborate alternatives. Repetitions are a further aid to understanding, and so are phrases that have associations for the listener. These principles apply equally to translations, which can often be made more effective than the original text. It goes without saying that a librettist must have a sense of the stage; but he needs to realize that music moves at a slower pace than the spoken word, and also that the orchestra can suggest emotions that would need to be made explicit in a play. A plain, simple language is the most appropriate for music; colloquialisms, except in comic opera, are nearly always out of place and tend to destroy the illusion that opera aims at creating. The composition of an opera is a major undertaking; but the librettist's task can be almost equally severe.

(JA. A. W.)

LIBREVILLE, capital of Gabon Republic in west Africa. The town lies about 25 mi. N. of the equator, on the north (right) bank of the Gabon river estuary, which forms a large roadstead for shipping. Pop. (1961) 29,603, including about 1,600 Europeans.

Libreville occupies rising ground surrounding the former European quarter, which is rapidly becoming modernized but preserves traces of the French trading depot established in 1843. This quarter contains the principal administrative and commercial buildings, but it still has a number of wooden houses built on piles and surrounded by covered balconies. The extensions on the outskirts are of more modern construction. Most of the African population occupies small groups of dwellings locally called *villages,* those of Glass upstream and Louis downstream being connected by those of Montagne-Sainte, Mont Bouët and Nombakélé, which form a belt around the centre of the town. The African inhabitants are of mixed origin but consist mainly of Mpongwe and Fang. Their settlements have preserved a rural appearance, with traditional huts of earth (or, more rarely, of concrete) amid palm trees.

Libreville, apart from being the centre of government, has a considerable local trade and exports timber. Its land communications with the hinterland are poor, however, and as a port and economic centre it has been outstripped by Port-Gentil. International and domestic air services call at Libreville airport, 7 mi. from the town.

Following the establishment of a French fort and trading post on the right bank of the estuary in 1843, a settlement for freed slaves was founded alongside the Mpongwe villages there, and the town received the name Libreville in 1848. (J. D.)

LIBYA (AL MAMLAKAH AL LIBIYAH AL MUTTAHIDAH), a kingdom of north Africa, bounded north by the Mediterranean, east by Egypt, southeast by the Sudan, south by the republics of Chad and Niger and west and northwest by Algeria and Tunisia. Total area: 679,358 sq.mi. Long understood as a geographical expression for what is now the kingdom, Libya became the official name of the Italian colony formed on Jan. 1, 1934, by the union of Cyrenaica and Tripolitania, including Fezzan (*qq.v.*). The colony was incorporated into the metropolitan kingdom of Italy on Jan. 9, 1939. It was created an independent, sovereign, federal kingdom on Dec. 24, 1951. On April 27, 1963, it became a unitary state. (See *Administration and Social Conditions* below.)

Physical Geography.—Libya is a part of the great plateau of Africa, and thus has closer geographical affinities with Egypt than with Algeria, Tunisia and Morocco. The main geological element is the Gondwana Basement complex, a mass of Pre-Cambrian schists and granites upon which occur fairly regular later sedimentary and aeolian deposits, chiefly of Jurassic, Eocene, Miocene and Quaternary age. In the extreme south and east, the Basement rocks appear as the Tibesti and associated mountains, which reach 10,000 ft. In the north, the Basement has been downwarped and dislocated, giving rise to faulting and slight folding. Vulcanicity has occurred in the Jabal (mountain district) of Tripolitania, and farther south and east.

The main geographical units of Libya are (1) the Gefara, a zone of subsidence lying between the Mediterranean and the fault scarps of the Tripolitanian Jabal; though small in area (about 10,000 sq.mi.) it contains most of the population of Libya and the largest city; (2) Al Jabal al Akhdar of Cyrenaica with associated scarplands, structurally a shallow anticline; (3) the remainder of the country, a low plateau rising gradually and irregularly from sea level in the north and extending south deep into the Sahara (*q.v.*). The plateau surface is diversified by numerous artesian basins and hollows, some of which have oasis settlements, and by extensive sand deposits. No perennial rivers exist but there is extensive underground percolation of water. Soil is generally scanty, with occasional deeper patches in the north; alkalinity is a danger in some farming areas.

Climate.—Libya has a modified Saharan climate, characterized by a wide variation of weather conditions. The summers are hot (especially inland) and rainless; the winters are generally mild with some cold spells and sporadic torrential downpours in the north, particularly over the hills. About two years in ten rainfall fails; and another handicap is the *ghiblis,* hot scorching winds from the south that destroy crops.

Vegetation.—The vegetation varies from place to place and according to climatic variations. In Tripolitania it consists of scrub or semidesert plants; this has however been somewhat modified by the introduction of eucalyptus and date palms. In Cyrenaica, vegetation varies according to the soil cover. Over the coastal plain, garrigue is widespread, and salt marshes limit the growth of typical Mediterranean flora. Inland in northwestern Cyrenaica juniper, lentisk trees, pines and other evergreens give dense patches of woodland, the trees rarely exceeding eight feet in height. In the region of Al Jabal al Akhdar the woodland is replaced by garrigue and grassland; steppe vegetation with juniper and lotus is characteristic of the damper valleys south of the crest line. Ultimately this is replaced by true desert vegetation.

Animal Life.—The main types of animal life are desert rodents (jerboa, etc.), a few small carnivores (hyena, wildcat, fox), many reptiles including lizards and a few snakes, of which the poisonous species are chiefly adders and kraits. A conspicuous feature is the passage of numerous migrating birds in spring and autumn.

The People.—The total population of Libya at the 1954 census was 1,091,830; (1962 est.) 1,240,000; the majority live in Tripolitania (about 800,000), followed by Cyrenaica (310,000) and Fezzan (54,000). The earlier inhabitants of Libya were Berber (*q.v.*); but massive colonization in the 9th–11th centuries A.D. brought in Arabic-speaking Semites from farther east, who now form the great majority of the population, and are Sunni Muslims. There are only a few Berber-speaking districts; *e.g.,* round Zuwarah (Zuara), at Aujila (Awjilah) and in the Tripolitania Jabal. The towns of Fezzan, like Ghat and Ghudamis (Gadames), have a Berber form and peoples of mixed blood and Negro traditions. Main present-day divisions are between urban and rural populations, and between nomadic and settled. There are now about 200,000 nomads, including Bedouin (*q.v.*), chiefly in Cyrenaica; but, as elsewhere in the middle east, a feature of the two decades after World War II was the rapid growth of towns, which because of their expanding contacts and activities now attract both settled rural and nomad groups.

Besides the indigenous Arabs, there are minorities of Italians (in Tripolitania only, and declining), Greeks and Maltese—each group less than 20,000. Up to 1948–50 there were significant numbers of oriental Jews living as craftsmen, artisans and merchants in the towns (and sometimes as troglodytes), but most have emigrated to Israel.

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VIEW OF THE BAYSIDE PROMENADE IN BENGASI

Arabic is the official language and Islam the state religion. The religious and spiritual unity of the country was achieved by the Senusi (*q.v.*), a strict Muslim religious brotherhood founded in 1843 in the heart of Cyrenaica.

The main towns are: Tripoli (Tarabulus), Bengasi (Banghazi), Derna (Darnah), Barce (Al Marj), Tobruk (Tubruq) (*qq.v.*), Sebha (Sabhah), Zuara (Zuwarah), Agedabia (Ajdabiyah) and Misurata (Misratah). (J. H. Se.; W. B. Fr.)

Archaeology.—Libya has many antiquities, prehistoric, Greek, Roman, Byzantine and Islamic. During the Italian regime (1913–42) systematic excavation was begun and large areas of Leptis, Sabratha, Cyrene, Apollonia and Ptolemais were uncovered. Work has since been continued by the Libyan department of antiquities and by visiting foreign expeditions. Antiquities are under the care of the undersecretary of tourism and antiquities, attached to the ministry of national economy; there are provincial departments and museums at Tripoli, Cyrene (Shahhat) and Sebha containing many fine sculptures, mosaics and numerous inscriptions. For Libyan prehistory, *see* Africa: *Archaeology,* subsections *North Africa* and *Carthaginian and Classical.*

In Tripolitania whole quarters of the Romano-Punic cities of Leptis Magna (*see* Leptis) and Sabratha (Sabratah), with their public monuments of pagan and Christian times, have been excavated. The ancient city of Oea (Tripoli) is now covered by modern buildings, but a triumphal arch of Marcus Aurelius remains standing. The hinterland is rich in Roman remains, which continue southward through a frontier zone nearly 100 mi. in depth, studded with fortified farms, tombs and water-conservation works. On the frontier at Bu Ngem (Bu Nujaym) and Gheria el Gharbia (Al Qaryah al Gharbiyah) are early 3rd-century forts guarding the ancient caravan routes to the south; evidence from inscriptions shows that there was another fort at the oasis of Ghudamis. Excavation begun in 1963 at Medina Sultan, the medieval town of Sort (Surt), on the Syrtic coast (Gulf of Sidra), has revealed a mosque and other buildings of the Fatimid period.

In Cyrenaica classical Greek archaeology is represented in the remains of Cyrene (*q.v.*) and Teuchira (Tukrah); excavation has also been carried out on the site of Euhesperides (6th century B.C.), located by air photography beside modern Bengasi. The town plan and walls of Ptolemais (Tulmaythah) are Hellenistic. There are important Roman and Byzantine remains, often covering earlier structures, at Cyrene, Apollonia (Marsa Susah), Teuchira and Ptolemais. At Apollonia details of the ancient harbour, including the entrance through a mole, the warehouses and the slipways, have been studied by underwater exploration. Inland sites are gradually being investigated, such as the important shrine of Aesculapius near Beda (Zawiyat al Bayda), and a Justinianic church with outstanding mosaics at Gasr Lebia. The remains of many fortified posts show the care taken to protect the fertile highlands from marauders. Some of these can be dated as early as the first century A.D., but the most substantial are Byzantine. Among early Islamic sites is the 10th-century Fatimid mosque at Agedabia (Ajdabiyah).

Archaeological work in Fezzan has been largely concerned with the study of paleolithic artifacts and of the prehistoric rock engravings and paintings of the region. In the 1930s and again in the 1960s excavations were carried out in graves and settlements in the Wadi al Ajal near Jerma (Jarmah), the ancient capital of the Garamantes, where a mausoleum of Roman type has long been known. Much of interest was revealed, including evidence of trade with the Roman world. (O. P. F. B.)

History.—The term Libya as used by the ancient Greeks referred generally to north Africa comprising the southern littoral of the Mediterranean from the Nile delta to the Atlantic, and also its desert hinterland and oases. The name derives from a single tribe established in eastern Cyrenaica early in the 2nd millennium B.C. There is reason to think that the territory as a whole showed a considerable degree of uniformity of race and culture. Prehistoric rock engravings in Algeria and Tripolitania datable roughly to the 2nd and 3rd millennia B.C. show distinctive features of headdress, clothing, ornaments and religious practices that can be recognized on Egyptian monuments and works of art.

By the Middle Egyptian Kingdom personal and tribal names, epithets, etc., reveal that in the east, at least, these people spoke a Hamitic language akin to the Berber dialects now found from Siwah in Egypt to Morocco. Their physical type was clearly Mediterranean and contrasted with the Negroid races inhabiting the desert to the south. Their way of life was that of shepherd nomads loosely organized into tribes and confederations. From the Old Kingdom onward the Libyans constantly encroached on the settled populations of the western delta, and this tendency seems to have been dramatically accentuated during the great period of migration in the eastern Mediterranean region in the latter part of the 2nd millennium B.C. At this time they were joined by culturally more advanced seafaring peoples from the north and west in a series of attacks on the delta. Contemporary Egyptian records give vivid glimpses of pitched battles between them and the Egyptians under Seti I, Ramses II, Merneptah and Ramses III.

During the New Kingdom a Libyan dynasty, established by Sheshonk I about 945 B.C., actually ruled Egypt.

Libya was colonized by the Greeks (see *Archaeology* above) and eventually passed under Roman control (*see* Africa, Roman Province of). It subsequently came under Muslim-Arab domination and during the confused medieval period acknowledged an uncertain Ottoman suzerainty.

For the subsequent history of the area up to 1912 *see* Tripolitania; Cyrenaica; Fezzan. (C. B. M. McB.)

Modern Libya.—The Italo-Turkish War (*q.v.*) of 1911–12 began a process that resulted in the emergence of the modern kingdom of Libya. When that war ended with the treaty of Ouchy in Oct. 1912, the Turkish sultan granted the Libyans "full and entire autonomy" retaining the right as caliph to appoint a *naib* (governor). The Libyans fought on against the Italians but by the spring of 1914 the whole country, including Fezzan, was occupied. Italian entry into World War I and the renewed direct conflict with Turkey resulted in the Italians withdrawing to the coastal towns. After the war, liberal governments in Italy sought an accommodation by which Tripolitania and Cyrenaica would have local parliaments under Italian governors. The Libyans, who had first declared a republic, offered the throne to the Senusi leader Mohammed Idris (later Idris I).

The governorship of Count Giuseppe Volpi (from July 1921) and the rise of fascism, however, led to stronger Italian action. With Gen. Rodolfo Graziani as military commander, northern Tripolitania was subdued by 1923 and Fezzan by 1929. In 1932 Graziani, by a ruthless use of concentration camps, reduced Cyrenaica also; and in 1934 the two provinces of Tripolitania and Cyrenaica were formally united to form the colony of Libya (Libia). Fezzan was administered as part of the military terri-

tory of South Tripolitania. There followed several years of colonization and of brilliant though uneconomic development of cities, roads and water supplies. During 1938–39 more than 30,000 Italian peasants were settled in the Gefara plain of Tripoli and Al Jabal al Akhdar in Cyrenaica. The administration was almost exclusively Italian. The colony of Libya was incorporated into the metropolitan kingdom of Italy in 1939.

Italy's entry into World War II resulted in the evacuation of the entire Italian population from Cyrenaica in 1942 and (after a series of seesaw battles) the expulsion of the Italo-German forces from all Libya, which had become a major theatre of war, in the spring of 1943. A year earlier the British government in response to help given by the Cyrenaicans, and the formation of a Libyan Arab force to cooperate with the British army, undertook that the Cyrenaicans should not fall under Italian domination after the war. Administration was carried on by British military governors in Cyrenaica and Tripolitania; meanwhile the French who had occupied Fezzan administered that territory.

At the end of the war the future of Libya was referred to the United Nations. In Nov. 1949 it was decided that a united Libya should become independent not later than Nov. 1, 1952. A Dutch high commissioner for the UN, Adriaan Pelt, arrived in Tripoli in Jan. 1950 and a Libyan assembly representing Tripolitania, Cyrenaica and Fezzan proceeded to draft a federal constitution for a United Kingdom of Libya. Independence was declared on Dec. 24, 1951, by King Idris I (*q.v.*).

General elections in 1956 and 1960 were not contested on party lines. Under governments dependent on the will of the king more than on that of parliament the country made peaceful though slow progress. The budget was balanced by sums received from Great Britain and the United States in return for the right to maintain military and air bases (treaty with Great Britain, 1953; agreement with the United States, 1954). In March 1953 Libya joined the Arab league, generally siding with its more moderate elements. Oil was discovered in Tripolitania and Cyrenaica in 1959, transforming the economy of the country (see *Economy*, below).

As from April 27, 1963, the federal constitution of Libya and the provincial system were abolished. Libya was proclaimed a unitary state. (For further details see *Administration and Social Conditions* below.) (N. BA.)

In 1964 the Libyan government announced that it would abrogate the Anglo-Libyan treaty of 1953 and the agreement with the U.S. of 1954. Negotiations took place, and the first stage of the evacuation of British forces from Libya was completed by March 31, 1966. No date was fixed for the evacuation of the U.S. Wheelus Field air base near Tripoli. (X.)

Administration and Social Conditions.—Until 1963 the kingdom of Libya was a federal state consisting of three theoretically autonomous provinces each with its own capital: Tripolitania (capital Tripoli), Cyrenaica (Bengasi) and Fezzan (Sebha). The federal capital alternated between Tripoli and Bengasi. Each province had its own government and there was a two-chamber federal parliament. On April 27, 1963, King Idris announced the unanimous approval by the federal parliament of a decree amending the constitution, whereby Libya became a unitary state. The provinces were abolished and the central government was entrusted with the administration of all internal as well as external affairs. The kingdom was thereupon divided into ten administrative units (*muhafazat*), each headed by a *muhafiz* ("governor") who was appointed by the cabinet and assisted by a local advisory council.

Living Conditions.—Poverty in resources, destruction from war, centuries of foreign rule and the great lack of highly educated personnel meant that the functions of government had to be rapidly created from rudimentary or nonexistent bases in 1951. The extent of nomadism and illiteracy makes administration difficult; hence taxation is mainly indirect, with a number of fiscal monopolies, especially regarding the import of foreign consumer goods. Because of difficult geographical conditions and the absence of mineral resources, living standards for a majority of the Arabs have in the past approached barest subsistence level, on average distinctly below those of most neighbouring Arab countries. In the southern oases, dates and a little millet formed the only food for several weeks each year, and drought resulted in extensive famines. After independence, however, there were conspicuous improvements in certain areas, and these seemed likely to spread as foreign trade developed as a result of oil exploitation.

Health.—Public health is on the whole good. Aridity inhibits the spread of malaria, so characteristic of many other Mediterranean lands; and the absence of large cities is another favourable factor. Enteric diseases and trachoma are widespread, however, and the infantile death rate is high.

Justice.—The Libyan legal system is still being built up, based mainly upon the Egyptian model and also on the Italian codes. Muslim affairs are dealt with by separate Muslim courts; all other cases are dealt with in the ordinary courts. There is a supreme court, the president and judges of which are appointed by the king; there are also courts of appeal, courts of the first instance and summary courts.

Education.—Schools number more than 700 and these are mainly elementary. There are an agricultural training centre, an arts and crafts school, several teachers' training colleges and technical schools, a religious centre and clerical college. The small University of Libya, founded in 1956 at Bengasi, has faculties of arts, science and commerce. Most students seeking higher education are trained abroad. Foreign schools exist for the non-Libyan communities.

Economy.—In a few areas of the extreme north there is sufficient rainfall in most years for cultivation, but elsewhere irrigation is essential. This is possible not only in the oases of the south but in much of the Gefara and on the flanks of Al Jabal al Akhdar of Cyrenaica. Origins of the fairly extensive underground water in Libya are disputed: one theory suggests that there is direct replenishment from present rainfall; another that supplies represent falls at an earlier, wetter climatic phase, and are therefore irreplaceable. Northern Tripolitania is the chief farm area. Barley is the principal crop, with wheat second, and millet and maize (corn) minor adjuncts, millet being important in the oases. Tomatoes and Mediterranean tree crops are also significant, especially the olive, almond and orange; groundnuts (peanuts), a recent introduction, have made much headway. Vines, important in Italian days, are now less so, but there is a growing market for vegetables of all kinds. Some tobacco, oilseeds and fodder crops are grown but only by more advanced farmers. Nomadic pastoralism is important, especially in Cyrenaica. There was formerly a natural growth of esparto grass, which is collected and exported; but this has declined greatly following reckless cutting. Fishing for sponges, tunny and sardine occurs on a small scale. Later, a new development was the increasing use of Libya by film companies; and there is also a small tourist industry related in part to the remarkable ruined classical cities.

There are few manufactures other than a limited activity concerned with the processing of foodstuffs, bazaar crafts and crude textile weaving. Almost all manufactured goods, sugar and tea (the national beverage) are imported, and normally there is a considerable trade gap, since the chief Libyan exports (vegetable oils [olive and peanut], hides and skins and other agricultural and pastoral products) amount to less than 50% of the imports. This situation may however greatly alter following the discovery of extensive petroleum deposits in some areas: at Zaltan, 200 mi. S. of Bengasi; around Dahra, 100 mi. S. of Tripoli; in the extreme southwest near the Algerian border; about 100 mi. due south of the Gulf of Sirte; and south of Tobruk. Concessions were granted to U.S. and British oil companies and oil was struck at Zaltan in 1959. A pipeline constructed from Zaltan to a new oil port at Marsa al Brega (Burayqah) on the Gulf of Sirte was opened on Oct. 25, 1961, by King Idris I, and the first shipment of oil was then made.

Chief trading partners are the United Kingdom, United States and Italy (imports), and Italy, Egypt and the United Kingdom (exports). The port of Tripoli has a custom free zone.

Finance.—The Libyan pound is equivalent to the pound sterling and is divided into 100 piasters and 1,000 milliemes. Currency is circulated in notes and coins printed and struck in the U.K.

The National Bank of Libya was established in 1955, and the National Agricultural bank has offices in Tripoli and Bengasi. Several foreign banks have branches in the country. Libya is a member of the sterling area and in 1958 became a member of the International bank and of the International Monetary fund.

Governmental expenditure has hitherto exceeded domestic revenue by about 40%. The annual deficits, of the order of LL.3,000,000–LL.4,000,000, are met by grants-in-aid from British and U.S. sources and Libya, which endorsed the Eisenhower doctrine (*q.v.*), has been regularly in receipt of American foreign economic aid. An important feature is the extensive development program undertaken by international agencies at an annual cost of LL.4,000,000–LL.6,000,000. Foreign aid, at least until the 1960s, was therefore essential to the existence of Libya as an independent country.

Communications.—There are two separate narrow-gauge railways, each about 100 mi. long, centred respectively on Tripoli and Bengasi, but these are of minor economic importance. The main communications are provided by roads, which are confined to the coastal zone; inland, there are merely desert tracks. Weekly bus services and caravans operate on many routes. International airports exist at Idris (near Tripoli) and Baninah (at Bengasi); there are British air bases at Idris and El Adem (Al'uzaym) and a U.S. air force installation, Wheelus air base (Tripoli). Telegraphic and telephone stations link Libya with Europe.

The Libyan broadcasting service, controlled by the ministry of information, broadcasts in Arabic from Tripoli and Bengasi. There are two British forces' radio stations (Tripoli and Bengasi) and one U.S. radio and television station (Wheelus field, Tripoli). *See* also references under "Libya" in the Index. (W. B. Fr.)

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LIBYAN DESERT (As Sahra' al Libiyah), the northeastern portion of the Sahara (*q.v.*), extends eastward of the Fezzan and northeastward of the Tibesti mountains; that part of it in Egypt is known as the Western desert (As Sahra' al Gharbiyah), a critical area of operations in World War II. Its bare rocky plateaus and stony or sandy plains are harsh, arid and inhospitable. Jabal al 'Uwaynat (Gebel Uweinat) is 6,208 ft. above sea level but the Qattara depression (Munkhafad al Qattarah) descends to 436 ft. below sea level. There are very few inhabitants, mainly concentrated in those areas with artesian water such as the Siwah, Bahriyah, Farafirah, Dakhilah, Kharijah and Kufrah oases. (R. W. Sl.)

LICATA, a seaport in the province of Agrigento, Sicily, Italy, is situated west of the Salso river, 47 km. (29 mi.) S.E. of Agrigento by road. Pop. (1957 est.) 40,714 (commune). The town lies at the foot of the promontory known as "Montagna" (ancient Ecnomus), the site of the town Phintias, which was founded in 281 B.C. The castle of Falconara and the beach called Lido Sorriso di Falconara are to the east and the plain of Licata to the west. Railways run to Palermo, Catania and Syracuse. The port, one of the most important in Sicily, exports sulfur, cereals and salt. Chemical fertilizers, *pasta* and flour are produced. The Salso, the classical Himera Meridionalis, flows through a plain where tomatoes, peas and artichokes are grown; because of the warm climate these ripen earlier than in other places in the island and are exported throughout Europe. The Romans defeated the Carthaginian fleet off Licata in 256 B.C., and in the plain to the north Hamilcar defeated Agathocles in 311/310 B.C. During World War II Allied forces landed at Licata during the invasion of Sicily on July 10, 1943. (E. A. Li.)

LICENCE, in law, is a permission to do an act or acts which without the permission would be unlawful. There are two main heads of licence, one concerned with property and the other with public law. First, the owner of property may grant permission to another to do acts which otherwise would infringe the owner's right of property. Thus a landowner may grant a man a licence to enter upon his land (*e.g.*, to cross it, or to play games on it) and thereby prevent the entry from constituting a trespass. Again, the owner of a patent or copyright may grant licences to do acts that otherwise would infringe his monopoly rights. Secondly, many relatively modern statutes prohibit specified activities, such as driving a car or selling liquor, by any except those to whom licences have been issued by some specified officer or authority.

Property.—Licences in respect of land fall into three categories. First, a bare licence is a mere gratuitous permission; *e.g.*, to cross a field. Such a licence is usually personal to the licensee, and is revocable at any time. Second, there is a licence for value such as a theatre ticket. This too is usually not assignable, but it is not freely revocable. On one view, the licensor may revoke it even in breach of contract, though he will be liable in damages for his wrongful revocation; but the modern tendency is to take the view of equity and treat the licence as not being revocable in breach of contract. Third, a licence may be coupled with some interest in the land, such as the right to take away timber on the land. Such a licence is both assignable and irrevocable.

At common law a licence created no interest in the land and so would not bind a purchaser of it. But in England modern cases such as *Errington* v. *Errington* [1952] 1 K.B. 290, support the view that at least some licences over land create an equitable interest in the land and so will bind any purchaser who has notice of the licence. Modern English statutes which protect tenants, such as the Rent acts for dwelling houses and the Landlord and Tenant act, 1954, for business tenancies (*see* Landlord and Tenant), have led to many recent attempts by landowners to escape the restrictions of the statutes by purporting to grant licences instead of tenancies; but the courts have treated most of these transactions as in fact creating tenancies.

Public Law.—In England the 19th and 20th centuries saw the enactment of a wealth of statutes prohibiting various activities by any persons except those who hold a licence. This system of licensing is sometimes used mainly to regulate the activities in the public interest, sometimes primarily as a method of taxation, and often for both purposes. In each case the statute provides for the conditions under which licences will be issued, and the fees payable, so that usually the only questions that will arise turn on the construction of the statute. (R. E. My.)

In the United States most courts hold that a public agency may grant licences for private uses of public land where they work no major inconvenience to the public and are not inconsistent with the public use for which the land is held; *e.g.*, licences to maintain market stalls on the sidewalks, projections over the public ways, etc. Licensing is also used to accomplish a great variety of police power objectives and varies all the way from simple registration for purposes of identification to the imposition of conditions so onerous as to constitute a prohibition. In the case of occupations in which highly competitive operation is considered contrary to public interest, *e.g.*, taxicabs, common carriers or taverns, licences are often used to limit entrance. Where the limitation is effective and the licence transferable, it is often bought and sold in the market for a price greatly in excess of the fee charged for its issuance. Occasionally monopolies are granted through the refusal to issue more than one licence. Licensing of many activities, including professions and trades, is designed to ensure minimum competence. Physicians and lawyers must have a medical or law school degree and may be required to pass examinations before receiving licences to practise; plumbers may be required to serve an apprenticeship, barbers and beauticians to attend trade schools. Other schemes are designed to enforce inspections; restaurant licences are frequently of this character. In all cases the power to license is measured by the power in the enforcement of which it is employed. Thus where there is a power to regulate but none to prohibit, prohibition cannot be effected by

attaching burdensome conditions to the grant of a licence; where there is a power to regulate and none to tax, a licence fee not reasonably commensurate with the cost of regulation will be struck down by the courts.

Considerable confusion exists in the U.S. between these two uses of the term licence. It is often said that where an activity can be prohibited altogether, permission to carry it on is a privilege, and that licences which grant privileges can be withheld, or revoked, at the pleasure of the state. Where the activity is one in which citizens have a right to engage, *i.e.*, where there is no power to prohibit, it is said that a licence may not be arbitrarily withheld and the applicant is entitled to notice and hearing. This distinction has been widely criticized. The character of a licensed activity as a privilege, it is argued, should have no bearing upon a citizen's right to be heard but only upon the issues which he may raise. Where an activity is prohibited altogether, for example, through the imposition of burdensome conditions, the only issue that can be raised is the existence of the power of prohibition. The arbitrary refusal to issue a licence, where such licences are being issued to others, should be subject to review, even though the occupations in question are ones that the state can prohibit altogether.

In the United States, where the federal government, the states and a vast number of local governments require licences for a very large number of activities, there is great danger of inconsistent requirements. This problem is met partly by the supremacy clause of the federal constitution and by reading into the commerce clause a prohibition of state and local regulations unduly burdening interstate commerce; and partly by reciprocal state licensing provisions. Reciprocity has grown most rapidly in the licensing of automobiles and automobile operators. With a few minor exceptions an automobile operator can drive anywhere in the United States on the strength of a valid and unexpired operator's licence issued by his home state; conversely, traffic violations occurring in other states are regularly reported to the motor vehicle department of his state, and where they would constitute grounds for revocation of his licence had they occurred at home, the motor vehicle department is authorized to proceed to revoke it.

See also references under "Licence" in the Index.

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LICHAS, in Greek mythology the herald of Hercules (*q.v.*); chiefly known from Sophocles' play *The Trachiniae* (*The Trachinian Women*). Here he brings home the captive Oechalian princess Iole. In jealousy, Hercules' wife, Deianeira, sends to her husband by Lichas the robe of Nessus to keep him faithful. Hercules, frenzied by the poison it contains, hurls Lichas to death from a cliff on the island of Euboea. (H. W. PA:)

LICHENS, a group of plants which are unique in being a combination of plants from two entirely different groups. This is quite unlike the situation in the mosses, ferns, wild flowers or trees, which are single plants. Each of the combinations in the lichens produces a plant body which appears as a distinct "species" despite its dual origin. The plants which unite to produce this combination are an alga and a fungus. These live together in an intimate relationship called symbiosis (*q.v.*) by most biologists and parasitism by others. Although lichens are commonly thought of in connection with the mosses, there is no relationship between these plants.

Lichens are found throughout the world, often occupying niches in which no other plants can become established. They are most conspicuous in the alpine and arctic tundras, where they are dominant forms of vegetation. The rock outcrops of the world are usually clothed with an abundance of these plants. Lichens are almost the only plants able to survive the severe conditions of life found at high altitudes and latitudes.

In Antarctica, where there are very few flowering plants and perhaps 60 mosses, there are more than 400 species of lichens. In more temperate regions the lichens are common in undisturbed habitats in old fields, in bogs and in forests, on the soil and old rotting logs, on tree trunks and branches. In tropical regions lichens are abundant, with different species occupying the ecological niches occupied by other species in other parts of the world. Few species survive in the vicinity of large cities, where they are killed by smoke and gases. The higher temperatures and consequent drier conditions of cities may also reduce lichen populations.

USES AND VALUES

Soil Formation.—Lichens are well known as pioneers on bare rock surfaces. Here some of them act by secreting acids which dissolve the material that cements the particles together. On limestone some species of *Verrucaria* and *Caloplaca* may dissolve pits

(LEFT) BY COURTESY OF "ENDEAVOUR," LONDON; PHOTOGRAPH, A. HORNE, IMPERIAL COLLEGE, LONDON; (RIGHT) RUTHERFORD PLATT

CLOSE-UP OF CALOPLACA ELEGANS (MAGNIFICATION × 2.8), LICHEN CAPABLE OF DISSOLVING PITS IN ROCK SURFACE (LEFT); (RIGHT) ROCKS COVERED WITH SAME LICHEN

in the rock surface. Other lichens help to fragment the rock by expanding when wet, attaching to the rock, then contracting when dry, thereby plucking away particles of the rock. Still others may act by a process of chemical binding to remove some of the mineral elements from the crystals of the rock. As the rock becomes broken up by the action of the lichens and by weathering, the debris furnishes a lodging for the growth of mosses and eventually higher plants.

Erosion Control.—Some species of lichen thrive on very sandy soil. Here the undifferentiated plant body or thallus of a species such as *Lecidea uliginosa* will help materially in binding the soil surface against the action of the wind. On clay soils in abandoned roadbeds in the eastern United States, *Baeomyces roseus* helps to protect against water erosion by binding the soil surface.

Food.—In the arctic and subarctic regions lichens are important

(LEFT) BY COURTESY OF "ENDEAVOUR," LONDON; PHOTOGRAPH, A. HORNE, IMPERIAL COLLEGE, LONDON; (RIGHT) RUTHERFORD PLATT

LICHENS USED FOR FOOD SUBSTITUTE: (LEFT) CLADONIA ALPESTRIS; (RIGHT) CLADONIA GRACILIS

as forage for reindeer, caribou, musk ox and moose. Lichens of the so-called reindeer moss group (*Cladonia mitis, C. sylvatica, C. alpestris*) and Iceland moss (*Cetraria islandica*) are the most important species. Because growth in these northern climates is so slow, 35 to 38 years are required for an area to recover from grazing. The area required to support a herd thus is enormous, and the Laplanders whose reindeer herds subsist mainly on lichens are forced to be a nomadic people. Iceland moss is used in Greenland and Iceland as a supplement in the food of sheep and cattle as well as of human beings. For use as food, the lichen is soaked in soda solution to neutralize the lichen acids, dried and powdered, and then mixed with potatoes. Some of the rock tripes (leafy or foliose forms), *Umbilicaria* species, have been used as emergency foods by explorers, but the action of the lichen substances on the body is generally unpleasant. One of the plants credited with being the manna of the children of Israel is the lichen *Lecanora esculenta* of north Africa and Asia Minor. This species sometimes rolls before the desert winds in great quantities. Numerous small animals feed to a limited extent on lichen thalli; slugs, snails, mites, caterpillars and termites all are reported to feed upon lichens.

Medicine.—The fancied resemblance of lichens to parts of man's body led in earlier times to their use in the treatment of various ailments. For example, the lungwort, *Lobaria pulmonaria,* has the appearance of the surface of the lungs, hence was used to treat tuberculosis, pneumonia and similar afflictions; the yellow *Xanthoria parietina* was deemed valuable in cases of jaundice; the dog lichen, *Peltigera canina,* with its fruits resembling teeth in a jaw, was used in the treatment of rabies. The skull lichen, *Parmelia saxatilis,* was considered excellent for epilepsy if found on old skulls instead of its usual habitat on tree trunks and rocks; its value was greatly enhanced if the skull happened to be that of an executed criminal. These fanciful treatments—based on the "doctrine of signatures," by which nature was believed to have placed a sign indicating the value of the plant to man—have given way to more scientific remedies. Many of the lichens contain usnic acid and other lichen acids which have been shown to have antibacterial properties. In Scandinavia the reindeer lichens have been used in the manufacture of alcohol, but difficulties in obtaining raw materials for this industry arise because the regrowth of the lichen supplies is so slow. The wolf lichen, *Letharia vulpina,* has been used in Russia for poisoning wolves. One of the lichens of the plains of western North America, *Parmelia chlorochroa,* accumulates selenium and is therefore poisonous to livestock.

WALTER DAWN

SHORE LICHEN (XANTHORIA PARIETINA)

Perfumes.—The oak moss lichen, *Evernia prunastri* and related species, is gathered in southern Europe and used in perfumes; it functions as a fixative to assist in controlling the uniform evaporation of the many varied ingredients of the perfumes.

Dyes.—Probably the most familiar use of dyes derived from lichens is in the litmus paper (paper saturated with litmus solution) of the chemist. This reddish-violet dye, litmus, used as an acid-base indicator, is prepared from a purple or reddish-purple dyestuff called orchil, archil or cudbear. In Europe, cudbear, *Ochrolechia tartarea,* a crustose lichen (having a thin flat crusty aspect), is scraped from the rocks and used in the preparation of the dyestuff. In the Canary Islands, Madagascar, the coast of South America and formerly along the coast of California, various species of orchil lichens, *Roccella tinctoria* and other species of *Roccella,* are gathered, prepared with sodium or ammonium hydroxide solutions and used for dyeing wool and silk. Rock tripes, *Umbilicaria* and *Parmelia* species and other lichens are used in northern countries as sources of other dyestuffs, giving soft browns, yellows and other colours to wool.

NATURE OF LICHENS

The unusual structure of the lichens (*i.e.,* a composite plant body or thallus composed of two interdependent plants) was not discovered until after the development of the microscope. The name of this group of plants first appears in the writings of Theophrastus, a disciple of Aristotle, about the 4th century B.C. At that time, and for many centuries thereafter, lichens were confused with the mosses (*q.v.*) and the hepatics. The early students of lichens thought that the green cells (now known to be alga) were specialized structures produced by the fungus and probably of reproductive function. Wallroth (1825) coined the term gonidia to indicate this reproductive function, but also mentioned the resemblance to some of the well-known free-living algae. It was not until 1867 that Simon Schwendener announced that the green cells were indeed algae, and that the fungi were parasitic upon them. After the introduction of pure culture techniques, the constituents of numerous lichens were isolated and grown apart from each other and then recombined. The resulting lichen, however, appears somewhat different from the original, and the experimental demonstration of the complete life cycle presents difficulties.

Because the lichen appears as a healthy organism which thrives in very severe environments, the interpretation of the relationship as a simple case of parasitism did not satisfy many of the workers in this field. The term consortium (a union or fellowship) was proposed by Johannes Reinke (1873) to explain the relationship; then H. A. de Bary (1873) suggested that symbiosis would be a more satisfactory term to describe the relationship. Experimentation shows that there is not only manufacture of the food by the alga in the process of photosynthesis and absorption of water from the atmosphere by the fungus, but that there is also an exchange of complex organic compounds between the components of the lichen.

The constancy of the algal host in the lichen relationship is undetermined. Although the same genus of alga is present in a given species of lichen, there are indications that different species or races of the alga may be present. In some lichens there may be two groups of algae represented in the thallus. In *Peltigera aphthosa* and *P. venosa,* for example, the alga in the thallus is one of the green algae, *Coccomyxa,* while the blue-green alga, *Nostoc,* is found in special gall-like growths called cephalodia. In *Solorina crocea* there may be two layers of the two types of algae. The algae of the lichen are often considerably different from free-living algae of the same genus, and only by pure culture can they be definitely identified. Some of the algae may change their colour. Others which normally grow in chains of cells may be broken up into cell units scattered throughout the thallus.

Algal Member.—The algae in the lichens belong to one of two groups, the Cyanophyta or blue-green algae, or the Chlorophyta or green algae. In the case of the association with the blue-green algae, the shape of the lichen is usually determined by that of the alga, and the fungal threads or hyphae are usually within the gelatinous sheath of the alga. When the algal component is a branched filamentous type, such as *Rivularia, Stigonema* or *Scytonema,* the lichen is of the same form, and the filaments of the fungus grow in a sheathing mass around the algal cells. If the blue-green alga normally forms flat colonies containing threads scattered through a gelatinous layer, the lichen will have the same shape, the threads of the fungus being intermixed with those of the alga, or the algal threads may be broken into single-celled units by the growth of the lichen thallus; *Nostoc* and *Gloecapsa* are common blue-green algae with such a distribution in the thallus. Lichens formed with such a uniform distribution of the two components are said to have a homeomerous thallus. *Collema* is a typical lichen of this type. In *Leptogium* the fungus produces a definite layer on either side of the thallus but the internal structure is similar to that of *Collema.*

A wide variety of green algae can be associated with the fungi of lichens; *Protococcus, Trentepohlia* and *Trebouxia* (*Cystococ-*

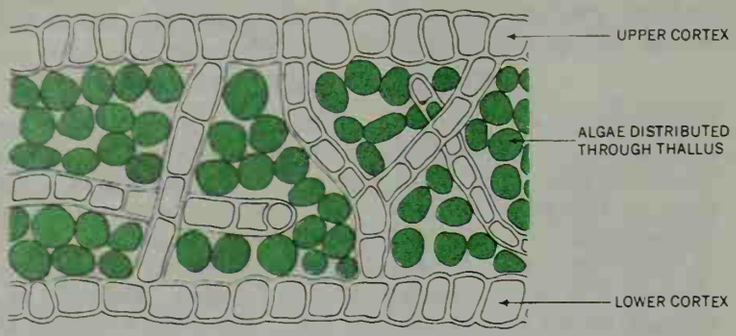

FIG. 1.—SECTION OF THALLUS OF LEPTOGIUM CYANESCENS SHOWING HOMEOMEROUS TYPE OF THALLUS, ENLARGED

cus) are the commonest, but other genera may also be involved. One of the filamentous types, *Cladophora* (alga), is involved in *Racodium* (lichen), and in this case the shape of the lichen is influenced by the shape of the alga. In most lichens in which the alga is a member of the Chlorophyta, the fungus determines the shape of the lichen; in the case of flat thalli the algal cells are in a definite layer within the upper part of the thallus, whereas in cylindrical thalli the algal cells are in a layer around the thallus but under the surface. The lichens with layered structure are termed heteromerous. In only a few of the lichens does there appear to be a penetration of the algal cells by special bodies of the fungus called haustoria. In most there is only a close application of the fungal filaments to the algal cells.

Fungal Member.—The lichen fungi belong to a wide variety of groups of the fungi. In a very few tropical lichens such as *Cora pavonia* and *Dictyonema* the fungal symbionts are members of the Basidiomycetes. In most of the lichens, however, the fungal symbionts are members of the Ascomycetes. There are four main groups of Ascomycete fungi involved, with the fruiting structures being the basis of the classification. The Pyrenulales form a fruiting body called a perithecium, a small round enclosed body containing many spore sacs (asci) containing spores and opening by a pore at the tip. The Caliciales form a fruiting body within which the asci break down at maturity to release a mass of dry, powdery spores. The Hysteriales form oblong, more or less linear apothecia which open by slits along the top. The largest group of lichen fungi belongs to the Lecanorales, in which the open disklike apothecia may be either flat, or convex or even cuplike.

Evolution.—There is no record in the rocks as to the antiquity of the lichens, but it is obvious that this symbiotic organism must be more recent than its components. It is also obvious that lichens are not primitive but highly developed structures. Both the symbionts are polyphyletic; that is, the algae come from several groups, and the fungi, likewise, are of several widely different origins. Presumably the earliest lichens were a loose association of fungal hyphae with free-living algae. Some lichens are still on this borderline. In *Calicium* and *Mycocalicium* it is sometimes difficult to be certain of the presence of the alga. Some fungi such as *Leotia* may contain algal cells in their fruiting bodies. Evolution probably developed from these loose associations to a definite crustose structure, then to the leafy (foliose) structure and finally to the intricate fruticose (shrubby or bushy) type of thallus.

STRUCTURE

General Form and Growth Habit.—There are four general types of growth habit among the lichens: crustose, squamulose, foliose and fruticose.

Crustose.—In the crustose lichens there may be but a thin layer of fungal hyphae with the algal cells scattered among them. This grades into definitely layered structures with an upper cortex of hyphal cells, an algal layer and then an inner layer of loose hyphae, the medulla. The crustose thallus may be granular or smooth, and, if thick may become divided into small, marked-off, angular pieces or elongate lobes; these in appearance approach those of the foliose lichens but are more closely attached to the substratum. If the thallus of the crustose lichen is over the bark surface it is termed epiphloeodal; if it penetrates the bark, only forming the fruits on the surface, it is termed hypophloeodal. Similarly the rock lichens may be epilithic or endolithic. Sometimes the crustose lichens on rocks penetrate them to surprising depths; *Biatorella simplex* penetrates its rock substrate to a depth of almost half an inch.

Squamulose.—In the squamulose lichens there is a small, leafy, layered thallus which, unlike the crustose type, is more loosely attached, usually toward one edge. *Dermatocarpon, Lecidea* and *Cladonia* form this type of thallus.

Foliose.—The foliose type of thallus is one of the most conspicuous types of growth of lichens. It is a large leafy type, sometimes in smaller lobes as in *Physcia* or *Parmelia,* sometimes forming huge plates attached at the centre as in the rock tripes, *Umbilicaria.* The typical foliose thallus is definitely layered. The upper layer is of either fibrous or cellular appearance; next below this layer is the algal layer with some of the fungal hyphae running through it; then follows a loose inner layer, and finally the lower layer or lower cortex, which may be cellular or loose, and from which project the rootlike structure or rhizinae which attach this type of thallus to the substratum. The rhizinae are sometimes quite abundant as in some of the *Parmelias.* Growth of these lichens is from the margins, which are often lighter in colour as they have not yet accumulated the substances which will darken them.

Fruticose.—The upright shrubby or fruticose forms, rarely exceeding six inches in height, usually arise from a primary thallus of a different growth form, sometimes crustose and sometimes squamulose. The fruticose lichens may be quite simple with club-shaped, pointed or cup-shaped structures, or they may form intricately branching stalklike structures as in the reindeer lichen *Cladonia rangiferina.* This species in turn forms large mats on the soil. The internal structure of the fruticose lichens is similar to that of the foliose types, except that it is based on the cylinder. There is an outer cortex, an algal layer which is more or less continuous, then an inner medullary layer. In *Cladonia* and *Dactylina* the stalks are hollow. In some of the fruticose lichens, as *Roccella* and *Ramalina,* there are longitudinal thick-walled strands. This tendency reaches its peak in the *Usneas,* which have a central strand of great toughness and strength, enabling the hanging thallus to reach a recorded length of 11 yd. in the case of *Usnea longissima* which hangs from tropical trees.

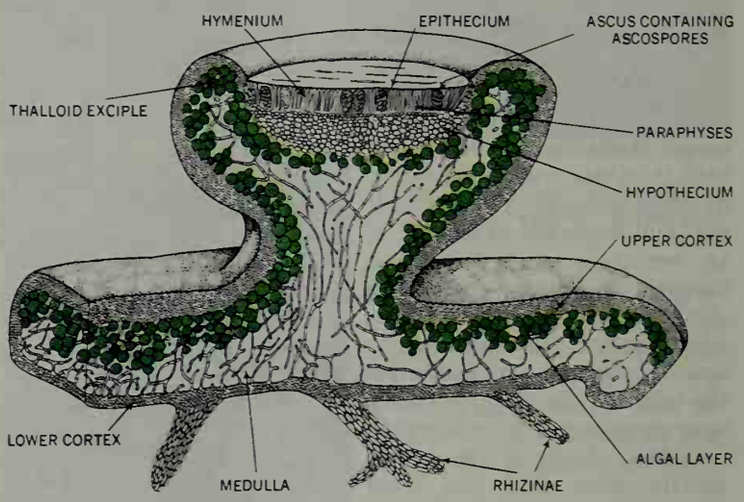

FIG. 2.—SECTION OF PHYSCIA LICHEN SHOWING HETEROMEROUS TYPE OF THALLUS AND LECANORINE APOTHECIUM WITH THALLOID EXCIPLE, ENLARGED

Special Structures.—*Cyphellae.*—Replacing the stomata of the flowering plants are the cyphellae and pseudocyphellae of the lichens, which are reputed to be organs of gaseous exchange. The cyphellae have a definite margin and occur as small pores on the underside of some of the family Stictaceae. The pseudocyphellae lack the definite cup margins and occur more widely among the lichens, in the Stictaceae, in *Nephroma, Cetraria* and some *Parmelias.*

Cephalodia.—These occur only in lichens with green algae. They contain algae of a blue-green type, different from those of

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FRUTICOSE LICHENS: (LEFT) BEARD LICHEN (USNEA BARBATA); (RIGHT) JOINTED BEARDED LICHEN (USNEA ARTICULATA)

the host. They may originate from algae which land on the surface of the lichen and become the centre of the gall-like growth of the cephalodium. Cephalodia occur on the upper surface of *Lecanora gelida* and *Peltigera aphthosa,* on the underside of *Peltigera venosa* and within the thallus in *Solorina saccata.* In *Stereocaulon* they contain the algae *Stigonema* or *Scytonema* instead of the commoner *Nostoc.* Cephalodia occur quite widely among the lichens.

Soredia.—These consist of a few algal cells enveloped by a weft of fungal hyphae to form a powdery granule which serves in the reproduction of lichens of many species. In the more primitive lichens the soredia are formed over the surface of the thallus. In the more advanced lichens they are formed in special structures termed soralia. The soralia are sometimes head-shaped and are then commonly found upon the surface of the thallus. In other cases they may be lip-shaped and located at the tips of the lobes or along the sides of the lobes of the thallus. In some cases, as in *Parmelia sulcata,* they may be formed along ridges on the tops of the lobes. Still other soralia may be formed on the underside of the thallus.

Isidia.—These are outgrowths on the upper surface or the margins of the lobes of many lichens. They are corallike extensions of the thallus; the internal structure usually includes a central medulla, an algal layer and an outer cortex. Their function is usually supposed to be that of increasing the area of the thallus devoted to photosynthesis. They are also usually quite brittle and may serve as organs of vegetative reproduction.

Rhizinae and Cilia.—Rhizinae are groups of the fungal hyphae which anchor most of the foliose lichens to the substratum of rock, bark or soil. They do not appear to play an important role in transfer of water or minerals to the lichen. The cilia are long hairlike structures which ornament the margins of the lobes of species of *Parmelia, Anaptychia, Physcia* and *Umbilicaria.* Their function is unknown although occasionally they may serve to attach the lobes to each other, thereby strengthening the mass of the plant.

REPRODUCTION AND GROWTH

Modes of Reproduction.—Probably the commonest means of reproduction of this dual organism, the lichen, is vegetative reproduction. Dry lichens are very brittle and small bits are readily fragmented from the thallus to blow away, anchor and give rise to new thalli. Special organs which contain both components of the thallus (*i.e.,* soredia, isidia or other small lobes) may also be widely distributed by the wind, by water, or over the surface of the snow.

Rigorous proof of the sexual reproduction of the fungal member of lichens remains to be shown. The difficulties of carrying out experimental culture have limited the studies to examination of the structures present in the lichens and to analogy with the methods of reproduction of similar nonlichen-forming fungi. In *Collema* there is a coiled egg-bearing structure which bears a trichogyne (receptive filament) which may or may not reach the surface of the lichen. Male sex cells (spermatia or pycnoconidia) have been observed attached to the trichogyne and suggest the possibility of sexual union. But the pycnoconidia have also been shown experimentally to be able to germinate into fungal hyphae and there is a distinct possibility that the association of the structures is merely accidental. In *Peltigera* there is formation of a hook or crozier similar to that in Pezizales, which suggests fusion of nuclei. Asexual reproduction has also been suggested for many lichen fungi in which the sexual process has considerably degenerated. Yet the majority of the lichen fungi produce an abundance of apothecia containing ascospores which suggests that these are important.

Types of Spores.—The lichen fungi form ascocarps (fruiting bodies) of a variety of types depending on the Ascomycete involved in the lichen. In the Lecanorales there is a disk—or cup-shaped apothecium borne on the upper surface or margins of the thallus. The typical structure of the apothecium consists of a layer of tissue called the hymenium, which contains sterile hyphae (paraphyses) interspersed among the saclike asci containing the ascospores. The usual number of ascospores per ascus is eight, but there may be only one or two as in some of the *Pertusaria* and up to hundreds of tiny spores in *Acarospora.* Below the hymenial layer is a layer of fungal tissue, the hypothecium, which is extended up the sides of the cup to form the proper margin or proper exciple of the apothecium, as in the genus *Lecidea.* Below this layer may be another which is an extension of the thallus usually containing the algae. This grows up in some of the lichens (as *Lecanora*) to form another margin, the thalloid margin or thalloid exciple around the apothecium. The tips of the paraphyses are

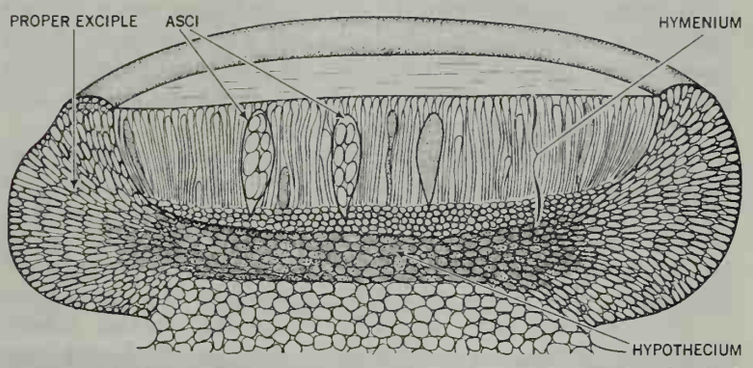

FIG. 3.—SECTION OF APOTHECIUM OF LECIDEA STERIZA SHOWING LECIDEINE APOTHECIUM WITH PROPER EXCIPLE, ENLARGED

more or less enlarged and form a layer (epithecium) over the tips of the asci. In the lichen fungi belonging to the Sphaeriales, the asci are formed in a layer inside the flask-shaped perithecium, which is partly, or wholly embedded in the thallus. The outer tissue is usually partly black and carbonized; it may extend entirely around the fruit except for the tiny ostiole or opening, or it may extend only over the upper part of the perithecium. In many species the paraphyses may become gelatinized and disappear as the asci mature. In certain types of lichen fungi belonging to the Hysteriales there is a long, narrow ascocarp with the sides carbonized and the asci and paraphyses in a furrow down the middle. In still other lichen fungi belonging to the Caliciales the asci disintegrate tc leave the spores free in a threadlike mass, the mazaedium.

The life of the apothecia and perithecia in the lichens, unlike that of the ascocarp in the nonlichen-forming fungi, may extend over a period of many years. The spores may be shed from the same hymenial layer as in most of the lichens, or there may be an added layer as in the concentric layers of the rock tripes, *Umbilicaria.* When the thallus is moist the spores are ejected from the asci into the wind for distribution. Although there seems to be a greater formation of ripe spores in the spring by some lichens, there are usually some spores present in the apothecium at all times of year.

Among the lichen fungi which belong to the Basidiomycetes the spores, called basidiospores, are borne on the underside of the bracket-shaped thallus.

The spores of lichens are exceedingly varied, and this variability is helpful in the classification of lichens. The spores may be brown or clear, one celled or two celled, or there may be a number of square- or lens-shaped cells placed either lengthwise, or lengthwise and crosswise. The spores may have very thick walls and the tiny cell cavities joined by a canal as in *Caloplaca.* Spores vary

from very small (1 micron, or $\frac{1}{100,000}$ in.) as in *Acarospora* to very large (250 microns, or $\frac{1}{100}$ in.) as in *Pertusaria* and *Thelotrema*. The wall may be smooth or sculptured, and the shape varies from spherical or elliptical to fusiform or needlelike. Most spore cells appear to be uninucleate, but in the large simple spores of *Pertusaria* they are multinucleate.

GRANT HAIST

SIMPLE CUPS OF PYXIE CUPS LICHEN (CLADONIA CHLOROPHAEA)

Most lichens produce pycnidia, flask-shaped structures, in addition to the apothecia. The pycnidia may be within the surface of the thallus as in *Parmelia* and *Physcia* or marginal, somewhat barrel-shaped structures as in *Cladonia* and *Cetraria*. They produce spores called pycnoconidia within the pycnidia. These spores can germinate to produce fungal hyphae and possibly represent one additional means of reproduction. The possibility of their being spermatia is uncertain.

Reproduction of the algae in the lichens is usually by ordinary division. In pure cultures the algae may form zoospores or autospores, depending upon the type of alga.

Germination and Growth.—The fungal spore may germinate and form a tiny prothallus which goes into a resting stage. A new lichen thallus may be initiated when an appropriate algal cell or the soredium of the same lichen species alights by chance upon or very close to the resting prothallus stage.

Growth of the thallus of the lichens occurs mainly at the periphery. Sometimes the algal cells are carried out at the edge of the thallus by special fungal hyphae. The fungal hyphae may grow out farther than the rest of the thallus, and algal cells carried on the winds anchor upon the hyphae giving rise to new parts of the thallus. The rate of growth of a given lobe of a lichen tends to be exceedingly slow, especially among the crustose lichens. Figures of fractions of a millimetre a year are usual, and some single thalli may be estimated to be centuries old. The foliose and fruticose lichens grow more rapidly, one or two centimetres a year being common growth rates for these. Frequently, as the thallus reaches large size, the centre portion will die out leaving a bare area, while the periphery continues to grow. In the centre new thalli may colonize and thus form concentric rings of lichens.

PHYSIOLOGY

Lichens obtain part of their water supply from rains, part from the atmosphere directly, and part from dews and fogs. In desert regions the dews are of special importance. Water can be absorbed by lichens to the extent of 1 to 35 times their own weight. When growing on damp mossy surfaces, the lichens can obtain much of their water from the substratum. Although water is easily taken up by the thallus, it is also quickly lost; it has no special ability to retain the moisture. Lichens are able to withstand extreme drying, especially those species growing on the hot dry rocks of deserts. However, they show correspondingly reduced assimilation and respiration.

Respiration of the lichen thallus is of course dependent upon the two components of the lichen. In the dark the CO_2 output rises and O_2 utilization increases; in the light the reverse occurs. The balance of these two measures of respiration depends on the kind of lichen, the temperature and the availability of water. The lichens of shade achieve a balance sooner during the day under lower intensities of light than do the lichens which grow in higher light intensities. The rate of respiration drops rapidly with lowering temperatures until at −10° C. (14° F.) it becomes immeasurable, although the lichens still survive much lower temperatures. Respiration is at a maximum at from 15° to 25 ° C. (59° to 77° F.), then drops as the temperature is raised. In lichens in the dry condition the gaseous exchange is very slight. With increase in moisture content of the thallus up to a point just short of saturation the gas exchanges increase. They then diminish as saturation is reached. A moist lichen will carry on about five times as rapid a gaseous exchange as a dry lichen. The carbon dioxide and oxygen ratio is not much influenced by the moisture content of the lichen.

Light requirements of lichens are dependent upon the kind of lichen being studied. There appear to be two maxima in the rate of assimilation, one at from 75 to 400 lux and another in the more moderate range of 2,000 to 3,500 lux.

Lichens are sensitive to gaseous compounds of sulfur and to ozonated hydrocarbons. This probably accounts for their scarcity in areas around cities where such compounds are abundant. Some species as *Xanthoria parietina, Evernia prunastri* and *Anaptychia ciliaris* have been suggested as indicators of air pollution.

Because of the difficulty of growing the lichen fungi in pure culture, comparatively little is known about their requirements. They are like the nonlichenized fungi in a preference for common hexose and disaccharide sugars. A deficiency of thiamine has been shown for six species. Ammonium salts are readily utilized by a number of species, but amino acids are apparently poor sources of nitrogen for these fungi. Mineral nutrition is poorly understood. An exchange of organic compounds between the two symbiotic members of the lichen has been suggested.

RUTHERFORD PLATT

TYPICAL LICHEN GARDEN SHOWING SNAKESKIN LICHEN AND ASHEN STUD LICHEN (PARMELIA) ON ROCK SURROUNDED BY CLADONIA

CHEMISTRY

The fungal tissues of lichens produce a wide variety of substances. The hyphal walls in many lichens are composed mainly of the polysaccharide lichenin, which does not react with iodine, whereas in other lichens, isolichenin is found, which has a blue reaction with iodine. Chitin, hemicelluloses, pentosan, dextran and a glucan may also be formed. Lipoid substances are very commonly formed. A number of other types of sugars such as arabinose, sucrose and trehalose and polyhydric alcohols such as mannitol and volemitol have been reported in lichens. Sixteen amino acids, growth substances and a number of vitamins also have been found in lichens. The constituents of the algal member of the lichens are presumably the same as in the free-living algae of the corresponding genera.

The most interesting of the substances produced by lichens are those which are produced on the exterior of the fungal hyphae. In addition to calcium oxalate, there are formed a large number of peculiar chemical substances with a very wide range of chemical formulas and an interesting variety of crystalline structure. Lichen substances are in some cases formed without the algal partner's being present. Many of the lichen substances are of bright colours, red, yellow or orange, and give the clear colours to the common lichens. They are in most cases unique to the lichens, but in some cases are also formed by independent fungi. The exact function of these substances in the life processes of lichens was unknown in the early 1960s. Various ideas include: (1) they provide protection against animals as a result of the bitter flavour of the substances; (2) they give protection against transpirational loss of water; and (3) they are end products of cell metabolism, excretory substances. Some, like usnic acid, have an antibacterial effect. Although commonly called lichen acids, these include a wide series of other types of chemicals.

CLASSIFICATION

Long before the true nature of the lichen thallus was understood, there had been attempts to classify the lichens. Usually they were placed among the mosses, the hepatics and the algae. Even Linnaeus (1753) added other plants to his genus *Lichen,* which contained all the lichens then known to him.

Modern systems of classification of the lichens show an increasing emphasis upon the fungi which are associated in the lichen relationship. There is an increasing tendency toward distributing the groups which are associated with the blue-green algae among those associated with the green algae according to the type of fungus present. The names are based on the fungus member of the partnership in order to avoid the naming difficulties which would result from basing them on the combination. One system, quoted by M. E. Hale (1956), includes the following:

Class Ascomycetes
- Subclass Bitunicatae (Ascoloculares)
  - Order Hysteriales (Opegraphaceae, Dirinaceae, etc.)
- Subclass Unitunicatae (Ascohymeniales)
  - Order Sphaeriales (Pyrenulaceae, Verrucariaceae, Dermatocarpaceae)
  - Order Pezizales (Graphidaceae, Pannariaceae, Lecideaceae, and nearly all foliose and fruticose genera)
  - Order Caliciales (Caliciaceae, Cypheliaceae, Sphaerophoraceae)

Class Basidiomycetes
- Order Thelephorales (Cora, Dictyonema)

Class Fungi Imperfecti (Crocynia, Lepraria)

These larger groups are divided into a large number of families and more than 200 genera. There are more than 18,000 species of lichens in the world. In North America more than 2,200 species have been listed.

PHYTOGEOGRAPHY AND ECOLOGY

Distribution.—So much remains to be done in the collection and study of lichens that only the general outlines of the distribution patterns can be described. For those which have been studied, patterns matching those of the better-known flowering plants can be shown, but some unique patterns have been found. In the arctic there is a circumpolar distribution type containing many wide-

(LEFT) WALTER DAWN; (RIGHT) A. HORNE, IMPERIAL COLLEGE, LONDON

NORTH AMERICAN LICHEN: (LEFT) WRINKLED SHIELD LICHEN (PARMELIA CAPERATA); (RIGHT) PARMELIA STENOPHYLLA (MAGNIFIED × 1.5)

spread species such as *Alectoria ochroleuca, Cetraria nivalis, C. cucullata* and *Parmelia centrifuga.* An Arcto-Pacific distribution type contains species which are found in Siberia and in the western American arctic; *e.g., Cetraria richardsonii* and *Cetraria chrysantha.* A lichen occurring in both arctic and antarctic regions is *Usnea* (*Neuropogon*) *sulphureus.* A very large number of lichens of the temperate zone occur around the world, so that manuals of European lichens are of great help in studying North American lichens and vice versa. Such genera as *Alectoria, Cladonia, Caloplaca, Lecidea, Lecanora, Parmelia, Physcia* and *Rinodina* provide many examples of such wide distribution. A few species such as *Lecidea olivacea, Alectoria fremontii, Cavernularia hultenii* and *Lobaria hallii* are found in the western parts of both North America and Europe. Some species such as *Cetraria oakesiana* and *Baeomyces roseus* are found in eastern North America and in Europe.

Mediterranean desert lichens such as *Physcia biziana* are also found in the arid regions of western North America. Along the

GRANT HAIST

BRITISH SOLDIERS (CLADONIA CRISTATELLA)

coastal regions of western North America are a number of lichens which also occur in Japan.

Tropical lichens tend to be represented strongly by lichen fungi associated with the algal genus *Trentepohlia.* Although many of the same genera that occur in temperate regions are present, the predominant lichens are different. The families Graphidaceae, Pyrenulaceae, Astrotheliaceae, Paratheliaceae, Coenogoniaceae, Thelotremaceae, Stictaceae and Parmeliaceae are conspicuous among the tropical groups.

In antarctic regions the most conspicuous lichens are the Stictaceae, the Cladoniae and members of the subgenus *Neuropogon* of the genus *Usnea.* In Antarctica there are more than 400 lichens, the bulk of them being crustose; the genus *Buellia* is best represented.

Ecology.—Although lichens are to be found in many kinds of habitats in the world, the balance between the two components in each species of lichen is so delicate that any given kind is likely to show a very marked response to the external conditions under which it grows. Thus, lichens make very good indicator plants to deduce the nature of the environment. The substratum, light, temperature, moisture and winds all may play a part in the limitation of a given lichen to a specific ecological niche.

In Europe and to a lesser extent in North America there is a broad intertidal zone along the coastal rocks in which species such as *Verrucaria maura* and *Caloplaca marina* can grow between the seaweeds in the periodic salt-water bath.

In North America there is one species *Hydrothyria venosa,* which is completely aquatic in fresh-water streams in the eastern mountains and in California. Another species, *Dermatocarpon aquaticum*, occurs along streams of the northern hemisphere in places which are periodically flooded. Just as in the case of the higher plants, lichens may be tolerant of a wider variety of habitats toward the centres of their ranges, whereas on the periphery of their ranges they may show a stronger limitation to a certain habitat. Some species are indicative of limestone soil or rocks (calcicolous lichens); these include *Cetraria tilesii* and *Dactylina arctica* in the arctic, and *Lecanora crassa* and some species of *Collema, Caloplaca* and *Verrucaria* in more temperate regions. Some prefer acidic rocks (silicicolous lichens); *e.g.,* most of the *Umbilicarias, Rhizocarpon, Lecidea, Stereocaulon* and many *Lecanoras*. Although many lichens grow in very dry habitats, others prefer higher atmospheric humidity; the lace-lichen or so-called Californian Spanish moss, *Ramalina reticulata,* for example, festoons the foggy redwood forests of western North America. Studies of tree bark, or corticolous, communities of mosses and lichens show that although such lichens may grow on many kinds of trees there is a marked preference for certain species. The type of bark (rough or smooth), the bark acidity, the amount of shade of a given tree—these are some of the factors determining this selectivity. Because many lichens have very similar habitat requirements, they can be grouped into communities of species which frequently occur together. Such studies of lichen communities, or lichen sociology, show them to be quite specific for various parts of the world.

See also references under "Lichens" in the Index.

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See also *The Bryologist,* published quarterly by the American Bryological Society. (J. W. Tn.)

LICHFIELD, a city, county of a city and municipal borough of Staffordshire, Eng., lies 16 mi. N. of Birmingham by road. Pop. (1961) 14,077.

Lichfield is on a stream with low hills to the east and south. There is a tradition that "Christianfield" nearby was the site of the martyrdom of 1,000 Christians during the persecutions under the Roman emperor Maximian about 286. The first authentic notice of Lichfield occurs in Bede's *Historia ecclesiastica gentis Anglorum,* where it is called Liccidfeld ("open land in Liccid forest") and mentioned as the place where St. Chad fixed the episcopal see of the Mercians.

At the time of the Domesday survey the bishop of Chester held the lordship and manor of the town until the reign of Edward VI, when they were leased to the corporation. Richard II gave a charter (1387) for the foundation of the guild of St. Mary and St. John the Baptist. The whole government was exercised by the guild until its dissolution by Edward VI, who incorporated the town (1548), which was constituted a county unto itself, with the right to its own sheriff, in 1553 by Mary I. The only surviving fair is a small pleasure fair of ancient origin held on Shrove Tuesday. Other annual events are the court of the view of frankpledge and court baron of the burgesses of the manor of Lichfield, which has been held on April 23 since Norman times; the court of arraye held on Whitmonday is believed to date back to 1176 and is associated with the Greenhill Bower held annually since pre-Conquest times; the sheriff of Lichfield ceremonially perambulates the boundaries of the city and county on Sept. 8.

The cathedral, one of the smallest in England, is dedicated to SS. Mary and Chad and dates from the 13th and early 14th centuries. Built mainly of red sandstone, its fine exterior has a lofty central and two lesser western spires known as "the Ladies of the Vale," of which the central, 252 ft. high, is a restoration attributed to Sir Christopher Wren after its destruction during the Civil War. Among numerous monuments are memorials to Samuel Johnson (born in Bread Market street, 1709) and a tablet marking the site of the home of David Garrick, who spent his early life and was educated in Lichfield. Notable figures associated with the town include Elias Ashmole, Joseph Addison and the members of an 18th-century literary circle known as the Lichfield group embracing Erasmus Darwin, Anna Seward, Thomas Day and R. L. Edgeworth. It possesses a municipal art gallery and museum as well as Dr. Johnson's birthplace (now a museum of his personal relics) and the Regimental museum. King Edward VI's grammar school was founded in 1495. There are several houses of historic interest and architectural merit and also public gardens and pool walks. The boundaries of Lichfield were extended in 1934 with extensive housing projects. The variety of crafts and industries ranges from the production of essences to plastics and light engineering works.

LICINIUS (Valerius Licinianus Licinius) (d. A.D. 325), Roman emperor from A.D. 308 to 324, was an officer of Illyrian peasant origin, a friend of Galerius (*q.v.*), who on Nov. 11, 308, proclaimed him *Augustus* (for the significance of the title *see* Emperor). He was intended to rule the west, but as Italy, Africa and Spain were held by the usurper Maxentius, and Constantine (*q.v.*) ruled Gaul and Britain, he had to content himself with Pannonia. On Galerius' death in 311 he occupied his European dominions, while Maximinus (*q.v.*) seized Asia Minor. Licinius maintained an attitude of benevolent neutrality to Constantine when he attacked and overthrew Maxentius, and in 313 visited him at Milan and married his half sister Constantia. In the same year Maximinus invaded Thrace, but Licinius struck back quickly, defeated him at Tzurulum, east of Adrianople, and pursued him into Asia Minor. Maximinus fled to Tarsus, where he died, and Licinius thus became the ruler of all the eastern half of the empire.

During the campaign against Maximinus, Licinius made his army use a monotheistic form of prayer closely resembling that later imposed by Constantine, and on entering Nicomedia he issued on June 15, 313, an edict granting toleration to the Christians and restoring their property to the churches. He was hailed by contemporaries, Lactantius and Eusebius, as a convert, and may perhaps, impressed by Constantine's success, have wished to win the favour of the Christian god. His accord with Constantine was brief. In 314 war broke out, and Licinius was worsted and had to surrender the dioceses of Pannonia and Moesia. There followed ten years of uneasy peace in which Licinius built up his army and accumulated a huge reserve of treasure. He became alienated from the Christians and about 320 began a mild persecution, dismissing Christians from the army and the civil service, banning services in towns and prohibiting bishops from holding councils. In 324 Constantine attacked him and defeated him at Adrianople in Thrace (modern Edirne) and again at Chrysopolis (Üsküdar). Licinius surrendered and was exiled to Thessalonica. Next year he was executed on the charge of attempted rebellion. (A. H. M. J.)

LICORICE, the leguminous plant *Glycyrrhiza glabra,* a perennial herb of southern Europe, and the flavoured product derived from its sweet roots (the term licorice is a corruption of *Glycyrrhiza,* meaning "sweet root"). This species, the only one of

its genus that is cultivated, is the common or Spanish licorice grown throughout the warmer parts of Europe, especially on the Mediterranean shores, and to some extent in California and Louisiana. It is two to three feet tall, with compound leaves having four to eight ovoid leaflets; pealike, blue flowers in axillary clusters; and flat pods or legumes three to four inches long.

The roots for use are obtained in lengths of three or four feet, varying in diameter from one-quarter to one inch; they are soft, flexible and fibrous, and internally of a bright yellow colour. The characteristic sweet, pleasant taste is due to the substance glycyrrhizin, which, on hydrolysis, yields glucuronic acid (many times sweeter than table sugar) and glycyrrhetinic acid, which resembles a steroid (desoxycorticosterone) in both structure and action (*see* GLYCOSIDES, NATURAL; SAPONINS AND SAPOGENINS).

The hard and semivitreous sticks of paste, black in colour and possessed of a sweet, somewhat astringent taste, known as licorice paste or black sugar, are the thickened juice of the roots, the *radix glycyrrhizae* of pharmacopoeia. The preparation of the juice, by boiling crushed and ground roots, is an industry along the Mediterranean coasts. Licorice enters into the composition of cough lozenges and other demulcent preparations, and in the form of aromatic sirups and elixirs it has a remarkable effect in masking the taste of medicines. It also finds use as a flavouring agent in candies and tobacco. In medicine it has been used in the treatment of peptic ulcers and Addison's disease.

LICTORS (Lat. *lictores*), a class of attendants (*apparitores*) upon certain Roman and municipal magistrates, probably Etruscan in origin and dating in Rome from the regal period. In historical times they were mostly freedmen, and were organized in a society divided into three decuries headed by *decemprimi,* from which the attendants of the city magistrates and probably also those of the givers of games were drawn. The *lictores curiatii,* 30 in number, whose functions were mainly religious, provided the attendants on the *pontifex maximus* and probably on other priests and the Vestal Virgins. Lictors were exempt from military service. In Rome they wore the toga, on campaigns and at triumphs the red military cloak (*sagum*); at funerals they were clad in black. They received fixed salaries and served on annual appointments which were regularly renewed. They carried the fasces (*q.v.*) and were constantly in attendance in public on the magistrate they served and were dismissed with his dismissal or abdication. They cleared his way in a crowd, saw that he was received with the respect due to his office, stood by him on the tribunal (magistrate's platform), guarded his house, summoned offenders before him and seized, bound and scourged them at his orders. The monthly alternation of leadership between the consuls was expressed by lictors preceding the consul when he led, and following when he did not. The consul had 12, the dictator 24, praetors 6 (2 in the city), legates 5 and other magistrates with *imperium* a variable number. Priests and priestesses had one. Lictors originally summoned the *comitia curiata* (*see* COMITIA) but in the late republic it was represented by 30 lictors. In colonies they attended on the *duoviri* and were annual appointments.

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LIDDELL, HENRY GEORGE (1811–1898), English lexicographer, co-editor of *A Greek-English Lexicon,* was born at Binchester, near Bishop Auckland, on Feb. 6, 1811. He was educated at Charterhouse and Christ Church, Oxford, became a college tutor and was ordained in 1838. In 1846 he became headmaster of Westminster school. Early in 1834 Liddell and Robert Scott began the great *Lexicon* (based on the German work of F. Passow) which became his life work, and the first edition was published in 1843. It is still the standard Greek-English dictionary (revised ed. by H. S. Jones and others, 1940). In 1855 he became dean of Christ Church and took an active part in the first Oxford University commission. He resigned the deanery in 1891 and retired to Ascot, where he died on Jan. 18, 1898. It was for Liddell's daughter Alice that Lewis Carroll wrote *Alice in Wonderland.*

See H. L. Thompson, *Henry George Liddell* (1899).

LIDDESDALE (LIDDISDALE), the valley of Liddel water, Roxburghshire, Scot., extends 21 mi. from the Peel fell to the Esk, its head being crossed by the Catrail or Picts' dike. For 7 mi. it forms the border between England and Scotland. At one period points on the river were occupied with freebooters' peel towers, but many have disappeared. Hermitage castle, a massive H-shaped fortress and one of the oldest baronial buildings in Scotland, stands on a hill overlooking Hermitage water, a tributary of the Liddel. It was built in 1244 and captured by the English in David II's reign. It was retaken by Sir William Douglas, who received a grant of it from the king (*c.* 1353). In 1492 Archibald Douglas, 5th earl of Angus, exchanged it for Bothwell castle on the Clyde with Patrick Hepburn, 1st earl of Bothwell. It later passed to the duke of Buccleuch. It was there that Sir Alexander Ramsay of Dalhousie was starved to death by Sir William Douglas in 1342, and that James Hepburn, 4th earl of Bothwell, was visited in 1566 by Mary, queen of Scots, after being severely wounded by the outlaw Little Jock Elliot.

LIDDON, HENRY PARRY (1829–1890), Anglican preacher and theologian, was perhaps the most powerful advocate of the principles of the Oxford movement (*q.v.*) during the latter part of the 19th century. Born on Aug. 20, 1829, at North Stoneham, Hampshire, he was educated at King's College school in London and at Christ Church, Oxford. He was ordained in 1852 and in 1854 became vice-principal of the newly founded theological college at Cuddesdon, in the few years that he was there exercising a decisive influence on its development. In 1859 he became vice-principal of St. Edmund hall, Oxford. There he threw the whole weight of his attractive and powerful personality into the maintenance of the high church position in the university in the face of the strong liberal reaction which had developed after J. H. Newman's conversion in 1845. In 1864 he became examining chaplain to W. K. Hamilton, bishop of Salisbury, one of the few English bishops at that time favourable to high church principles. In 1866 he delivered the Bampton lectures, entitled *The Divinity of Our Lord* (published 1867), which had a great reputation as a clear and forceful restatement of traditional positions. He became a canon of St. Paul's cathedral, London, in 1870 and in the same year was made Ireland professor of exegesis in the University of Oxford. As the closest friend and associate of E. B. Pusey, Liddon played a large part in university affairs, opposing many of the changes then being made. But it was by his sermons in St. Paul's that he became most widely known; for 20 years his preaching attracted vast congregations and had its part in the transformation of the cathedral during the years when R. W. Church was dean (1871–90). Liddon entered entirely into the convictions and attitudes of the older Tractarians and like them consistently refused preferment. He is known to have refused more than one bishopric. His own genius was rather for the clear and forceful statement of a position than for original or creative thought. He had, like all the Tractarians, a deep concern for Christian unity. He took part in the development of the Old Catholic movement after the Vatican council of 1871 and became personally acquainted with J. J. I. von Döllinger. He traveled in Russia and the middle east, making contact with the leaders of the Eastern churches. After Pusey's death in 1882, Liddon undertook the writing of his official biography (posthumously published). His admiration for Pusey was unbounded; and this fact together with a certain lack of intellectual adaptability brought him in his latter years increasingly into conflict with some of the younger thinkers of the high church movement. The publication in 1889 of *Lux mundi,* a series of essays intended to state the Catholic faith in terms appropriate to contemporary modes of thought, was a great blow to him. Liddon died at Weston-super-Mare on Sept. 9, 1890.

See J. O. Johnston, *Life and Letters of H. P. Liddon* (1904).

(A. MACD. A.)

LIDICE, a mining village in the *kraj* (region) of central Bohemia, Czech., lies 3½ mi. E. of Kladno. It is one of the mining settlements of the Kladno coal basin and before World War II had about 450 inhabitants. On June 10, 1942, the village was completely destroyed by the Germans. Its people were accused of

complicity in the assassination of the German gauleiter Reinhard Heydrich, and the fate of Lidice was a reprisal. All the men (about 190) were shot. The women were deported, mainly to the concentration camp at Ravensbrück, and the children were scattered among German families. Many disappeared without trace. Lidice was rebuilt as a national memorial to the fate of its unfortunate people. It had (1960) about 150 inhabitants including a few of the women and young people who survived the tragedy and returned to their old neighbourhood. Miners in many countries were interested in the restoration of the village, which contains a museum of souvenirs belonging to the original settlement. Part of the memorial is an international rose garden.

(H. G. S.)

LIDNER, BENGT (1757–1793), Swedish poet of the 18th-century romantic movement, was born at Göteborg on March 16, 1757. He studied at Lund, 1774–75, and spent three years in Germany and one in Paris. He died at Stockholm, Jan. 4, 1793.

Lidner's best works were written between 1783 and 1787. His subjects are spectacular. *Spastaras Död* (1783), the text for a cantata, deals with a woman who attempts to rescue her son during an earthquake. Both are killed, and the poem follows the mother to heaven, where she meets Lidner's own mother, who had died when Lidner was a boy. In the operatic libretto *Medea* (1784), a deceived wife kills her sons on the stage. The heroine of the epic *Yttersta Domen* ("The Last Judgement"; 1788) is Eve: its opening, in which images of sound and light combine to evoke an intense atmosphere of death, is famous. Lidner's motto *"In lacrimis voluptas"* ("there is pleasure in tears") points to the pathetic element in his poetry and in his emotional life. He was musical, and his verse is melodious.

Lidner's *Samlade arbeten,* in two volumes, were published in 1788; there is an incomplete critical edition (1930–39).

See also K. J. Warburg, *Lidner* (1887); M. Lamm, *Lidnerstudier,* in *Samlaren* (1909). (S. E.)

LIDZBARK WARMINSKI (Ger. HEILSBERG), a district capital in the Olsztyn *wojewodztwo* (province), northern Poland, about 250 km. (155 mi.) N. of Warsaw by road. Pop. (1962 est.) 11,600. The town is a junction of several minor railway lines and has a grain and cattle market. It contains fine Gothic buildings, including the castle and a 14th-century church. In 1240 the Teutonic Knights erected the castle on the site by the Lyna river. The settlement around the castle obtained town rights in 1308. From 1306 to the beginning of the 19th century, Lidzbark castle was the seat of the bishops of Warmia (Ger. Ermeland). It was incorporated in Poland along with the whole of Warmia in 1466. Seized by Prussia in 1772, after the first partition of Poland, it was returned to Poland in 1945. (T. K. W.)

LIE, JONAS LAURITZ IDEMIL (1833–1908), Norwegian novelist, best known for his portraits of Norwegian home-life, was born on Nov. 6, 1833, at Modum, near Drammen. He spent his youth partly in the arctic town of Tromsø, partly near Bergen in the west, and prepared himself for university studies at a school in Christiania (Oslo), where Henrik Ibsen and Bjørnstjerne Bjørnson were among his fellow pupils. He practised as a solicitor in the east of Norway and lived for a great many years in Germany, France and Italy after his first literary success.

As a novelist Lie was constantly changing his aims and his technique in accordance with the successive literary schools of the second half of the century, passing from "poetic realism" via realism and naturalism into a new idealism in the 1890s. Nevertheless his originality is evident, and his first novel *Den Fremsynte* (1870; Eng. trans., *The Visionary,* 1894) made him famous. In this book he utilizes for the first time since Petter Dass (*q.v.*), 250 years earlier, the spell of the north of Norway, a country full of mysticism and strange events, and treats the same country in his folk tales *Trold* (1891–92; some translated in R. N. Bain's *Weird Tales from Northern Seas,* 1893). Lie is also known as the novelist of the sea, and *Lodsen og hans Hustru* (1874; Eng. trans., *The Pilot and His Wife,* 1876) placed him at the head of Norwegian novelists. It is a fine sea novel and at the same time a profound psychological study of jealousy in married life. His best work includes *Kommandørens Døtre* (1886; Eng. trans., *The Commodore's Daughters,* 1892) and *Familjen paa Gilje* (1883; Eng. trans., *The Family at Gilje,* 1920), a novel combining psychological insight with implicit social criticism and a vivid picture of domestic life in the 1840s. Lie died at Stavern on July 5, 1908.

See F. Bull, *Norsk litteraturhistorie,* vol. 4 (1924–55); J. W. McFarlane in *Ibsen and the Temper of Norwegian Literature* (1960).

(D. A. H.)

LIE, (MARIUS) SOPHUS (1842–1899), Norwegian mathematician who made significant contributions to the theories of algebraic invariants and differential equations, was born at Nordfjordeid, near Bergen, on Dec. 17, 1842. Educated at the University of Christiania (Oslo), in 1869 he went to Berlin and there met Felix Klein, in conjunction with whom he afterward published several papers. In 1871 he was appointed assistant tutor in Christiania university, in the same year submitting for his doctor's degree his famous memoir *Ueber Complexe, insbesondere Linien- und Kugel-Complexe, mit Anwendung auf die Theorie partieller Differential-Gleichungen,* in which he advanced the theory of tangential transformations. He was appointed extraordinary professor in 1872, and the following year began his researches on continuous transformation groups and discovered his transformation, making a sphere correspond to a straight line. In 1884 Ernst Engel went to assist Lie, and after nine years' work *Theorie der Transformationsgruppen,* three volumes (1893), was published, a work of wide range and great originality. It was followed by *Geometrie der Berührungstransformationen,* written with G. Scheffers (1896). In 1886 Lie succeeded Klein in the chair of mathematics at Leipzig, Engel being appointed his assistant. In 1898 he returned to Christiania to accept a special post created for him, but his health was already broken, and he died on Feb. 18, 1899. Besides his development of transformations, Lie made contributions to differential geometry; but his primary aim was the advancement of the theory of differential equations.

An analysis of Lie's works is given in the *Bibliotheca Mathematica* (1900); his collected works are contained in *Gesammelte Abhandlungen,* six volumes (1922–37). (O. OE.; X.)

LIE, TRYGVE HALVDAN (1896–), Norwegian statesman, was the first secretary-general of the United Nations. He was born in Oslo, Norway, July 16, 1896. Educated at Oslo university, he became a leading Labour party lawyer and politician, and in 1940 became foreign minister of the Norwegian government-in-exile. On Feb. 1, 1946, he was elected UN secretary-general for a term of five years.

As secretary-general, Lie exercised and developed the political authority of his untried office in the Iran, Palestine and other cases, and, in 1950, undertook a "peace mission" to great power capitals designed to end the Soviet boycott over representation of Nationalist China and to advance his "Twenty Year Peace program."

His important support of UN military action in Korea led to his denunciation by the Soviet bloc, whose opposition to his renomination was overridden in 1951 by extending his term for three years. The barrier to his mediatorial activities raised by continuing Soviet refusal to recognize him as secretary-general was a principal cause of Lie's submitting his resignation in Nov. 1952, in a context of criticism of his personnel policies.

See Trygve Lie, *In the Cause of Peace* (1954) and Stephen M. Schwebel, *The Secretary-General of the United Nations* (1952).

(S. M. S.)

LIEBER, FRANCIS (1800–1872), U.S. political philosopher whose code of military regulations for the conduct of the Federal troops in the Civil War became the basis of the Hague conventions of 1899 and 1907, was born in Berlin, Ger., on March 18, 1800. After studying mathematics at the universities of Jena, Halle and Dresden in 1820–21, he joined an expedition to free Greece from Turkish rule. On returning to Berlin in 1823, he was soon, as on a previous occasion, imprisoned without trial by the Prussian police on suspicion of being a revolutionary; he emigrated to the United States in 1827.

His first important venture in his new home was the *Encyclopedia Americana* (13 vol., 1829–33). In 1835 he obtained the professorship of history and political economy at South Carolina

college, where he made his reputation as a political theorist with his *Manual of Political Ethics* (2 vol., 1838–39), *Legal and Political Hermeneutics* (1839) and *On Civil Liberty and Self-Government* (1853). In 1857, when Columbia college in New York city began to expand into a university, Lieber was appointed to the new chair of history and political science, and in 1865 he became professor of constitutional history and public law in the Columbia law school. During the Civil War, while a member of a war department board, he prepared the codified *Instructions for the Government of the Armies of the United States in the Field,* which was issued by the adjutant general's office as *General Orders No. 100* (1863). This codification became international law through embodiment in the Hague conventions of 1899 and 1907.

To Lieber, the national polity was the normal type of government in modern civilization. However, he deprecated "centralization," which he described as the converging of all the "rays of power into one central point"; whereas nationalization was the "diffusion of the same life blood through a system of arteries, throughout the body politic." His most distinctive contribution was the view that civil liberty could be realized only through the development of a "vast system of (self-governing) institutions, where number supports the whole, as the many pillars support the rotunda of our capitol." Lieber died in New York city on Oct. 2, 1872.

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LIEBERMANN, MAX (1847–1935), painter and etcher, who became a leader of the German Impressionist school, was born in Berlin on July 20, 1847. After studying under Steffeck, he entered the school of art at Weimar in 1869. Though the straightforward simplicity of his first exhibited picture, "Women Plucking Geese" (Berlin, National gallery) in 1872, presented already a striking contrast to the art then in vogue, it was heavy and bituminous in colour. In his course he was confirmed by Mihaly von Munkacsy's influence in Paris in 1872. A summer spent at Barbizon in 1873, where he became acquainted with Jean François Millet and studied the works of Jean-Baptiste Camille Corot, Constant Troyon and Charles François Daubigny, resulted in the brightening of his palette. He subsequently went to the Netherlands, where the example of Jozef Israëls confirmed him in the method he had adopted at Barbizon; on his return to Munich in 1878 he caused much unfavourable criticism by his realistic painting of "Christ in the Temple," which was condemned by the clergy as irreverent. His later work showed the influence of French and German Impressionism, overlaid with his personal style. He devoted himself exclusively to the study of light and to the painting of the life of humble folk. He found his best subjects in the orphanages and asylums for the old in Amsterdam, among the peasants of the Netherlands, and in the beer gardens, factories and workrooms of his own country.

Liebermann did for his country what Millet did for France. His pictures hold the fragrance of the soil. His people move in their proper atmosphere and their life is stated in all its monotonous simplicity. His work being at variance with the academic tradition, he became the leader of the *Berliner Sezession* (*see* PAINTING: *Expressionism and the German school*). His first success was a medal awarded him for "An Asylum for Old Men" at the 1881 salon. Then followed "The Cobbler's Shop" (1881) and "The Flax Spinners" (1887). In 1884 he settled in Berlin, where he became president of the Academy. Liebermann's painting and etchings are represented in many of the leading continental galleries. He died in 1935.

LIEBIG, JUSTUS VON, BARON (1803–1873), German chemist who made important contributions to the early systematization of organic chemistry, to the application of chemistry to biology (biochemistry), to chemical education and to the basic principles of agricultural chemistry, was born at Darmstadt on May 12, 1803. He studied pharmacy for a short time but, since he was determined to become a chemist, he entered the University of Bonn to study with a leading chemist of the day, K. W. G. Kastner. When Kastner moved to the University of Erlangen, Liebig accompanied him and received his doctorate there in 1822. He then received a grant from the Hessian government to study in Paris. Through the influence of Alexander von Humboldt he was able to work in the private laboratory of J. L. Gay-Lussac (*q.v.*).

In 1824 he joined the faculty of the University of Giessen, where he became a full professor in 1826. At Giessen he established the first laboratory in which the methods of chemical research were taught systematically to young chemists. The laboratory soon became world famous and students from all over Europe came to study with him. Among them were many of the notable chemists of the following generation, including A. W. von Hofmann, Sir Edward Frankland, F. A. Kekulé von Stradonitz and C. A. Wurtz. Liebig's laboratory set the pattern for chemical education that came to prevail in Germany and was in large part responsible for the great development of German chemistry later in the 19th century. In 1845 he was made a baron and in 1852 he became professor of chemistry at the University of Munich, where he remained for the rest of his life. He died in Munich on April 18, 1873.

Liebig was an active worker in many fields of inorganic and organic chemistry, but certain of his studies stand out because of their great significance in the later development of chemistry. His early studies on the isomerism of cyanic and fulminic acids made a great impression on his contemporaries and led him into the field of organic chemistry. Through his work in organic chemistry, he became acquainted with another outstanding chemist, Friedrich Wöhler (*q.v.*). His friendship with Wöhler lasted a lifetime and the two men collaborated in several investigations. The most important of these was the study of bitter almond oil (benzaldehyde), in which the same chemical group was found to pass unchanged through a great variety of reactions. Such a group was called a radical, and the radical theory that Liebig did much to develop was the first major attempt at systematization in organic chemistry. (*See* BENZOIC ACID; CHEMISTRY: *Organic Chemistry: The Radical Theory of Structure* [*Wöhler and Liebig*].)

Liebig's studies in organic chemistry were greatly aided by the simple method he developed for the analytical determination of carbon and hydrogen. He also developed a method for the analytical determination of halogens, published important work on polybasic organic acids and did much to support the hydrogen theory of acids. (*See* CHEMISTRY: *Analytical Chemistry: Organic Analysis: Quantitative Analysis of Organic Compounds.*) He popularized but did not invent the Liebig condenser still used in many laboratory distillations.

After 1838 Liebig's interest shifted from pure organic chemistry to the chemistry of plants and animals. He made a large number of analyses of tissues and body fluids and carried out a study of the nitrogenous products of the animal organism. A by-product of this investigation was the Liebig extract of beef. (*See* BIOCHEMISTRY: *History: Liebig and Pasteur.*) He then became greatly interested in agricultural problems and in 1840 published *Die organ. Chemie in ihrer Anwendung auf Agrikulturchemie und Physiologie.* This book exerted a very great influence on practical agriculturalists. He rejected the old theory that humus supplied plants with food and showed that plants took carbon dioxide, water and ammonia from the air and soil. He advocated the use of mineral fertilizers to supply other elements that might become depleted in soils. (*See* FERTILIZERS AND MANURES: *History.*)

In his later years Liebig's reputation became so great that he was regarded as the final authority in chemical matters. He never hesitated to express his sometimes rather rigid views. As a result he was often involved in scientific controversies in which he was not always in the right. Much of his work was published in the journal that he founded in 1832, the *Annalen der Pharmazie,* which ultimately became the *Annalen der Chemie,* one of the major chemical journals.

After he accepted the professorship at Munich, Liebig grad-

ually lost his enthusiasm for laboratory work. He soon refused to accept new students and devoted himself more and more to literary activities. In these, aside from his frequent polemics, he was occupied in stressing the broader applications of chemistry to human life.

See also references under "Liebig, Justus von" in the Index.

BIBLIOGRAPHY.—The correspondence of Liebig with the leading chemists of his day, such as J. J. Berzelius, F. Wöhler, C. F. Schönbein and K. F. Mohr, has been published and casts much light on the conditions of chemistry during his lifetime. There are numerous biographies, including the article by R. Winderlich in G. Bugge's *Das Buch der grossen Chemiker* (1930) and that by Fritz Haber in Eduard Farber's *Great Chemists* (1962). (H. M. L.)

LIEBKNECHT, KARL (1871–1919), German left-wing socialist whose internationalism and antimilitarism led him to become first a Spartacist and then a founder of the German Communist party, was born in Leipzig, on Aug. 13, 1871, the son of Wilhelm Liebknecht (*q.v.*). Educated for the law, he early became absorbed in the socialist workers' movement. He argued passionately against the bureaucratic leadership of the Social Democratic party and made himself known even outside Germany by his defense of Russian revolutionaries before a German court (1904); by his activity in the second international; by his role in the foundation of the Socialist Youth international (1907); and by his book *Militarismus und Antimilitarismus* (1907), for which he was sentenced to 18 months' detention in a fortress.

Elected to the Prussian chamber of deputies in 1908 and to the *Reichstag* in 1912, he made a sensational exposure of the bribery of war office staff by employees of the Krupp firm in 1913. Though for reasons of party discipline he voted with the rest of the Social Democrats for the war credits on Aug. 4, 1914 (*see* GERMANY: *History*), he voted against the credits as early as Dec. 2, 1914, being then the only member to do so. Thenceforward he conducted his own campaign in the *Reichstag* against the government. Moreover, with Rosa Luxemburg and others, he worked to gather the opponents of the party leadership's war policy into the Gruppe Internationale, the future Spartacus group.

In his struggle against the leaders of the Social Democrats, and also against the centre faction of the Independent Social Democrats, Liebknecht came close to Lenin's advocacy of civil war. On Jan. 1, 1916, he was expelled from the Social Democratic group in the *Reichstag*. He then had some experience of war as a simple soldier in a labour battalion; but on May day in 1916 he led a demonstration in Berlin against the imperialist war. For this he was arrested and sentenced to 49 months' hard labour. He was released, however, on Oct. 23, 1918; and on Nov. 9 he succeeded in proclaiming a German socialist republic in Berlin. To resist Friedrich Ebert's government, the Spartacus group, in its meeting of Dec. 30, 1918–Jan. 1, 1919, was transformed into the Communist Party of Germany, with Liebknecht remaining one of its leaders. Then a Communist rising against Ebert's government was suppressed, and on Jan. 15, 1919, Liebknecht was arrested and murdered by officers of the counterrevolutionary volunteers.

Liebknecht showed striking originality in the critical elaboration of Marxian themes in his *Studien über die Bewegungsgesetze der gesellschaftlichen Entwicklung* ("Studies of the Laws of Motion in the Development of Society"; 1922). He was not merely an outstanding orator but a man of aesthetic sensitivity, with an especial understanding for music. Absolute personal honesty and unquestionable idealism were fused in him with dogmatic conviction and credulous optimism. Faced with the horrors of World War I, he came more and more to hate not only the Social Democratic leaders but also the Independent Socialists, thus isolating himself more and more from the bulk of the workers' movement until at last he saw revolutionary violence as the only way out. Yet he never renounced his humanist belief in a democratic socialist world republic as the ultimate goal. Publication of a collected edition of Liebknecht's speeches and writings began in 1958.

See H. Schumann, *Karl Liebknecht* (1923); K. W. Meyer, *Karl Liebknecht: Man Without a Country* (1957). (O. K. F.)

LIEBKNECHT, WILHELM (1826–1900), German socialist political leader and author, was born at Giessen, Ger., on March 29, 1826. He studied at various German universities and became a radical democrat while still a student. He participated in two armed insurrections during the German revolution of 1848–49, and afterward escaped to Switzerland and then to England. In London, where he lived for 13 years, he made the acquaintance of Karl Marx and became his loyal disciple. After the amnesty of 1861 Liebknecht returned to Germany where he earned a precarious living for himself and his family by writing for newspapers. Marx and Friedrich Engels had little confidence in Liebknecht's acumen and good judgment, but respected his character and trusted his loyalty so that they made him their principal spokesman in German politics.

Instructed by Marx, Liebknecht first tried to co-operate with the other leading German socialist, Ferdinand Lassalle, but differences of opinion, aggravated by Marx's deteriorating relationship with Lassalle, eventually opened a rift between Liebknecht and the Lassallean camp. The widespread opinion that Liebknecht was more radical than the Lassalleans is derived mainly from his skepticism about bourgeois parliamentarism and universal suffrage, which the Lassalleans valued highly, and his vigorous opposition to Bismarck's paternalistic "state socialism," with which the Lassalleans were inclined to compromise. The idea of an independent workers' party for Germany was primarily a Lassallean principle; Liebknecht, when he founded (with August Bebel; *q.v.*) the *Sächsische Volkspartei* in 1866, at first kept this organization within the framework of the middle-class *Deutsche Volkspartei*. In this period Liebknecht and his friends still tended to regard the left wing of liberalism as the natural if unreliable ally of the socialist workers, whereas the Lassalleans considered the *bourgeoisie* the principal enemy and were inclined to accept conservative support, especially Bismarck's, against middle-class capitalists. In 1869 Liebknecht and Bebel broke with the *Deutsche Volkspartei* and reorganized their own group as a strictly Marxist party under the name of *Sozialdemokratische Arbeiterpartei*, usually called the *Eisenacher* after the location of the founding congress. Liebknecht's and Bebel's bitter anti-Prussianism, which the Lassalleans did not share, was one of the factors that caused rivalry and even hostility between the new organization and the Lassallean *Allgemeiner Deutscher Arbeiter-Verein*. In 1875, when Prussian hegemony had become an indisputable fact through the founding of the German *Reich* with its Bismarckian constitution, the Lassallean and Marxist parties merged, largely on Liebknecht's initiative.

Liebknecht was elected to the north German *Reichstag* in 1867, and after German unification belonged to the new *Reichstag* from 1874 to his death, with an interruption from 1887 to 1890. Liebknecht's close association with Bebel was very beneficial for Bebel, who had never enjoyed much formal education and learned from Liebknecht the elements of general knowledge. In planning political strategy, Bebel gradually overshadowed his teacher, but Liebknecht always proved himself a master of the written and spoken word in the political struggles of his time; especially during the period of the antisocialist law, Liebknecht's devotion, courage and contagious enthusiasm made him invaluable to his party. In the internal struggles of the party, he proved himself a stanch opponent of the revisionists, but always tried to prevent an open split. Liebknecht was immensely popular with the German workers. He died at Charlottenburg on Aug. 7, 1900, and his funeral turned out to be one of the greatest demonstrations for the socialist cause ever seen in any country.

Liebknecht's major publication was *Robert Blum und seine Zeit* (1888).

See also SOCIALISM.

See Kurt Eisner, *Wilhelm Liebknecht, sein Leben und Wirken* (1900) and many references to Liebknecht in the biographies and published letters of Karl Marx, Friedrich Engels and other socialist leaders. (C. L.)

LIECHTENSTEIN (FÜRSTENTUM LIECHTENSTEIN), one of the smallest independent principalities in Europe, 157 sq.km. (61 sq.mi.) in extent. Separated on the west by the Rhine a few miles below the Lake of Constance from the Swiss canton of Sankt Gallen, it is bounded on the east by Austrian Vorarlberg and on

FRITZ ESCHEN

BURG LIECHTENSTEIN, CASTLE OF THE RULING PRINCE, SITUATED ABOVE VADUZ, CAPITAL OF THE PRINCIPALITY

the south by the western crests of the Rhätikon, between Liechtenstein and Graubünden, Switz. The major physical divisions are: (1) a once marshy flood plain parallel to the Rhine, widening northward into the triangular lowland formed by the Rhine and its tributary the Ill; (2) a foothill zone practically bisected by the Samina, which feeds the Ill. The highest peaks lie southward, with Falknis (8,399 ft.) central south, and Naafkopf (8,432 ft.) southeast, at the meeting point of the three frontiers. The chief settlements are on the terraces above the flood plain. In order from the south, they are Balzers, Triesen, Vaduz (capital and seat of government; pop. [1960] 3,398), Schaan and Nendeln. They are linked by the road joining Bad Ragaz, Switz., with Feldkirch, Aus. Two small settlements, Eschen and Mauern, lie in the northern triangular lowland. Liechtenstein's only railway crosses the Rhine between Buchs, Switz., and Schaan and then parallels the road to Nendeln and continues on to Feldkirch. It is part of the Arlberg Express route (Paris–Vienna). A 740-ft. tunnel connecting the Rhine and Samina valleys was opened in 1947. The population in 1960 was 16,628, largely Austrian in origin and speaking a German dialect, and Roman Catholic in religion. German is the official language. The majority of the people are engaged in farming; corn, wine and fruit are grown and cattle are reared. There are also small manufactures of cotton and leather and of postage stamps, which provide a considerable proportion of the principality's revenue. Vaduz is a thriving tourist centre from which a circuitous road leads up a steep slope to the medieval castle on the bluff overlooking the town, where the prince of Liechtenstein resides.

The principality was founded in 1719, consisting of the lordships of Schellenberg and Vaduz, and formed part of the Holy Roman empire. It was included from 1806 to 1815 in the Rhine confederation, and from 1815 to 1866 in the German confederation. In 1866 it became independent. The monarchy is hereditary in the male line. Prince John II (1840–1929) succeeded his father in 1858. Francis I (1853–1938) succeeded his brother in 1929 and was in turn succeeded by his great-nephew, Francis Joseph II, in 1938. The constitution, after 1921, provided a *Landtag* of 15 members elected by all males over 21. On the motion of the *Landtag,* the prince appoints the chief of government and his deputy, who serve six-year terms. The *Landtag* also appoints two councilors to assist in the administration. Liechtenstein has its own civil and criminal codes and court system, although Swiss courts have jurisdiction in certain cases. There are primary and secondary schools. The standing army was abolished in 1868.

Until 1919 Liechtenstein was closely allied with Austria. In 1921 it adopted Swiss currency and after 1924 it was included in the Swiss customs union. Switzerland also administers the post, including the telephone and telegraph systems.

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LIED, plural *Lieder,* the German word for "song," used in English to denote the particular form of 19th-century German song written by Schubert, Schumann, Brahms and others, *i.e.,* the *Lied* form. It is also used for the 16th-century German form of the polyphonic song. *See* SONG.

LIÈGE (Flem. LUIK), the most easterly of the nine provinces of Belgium, consisting of four administrative *arrondissements* (Huy, Liège, Verviers and Waremme), 29 judicial cantons and 369 communes. Pop. (1961) 1,003,526. Area 1,497 sq.mi. The province is bounded by the provinces of Limburg (north), Luxembourg (south), Namur (southwest) and Brabant (west); also north by the Netherlands and east by Germany. It includes the former German territory of Eupen-et-Malmédy (*q.v.*) and the neutral district of Moresnet, which became Belgian in 1919 and are within the *arrondissement* of Verviers. German is still widely spoken there.

The province has four geographical regions: the Meuse valley, the southern part of the plateau of Hesbaye to the north of the Meuse, the plateau of Herve and the northeastern part of the Ardennes and the Condroz. The Meuse flows east-northeast from its junction with the Sambre at Namur, enters the province near Andenne, and continues in this direction to Liège. Upstream from Liège it is a useful waterway; at Monsin barrage, below Liège, it becomes virtually unnavigable, and the Albert canal follows its left bank to Lanaye before it turns northwest around the Maastricht district.

To the north lies the southern part of Hesbaye plateau, the edge of which rises to 719 ft. overlooking the Meuse valley. Most of it consists of Upper Chalk, though overlain by a *limon* (clay or loam) cover, in places 50 ft. thick. The plateau surface is uniform, interrupted only by the valleys of two Meuse tributaries, the Mehaigne and the Geer, and by broad shallow depressions. The Pays de Herve lies in the northeast, between the Meuse valley and the German frontier, bounded on the south by the valley of the Vesdre (which flows to the Ourthe, thence the Meuse). The plateau surface consists of Upper Chalk with a clay-with-flints cover, though the valleys are cut down into Paleozoic rocks. A cover of *limon* occurs on the Meuse terraces to the northwest. Zinc ores occur in the old rocks and mines, now closed, were worked for centuries in the valleys at Welkenraedt, Lontzen, Moresnet, La Calamine and Bleiberg. Almost all the plateau exceeds 600 ft. and it reaches 1,161 ft. near Henri-Chapelle. A few rivers have cut prominent valleys into the plateau surface (notably the Geule and the Berwinne) and some short streams drain the southern plateau and join the Vesdre; otherwise surface drainage is deficient.

The southeastern corner of the province consists of a portion of the Condroz and the Ardennes, drained by the Ourthe and the Amblève. The rocks are of Carboniferous Limestone, Devonian sandstones, shales and limestones, and Cambrian slates and quartzites. The last form the Stavelot massif, the highest point of the Ardennes (the Botrange, 2,277 ft.; the Baraque Michel, 2,211 ft.). These form rounded summits separated by shallow depressions, with peat bogs or moorland (notably the Plateau des Hautes-Fagnes) and areas of spruce plantation. A small part of the Condroz plateau lies in the angle between the Meuse and the Ourthe.

Agriculturally the area is varied. In Hesbaye arable farming is predominant, and on the loam soils the emphasis is on wheat and sugar beet. In the Meuse valley market gardening and dairy farming supply the dense industrial population. There is arable farming in the northwestern part of the Pays de Herve on the *limon* soils; oats and fodder crops predominate on the higher plateau, wheat and sugar beet in the lower areas, elsewhere meadows and orchards. It is a prosperous dairying district, and store cattle are sold off to farmers farther west. Agriculture in the Ardennes is limited; beef cattle are bred on the uplands and dairy farming and the cultivation of oats, rye, trefoil and potatoes are carried on in the valleys. Parts are quite thickly wooded; some of the best-maintained forests in Belgium are in the Eupen-et-Malmédy district.

The province has two major industrial regions: along the Meuse valley, centred on the city of Liège, and in the Vesdre valley around Verviers. The most easterly basin of the Sambre-Meuse coal field occurs around Liège. In the mid-20th century numerous uneconomic pits were closed and several others modernized. Liège (*q.v.*) has been industrial since medieval times. With its satellite towns (Grivegnée, Angleur, Ougrée, Tilleur, Seraing, Flémalle, Herstal and others) it has varied industries and is a major centre of heavy industry. Collieries, coke ovens, steelworks and chemical factories extend along the Meuse valley.

Since the 15th century Verviers (*q.v.*) has been important for the production of woolen textiles, and with neighbouring small towns (Ensival, Dison and Theux) it now dominates the Belgian woolen industry. It is supplied with pure soft water from the reservoir behind the Barrage de la Gileppe, near Dolhain. The district also manufactures leather goods, brushes, chemicals, glue and chocolate. Liège is an important centre of communications; apart from the Meuse river and the Albert canal, six main roads converge upon it, and several international railway routes (Paris–Charleroi–Cologne, Ostend–Brussels–Cologne, and Amsterdam–Luxembourg–Basel) pass through.

While the average density of population over the province is 663 per square mile (below the national average), this disguises considerable variations. Southern Hesbaye has many villages nucleated into compact groups of houses and towns, and such small towns as Ambresin and Waremme, with less than 5,000 inhabitants. Much of the Ardennes is thinly populated, but several towns are market centres and resorts: Eupen (14,445, the largest), Spa (9,055) with its mineral springs situated at a height of 800–1,000 ft. in a wooded valley, Stavelot in the Amblève valley (a town with a history going back to the 7th century) and St. Vith, rebuilt since its destruction in 1944. The most densely populated part is the Meuse valley industrial district; the population of the Liège industrialized area exceeds 500,000. Farther upstream is Huy (13,447) which dates from the 9th century, its citadel crowning a gray rock above the Meuse; Peter the Hermit was buried in 1115 at Neufmoustier abbey, one of ten abbeys at Huy once dependent on the bishopric of Liège. (F. J. M.)

History.—The bishopric of Liège was one of the ecclesiastical principalities of the Holy Roman empire. It was much larger than the modern province. By the beginning of the 11th century it included, in the north, most of what is now Belgian Limburg (the countship of Looz and the Campine or Kempenland); in the south the eastern part of the modern province of Namur; and, to the southwest again, a considerable area between the Sambre and Meuse rivers. Bouillon, south of Luxembourg, was likewise a dependency of the bishopric. It thus extended from Upper Gelderland to the French frontier (Champagne); but its frontiers were deeply indented, and within them were enclaves of territory depending on neighbouring states. Internationally it became especially important in the 15th century, since it lay between the northwestern and the southeastern areas of the Burgundian Netherlands. From the 16th century, however, when the Burgundian lands had passed to the Spanish Habsburgs, the prince-bishops generally collaborated with the Habsburgs. Consequently, in the 17th century, the French began to encroach on their territory. Annexed to France in 1795, during the French Revolutionary Wars, the principality was dissolved among the *départements* of Sambre-et-Meuse, Ourthe and Meuse-Inférieure. Assigned to the kingdom of the Netherlands in 1815, the lands became Belgian in 1831. (X.)

LIÈGE (Flem. Luik, Ger. Lüttich), the chief town of the province of Liège, Belg., and between *c.* 1000 and 1795 the capital of the principality of Liège, lies on the Meuse at its confluence with the Ourthe. Pop. (1961) 153,240. (Liège was spelled with a grave accent until after World War I, when the spelling with the acute accent prevailed. The grave accent was again officially decided upon in 1946.)

Liège is the largest French-speaking city in Belgium and the third most important river port of western Europe. The Meuse, which is deep enough to take Rhenish boats of more than 2,000 tons and some seagoing ships, connects the city with other Belgian industrial districts and with those of northern and eastern France and of the Netherlands. There is a heliport in the town. After Antwerp, the most important rail centre of Belgium, Liège is the meeting place of the great Paris–Berlin and Amsterdam–Basel roads. The Meuse flows through the centre of the town. The old part on the left bank, comprising the residential quarter, is the largest section of the city. There are several parks, one of which, the Parc d'Avroy, is close to the large boulevard which runs through the city. To the west of this park are the botanic gardens.

The cathedral (the former abbey church of St. Paul), which stands to the north of the Parc d'Avroy, is one of many Romanesque and Gothic churches; others include those of St. Barthélemy, St. Denis, St. Jacques, St. Jean, St. Croix and St. Martin. The city has concert halls, theatres and an opera house. The museums of fine art and of Walloon life have a particularly fine collection of French painting from Ingres to Picasso. The Archaeology museum (in Maison Curtius) and Ansembourg museum for decorative arts house important examples of Mosan art (artifacts of the Meuse valley) and an international collection of glass. Liège university (1816) was being entirely rebuilt in the 1960s on a spacious new site in the forest of Sart Tilman south of Liège. The Royal Conservatoire of Music was founded in 1887 and is famous for its violin school established by Eugène Ysaÿe. An example of modern building is the Palais des Congrès (1957–58).

There are also several research laboratories and technical schools associated with the major industries of Liège, such as the Belgian centre for the study of water, the national centre for metallurgical research, the coal industry's national institute and a section of the nuclear sciences inter-faculty centre. Liège has been an important industrial centre for many years, due, in great part, to its easy accessibility by water and road and to the presence of coal. The largest finished product is steel and of that almost one half is in the form of rolled steel. The manufacture of small arms is still an important industry.

Men have lived in the area of Liège in Paleolithic, Neolithic, Roman and Frankish times. The city, which came into being during the 8th century when a bishopric was established, took advantage of its favourable geographic position near the Carolingian settlements of Jupille, Herstal and Aix-la-Chapelle. About the year 1000, under the powerful bishop Notger, it grew greatly in importance; it was the centre of Mosan art and it became one of the most famous intellectual cities of the west.

In 1131 Pope Innocent II met King Lothair (later emperor) at Liège at a council attended by St. Bernard. Its status was that of an independent principality ruled by the prince-bishops, under the Holy Roman emperor. It was given a communal magistracy in 1185. On June 3, 1208, Philip, duke of Swabia and king of the Romans, confirmed the citizens' charter of Bishop Albert de Cuyck (1195–1200). But the nobles and upper class, who bitterly resented the strengthening of the municipal power and of the trade guilds, with their right (from 1303) of representation on the city council, attempted a *coup de main* on the night of Aug. 3–4, 1312. This, from its failure, with the burning to death by the populace of the nobles' armed party in the church of St. Martin, is remembered as the Male St. Martin. On Feb. 14, 1313, political equality was granted to the labourers and a preponderance of the trade guilds. In the 15th century, during the Burgundian domination of the Netherlands, Liège was attacked by Charles

the Bold and the city was ruthlessly sacked (1467). After the fall of the Burgundian power in Liège in 1477 the city was rebuilt. In the first part of the 16th century, under the prince-bishop Evrard de la Marck, there was a vigorous movement in the arts deriving from the medieval rather than the Italian style. In the 17th century, when industrialization started, internal strife between the Chiroux (the pro-prince party) and the Grignoux was aggravated by the intervention of Richelieu and Mazarin. In 1684, after hard fighting, the prince-bishop Maximilian Henry of Bavaria destroyed all democratic institutions. In 1691 Liège was bombarded by the French artillery. In 1702 it was taken by Marlborough. For a century the nobles and upper classes flourished undisturbed, but their rule was ended in 1789 by a bloodless revolution. In 1795 Liège was formally joined to France, becoming chief town of the *département* of the Ourthe, and so remained until 1814 when the first treaty of Paris detached it. In 1815, the whole of the *département* of Meuse-et-Ourthe (created in 1814) was awarded to the kingdom of the Netherlands by the congress of Vienna.

In the Belgian revolution of 1830, the Liégeois under Charles Rogier played an important part; and, on Oct. 28, Liège became part of Belgium. From that time the city expanded, and its arms industry became one of the foremost in Europe. In World War I the battle of Liège (Aug. 4–16, 1914) delayed the advance of the Germans and it was only after fierce fighting that the city fell. During World War II, when Liège was the centre of the Belgian resistance, the city was heavily bombarded but the historic buildings were not badly damaged.

Jean le Bel, the 14th-century chronicler, was a native of Liège, which has numbered among its citizens many men who have made important contributions to industry, music (César Franck) and art. Three dignitaries of the ancient cathedral of St. Lambert became popes under the names of Urban IV, Gregory X and Innocent VI.

See also references under "Liège" in the Index.

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(JH. PE.)

LIEGE, an adjective originally meaning "simple" or "unconditioned," which after the development of feudalism came to be used to qualify certain legal terms. In feudal law, liege homage was the homage due from a tenant to his chief lord, *i.e.,* the lord from whom he held most land or from whom he had held the longest. Soon kings demanded the insertion of the clause "saving the faith due to the king" into every act of homage. Under Edward I (d. 1307) of England every adult male had to swear fealty to the king—a fealty so unconditioned that the oath became known as an oath of ligeance (Lat. *ligeantia*) or allegiance. Thus the word "allegiance" came to denote the subject's duty to his sovereign. *See* FEUDALISM: *Feodo-vassalitic Institutions.*

See F. Pollock and F. W. Maitland, *The History of English Law,* 2nd ed. (1898).

LIELUPE, a river, the basin of which lies in the Lithuanian and Latvian Soviet Socialist Republics of the U.S.S.R., though the river itself, which is formed by the confluence of the Memele and Musa at Bauska, a point 64 km. (40 mi.) S. of Riga, is entirely in Latvia. With its tributaries it drains a roughly circular lowland area, partly in Lithuania. It enters the Gulf of Riga at Riga, after flowing eastward parallel to the coast for 15 mi. The lower course is through marshland. The river floods in spring and at times in summer and autumn. It is navigable for small craft for about 100 km. (62 mi.). The chief town on the Lielupe is Jelgava; there are several resorts near its mouth. (J. P. Co.)

LIEN, in law, signifies the hold or claim which one person, the lienor or creditor, has upon the property of his debtor as security for the performance of some debt or obligation. The word lien is a generic term and includes liens acquired by contract or by operation of law, on real or on personal property. Among the many types of liens are tax, judgment, conditional sales, mortgage, maritime, mechanic's, vendor's, attorney's, innkeeper's, warehousemen, banker's and factor's liens.

The significance of a lien is that it gives a right which is superior to the rights of general creditors. The holder of a lien may look to specific property with which to satisfy the debt which is owed to him, whereas the general creditor may find his claim worthless if his debtor has no unencumbered property from which his claim can be satisfied. Even if the debtor has personal property from which a judgment can be satisfied, it is necessary, in order for the judgment to attain the status of a lien, that the creditor obtain a writ of execution for his judgment and have the sheriff levy upon his debtor's property; or if he is to satisfy his claim from his debtor's land, he must record his judgment according to statute.

Legal Liens.—A legal or possessory lien is perhaps the most common and simplest type of lien. It is the right "in one man to retain that which is in his possession belonging to another, till certain demands of him the person in possession are satisfied" (*Hammonds* v. *Barclay* [1802], 2 East [K.B.] 227). Thus the security of the lienor is in the possession of the goods of the debtor. With the exception of factors (commercial agents employed to buy and sell goods on commission), possessory lienors have no right to sell the bailed property unless such right is conferred by statute or by the express terms of the bailment contract. The common-law possessory lien is, therefore, simply a legal device to coerce the debtor into payment of the debt. It follows, too, that a possessory lienor cannot transfer the article to another as if it were his own, even if the debtor refuses to pay the debt. Such a transfer would result in a loss of the lien and constitute a conversion, making the lienor liable to the debtor for the value of the chattel. Although there is no unanimity in the law, it is generally agreed in the U.S. that the lienor can expressly assign his debt and with it the lien which secures it. The right to assign the benefit of the lien is frequently conferred by statute.

Possessory liens may arise from operation of the common law, out of custom made a part of the agreement, by a special agreement of the parties, or by statute. But not all bailees have possessory liens. It is the bailee-artisan, such as the tailor, shoemaker, furrier or jeweler, who, by improving the bailed article, can assert the right to retain it until his bill is paid.

Pledge or pawn is a special type of possessory lien, since it is a bailment specifically intended to secure a loan. A possessory lien must also be distinguished from a mortgage (*q.v.*), whether of real or personal property, since, in a mortgage, title rather than possession is in the creditor. (*See* PAWNBROKING.)

Specific Liens.—A common-law possessory lien may be either specific (particular) or general. The specific lien applies only to the amount due the lienor for services performed on a specific chattel. Several requirements must be satisfied in order for a creditor to maintain a specific lien. Present possession and the right to retain possession must be in the creditor. Further, he must have added to the value of the bailed goods by his labour, skill or materials. Thus agistors (those who take in livestock to pasture at certain rates), livery stablekeepers and garage owners obtain no lien for keeping the property of their customers under the common law, although in some jurisdictions this has been changed by statute. Wharfingers and warehousemen are an exception to this rule, as they are in the business of storage, and the same is true of common carriers who, because they are under a duty to accept the goods, are given a right to retain the goods until their bills are paid.

General Liens.—The general lien permits the possessor to retain the goods not only for the bill due regarding the specific goods, but also for the balance of the general account between the lien creditor and his debtor resulting from a series of business transactions between them in the trade in which the creditor is engaged. Unlike the specific lien which arises by force of law alone, the general lien arises when separately contracted for, when conferred by statute, or most often when, by custom in a particular trade or

profession, a general lien is so common that the parties are assumed to have contracted in relation to the custom. Some of the callings which have established this custom are bankers, factors, attorneys and innkeepers.

The innkeeper's lien dates from very early times and arises because of the duty to accept all comers and the high degree of care which is required of the innkeeper. The lien attaches to the goods of the guest in the inn, not in relation to services performed on the goods, but for the general account owed by the guest for his board and lodging. The rule does not apply to boardinghouse and rooming-house keepers, for they are not obliged to accept all comers. In England, the innkeeper's lien is classified as specific.

The attorney has two types of liens, one general and one specific. The attorney's general lien gives him the right to retain securities and papers belonging to his client for the general balance of the account due him for his professional services. However, the securities and papers must have been received by him in his professional capacity. The attorney also has a specific lien on a judgment secured for his client through professional services. The lien covers both costs and disbursements and the professional fee.

The banker's lien, arising from a mercantile custom, is a right of the bank to appropriate money or securities, owned by a customer and deposited with the bank in the regular course of business, in satisfaction of a matured debt of the customer to the bank. The general lien covers commercial paper deposited for collection, but does not cover collateral pledged to secure a specific debt nor securities deposited for safekeeping.

The factor's lien, which also rose out of custom to become a part of the common law, is a general lien in favour of factors and brokers on the goods of their principals for the general balance of their account with the principal.

At common law a mechanic was simply a general creditor and had no lien upon a building for labour done upon it or for materials furnished. However, practically all the states of the U.S. now have statutes expressly permitting labourers, contractors, subcontractors and suppliers of material to secure a priority of payment for the value of the work and materials devoted to constructing or repairing a building. Mechanic's liens, attaching both to buildings and improvements and to land, are enforceable in a court of equity only if all of the statutory requirements are strictly observed.

Maritime liens are privileged claims of a creditor enforceable by an action *in rem* against the vessel. Creditors with maritime liens have a special right in the ship, independent of possession, and may sell the vessel in order to have their debt paid from the proceeds of the sale. Maritime liens cover a variety of claims, such as salvage wages, master's wages and claims for damages from collisions. (*See* MARITIME LAW: *Liens.*)

Equitable Liens.—Equitable liens arise from a written contract indicating an intention to charge particular property with a debt or obligation, or from facts which equity out of a sense of fairness feels justify the implication of a lien. Possession is not essential to acquiring or enforcing equitable liens, but lack of possession may make such liens unenforceable against subsequent bona fide purchasers or other lien creditors.

Express equitable liens arise from enforceable agreements to pay a sum of money out of the proceeds of the sale of specific property, provided the property is clearly designated and there is proof of the intent to create a lien. They also arise from an agreement that the cost of improvements shall be a lien on the property improved.

One of the most valuable equitable liens arises in connection with the sale of land. The vendor of an enforceable contract of sale has an implied lien on the realty sold to the extent the purchase price is unpaid. Thus if the vendee defaults on his contract, instead of specific performance or an action at law for damages the vendor may foreclose the implied equitable lien by selling the property and taking the proceeds from the judicial sale in payment of the purchase price. Similarly, equity implies a lien for the purchase price in favour of an unpaid grantor. In some jurisdictions, however, the unpaid grantor is only a general creditor and is denied a lien unless he expressly reserves it in the deed of conveyance. Where the vendor is in default, a vendee is also given an implied lien to recover the deposit and any expenses incurred in connection with the contract of sale.

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(E. G. S.)

LIEPAJA (LEPAYA; Russian LIBAVA), an ice-free port of the Latvian Soviet Socialist Republic of the U.S.S.R., is located at the northern extremity of a narrow sandy peninsula which separates Lake Liepaja (Liepajas Ezers) from the Baltic sea, 120 mi. W.S.W. of Riga. Pop. (1959) 71,464.

The estuary of Lake Liepaja in ancient times was a Courish port, Lyva portus, where in 1263 the German Livonian Order built a fortress. The lake's mouth became silted and an artificial harbour was constructed (1697–1703) after James, duke of Courland, had regained the Grobina district from the Prussian duke, Albert. In 1701 Liepaja was captured by Charles XII of Sweden, and in 1795, with the third partition of Poland, it was annexed to Russia.

In the 1870s the railway to Riga was built and in 1891 connections were made with Romny in the Ukraine. Liepaja then developed rapidly and became an important port. It is now a transportation hub with five railway lines.

In 1893 the Russians began the construction of a naval port. The modern port facility, which has three wide gates, is protected by the south mole (1¼ mi. long) with breakwaters and the north mole (1 mi.). The commercial harbour consists of the town canal quay with elevators and storehouses, the deep winter port and the deep foreport or new port. There are two dry docks, each 656 ft. long, and a floating dock that can take vessels of 1,200 tons.

The chief imports are coal, iron, salt, herring, grain, machinery and phosphates. The exports include rye, barley, oats, wool, linseed, timber, leather, wheat and eggs. Industries include steel (metallurgical) works and railway and marine workshops, veneering, fish canning, flour milling, bacon curing, tobacco manufacture, the extraction of vegetable oils, the making of paints and varnishes, brewing, distilling and leather work. A sugar mill was built in 1933. An immense state-owned factory now dominates the water front and produces agricultural and other heavy machines.

At the beginning of World War I Liepaja was occupied (1915) by German forces and sustained heavy damage. The Latvian provisional government removed there when Riga was in German occupation, Jan. 6–June 22, 1919. In World War II Liepaja was the scene of long street battles and the town centre was severely damaged. From 1941 to 1945 it was occupied by the Germans, and in May 1945 it was repeatedly bombarded; afterward it was overrun by the Red army. The port was used by the German navy in both world wars. After 1945 the fortified harbour in the northern outskirts served as a Soviet naval base with powerful radar stations and airfields. The commercial port also came under Soviet naval administration in 1951. A special trawler base for ocean fishing has been organized.

LIER (Fr. LIERRE), a town in Antwerp province, Belgium, is situated at the confluence of the Great and Little Nethe, 10 mi. S.E. of Antwerp. Pop. (1961) 28,755. The ancient town developed around the chapel of St. Peter (1225), which was erected in place of a wooden chapel. Although its gate dates from 1741 and its baroque church from the Renaissance period, the Lier *béguinage* (an enclosed district of the Beguines), one of the most picturesque in Belgium, was a real miniature town in the 13th century. Several medieval buildings can still be seen around the Grote Markt and by the inner Nethe. The most impressive building from the 15th century is St. Gommarus' church, a typical example of the Brabantine High Gothic style. It contains a rich collection of art treasures (stained-glass windows, paintings and sculptures). The Danish gate (16th century) is a relic of the residence of Christian II of Denmark, who found refuge in Lier in 1524. Nearby is the "Court of Aragon," where Philip the Handsome and Joan of Castile were married in 1496. The town

hall was built in 1740 to replace the old cloth hall.

Lier is a noted cultural centre and is associated with many artists. In the town museum are works by Brueghel, Rubens, Van Dyck, Teniers and Murillo. Contemporary painters are represented by Baron I. Opsomer, E. Tijtgat, O. Permeke and F. Jespers.

Because of the close proximity of Antwerp there are no large industries. Lier, however, is noted for its lace, spangle embroideries and beaded bags. Ready-made clothes, shoes and musical instruments are also manufactured. (M. L. T. G.)

LIETZMANN, HANS (1875–1942), German Protestant theologian and church historian, who combined the disciplines of classical philology and theology in order to show the connection of the Christian faith with its historical foundation, was born at Düsseldorf, on March 2, 1875. He studied at the universities of Jena and Bonn, where he became a lecturer in church history in 1900. From 1905 he was professor at the University of Jena and in 1924 was appointed professor at the University of Berlin, succeeding Adolf von Harnack. He died at Locarno, Switz., on June 25, 1942.

Lietzmann's works include *Der Menschensohn* (1896); *Catenen* (1897); *Apollinaris von Laodicea und seine Schule* (1904); *Das Leben des heiligen Symeon Stylites* (1908); *Petrus und Paulus in Rom* (1915; 2nd ed., 1927); *Messe und Herrenmahl* (1926; Eng. ed., 1953–57); *Geschichte der alten Kirche,* four volumes (1932–44; Eng. ed., 1937–52); and many other books and articles. He edited *Kleine Texte für theologische Vorlesungen und Übungen* (1902 *et seq.*); *Handbuch zum Neuen Testament* (1906 *et seq.*); and *Zeitschrift für die neutestamentliche Wissenschaft und die Kunde der älteren Kirche* (1920 *et seq.*).

Lietzmann's autobiography to 1924 is in *Die Religionswissenschaft der Gegenwart in Selbstdarstellungen,* vol. ii (1926); a bibliography of his writings may be found in *Zeitschrift für die neutestamentliche Wissenschaft und die Kunde der älteren Kirche,* vol. xli, pp. 12–33 (1942). (Jk. F.)

LIEUTENANT. In general use, a lieutenant is an assistant, a deputy, or one who acts in lieu of another. The term appears in this sense in the title of Douglas Southall Freeman's classic work on the American Civil War, *Lee's Lieutenants.* More specifically, in most armies of the world, a lieutenant is the lowest rank of commissioned officer; he normally commands a small tactical unit such as a platoon. The modern British pronunciation, "leftenant," stems from various Old English spellings such as *lieftenant.*

In the British army and in the U.S. army, air force and marine corps, a second lieutenant is the lowest ranking commissioned officer. Above him in the U.S. services comes a first lieutenant (lieutenant in the British army), then a captain. In the Soviet army there is still another rank, senior lieutenant. The term has a somewhat different meaning in the U.S. and British navies where the lowest ranking commissioned officer is an ensign (U.S.) or commissioned officer (British). The next higher rank is lieutenant junior grade (U.S.) and sublieutenant (British) followed by lieutenant and lieutenant commander. A navy lieutenant (U.S.) is thus equal in rank to an army, air force or marine corps captain; a navy ensign (U.S.) is equal in rank to a second lieutenant in the other services. In the Royal Air Force a flight lieutenant ranks below a squadron leader and above a flying officer.

The word also appears in combination with other military and civilian titles to denote a second-in-command or one of lower rank. A lieutenant colonel, for example, ranks below a colonel and above a major. This use of the term stems from the period of English history when colonels raised and literally owned regiments but turned over their administration to lieutenant colonels. A lieutenant general ranks below a general and above a major general. In the U.S. and British navies a lieutenant commander, as noted above, ranks between a lieutenant and a commander. The term lieutenant governor in the United States describes an elected state official who may act for the governor or take his place if the governor dies or is incapacitated. In Canada the governors of provinces bear the title of lieutenant governor. The same term in British usage describes a governor who represents the sovereign in a given area. In similar fashion the lord lieutenant of a county in England or a province in France was originally the sovereign's deputy in that area for military affairs. *See* also Insignia, Military; Officers, Military.

LIEVENS (Livens, Lievensz), **JAN** (1607–1674), versatile Dutch painter and etcher, was born in Leyden (Leiden) on Oct. 24, 1607. A contemporary of Rembrandt, he was a pupil of Joris van Schooten (1615–18) and of Rembrandt's teacher Pieter Lastman in Amsterdam (1619–21). In Leyden Prince Frederick Henry bought one of Lievens' paintings and gave it to the British ambassador Sir Dudley Carleton; this probably was the cause of Lievens' stay in England (1632–35). From 1635 to 1644 he lived in Antwerp. In 1644 he returned to Amsterdam, where he received important commissions and was greatly admired. Yet his last years were troubled by debts, loneliness and wandering. He was buried in Amsterdam on June 4, 1674.

Lievens is remembered primarily for the works of his Leyden period; they derived occasional greatness from the influence of, and the competition with, his friend Rembrandt. The diary of the connoisseur Constantijn Huygens, who visited the young men about 1629, contains a fascinating estimate of their respective abilities; while he correctly sensed a certain grandiloquence in Lievens' works, some of them do approach Rembrandt's rather closely, and there were cases of collaboration. He painted biblical, allegorical and mythological subjects, figures of saints, old men and children, portraits and genre scenes. During his stay in Antwerp his art acquired a strong flavour of the style of Van Dyck. Some of his excellent landscapes were long attributed to his friend Adriaen Brouwer. During his later years in Holland, the Flemish element in his art recommended him to official circles, and he was commissioned to paint decorative canvases for the town hall in Amsterdam and other buildings. Some of his early etchings are worthy of Rembrandt. He also made eight woodcuts of surprising originality. (W. Sw.; X.)

LIF AND LIFTHRASIR. In Scandinavian mythology, Lif, a man, and Lifthrasir, a woman ("Life and Vitality"), are the human couple who survive the period of chaos when the world comes to an end. According to the myth, Lif and Lifthrasir are destined to become the progenitors of a new race on the earth. *See* Ragnarok.

LIFE. For a discussion of the unique qualities of living things, *see* Biology: *The Living Organism as a Natural Body.* The evolution of life from nonlife is dealt with in Life, Origin of. Other articles relating to life include: Death (Biological); Life Expectancy; Life Span; Reproduction.

LIFE, ORIGIN OF. It is literally impossible to frame a definition of the phenomenon popularly called life that would be universally satisfactory. Most modern scientists, echoing Aristotle, agree that there is no point along the continuum of existence, from the simplest atom to the most complex animal, at which a line can be drawn separating life from nonlife. The two qualities of being blended imperceptibly one into the other, the higher, more organized order evolving naturally from the lower, less organized order. In purely biochemical terms, life on earth is an open system of linked organic reactions catalyzed at low temperatures by specific enzymes, which are themselves products of the system. This statement defines life by metabolism. A more recent definition is: Life is the structural replication of enzymes, ensured by exactly reproduced nucleic acid molecules (*see* Nucleic Acids). Thus molecular biology has replaced biochemistry in defining life. This definition is deliberately couched almost in legal terms to include the bare essentials common to all living creatures. It excludes phenomena, such as flame, that maintain themselves and can even be said to reproduce but do not contain organic catalysts.

The following discussion, of necessity largely speculative, is one of several proposed schemes of how terrestrial life may have originated. Since the initiation of the space age, interest has begun to be focused on the possibility of the investigation of life beyond the earth, a study termed exobiology, astrobiology or xenobiology. Scientific theories on the origin and nature of the universe are dealt with in Cosmogony; of the earth, in Geochemistry: *Geochemical Evolution of the Earth.* A detailed working definition of "living matter," its conspicuous properties and various earthly manifes-

tations, is treated in BIOLOGY: *The Living Organism as a Natural Body* and *The Biosphere and Its Inhabitants.*

This article is a scientific account but as such does not preclude the possibility of ultimate divine involvement, which is the province of theology and philosophy. For various creation stories common in history, *see* CREATION, MYTHS OF; GENESIS. (X.)

HISTORICAL BACKGROUND

The problem of the origin of life is one of the last major gaps to be filled in man's knowledge of total history. Something is known of the prehistory of the earth and its solar system and of the history of the evolution of organized beings.

For Charles Darwin evolution began with a primitive organism potentially as much an animal as a plant. But what came before that, the 19th-century scientists hardly dared inquire. The learned of earlier times thought there was nothing to inquire about. To them it seemed perfectly natural that animals and plants should arise fully formed from inanimate matter: the mud of the Nile engendered not only frogs but even crocodiles; flies sprang from rotten meat; geese came from barnacles. The capacity of nature to generate innumerable animals and plants was everywhere visible. In ancient and medieval times people were quite accustomed to metamorphoses, some of them real—caterpillars into butterflies—and others deemed to result from magic—at night certain men could turn into wolves, vampires or cats and then back into men again (*see* MAGIC; LYCANTHROPY).

Spontaneous Generation.—It was only in the Renaissance, with the new interest in anatomy, that it became apparent that such transformations were impossible. William Harvey (*q.v.*), in the mid-17th century, in his studies of the reproduction and development of the king's deer, made the basic discovery that every animal comes from an egg. Francesco Redi, in the latter part of the 17th century, showed that the maggots in meat came from flies' eggs deposited thereon, and Lazzaro Spallanzani, in the 18th century, showed that spermatozoa were necessary for mammalian fecundation. But the idea of spontaneous generation died hard. Even though it was proved that the larger animals always came from eggs, there was still some hope for the smaller ones, the infusorians; it seemed obvious that these microscopic creatures must be generated always afresh because they appeared everywhere.

Meat could be kept from going maggoty by covering it with a flyproof net, but grape juice could not be kept from fermenting by putting any kind of netting over it. This was the subject of the great controversy between Louis Pasteur (*q.v.*) and F. A. Pouchet in the 1850s, in which Pasteur triumphantly showed that even the minutest creatures came from germs floating round in the air, which could be guarded against by suitable filtration. Actually Pouchet was trying to argue that it was possible for life somehow to be generated; if not, how had life come about in the first place? Instead of the multiple miracle of all the forms of life today, there still remained the single absolute miracle of the formation of the first kind of life. (*See* also BIOLOGY: *History: Biogenesis Versus Abiogenesis; the Origin of Life.*)

Pasteur's work, in effect, discouraged scientists from discussing the origin of life at all. Moreover, they were concerned that they would offend religious feelings if they probed the Creator's work too closely. Although Darwin would not commit himself on the origin of life, others were more resolute, notably T. H. Huxley in his *Protoplasm: the Physical Basis of Life* (1869) and John Tyndall in his "Belfast Address" of 1874. Although Huxley and Tyndall asserted that life could be generated from inorganic chemicals, they had extremely vague ideas of how it might be done. This was inevitable at the time because the necessary clues were in the new biochemistry, which Sir F. Gowland Hopkins was to found at the beginning of the 20th century.

Chemical Evolution: Inorganic Into Organic.—In the 1920s a new interest in the origins of life arose, starting from the independent speculation of two biochemists, A. I. Oparin in the Soviet Union and J. B. S. Haldane in Britain, both deriving from the new biochemistry that Sir F. G. Hopkins had founded. To those who were creating this new field it was apparent that the evolution that had occurred since the first cell, an evolution that depended on changes of shape, of motion and sensation, dealt with later and more complicated changes imposed at the end of an enormously longer evolution that was purely chemical—the gradual transmutation of inorganic compounds into organic ones. Oparin and Haldane argued that spontaneous generation does not occur now because life itself has altered the conditions and made it impossible. This is largely due to the presence now of an oxygen atmosphere, unfavourable for the development of inorganic into organic substances; moreover, if anything at all edible should now develop spontaneously, it would at once be eaten up by the forms of life already existing. Life, then, has destroyed its own means of regeneration from nonlife. Oparin and Haldane postulated an original atmosphere containing mainly water, methane and ammonia, from which by a series of changes the more complicated of the present-day forms of organic molecules were evolved.

A Speculative Problem.—After the 1920s the subject of the origin of life attracted ever increasing interest. The quasi-philosophical question, "Did life originate on this planet?" has gradually given way to the more scientific and ultimately answerable one, "How did life originate on this or any other suitable planet?" Biopoesis (N. W. Pirie's term for the study of the origin of life) remains necessarily a speculative subject; one can talk only of the problem of the origin of life but not of its solution.

The problem is twofold: how could life have originated on a planet like this? and more precisely, how did it? There may have been a variety of ways in which life could have developed, but only one way in which it did happen. Experiments, however successful, can answer only the first part; the second requires the study of the evidence and deductions based on the first. Two kinds of evidence are available.

The origin of life, whatever form it took, must have occurred a long time ago, and certainly long before the first direct evidence of organized beings from the fossils in the rocks. The first fossils are not skeletons of animals or plants, or even such imprints as are found of their bodies, but chemical evidence of life. P. H. Abelson's finding of amino acids in rocks of Pre-Cambrian Age strongly suggests some form of organism at that date. Isotope abundance may give evidence of even earlier lifelike forms. The earliest fossils known are probably not much more than 2,800,000,000 years old, and most of them found in the Cambrian rocks are about only a quarter that age. Except for the absence of vertebrates the Cambrian fossils are hardly different from those of present-day animals and must have had a long evolution. It cannot be expected that any direct evidence will be found dating back to when the first cell was formed, but from geology, geochemistry and astronomy some idea may be formed of what the earth was like at that period.

The other kind of evidence comes from the actual chemical processes that go on in organisms living today. From biochemical studies it is apparent that the relationship of the different forms of life, assessed by Darwin on the grounds of their external appearance only, extends into the intimate recesses of the cell, indeed even to the molecules of which the cell is made. There are certain recurrent patterns, for instance in the molecules of the sugars or the hemoglobins, which go back to the simplest forms of present-day life. The very complexity of those primitive molecules shows that they have a long evolutionary history, which must be unraveled by deduction from their mutual relations. Every complicated molecule is, in fact, built up from very simple molecules in the body of the animal or plant. The plant that starts the process has to do all its building from carbon dioxide, water, ammonia and a few salts. The steps by which all cells build up their complicated compounds—though they may not be precisely the same—must cover the same ground that was first covered in the evolution of life itself.

WHEN AND HOW LIFE MAY HAVE BEGUN

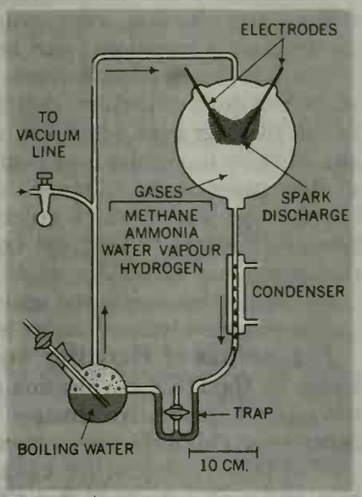
From the first opponents of Greek atomism onward, thinkers have objected that nothing so complicated as man could have arisen out of a chance coming together of atoms. It is known now that atoms do not fit together by chance but assemble in a limited sequence of intermediate ordered arrangements, each one built out of

elements from the order below it: simple molecules arise from atoms not by chance but by the quantum laws of chemistry; molecules unite by different laws into polymers to form colloid particles, fibres and membranes of cells; cells join to form tissues, such as bone, muscle and nerve; and tissues give rise to organs, which working together make up the whole organism. This is only the static aspect; at each stage, structure and function are linked, but there is an underlying pattern that appears to have some intrinsic necessity.

To trace the origin of life requires the solution of three problems, in the following order: (1) the origin of the materials out of which living things are at present made; (2) the processes of the energies by which life is carried on (metabolism); and (3) the reproduction, first of molecules and then of organisms, characteristic of current life, though not necessarily of all life. This last point is the key attribute that distinguishes life from inorganic processes.

By the mid-20th century the subject of the origin and early chemical evolution of life was in much the same state that the Darwinian theory of evolution of living forms had reached when it was winning acceptance in zoology and botany.

The following hypothesis is largely a speculative picture of how life may have originated. Though drawn from many sources, it is in essence still the Oparin or Haldane hypothesis; but many new difficulties have been raised and partially surmounted, and many new facts have come to light. Most important was the actual production of amino acids and other complicated organic compounds from simple precursors (methane, ammonia, hydrogen and water vapour) under the influence of light or electrical stimulation —classical experiments inspired by H. C. Urey and first carried out by S. L. Miller in 1953.



FROM W. JOHNSON AND W. STEERE, EDS., "THIS IS LIFE"; REPRODUCED BY PERMISSION OF HOLT, RINEHART AND WINSTON, INC.

S. L. MILLER'S EXPERIMENT IN WHICH AMINO ACIDS WERE FORMED BY CIRCULATING WATER VAPOUR AND OTHER GASES PAST AN ELECTRICAL DISCHARGE. AFTER SEVERAL DAYS THE WATER WAS FOUND TO CONTAIN SEVERAL DIFFERENT AMINO ACIDS

Requisites for Life.—Life may be 4,000,000,000 years old or even older. It may be as old as, and in a certain sense even older than, the planet earth: primitive forms of life may have been present ever since the earth came into existence without our being able to detect them now. The earth seems a natural place for life to originate because it is large enough to hold (by gravity) all the elements except hydrogen; such a small body as the moon cannot hold even water, and consequently it is dry and lifeless. Moreover, the earth is about the right distance from the sun so that most of the water exists as a liquid, somewhere between the freezing and boiling points. On the surface of Venus temperatures are thought to be always above the boiling point, hardly suitable for life as we know it. On Mars the night temperatures drop considerably below freezing, but much evidence points to life there. Farther out, on Jupiter and Saturn, it is perhaps much too cold. Thus, in any solar system there will usually be a zone in which one planet (or at most two) would provide the right setting for life to originate. Out of the many billions of stars in our own galaxy alone, it has been estimated that several million have planets with conditions eminently suited to the evolution and maintenance of higher forms of life. (*See* PLANETS: *Habitability of the Planets;* COSMOGONY.)

The elements of life—hydrogen, carbon, nitrogen and oxygen—happen to be the commonest in the solar system. How did they appear on the surface of a primitive earth, say, 4,000,000,000 years ago? Oparin thought the original atmosphere was mephitic, consisting of methane and ammonia. Some geochemists have criticized this view, but it is not essential to Oparin's hypothesis: all that is required is enough carbon and nitrogen compounds in or on the surface of the primitive oceans. That hydrocarbons drawn from the earth's body itself were present is fairly likely, since it has been found that carbonaceous meteorites contain just such material. One may therefore imagine a primitive earth with an atmosphere, possibly of nitrogen, in which there is a kind of thin oily film on the surface of the oceans that can be thrown up on the shores. The first stage in the building of life probably consisted of the reactions of these carbonaceous and nitrogenous molecules, with the formation of more complex molecules. These reactions—the beginning of what appears in life as enzyme reactions—were probably brought about by the presence of other elements, such as sulfur, phosphorus and iron.

Source of Energy.—The next question is: How was the energy to drive these chemical transformations derived? At the present time energy comes from the constant turnover of a very small fraction of the amount of solar radiation hitting the earth. This energy is transformed into food during photosynthesis (*q.v.*). In former geologic ages this same process produced considerable extra stocks in the form of coal and oil. But this store of energy was not available until the highly complex molecule of chlorophyll had been evolved. Most thinkers in this field have therefore postulated that some original source of free energy, in the form of energy-rich compounds, had been built up before the usually energy-wasting processes of life could begin. This primary accumulation must have been made in the first place by some form of radiation—by sunlight, by cosmic rays or by radioactive elements that were, thousands of millions of years ago, far more active than they are now. Evidence from carbonaceous meteorites suggests that this primary accumulation may have occurred in outer space in the dust clouds from which the planets were formed; if this is true, the energy-rich compounds were literally built into the primitive earth.

Accumulation of New-Made Molecules.—According to Haldane and Oparin the primary accumulation was produced by the intense ultraviolet rays of the sunlight, then not reduced, as it is now, by the ozone layer produced by sunlight in our oxygen atmosphere. This has been criticized on the grounds that the same ultraviolet radiation would destroy the new-made molecules almost as fast as they were formed. But if, as in Miller's experiments of making the complex organic compounds by electric discharges, the products are removed from the action of the light as fast as they are formed, it is possible to build up a reserve. One way in which these products may have been removed from the deleterious action of further radiation is by fortuitous entrapment in the spaces between clay particles on shores and estuaries. These particles then, as now, would adsorb all such materials.

Such dependent first phases may be called life of subvital areas, introducing the idea that life must have originated before the first distinct organisms. (The biochemical definition of life given above does not depend on the separation of regions, even into partially closed volumes, in which the basic chemical reaction patterns occur.) Clearly, however, this indefinitely diffused biochemical "life" was only a fleeting first stage in the evolution of life.

Formation of Polymers.—Nothing that could be called an organism could possibly occur until the units of life were able to separate themselves in the clay. But first a certain polymerization must have occurred by which these smaller molecules—amino acids, nitrogenous bases, sugars and phosphates—joined together into longer chains.

One method by which such polymers may have been formed is by the joining of small molecules adsorbed close to each other in clay particles, for which there is now some experimental evidence. Another radically different method has been proposed and supported experimentally by S. W. Fox: the formation of what he calls proteinoids, by heating a mixture of amino acids at temperatures near the boiling point of water. Unless life originated in hot springs, this proposal raises geological difficulties. But whether by cold or hot synthesis, one decisive stage in the origin of life must have been the appearance of organic polymers.

Free-Floating Blobs and Proto-Enzymes.—Once polymers were formed, there could then exist free-floating or self-subsistent little blobs of polymer jelly that no longer required attachment to

the clay particles to keep from dissolving in the surrounding ocean. Such blobs have been formed in the laboratory and are called coacervates. In the interstices of these coacervates the various forms of metabolic action were chemically evolved, the enzymes of today being the successors of proto-enzymes derived from the direct action of such metals as iron or copper, co-ordinated with simple organic bases. One way in which enzymes may have been formed is by attachment to the operative group (perhaps one containing a metal) of a set of polymers of the amino acids known as proteins, long considered the basic characteristic of life. (Interest now, however, has shifted to the nucleic acids as the basic molecule of life [*see* below].)

The function of proteins would seem to be that of enormously speeding up the processes of enzymic action and at the same time providing a molecule large enough and stable enough in a liquid for these processes to take place. Proteins are highly specific and this enables each enzyme to carry out one job only, thus leading to chains of linked reactions. The proto-enzymes, however, may have been far less specific, the actual enzymes of today having evolved chemically from them by separating their different functions. Enzymes need for their functioning another group called coenzymes, which have a much more generalized property, serving essentially to transfer chemical energy from one metabolic process to another. The coenzyme function is now carried on by nucleotides but may have been originally performed by the metaphosphates these contain.

Evolution of the chemical processes, by some primitive natural selection, even before distinct organisms appeared, is a new concept that owes much to such biochemists as F. Haurowitz and P. Mitchell. Chemically speaking, preorganisms were extremely slow and inefficient in their reactions. Although they had no competitors, they were far more at the mercy of their environment than are organisms of today. Apart from physical dangers, such as drying up, there was always the chemical danger that some essential small molecule might be in short supply. Therefore, any set of chemical reactions that could bypass such a molecule or make it from some more abundant precursor would be favoured over an earlier reaction in the preorganismal world. Thus the chemical efficiency of life as well as its capacity for survival in unfavourable circumstances would continually tend to increase.

Eobionts: First Synthetic Groups.—The next great advance occurred with the appearance of what Pirie calls eobionts. Oparin proposed that these took the form of a network of linked polymers, the drops of coacervates that form spontaneously in mixtures of amino acid and sugar polymers. In J. D. Bernal's view the full independence of these firstlings of life was originally secured by the synthesis of lipid or fatty substances that walled off the eobionts from the rest of the medium by single or double monomolecular films. Carried further into the eobiont, this ability to form "membranes" enabled different parts to perform different functions.

Once such an arrangement existed there could have evolved the process of photosynthesis—the building up of material as a result of absorption, not of the ultraviolet but of the visible radiation, the main radiation given off by the sun. With the supply of energy assured, life must have multiplied rapidly, throwing off as a by-product oxygen, which now fills a fifth of the earth's atmosphere. With oxygen came much more rapid oxidative changes that increased the possible activity of the primitive organism. Here a division may have occurred between those preorganisms that take in energy from the sun and build up organic material and those that take this material and use the oxygen in the atmosphere to carry out much more vigorous chemical changes; *i.e.*, the distinction between plants and some bacteria (autotrophs) and animals (heterotrophs).

Reproduction and Nucleic Acids.—The preceding stage, the evolution of metabolism, was followed by the appearance of reproduction, which thus completes the origin of life. Reproduction depends on the presence of special molecules of nucleic acids, polymers of four nucleotides composed of sugars, bases and phosphates, arranged in different orders (*see* NUCLEIC ACIDS). Experiment has shown that certain of these polymers can replicate themselves by an automatic process indefinitely. Such complicated molecules cannot have existed earlier, for their very existence depends on the preformation of specific nitrogenous bases and sugars. But they are built from nucleotides that are in themselves coenzymes; nucleic acids would be a natural development from the previous stages of chemical evolution.

The complex of nucleic acids, together with enzymes and coenzymes and protected by lipid layers, is a sufficient basis for carrying out all the typical functions of life. At this stage these effective chemical units, with linked reactions, were not yet quite organisms because of their dependence on the medium: they corresponded more to the suborganisms found inside the cell, the so-called organelles, the microsomes, mitochondria and photosynthetic plastids that carry out much of the chemical work inside the more complicated cells of today. They were perhaps also very similar to the smaller viruses and, like them, were not independent—they probably could operate only within a medium in which the nutrient molecules were available at fairly high concentrations. Already at the level of viruses is evidence of the fundamental and vital quality of reproduction of molecules.

Appearance of the Cell.—High concentrations of nutrients were secured in the next stage in the formation of a cell. The principal nucleic acid found in the primitive viruses and in the outer part or cytoplasm of cells is of the simple and relatively easily changeable kind of ribonucleic acid (RNA). The final stage of chemical evolution would be that of the dropping of one atom of oxygen in the sugar of every nucleotide unit, giving a much more stable deoxyribonucleic acid (DNA), which occurs in all cells.

For ordinary cell division the DNA molecule makes for a very reliable reproduction, even ensuring that any accidental changes of structure (mutations) can be passed on. Associated with its capacity for replication, it forms stable double helices and can also allow two such molecules, derived from different individual cells, to coil together even when they are not precisely alike. The progeny of these molecules may combine in various ways the capacity of their parent cells. This is the chemical basis for sexual reproduction, the way in which genetic damage can be neutralized and new evolutionary forms fixed (*see* GENETICS; HEREDITY). Thus, the appearance of DNA completed the work of precellular evolution; organic evolution and natural selection then began to act in molding more advanced forms of life.

Beginnings of Heredity and Evolution.—The fixing of heredity by the DNA conjugation mechanism in itself put an end to the relative qualitative changes that must have characterized the generation of lifelike forms in earlier stages. Before the appearance of DNA, reproduction could not be distinguished from evolution, and each generation was always different from the last; now, apart from mutation and inherited variation, they closely resembled each other. Before, there had been organisms; now there were *species* of organisms.

The first stage of organic evolution must have been the change-over—still somewhat problematical—between nonnucleated cells, such as those of bacteria, and nucleated cells, which are found in protozoans and all higher organisms. The cell may be considered as a kind of colony—an arrangement, with a wall around it, that serves to maintain a certain concentration of relatively small molecular substances so as to enable the organelles containing enzymes and nucleic acids to build them into more complicated particles, or to carry out the catabolic changes that reduce the complex particles no longer needed into simpler ones. The method of reproduction starts, not where one might expect, in the nucleus, but in a separate part of the cytoplasm—the centrosome—as if the cell and its method of splitting were developed together.

The last of the RNA suborganisms, or even the eobionts, probably did not differ very much from the first DNA organisms. All must have been minute creatures nearly spherical and not yet motile, floating in fairly dense colonies in the water or resting on the mud of estuaries. Most must have been capable of photosynthesis, though some may have taken to parasitic existence, living on chemical substances released by the death and decay of others, as many bacteria do today. It is from such lowly origins that the capacities of body and mind must have come after the first 1,000,000,000 years of evolution. (*See* EVOLUTION, ORGANIC;

REPRODUCTION; GENETICS; HEREDITY.)

Later Findings.—Intracellular structures, as well as viruses, are formed of chains, rings, hollow cylinders or spherical shells composed of identical protein molecules that fit together spontaneously. This implies what is already evident from the existence of specific enzymes: that all life as we know it depends on the complex workings of nucleic acids. There is therefore a deep divide between post-nucleic-acid and pre-nucleic-acid life, for some kind of life would be required to form the complex nucleic acids themselves. The polymerization of organic bases to produce the reproductive molecules of nucleic acids can be imagined; however, it still remains to be proved.

In the early 1960s the scope of theories of the origin of life became radically enlarged. The phrase "origin of life," formerly restricted to the idea of origin of life on earth, now is seen as applying to the origin of life anywhere in the universe. A renewed interest in space has focused attention on the study of the meteorites, which contain the only concrete evidence so far available of organic materials of cosmic origin. In 1961 B. Nagy and W. G. Meinschein stated that the structure of these compounds, particularly the distribution of the hydrocarbon molecules, showed that they were themselves the products of life processes. Later, together with G. Claus, they reported that the same meteorites contained actual fossil microorganisms similar to terrestrial unicellular algae. These results have been disputed: it has been said that the organic compounds found could have been formed without life and that the organized elements are either modified mineral grains or, in one case, pollen grain contaminants.

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(J. D. BE.)

LIFEBOAT AND LIFESAVING. Lifeboats are specially constructed for the purpose of saving lives in peril on the water. They usually measure from 25 to 52 ft. in length. The type of lifeboat carried aboard a vessel for use in an emergency has special features for survival on the open sea, but it seldom has the characteristics which provide safety when proceeding through heavy surf to the shore. Shore-based lifeboats are designed to put out from land and aid persons in distress. They are used by governmentally supported lifesaving organizations and by privately sustained lifesaving institutions; they are constructed to stay afloat under adverse sea conditions in which other boats would be helpless. The ability to meet these conditions requires special characteristics such as sturdiness, self-righting ability, reserve buoyancy and maneuverability in surf, particularly in reversing direction.

Figures 1 and 2 illustrate the self-bailing, self-righting design of the motor lifeboat which accommodates survivors in watertight compartments. This U.S. version is 44 ft. 7½ in. long, 12 ft. 8 in. wide, has a draft of 3 ft. 2 in. and weighs about 16 tons.

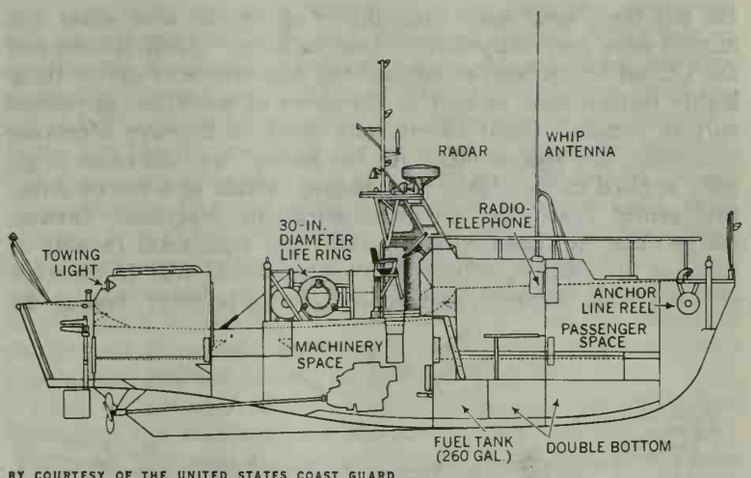

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FIG. 1.—PROFILE OF 44-FT. STEEL LIFEBOAT

It is constructed of steel and has watertight decks and compartments. It is powered by a 170–200 h.p. diesel engine and is designed for 40 persons. It operates from sheltered inlets. Figure 3 shows a motor surfboat of smaller size than the lifeboat. It is self-bailing but not self-righting. The pulling surfboat illustrated in figure 4 can be hauled along the shore and launched directly into the surf.

British lifeboat design does not stress the self-righting feature. As most British lifeboats go well out to sea, they sacrifice self-righting ability for a broader beam and greater stability. They are built in the following lengths: 36, 42, 47 and 52 ft. They are powered by diesel engines, with the smaller boats having 20 h.p.

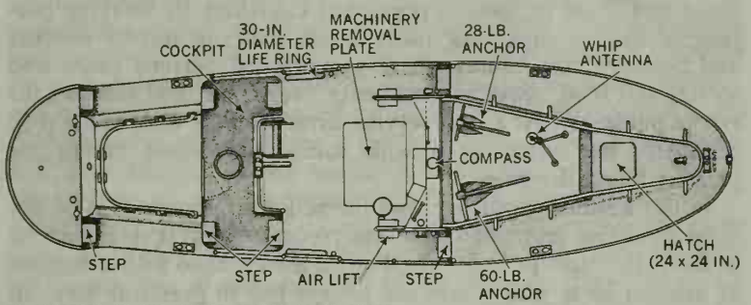

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FIG. 2.—TOP VIEW OF 44-FT. STEEL LIFEBOAT

and the larger boats having 60 and 72 h.p. The speed varies from seven and one-half knots in the smaller boats to nine knots in the larger craft. The capacity of the 36-ft. boat is 37 persons; the 42-ft. boat accommodates about 85 persons; the two larger boats can carry over 100 persons.

The term lifesaving, when considered in connection with lifeboats, refers to the organized efforts of specially trained groups of individuals for aiding persons in danger on the water, in the water and even over the water. (*See* also DROWNING AND LIFESAVING.) Before World War II the meaning of the term was limited to efforts to save life or render assistance by use of the lifeboat, the line-throwing and breeches-buoy apparatus and the application of resuscitation for the apparently drowned. During

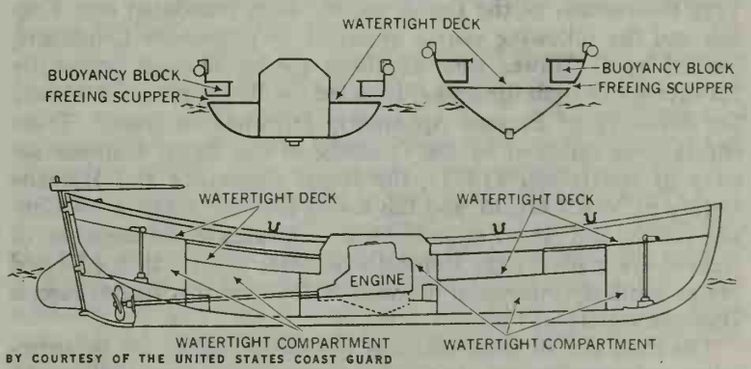

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FIG. 3.—PROFILE AND SECTIONAL VIEWS OF 25-FT. SELF-BAILING MOTOR SURFBOAT

the war there were many mass flights of aircraft over water and airmen were frequently forced down offshore. Great Britain and the United States both recognized the importance of saving these highly trained men, as well as the crews of numerous torpedoed surface vessels. Great efforts were made to improve lifesaving techniques and equipment. "Air sea rescue" was the name originally applied to the highly co-ordinated system of a rescue direction centre controlling all communications, electronic devices, rescue ships, airplanes, lifeboats and other equipment capable of assisting in saving such lives. Following World War II when air transportation became a globe-encompassing industry, finding the

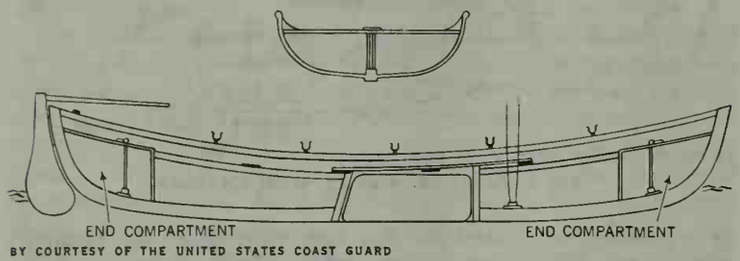

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FIG. 4.—PROFILE AND MIDSHIP SECTION OF 26-FT. SURFBOAT

exact location of a disaster scene in the vast ocean spaces became a paramount consideration, and the term for lifesaving throughout the world became "search and rescue."

HISTORICAL BACKGROUND

Records indicate that organized lifesaving was inaugurated by the Chinese centuries before its establishment in the occident. Certain Chinese benevolent institutions supported lifesaving services on the Yangtze and other large rivers. These services succoured those in danger, prevented casualties by ferrying passengers and accompanying junks across rivers in stormy weather and provided rest houses where shipwrecked persons could find shelter and food. Special "red boats" were built and manned for rescue purposes. As a final service, arrangements were made with associated institutions to provide coffins and decent burials for persons found drowned.

In the western world the need for action to prevent loss of life from drowning and shipwreck was recognized by several nations at about the same period. The French are credited with a number of original ideas which were not always put to practical use. In 1757 René de Réaumur sent a report to the Academy of Sciences at Paris regarding the resuscitation from drowning of several persons in Switzerland. The first "insubmergible" boat was constructed and tested on the Seine by M. Bernières in 1765. It was decked over at the bow and stern and contained airtight boxes under each deck for reserve buoyancy. Although the test found this boat to be practical it was not put into service at that time. About this same period M. Gelacy designed a life belt that would support its wearer in water. In 1796 M. La Fère of France was a contemporary of Sergeant Bell of the royal artillery in the design of a line-throwing gun.

The Netherlands has the distinction of establishing the first lifesaving society in Europe shortly after Réaumur reported his successful resuscitation cases. Established at Amsterdam, it was named Society for the Recovery of the Apparently Drowned. In 1773 the records of the Dutch society were translated into English and the following year a group of 32 prominent Londoners, headed by B. Hawes who had been paying rewards personally for saving life from drowning, founded the Royal Humane Society for Recovery of Persons Apparently Drowned or Dead. These efforts were followed by the founding of the Royal Humane society of Australasia (1874), the Royal Shipwreck and Humane society of New Zealand, and the Royal Humane societies of Canada (1897) and New Zealand (1900). Awards in the Republic of Ireland are made by the Comhaile na Mire Gaile. In the United States similarly interested individuals founded the Massachusetts Humane society in 1785.

The chief aim of these societies was the saving of life by swimming and resuscitation, but it is interesting to note that rescue from shipwreck quickly became part of their plan. As early as 1787 the Massachusetts Humane society launched a program which resulted in the construction of 17 huts for the shelter and succour of persons shipwrecked on the shores of that state. In England a comparatively early annual report of its society contains a short chapter describing a life raft and a long chapter on Captain Manby's method of rescuing shipwrecked persons by means of his line-throwing gun. These early efforts by humane societies led to the establishment of the Royal National Life-boat institution operating in the British Isles and Ireland, and of the U.S. lifesaving service (now coast guard).

Great Britain.—Some of the first practical steps in both lifesaving and lifeboat construction were taken by Great Britain. The start was made in 1785 by a London coachbuilder, Lionel Lukin, who converted a Norway yawl into an "unimmergible" boat by adding airtight cases in the ends of the boat and along the inside above and below the thwarts (seats). He also added an iron keel for stability and a thick layer of cork outside the gunwales for added buoyancy and protection against buffeting. This boat was stolen during tests, but the same principles of construction were used in rebuilding a Northumberland coble which became the first European boat used solely as a lifeboat; it was assigned to the first lifesaving station, established in 1786.

The activation of the first lifesaving station in England and the western world resulted from the philanthropic work of John Sharp, archdeacon of Northumberland, who administered the trust funds left for charitable purposes from the Bamburgh, Northumberland, estates of Lord Crewe, bishop of Durham. Sharp instructed Lukin to convert the coble mentioned above into the first lifeboat. In order to get the most efficient use from his lifeboat, Sharp placed a continuous watch in the tower of Bamburgh castle, and during bad weather he had two men patrol the coast on horseback for the purpose of locating and giving fast notice to his lifeboat crew of any shipwrecked vessel. Also, during fog, he had his men toll a bell and fire a cannon at intervals as a preventive warning signal. Thus, Archdeacon Sharp recognized and put into operation the basic duties of a lifesaving station—lookout watch, beach patrol, rescue by lifeboat, and preventive warnings.

Still other practical developments in the lifesaving field which originated in England are of interest. Following the tragic shipwreck in 1789 of the "Adventure" at the mouth of the Tyne, witnessed by helpless crowds on shore, a group of gentlemen from Newcastle sponsored a competition for the design of a boat that would right itself when capsized and would retain its buoyancy when manned and nearly full of water. William Wouldhave, a house painter, won half the prize for his model of the first English self-righting boat. Not fully satisfied with Wouldhave's design, the prize committee then drew up plans of its own and instructed Henry Greathead, who had also entered the contest, to build the first boat designed solely for lifesaving. Greathead added to the design submitted by the committee by using a curved keel, but Wouldhave's self-righting principle was not included, probably because of the extra weight. When completed in the latter part of 1789, this 30-ft., 10-oared, double-ended lifeboat was named the "Original." She remained in service in the vicinity of Newcastle for 40 years, and because of her early successful rescues she became the prototype for 30 other lifeboats built by Greathead.

In 1807 Capt. George Manby, an artilleryman, developed the first practical line-throwing mortar with a range of from 250 to 320 yd. After a line was fired to the wreck, a life cot was hauled back and forth between the ship and the shore to bring the crew and passengers to safety. This was the forerunner of the breeches buoy and the completely enclosed life car. A similar line-throwing apparatus propelled by a rocket was invented in 1821 by Trengrouse. In addition to its greater range, it was much lighter than the mortar and could be transported along the shore with greater ease. This apparatus was further perfected in 1832 by John Dennett.

The most important development in the history of lifesaving in England took place in 1824 following a crusading campaign by Sir William Hillary of the Isle of Man for action to reduce the terrible loss of life from shipwreck occurring at that period.

Chiefly through his efforts, prominent London citizens founded the National Institution for the Preservation of Life from Shipwreck. In 1854 this voluntarily supported society was named the Royal National Life-boat institution. It has served as a model for the formation of lifeboat societies in many other countries. In 1924, on the 100th anniversary of the founding of the institution, the first international lifeboat conference met in London; it was followed at four-year intervals by similar conferences in other cities.

During World War II lifeboats of the institution were launched on service 3,760 times and rescued a total of 6,376 lives. By the end of the 1950s the institution controlled 151 lifeboat stations of which 78 were in England, the Scilly Isles and the Isle of Man; 31 in Scotland; 22 in Ireland; 18 in Wales; and 2 in the Channel Islands. The crews of the lifeboats consisted mainly of part-time volunteers, though the institution paid retaining fees to coxswains and other officers, and wages to part-time and full-time coxswains and mechanics.

United States.—In tracing similar developments in the United States the difference in coastal topography and density of population in shore areas as compared with that of Europe must be considered. In the United States during the 18th and 19th centuries most of the shore was a flat, uninhabited beach extending for miles and separated from the populated region by swamps and inlets. These conditions affected the development of lifesaving in three ways. First, there were few people to witness a shipwreck and arouse public interest in remedial action. Second, because of the sparse coastal population there were only a few capable volunteers available for operating lifesaving equipment. Third, because rescue boats were usually launched from the beach, most surfmen preferred a lighter and more maneuverable boat than the heavier lifeboat with its self-righting and self-bailing characteristics. Because of these conditions, organized lifesaving lagged somewhat behind that in Europe. It is also noteworthy that when interest in rescue was aroused help had to be obtained from governmental sources.

The Massachusetts Humane society, as noted above, took the first step in 1787 with the construction of shelter huts on uninhabited beaches. This society next built and maintained a lifeboat, manned by volunteers, at Cohasset, a potentially dangerous spot on the approaches to Boston harbour. This boat was in service from 1807 to 1813. She was a 30-ft. whaleboat type of craft with a 10-ft. beam and considerable cork added for reserve buoyancy.

In 1816 a New York boatbuilder, Joseph Francis, built his first lifeboat. This boat's design was improved during the next few years when it became known as the "hydrogen lifeboat" because it obtained its reserve buoyancy from hydrogen tanks secured in the double bottom. The inner cockpit deck was made higher than the level of the sea so that water entering the cockpit would flow overboard through freeing ports in the boat's double bottom. It became popular as a lifeboat carried aboard ship.

In 1832 the federal government showed its first interest in lifesaving when the secretary of the treasury ordered several revenue cutters to cruise along the Atlantic coast and give seaborne commerce special protection during the winter season. This winter cruising was made a regular duty of the revenue marine by an act of congress passed in 1837; and it was continued until radio communication made such cruising unnecessary. Joseph Francis built his first life car in 1837, but it was ten years in development; when finally perfected it was a completely covered corrugated metal boat. This ten-foot life car held three or four people and was used in connection with a line-throwing mortar to haul shipwrecked crews and passengers through the surf from stranded vessels to the shore. Shortly after being put into service one of these life cars saved 201 persons from a ship wrecked on the New Jersey shore.

In 1840 the Massachusetts legislature appropriated $5,000 to assist the Massachusetts Humane society in the building of lifeboats. Of these ten were financed with state funds and one with funds from the society. A national humane organization known as the American Shipwreck and Humane society was founded in 1843. Although James Fenimore Cooper and a number of other prominent New York men were original board members, the society did not appear prominently in later lifesaving records. The federal government acted again in 1847 by appropriating $5,000 for furnishing lighthouses on the Atlantic coast with means of rendering assistance to shipwrecked mariners, but because of a technicality in the law the money could not be spent as originally intended. The funds were later used to provide lifesaving equipment for the Massachusetts Humane society. More federal aid came from congress in 1848 with the appropriation of $10,000 for the purpose of placing lifesaving equipment along the New Jersey coast. These two appropriations were chiefly the result of efforts of congressman William A. Newell of Imlaystown, N.J., who was dedicated to the work of saving lives from drowning by shipwreck and who campaigned and was elected on such a platform.

Capt. D. Ottinger of the revenue marine was directed to put into effect the 1848 act of congress, and with the funds appropriated he built several small boathouses and equipped each with a fisherman type of surfboat, a line-throwing mortar, a metal life car, and necessary marine supplies. Similar boathouses were built along the shores of Long Island in 1849, and another was established on the Rhode Island coast in 1850. Since no provision was made for crews or even caretakers this equipment rapidly deteriorated or was stolen. To remedy this situation congress made provision for paid keepers in 1854, but since the crews of these stations depended on volunteers from a sparsely settled coast, good surfmen were not always available and the system was far from satisfactory. There was some change for the better in 1870 when congress authorized crews at each alternate station for the three winter months.

The real beginning of a modern lifesaving organization was established in 1871 by Sumner I. Kimball who had just been appointed chief of the revenue cutter service (coast guard). He secured appropriations to rebuild the boathouses to accommodate lifeboat crews. Inefficient keepers were replaced by men selected for their skill and experience. Additional stations were established, and all stations were manned by capable surfmen who were appointed and promoted under a merit system. A beach patrol was instituted and maintained during darkness and thick weather for the purpose of warning vessels and for the prompt discovery of wrecks or castaways. As a result of this efficient management only one life was recorded as being lost during the next two years within the area of responsibility of the service. Thus the era of groping for an efficient lifesaving organization in the United States came to an end.

Later Developments.—Following the establishment of the parent organizations in both England and the United States there have been only a few basic changes in administration and duties. In Great Britain the Royal National Life-boat institution experienced a period of diminishing interest in the 1840s. This decline was rectified in 1851 when the fourth duke of Northumberland was elected president. Under his able leadership there was an active revival of the service, other lifeboat societies joined the institution, and steps were taken to maintain a continuing public interest. It should be noted that this institution remained a voluntary service, supported and directed entirely by private individuals.

Complete search and rescue co-ordination depends upon cooperation of the Life-boat institution with the coast guard, the Royal Air Force and the Royal Navy.

In the United States the management of the service following its founding was under the direction of the chief of the revenue cutter service until 1878, at which time it was organized as a separate bureau under the treasury department and titled the U.S. lifesaving service. In 1915 this service was reunited with the revenue cutter service under a new name—the U.S. coast guard (*q.v.*). For further efficiency, congress joined the lighthouse service with the coast guard in 1939, and placed the bureau of marine inspection and navigation in this group of amalgamated bureaus in 1946. The addition of these latter two organizations to the coast guard stressed the modern concept of saving life through preventive measures.

Modern science has vastly improved rescue facilities and life-

saving techniques throughout the world. The invention of radio communication, the airplane and helicopter, and amphibious vehicles now enable rescue forces to locate and reach persons in peril with greater speed and ease. When the helicopter cannot operate because of lack of range, darkness or high winds, rubber life rafts, food and survival gear may be dropped from planes until other assistance can arrive. Medical aid is sometimes parachuted where there is vital need at inaccessible locations.

The greatest advancement in lifesaving is the international trend to pool resources under the operational control of the most strategically located rescue co-ordination centre, where information is quickly evaluated and assistance directed to the scene. This aid may be the nearest merchant or naval vessel, air facility, weather station vessel, or the specially designed fast patrol craft and the modern lifeboat.

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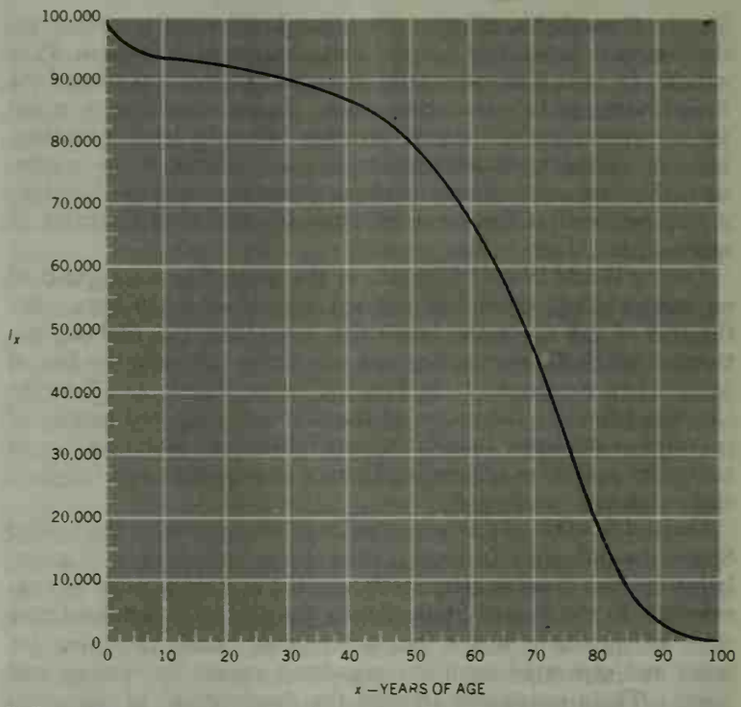
LIFE EXPECTANCY, or expectation of life, as used in actuarial work and vital statistics, means the average length of life after any given age; it is based on death rates shown in mortality tables.

Life expectancy statistics are related to an idealized conception or model. We consider hypothetically an indefinitely large number l_0 of individuals just born and observe their number as it is diminished by death with the passage of time. From birth until some years x later, a certain number of them will have died; those surviving will be aged x and their number is represented as l_x. The time x just prior to which the last surviving individual has died (that is, the time at which $l_x = 0$) is represented as w. The value of l_x plotted against x is assumed to form a smooth curve, and this curve is called the survivorship function. A typical survivorship function is shown in the figure, to exhibit its general form. Between any age x and a small increment dx—that is, between ages x and $(x + dx)$—a number of individuals dl_x will have died, and if dx is taken as infinitesimally small dl_x may be regarded as the number who die at exactly age x. The average age at death for all individuals who have survived to some specified age x—from which x, the age already attained, is subtracted—is the mean afterlifetime at age x, and is represented as $\mathring{e}_x$. The mean afterlifetime at birth, $\mathring{e}_0$, is the average age at death for the total l_0 births, and this is what is referred to as the expectation of life. The expectation of life as thus defined should not be confused with the age at which half the number beginning life at $x = 0$ have died (that is, the age x at which $l_x = \frac{l_0}{2}$); this is the median expectation of life.

An extension of the model just described of following some l_0 individuals just born, as they are diminished in time by death, is another model, referred to as a stationary population. In this model there is visualized not just one group of l_0 births but a succession of such births evenly occurring in time following the original set of births. From $x = 0$, when there are l_0 individuals, to an infinitesimally small time dx later, there will have died a certain number dl_0 of individuals. The survivors, diminished to number $l_1 = l_0 - dl_0$, advance to age $(0 + dx)$, while the original group is replaced by l_0 new births. With the passage of the next small interval of time, the first group will have been diminished to a number $l_1 - dl_1$, the second to the number $l_0 - dl_0$, and there will be a third group of births l_0 replacing the second. With the passage of time to $x = w$, when the first group will have been reduced to $l_x = 0$, there will have accumulated at each age x just the number that had survived to this age from the first group. From this time forward the population will be stationary in respect to the distribution of the number of individuals present at each age, for as some individuals at any age die, the survivors grow older, while the entire group is replaced by the survivors from the just younger age. In this model of a stationary population, there is, at any time, the same number of persons living at any particular age x.



THE NUMBERS OF PERSONS (l_x) SURVIVING TO AGE x OUT OF EVERY 100,000 BORN ALIVE

The total population at any time is equal to the same number as the total number of person-years lived by any l_0 individuals as they pass from birth to $x = w$, when the last survivor is eliminated by death. In this way there is a mathematical identification between the model of following a particular cohort of l_0 individuals from birth to death, and the stationary population. The total number of person-years lived by any l_x individuals, who have survived to age x, as they pass in time from age x to age w, the final age of the life span, is equal to the total population, aged x and older, present at any time in the stationary population. This number is equal mathematically to the area under the curve representing the survivorship function shown in the figure, from age x forward. If this number is divided by the value of l_x, the number living at age x, it gives $\mathring{e}_x$. Accordingly $\mathring{e}_0$, the complete expectation of life at birth, is equal to the total area under the survivorship function divided by l_0.

The model of a stationary population brings one closer to the actualities of existing populations for which values of the expectation of life are regularly calculated than the model of following a particular group of l_0 births, but still there is a fundamental discrepancy. If a population such as that of England and Wales or that of the United States at a given time is considered, there is a particular age distribution which is the actual census of individuals at specified ages. This is not the age distribution of the model stationary population that defines the calculated expectation of life, and the calculated expectation of life is not the same as the actual mean age of death occurring in the population over a year. In order that a population become stationary, it is required that there be no immigration into and no emigration from the population, and that the age-specific death rates remain constant over a period at least equal to w, the total life span. Obviously, in modern times for countries of western civilization these conditions are not fulfilled. The age distribution actually obtaining in these populations is the resultant of just such changes, and the age distribution is therefore not that of a stationary population. It is then natural to ask the questions: Why should the expectation of life be calculated if it is bound up with a stationary population that is not that of the population in question? How is the expectation of life calculated? The answer to the question "why" is that although the expectation of life calculated for a specified population does not estimate the actual mean duration of life of that population as of that time, it does provide a defined index of the prevailing death rates, and so serves as a general measure of prevailing hygienic conditions, insofar as these are reflected in mortality. This is the chief use to which the calculated expectation of life has been put.

The calculation of the expectation of life in terms of the model described is effected by way of the construction of a life table for the population at hand. Only the essentials of the calculations, so far as they pertain to the evaluation of the expectation of life, will be referred to. The basic information required is the probability of dying within a year after the attainment of any age of life. That is, we wish to know for the population in hand how many individuals who have just attained, say, age 40 years die before the attainment of their 41st birthday, and we wish such information for every integral year of life. The probability of dying in the year from age x to the next year $(x + 1)$ is symbolized q_x, and its complement, the probability of surviving, is $p_x = 1 - q_x$. The data from which these required quantities are obtained are (1) the number of persons of various specified ages living at a given time and (2) the number of deaths occurring in a year by age at time of death. The sources of these data are the government enumerations made in censuses and death certificate reports. The figures as recorded in these reports must be adjusted to obtain the required values of q_x. The census figures are available only for census years and are subject to inaccuracies of reporting. Certain corrections must be made, and interpolation must be effected in available census figures, to obtain the population estimate for the required specific age, sex and year. If the number of deaths in the year which have occurred at, say, age 40 (that is, between the 40th and the 41st birthdays) is divided by the number of persons age 40 living in the middle of the year (that is, on July 1), we obtain m_x, the central death rate for that year. This, it should be observed, is not quite q_x, which has reference to the number of deaths in a year among individuals who had their xth birthday within a year before their death. Individuals who died in the year at age 40—that is, at an age between 40 and 41 years —were not necessarily 40 years old at the beginning of the year.

If the 40th birthday was on July 15 and the person died in August of the year, his death certificate would be marked age 40 years, but the census would have included him in the age group 39 since that was his age on July 1 when the census was estimated. The estimate of m_x can be converted to an estimate of q_x, if it is assumed that the survivorship function between ages x and $(x + 1)$ is linear, by use of the formula

$$q_x = \frac{2\ m_x}{2 + m_x}.$$

One then begins with a hypothetical number of births, usually taken as 100,000 and called the radix of the table. This is the value of the survivorship function l_x at age $x = 0$ and therefore is represented as l_0. Multiplying l_0 by q_0 yields d_0, the number of deaths, out of the 100,000 births, which occur in the first year of life, and these deaths subtracted from 100,000 give the number surviving to age one year. In this way l_1 is evaluated. In the same way l_2 is obtained by multiplying l_1 by q_1 to give d_1, the number of deaths among the l_1 who die between age one year and age two years. We may formulize this calculation by noting that

$$l_1 = l_0 - l_0\, q_0 = l_0\,(1 - q_0) \doteq l_0\, p_0;\ l_2 = l_1\, p_1 = l_0\, p_0\, p_1$$

and so forth, so that in general

$$l_x = l_0\, p_0\, p_1\, p_2 \ldots p_{x-1} \text{ or } l_x = l_0 \prod_{0}^{(x-1)} p$$

where Π represents the continued product of the p's. In this way is calculated, from the determined quantities q_x, the value of l_x corresponding to each integral year of age x from $x = 0$ to $x = w$, the final year of the life span at which $l_w = 0$.

It will be remembered that the expectation of life after age x is given by the area under the survivorship function from x to w, divided by the initial value l_x. For purposes of calculating the area required, with the values of the survivorship function l_x calculated at each integral year of life, it is considered that a sufficiently good approximation is obtained if it is assumed that the survivorship function between each age year x and the next is linear.

On this assumption the area under the curve over a single year of age is half the sum of the values of the bounding l's. Thus the area from $x = 0$ to $x = 1$ is

$$\frac{l_0 + l_1}{2}$$

the area from $x = 1$ to $x = 2$ is

$$\frac{l_1 + l_2}{2}$$

and so forth. The total area from x to w is therefore

$$A = \frac{l_x}{2} + \sum_{x+1}^{w} l$$

where Σ represents the continued sum of l values from l_{x+1} on. The expectation of life from age x, or mean afterlifetime, is A divided by l_x; so

$$\mathring{e}_x = \frac{1}{2} + \left(\sum_{x+1}^{w} l\right) \Big/ l_x$$

and the expectation of life at birth is

$$\mathring{e}_0 = \frac{1}{2} + \left(\sum_{1}^{w} l\right) \Big/ l_0$$

From the development given, it is seen that the value of the expectation of life, as calculated, depends only on the values of the age-specific death rates obtaining in the population. It may be viewed as the actual mean age at death of a population in which these death rates prevailed indefinitely at the values they had in the year in question. It may thus be seen why it is regarded as a useful summary index of the mortality rates characteristic of existing conditions.

Fairly reliable estimates of the expectation of life in western communities have been made for periods since the middle of the 19th century. Females are found always to have a longer expectation of life than males. For both, great progress has been made in its extension as general sanitary conditions have been improved, food has become more abundant and better in quality and advances in medical science have been achieved. The accompanying table gives some values of the expectation of life for England and Wales and for the United States. The period covered is roughly the 100 years extending from the middle of the 19th century to the middle of the 20th century. Values of the expectation are given at approximately ten-year intervals. The phenomenal extension of the duration of life is notable. Expectation of life in Roman times has been estimated to have been about 30 years. From that time to the middle of the 19th century it was increased to about 40 years. In the next century the increase in expectation of life was about 25 years, so that by 1950 the expectation of life was more than double that of ancient times. *See* POPULATION; VITAL STATISTICS; *see* also references under "Life Expectancy" in the Index. (JH. B.)

Expectation of Life, in Years

United States			England and Wales		
Period	Male	Female	Period	Male	Female
1850	38.3	40.5	1838–54	39.9	41.9
1900–02	47.9	50.7	1901–10	48.5	52.4
1909–11	49.9	53.2	1910–12	51.5	55.3
1919–21	55.5	57.4	1920–22	55.6	59.6
1929–31	57.7	61.0	1930–32	58.7	62.9
1939–41	61.6	65.9	1937	60.2	64.4
1948–60	66.5	73.0	1948–60	68.3	74.1

LIFE INSURANCE, in the usual sense, means the business of issuing policies of insurance on human life. A policy on human life has been defined as any instrument by which the payment of money is assured on death or the happening of any contingency dependent on human life, or any instrument evidencing a contract that is subject to payment of premiums for a term dependent on human life.

In Great Britain the word "assurance" is in common use in connection with life contracts. In the United States the word "assurance" is rarely used, although it does appear in the names of a few life insurance companies.

Life insurance companies may be classified in two types: stock or proprietary, and mutual. Stock companies are nominally controlled by the shareholders; mutual companies are without shareholders and are nominally controlled by the policyholders.

A policy that shares in the profits of the company is called a participating policy. A policy that does not share in the profits of the company is called a nonparticipating policy. A stock company may issue both participating and nonparticipating policies. A mutual company's policies are usually participating, although there are some exceptions.

Mutual companies in Great Britain almost without exception issue both participating and nonparticipating policies. In the United States, for example, annuity contracts issued by mutual companies are likely to be nonparticipating.

Life insurance contracts may be classified as group or individual, the latter being further classified as ordinary or industrial. In an individual contract the policy is issued on an individual basis to the owner of the policy. The owner may or may not be the person whose life is insured. Before issuing an individual policy the company usually requires some evidence of insurability (*see* INSURANCE: *Risk and Insurance*). Under group insurance (*q.v.*) a large number of persons are insured under one blanket policy, the individuals insured receiving certificates and being called certificate holders rather than policyholders. The commonest group contract is issued to an employer on the lives of the employees, although many contracts have been issued to labour unions, associations and other groups. Individual evidence of insurability is usually not required under a group contract.

The essential distinction between ordinary and industrial insurance is that under industrial insurance the sum insured is comparatively small and premiums are payable at short intervals, the premium being commonly collected by the agent in the home of the insured. (*See* also INDUSTRIAL INSURANCE.)

In Great Britain the Industrial Assurance act (1923) defined industrial assurance as "assurances upon human life, premiums in respect of which are received by means of collectors and are payable at intervals of less than two months." Death benefits are usually small, ranging from about £10 to about £100.

The New York state insurance law has defined industrial insurance as "that form of life insurance, either (a) under which the premiums are payable weekly, or (b) under which the premiums are payable monthly or oftener, but less often than weekly, if the face amount of insurance provided in the policy is less than $1,000, and if the words 'industrial policy' are printed upon the policy as a part of the descriptive matter."

The Ontario Insurance act defined industrial insurance in the following language: " 'Industrial contract' means a contract of life insurance for an amount not exceeding $2,000, exclusive of any benefit, surplus, profit, dividend or bonus also payable under the contract, and which provides for payment of premiums at fortnightly or shorter intervals, or, if the premiums are usually collected at the home of the insured, at monthly intervals."

This article is divided into the following sections and subsections:

I. Types of Insurance
  1. One-Year Term Insurance and Ordinary Life Insurance
  2. Term Insurance
  3. Limited Payment Life Insurance
  4. Endowment Insurance
  5. Pure Endowment Insurance
  6. Modified Life Insurance
  7. Income Endowment Insurance
  8. Family Income Insurance
  9. Double Indemnity Benefit and Disability Benefit
II. Reserves
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V. History
  A. Great Britain and the Commonwealth
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    1. Early History
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    4. Credit Life Insurance
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VII. Mortality Tables

I. TYPES OF INSURANCE

1. One-Year Term Insurance and Ordinary Life Insurance.—The simplest form of life insurance is one-year term insurance under which the premium collected for one year is enough to pay the cost of insurance and expenses for that year. This type of insurance is sometimes called pure protection, indicating that there is no investment element. Since the cost of insurance increases with age, the premium for one-year term insurance increases every year, becoming prohibitive at the very advanced ages.

The disadvantages of increasing premiums were solved by the development of level premium life insurance. Perhaps the simplest and most familiar form is that known as ordinary life or straight life. This form provides a benefit of the face amount of the policy on the death of the insured and calls for the same premium at the beginning of every year during the lifetime of the insured.

Table I shows the premiums for one-year term insurance for $1,000 at quinquennial ages from 35 to 95 inclusive. The corresponding annual premium for ordinary life, issued at age 35, is

TABLE I.—*Premiums for One-Year Term Insurance, Ages 35–95*
(per $1,000)

Age	*Premium*	*Age*	*Premium*
35	$2.45	70	$48.58
40	3.44	75	71.58
45	5.22	80	107.30
50	8.12	85	157.21
55	12.68	90	222.58
60	19.84	95	342.67
65	30.98		

$17.67. The premiums are based on the 1958 Commissioners Standard Ordinary table with 2½% interest, and are net premiums (*i.e.*, no provision for expenses).

2. Term Insurance.—The one-year term insurance contract described above is a special case of term insurance. Term insurance may be defined more generally as a promise to pay the face amount on death if death occurs during the specified number of years, called the term of the policy. Premiums for term insurance are almost always constant and payable during the entire term.

3. Limited Payment Life Insurance.—The benefit under limited payment life is the same as under ordinary life: namely, the payment of the face amount (or sum assured) on death. The difference is in the premium payment period. Under ordinary life, premiums are payable for life; under limited payment life, premiums cease at death or at the end of the premium paying period specified in the contract, whichever comes first. Under a 20-payment life policy, for example, no premiums are payable after 20 years in any event. After the 20th annual premium has been paid the policy is said to be paid up. The sum insured under the policy is payable at subsequent death.

4. Endowment Insurance.—Under this type of policy the benefit is the payment of the face amount on the death of the insured if he dies before the end of the term (specified in the contract), or the payment of the face amount as an endowment if the insured lives to the end of the term. A continuous premium endowment insurance policy calls for premiums payable during the entire term—or until prior death. A limited payment endowment insurance policy is similar to a limited payment life policy in that the premiums are limited to some period less than the term of the policy. Under a 20-payment, 30-year endowment insurance policy, for example, premiums are payable for 20 years—or until prior death—but the term of the policy is 30 years; thus the benefit is payment of the face amount on death, if death occurs within 30 years, or the payment of the face amount at the end of 30 years, if the insured is then living. Limited payment endowment insurance is not generally written in Great Britain.

5. Pure Endowment Insurance.—A pure endowment benefit

is a promise to pay a certain sum if a specified person is alive at some specified future date. Issued as a separate contract in Great Britain, it is usual for the premium paid under a pure endowment to be returnable—sometimes with interest—at death during currency of the policy. This benefit is rarely granted by itself but is an important adjunct to surrender benefits, discussed in a later section. Mathematically, endowment insurance is a combination of pure endowment and term insurance. It is known in Great Britain as reduced premium optional assurance.

6. Modified Life Insurance.—Usually this refers to a policy for which the premium for the first few years is less than the ultimate premium but more than the term premium would be.

7. Income Endowment Insurance.—Under this type of policy the death benefit is the face amount, or the reserve if that is greater, if death occurs during the term of the policy. At the end of the term the insurance contract is in effect exchanged for an annuity contract. A common form of income endowment calls for annuity payments to begin at age 65, with monthly payments of 1% of the face amount of the insurance policy guaranteed for 10 years, subsequent payments being made only if the policyholder is alive at the time the payment is due. There is no generally accepted name for this type of insurance. Terms in common use, in addition to income endowment, include retirement endowment, retirement income, life income, insurance and income, income to insured. In Great Britain endowment insurance with guaranteed annuity option at maturity is written freely.

8. Family Income Insurance.—This benefit usually has a family income period of from 10 to 40 years, 20 years being very common. If death occurs during the period, a monthly income is paid from the date of death to the end of the period. At the end of the period the face amount of the policy is paid. The amount of the monthly income is commonly 1% of the face amount of the policy but may be some other percentage. The fact that the face amount is paid at the end of the period rather than at death results in some saving in interest to the insurance company, a saving that is used to reduce the premium from what it would be if the face amount were paid at death. A family income benefit is an example of reducing term insurance. In Great Britain a sustained demand for family income insurance led to the issuance of a variety of contracts written as installments of a capital sum, the income benefits being free of British income tax.

9. Double Indemnity Benefit and Disability Benefit.—Many life insurance policies provide supplementary benefits in the event of accidental death or disability. A common accidental death benefit, frequently called double indemnity, calls for a death benefit of twice the regular death benefit in the event that death occurs before age 60 and is due to an accident as defined in the policy. A common disability benefit provides that the company will waive payment of any premiums that come due while the insured is disabled within the meaning of the contract. Some contracts provide that the company will not only waive premiums during disability but will pay an income in addition.

There are a number of types of life insurance not described above; but most of them amount to combinations of the types described. *See* also *History: U.S.: Credit Life Insurance* and *Family Insurance* below.

II. RESERVES

The company must set up a reserve in the early years of a policy in order to avoid a financial deficiency in the later years. From a comparison of one-year term premiums (*see* Table I) with the premium for an ordinary life policy taken out at age 35, it can be seen that a person becoming insured at age 35 would pay less for his insurance on the one-year term plan than on the ordinary life plan until some age between 55 and 60, whereupon the one-year term premium would become more expensive than the ordinary life premium. Since the one-year term premium is the amount the insurance company needs to pay the death claims for the particular age group, the company is collecting more than enough to pay claims in the early years of a policy but less than enough to pay claims in the later years.

Actuaries customarily analyze reserves from two points of view: retrospective and prospective. From the retrospective point of view the reserve is the accumulated amount of that part of the premiums already collected that is not needed to pay the death claims already incurred. From the prospective point of view the reserve is the present value of future benefits less the present value of future premiums. Various actuarial techniques have been developed to calculate reserves. In most life insurance companies the policy reserves constitute by far the major portion of the company's liability. The subject of reserves is therefore extremely important.

There are essentially three systems in common use for valuing a company's reserve liability: (1) full net level; (2) modified net premium; and (3) gross premium. Under the full net level method (1), a net level premium for a policy is calculated on certain assumptions regarding interest and mortality and with no provision for expenses. The reserve for the policy at a given time is computed as the present value of future benefits less the present value of future net level premiums. Under the modified net premium method (2), a modified net premium is calculated in accordance with a formula. In the United States the formula is specified by state law. This modified premium is greater than the net level premium, so that reserves under this method are less than corresponding reserves under the full net level method. Under the gross premium method (3), the reserve is computed as the present value of future benefits and expenses less the present value of future gross premiums, the term "gross premium" meaning the premium actually collected.

In the United States state laws require that a company use either the full net level method or the modified net premium method in computing reserves for the annual statement. In Great Britain, where there is no legislation regarding reserves, the gross premium method is in common use. Many U.S. companies also use the gross premium method for internal purposes.

III. SURRENDER VALUES

Under most policies other than term insurance a company will, after a certain number of premiums have been paid, pay a sum of money on surrender of the policy, this sum being known as the cash value or surrender value.

In the U.S. and certain continental countries the laws require that the policy state the amount of the surrender value for various policy years or state the method of calculation or both. It is customary for a company to grant a loan on the security of the policy, the amount of the loan being limited by the surrender value and the interest charge. In the U.S. the loan privilege amounts to an automatic benefit; in Great Britain it is not automatic but companies are normally willing to grant a loan. In both countries banks are usually willing to make a loan on the security of a policy. An alternative to surrender for cash is the election of paid-up insurance. There are two common paid-up insurance options, commonly called nonforfeiture options. Under the reduced paid-up option, the benefit is paid-up insurance on the same plan as the original policy but for a reduced amount. The reduced amount is such that the paid-up insurance and the surrender value are actuarial equivalents; *i.e.*, the present value of the reduced paid-up insurance is equal to the surrender value.

Under the extended term insurance option the benefit is term insurance for the amount of insurance in force at the time the policy was surrendered. The length of the term is such that the paid-up term insurance and the surrender value are actuarial equivalents. In the case of endowment insurance the term for the paid-up insurance will not extend beyond the original term of the policy. Thus if the surrender value is large enough, the extended term insurance consists of term insurance for the original amount plus a pure endowment for a reduced amount.

IV. PARTICIPATION IN PROFITS

A mutual company returns to the policyholders any profits not needed to strengthen reserves, contingency funds and surplus. A stock company's relation with its holders of participating policies is the same except that the shareholders may take a small part of the profits.

The method of distributing profits to the policyholders varies from country to country. In Great Britain some companies make annual distributions while others make distributions every three or five years; the distribution is called a bonus distribution and takes the form of an addition to the sum insured. Two common bonus plans are: (1) the simple bonus plan, which provides additions at a given rate for each £100 of original insurance; and (2) the compound bonus plan, which provides additions to the sum insured, calculated on original insurance and accrued bonuses. Policyholders frequently elect to take the cash equivalent in lieu of the bonus.

In the United States and Canada annual distributions are the rule. The distribution to an individual policyholder is called the dividend. Policies provide that a dividend may be taken in various forms, called dividend options. The more common options available are: (1) cash; (2) reduction of the next premium; (3) leaving with the company to accumulate at interest; and (4) use for purchase of a paid-up addition to the policy, the paid-up addition being similar to the British bonus.

V. HISTORY

The beginnings of life insurance—that is to say, the payment of certain benefits on death, against certain periodical subscriptions—are to be found in the Roman *collegia* (artisans' associations). The guilds of medieval times would, in many cases, make provision for the decent burial of a member, but this was not life insurance in the full sense. Marine insurance is generally believed to have had an earlier origin than life insurance, and it is therefore natural that the first definite contracts of life insurance should have been on the lives of mariners.

A. Great Britain and the Commonwealth

The earliest life insurance transaction recorded to have been made in England was in 1583, when a number of merchants of the city of London subscribed to an insurance on the life of William Gybbons, described as a citizen and salter of London. This insurance was for a period of 12 months at a premium rate of £8 sterling per £100. During the following century insurance for temporary periods, such as might be required to protect the policyholder against the perils of travel and other risks arising during a limited period, was granted by individuals and certain civic guilds.

The history of life insurance companies in England commenced in 1706 when the Amicable Society for a Perpetual Assurance Office was formed. The insurance method was rudimentary and provided merely for the dividing up of certain sums among the representatives of those members who died each year. After a separate existence of 160 years, during which time it adopted a graduated scale of premiums according to age, the Amicable in 1866 became merged with the Norwich Union Life Insurance society.

A number of minor companies became defunct during the period of speculative financial schemes which resulted in the crisis of 1720, popularly known as the South Sea Bubble (*q.v.*). Speculation was common throughout the century, and in order to counteract the improper use of life insurance the Life Assurance act, known as the Gambling act, was passed in 1774. This act, which still remained on the statute book in the second half of the 20th century, provided that no insurance should be effected unless the person in whose favour the policy was taken out had a pecuniary interest in the life to be insured.

The Equitable society, founded in 1762, was the first to issue whole life insurance. The premium rates varied with age and were originally based on a mortality table constructed from the registers of Breslau, Germany, for the years 1687–91. The rates were later based on a mortality table deduced from the London bills of mortality for 1728–37; and still later on the Northampton tables which were prepared from a record of baptisms and deaths from the registers of the town of Northampton during the years 1735–80. When experience showed that rates could be reduced, policyholders paying the original rate were granted an addition to the sum insured.

Many new concerns were floated during the closing years of the 18th century, while between 1800 and 1870 some 500 new offices were established. A number of these companies had little hope of long surviving and some were of definitely fraudulent intent. This activity in company promotion was followed by a period of amalgamation, also marked by many abuses. The financial difficulties of two companies, the Albert and the European, were a factor in hastening much needed legislation. The Life Assurance Companies act (1870) was designed to prevent effectually a repetition of such disasters. Under the provisions of this act companies transacting life assurance business were compelled to submit annual accounts in a prescribed form to the board of trade for subsequent publication, and no new office was allowed to issue life policies until it had deposited £20,000 with the court of chancery. This act governed the business in Great Britain until it was practically re-enacted in the Assurance Companies act (1909), which was amended by the Assurance Companies act (1946) and the Assurance Companies act (1958), which consolidated the measures of 1909 and 1946.

The Married Women's Property act (1882) and the Married Women's Policies of Assurance (Scotland) act (1880) conferred certain powers on married women, enabling policies to be effected on their own lives or on the lives of their husbands for their own separate use. Similarly, married men were enabled to effect policies on their own lives for the benefit of their wives or their children, or both, and such policies were protected against their creditors absolutely.

British income tax laws encouraged life insurance ownership by providing that a policyholder who pays premiums for insurance on his own life, or on that of his wife, is entitled to claim relief from taxation in respect of such premiums paid. The relief took the form of a deduction from the policyholder's assessable income before income tax liability is calculated. The deduction represented the premium or a percentage of it, subject to a maximum percentage of income and to a maximum percentage of the amount guaranteed by the policy to be paid at death. Premiums for deferred annuities were also allowed as a deduction, subject to limitations and restrictions concerning the premium amount and policy use.

Life insurance in Australia and New Zealand developed in the main in accordance with the practice followed in the United Kingdom. British mortality experience is largely used in these countries. In Canada life insurance was modeled very largely on the U.S. system (*see* below). In all these countries the industry functions under varying degrees of legislative control, such legislation being in general more restrictive than British legislation, which tends to be based on the principle of freedom combined with publicity. In India and Pakistan the general pattern of life insurance is British, but at a much earlier stage of development than in Australia, New Zealand and Canada. Life insurance in India was nationalized at the beginning of 1956 and business transferred to the Life Insurance Corporation of India. In the same year British and French life insurance interests in Egypt were sequestrated. *See* also Fraternal Organization.

B. Europe

Life insurance on the continent developed later than in Great Britain. The first successful venture in France was made in 1819 when the Compagnie d'Assurances Générales sur la Vie was founded. In Germany branches of English offices were operating before the end of the 18th century but the first German company was not founded until 1828.

Detailed governmental control is the general rule in continental countries, the control extending in many countries to premium rates, reserve bases and investment policy. In France all insurance companies with premium incomes exceeding a prescribed amount are nationalized. British insurance companies operating in France, although otherwise free from national control, are obliged to reinsure a small proportion of all business written in that country with the French state reinsurance institute—La Caisse Centrale de Réassurance. British companies maintained an interest in France, Belgium and Spain in the second half of the 20th century, but had ceased to operate in Germany.

Although the years immediately after World War II witnessed a considerable growth in life insurance in continental countries, the expansion did little more than bring the average sum insured into line with the higher level of values. Continental practice included

the issue of policies with the right to participate in profits.

(Rt. E. L.)

C. United States

1. Early History.—What little life insurance there was in the United States during the colonial and confederation periods was furnished by British companies. Though the Corporation for the Relief of Poor and Distressed Presbyterian Ministers (and their survivors) was chartered by Pennsylvania in 1759 and issued life insurance contracts in 1761, it was in part a charitable organization, and limited in its scope of activity. Not until more than a century later was it authorized to do a general life insurance business under the name of the Presbyterian Ministers' fund. A few life insurance policies also were written by fire and marine insurance companies prior to 1800.

Between 1800 and 1843 scientific life insurance in the United States got its start by way of the proprietary (stock) and trust companies. The first commercial company for life insurance exclusively was the Pennsylvania Company for Insurance on Lives and Granting Annuities, chartered in 1812; it was also the first to use U.S. mortality statistics. The Massachusetts Hospital Life Insurance company (1818) was from the beginning more concerned with its trust business than life insurance, but the New York Life Insurance and Trust company (1830) actively promoted the sale of life insurance by way of the agency system. The Girard Life Insurance, Annuity and Trust company (Pennsylvania, 1836), following the example of some of the British companies, provided for policyholders' participation in the income of the company. There were various other stock companies chartered prior to 1840.

Life insurance in the United States made its first important growth with the organization of the mutuals in the 1840s. The mutual principle made it possible for resourceful men to form companies and give protection to the policyholder without the necessity of raising a sizable sum of capital to invest in the business. Eight of the more important companies founded in this period are still in business. They are the New England Mutual Life Insurance company (chartered in 1835, began business in 1843); the Mutual Life Insurance Company of New York (1842 and 1843); the State Mutual Life Assurance Company of Worcester (1844 and 1845); the Nautilus Insurance company (1845), which in 1847 was renamed the New York Life Insurance company; the Mutual Benefit Life Insurance Company of New Jersey (1845); the Connecticut Mutual Life Insurance company (1846); the Penn Mutual Life Insurance company (1847); and the Union Mutual Life Insurance company (1848 and 1849). About 40 other companies were organized by 1850, a number of which failed to survive. Companies pioneered in education of the public to the need for and advantages of life insurance and in promotion of volume sales through the agency system. From less than $5,000,000 of life insurance in force in 1840 the amount increased to $96,000,000 in 1850.

Several of the prominent companies which began writing life insurance in the 1850s were stock companies. Among them were the Aetna Life Insurance company, the Manhattan Life, the United States Life, the Charter Oak and the Knickerbocker. The Massachusetts Mutual Life Insurance company (1851), the Mutual Life Insurance Company of the State of Wisconsin (1857; in 1865 it became the Northwestern Mutual Life Insurance company) and the Equitable Life Assurance Society of the United States also began business. The last-named company, founded in 1859 by Henry Baldwin Hyde, a former cashier in the Mutual of New York, was originally a stock company but operated from the beginning as a mutual in regard to distribution of earnings.

Many of the early policies were for term insurance, but by 1860 approximately nine-tenths of the policies issued were level-premium life policies. Endowment insurance payable to the insured at a certain age—or to his beneficiaries—had its beginnings in the middle 1850s. By the late 1850s the application had become a part of the insurance contract and untrue statements made therein could render the contract void. The companies provided their own medical examiners to scrutinize the examinations made by local physicians. Extra premiums were required for hazardous occupations, residence in the less healthful portions of the country, military service or travel beyond the northern and eastern sections. Although most of the companies by 1860 paid some sort of surrender values after the fifth year if the policy was surrendered before it lapsed, there were no provisions in the contract regarding nonforfeiture. In 1860, however, New York Life marketed a policy which recognized nonforfeiture as a right. For calculation of premiums and policy reserves the companies used various British mortality tables and assumed 4% or 4.5% interest on the reserves. Investments were generally confined by law to United States and state and local bonds and to mortgages on improved real estate in the state where the company was chartered.

From the beginning insurance in the United States was under state supervision. Early laws sought to raise revenue and secure publicity by means of company reports, but systematic supervision by a commission or commissioner began in New Hampshire and Massachusetts in 1851–52. Elizur Wright, Massachusetts abolitionist turned mathematician, prepared lengthy tables by which the necessary reserves on policies might easily be calculated and the soundness of the company determined. As one of the insurance commissioners of his state he not only kept check on the companies but helped bring about the first step toward a nonforfeiture law (1861), by which four-fifths of the net value of the lapsing policy was to be used as a single premium for temporary insurance. A more complete nonforfeiture law was enacted in 1880, and most of the states soon followed suit. For this and other work in the field of life insurance Elizur Wright has sometimes been called the "father of American life insurance."

The Civil War stimulated the purchase of life insurance as it stimulated agriculture, industry and business. Approximately 24 new companies were organized during the war years. One of these, projected in 1863 with the idea of insuring the lives, limbs and health of men in the military service, became in 1868 the Metropolitan Life Insurance company, eventually the largest life insurance company in the world. The Connecticut General Life Insurance company (1865) pioneered in the writing of substandard risks—the insurance of persons unable to pass the regular medical examinations—a practice later accepted by most companies. Life insurance in force more than trebled from 1861 to 1865.

2. Growth and Development, 1868–1905.—The years 1868 and 1869 were important in life insurance history. First, Sheppard Homans, actuary of Mutual Life, published the first important mortality table based upon United States data. New York law established it as the standard for calculating reserves and this, the American Experience table, came to be the most widely used by United States companies until it was superseded in the 1940s. Second, in 1869 the supreme court of the United States in *Paul* v. *Virginia* ruled that an insurance policy was not a transaction in commerce and hence not subject to federal regulation. Third, Hyde and Equitable in 1868 introduced the famous tontine policies which helped popularize life insurance but brought on a long and lively controversy. Going back to Lorenzo Tonti for the basic idea, the tontine policy provided for payment of "dividends" or refunds at the end of a definite period such as 15 or 20 years. Those policyholders in each group who lived and maintained their policies collected not only their own accumulated "dividends" but the forfeited "dividends" and reserves of those who dropped out. Tontines of various types proved popular, and those companies which aggressively promoted them grew rapidly while those which opposed them on principle failed to keep pace or actually diminished in size. The war between the two schools of thought was long and bitter.

The period of the 1870s was a trying one. More than 200 new companies entered the field, but many were caught in the depression which began in 1873. One constructive step was the organization in 1871 of the National Convention of Insurance Commissioners (after 1935 the National Association of Insurance Commissioners), an organization which did much to bring order to the conflicting laws of the states. Entry of the larger U.S. companies into foreign fields came in the 1870s, and before long their policies were being sold in practically every country.

The liberalization of the policy continued during the post-Civil

War period. Travel and residence restrictions were gradually removed, cash loan and surrender values were included in the ordinary life policy, and the contract was made incontestable after three years. Investments in bonds of states and their subdivisions, and of foreign countries in which the companies were licensed to do business, were made legal, as were the stocks and bonds of corporations and mortgages on real estate.

Life insurance first began to reach the manual labouring class with the advent of industrial insurance—small policies with weekly premiums collected by the agent—in 1875, when the Prudential Friendly society (after 1878 the Prudential Insurance Company of America) issued its first policy. The Metropolitan, John Hancock Mutual, Guardian and other companies also began to sell industrial insurance, and by 1890 industrial insurance in force totaled more than $400,000,000.

Life insurance was also brought to the masses by the development of mutual assessment or co-operative societies and fraternal organizations with life insurance features. The assessment concerns criticized the high cost of legal-reserve level-premium life insurance and maintained that it was just as safe, and much cheaper, to "keep your reserve in your pocket" and pay death benefits by assessing the remaining members as required. But these organizations inevitably ran into the laws of both arithmetic and human nature; members died more frequently with increasing age, and young members could not be recruited in sufficient numbers to carry the increasing and uncertain assessments. By the mid-1880s there were hundreds of assessment societies; all sooner or later ceased functioning.

As assessment societies waned, the fraternal organizations reached their peak. By the end of the century there were more than 300, with 4,000,000 members and $6,000,000,000 of life insurance. Although in the beginning many of the fraternal organizations differed but little in insurance practices from the assessment societies, eventually they either had to conform to actuarial standards or fall by the way. Some of them were converted into legal-reserve companies.

The race for size on the part of the "big three"—Equitable, Mutual and New York Life—reached its height toward the end of the century and in the early 1900s. New types of policies were introduced periodically, extravagant promises were sometimes made regarding "dividends," and, despite various agreements, the companies continued to attract each other's agents and policyholders. Rebating by agents on commissions was a not uncommon practice, the proportion of lapsed policies increased and expenses became high. Then the tremendous surpluses which resulted largely from various types of deferred dividend policies tempted some of the companies to engage in financial operations not properly the function of life insurance companies. These factors—combined with the general tenor of the times that produced the muckraking movement—led to the New York legislative investigation of 1905 by the Armstrong committee with Charles Evans Hughes as counsel. As a result, New York enacted laws which limited expenses and the amount of new insurance a company might sell annually; provided for annual distribution of dividends; and prohibited the companies from engaging in underwriting syndicates. Other states enacted similar laws.

3. 20th Century.—The temporary embarrassment of some of the larger companies in 1905 encouraged the organization of hundreds of new companies, largely in the south and west. In 1911 Equitable wrote the first group insurance policy—insurance without medical examinations on a group of employees, members of a labour union, etc.—and thus opened a new field for life insurance. Life insurance came through World War I and the influenza epidemic of 1918 in sound condition. By 1920 there was more than $40,000,000,000 of life insurance in force in the United States, and in 1930 there was more than $106,000,000,000.

The great depression of the early 1930s did not hit the life insurance companies severely until the banks were closed in 1933 and moratoria were declared on mortgages, while at the same time death benefits and other claims were expected to be paid promptly. State insurance departments came to the aid of the companies by putting temporary restrictions upon policy loans and surrenders, except for emergencies. The companies were further hit by the low interest rates maintained by the government, and the policyholders were affected by the devaluation of the dollar and the inflation policies of the government. Not until 1937 did life insurance in force again equal that of 1931.

In 1936 the National Association of Insurance Commissioners (N.A.I.C.) inaugurated a movement for a new mortality table. After several years' work the Commissioners Standard Ordinary (C.S.O.) Mortality table and a Standard Industrial Mortality table were completed in 1941. A committee headed by Alfred N. Guertin of the New Jersey insurance department prepared model bills on nonforfeiture benefits and reserve standards which were recommended by the N.A.I.C. in 1942 and generally adopted by all the states within the next five years.

Meanwhile life insurance came through the investigation of the national economy by the temporary national economic committee of the U.S. senate in 1939–41—as its chairman, Sen. Joseph C. O'Mahoney put it—"with flying colors." Though the movement for federal regulation desired by some seemed again to have been sidetracked, the whole question was reopened in 1944 by the decision of the supreme court of the United States in *U.S.* v. *South-Eastern Underwriters' Association, et al.,* which overruled the decision in *Paul* v. *Virginia* and held that insurance was commerce and hence, when it crossed state lines, subject to federal regulation. To obviate the possible resulting confusion, public law 15 of the 79th congress (the McCarran act) in March 1945 stated that "the continued regulation and taxation by the several states of the business of insurance is in the public interest" but provided that after Jan. 1, 1948 (later extended to June 30, 1948), the federal antitrust laws and the like would be applicable to the business of insurance to the extent that such business was not regulated by state laws. Committees representing the National Association of Insurance Commissioners and all parts of the insurance business prepared model bills to meet the intent of the McCarran act, and they were adopted by most of the states by the second half of the 20th century. This legislation together with the standard nonforfeiture and valuation legislation being enacted at the same time gave insurance regulation laws a practical uniformity among the states. During the 1950s the average U.S. family with life insurance protection more than doubled the amount of insurance it carried.

(R. C. By.)

4. Credit Life Insurance.—The rapid increase in credit life insurance in force after World War II was a significant development in the history of U.S. life insurance. Under credit life insurance the life of a borrower or installment purchaser is insured to cover payment of a loan balance in the event of death. A specific credit life policy was written for the first time in 1917 on an individual basis. Group credit life was first written in 1926. Credit life insurance in force rose steadily (except for declines in the early 1930s and again in the early 1940s), reaching a total of $1,200,000,000 by the end of 1947. In the second half of the 20th century it reached a total of $21,500,000,000 and was beginning to be considered a fourth major division of life insurance, the others being ordinary, group and industrial.

5. Family Insurance.—In the second half of the 20th century family insurance became an important factor in U.S. life insurance sales, accounting for about 20% of the total purchases of ordinary insurance. The essential idea of family insurance is that all members of a family are covered under one policy. Although the details of the policy vary among insurance companies, a typical policy pays $5,000 on the death of the husband, a lesser amount (depending on the difference in age of husband and wife) on the death of the wife before the husband becomes 65 and $1,000 on the death of a child before age 21. The policy covers all children, including those unborn at the time the policy is issued, except that it is usual to restrict or deny the death benefit in the case of infant deaths. The premium is, typically, the same regardless of the number of children.

6. Taxation.—Originally state taxes on life insurance were intended to meet the expenses of the state insurance departments but the taxes soon greatly exceeded the expenses and became sources of general revenue. In the second half of the 20th century

every state imposed a premium tax, the average rate of tax among all the states being 1.82% for life insurance and 0.72% for annuities, the total annual premium tax collected by all the states from life companies being about $250,000,000.

Both the rate of tax and the formula for determining the amount subject to tax vary from state to state and are subject to change within a state. A typical premium tax law required a foreign (out-of-state) company to pay 2% of all life insurance premiums collected less dividends returned, with respect to policyholders who are residents of the state in question. The tax on domestic (in-the-state) companies is frequently less than the tax on foreign companies. Many states have a retaliatory law, which says in effect that a company domiciled in state A and doing business in state B must figure its state B tax on two bases and pay the greater: one basis is the tax specified in the statutes of state B; the other is the tax according to state A's formula for foreign companies.

Federal income taxation of life insurance companies is a complicated subject. Since life insurance company commitments run far into the future, the difficulty of accurately measuring taxable income for periods as short as a year is almost insurmountable. Hence federal income tax laws made special provision for life insurance companies. The Revenue act in effect from 1913 to 1921 sought to tax life insurance companies in the same way as any other corporation, but with certain special adjustments necessitated by the peculiarities of the business. This method was replaced in 1921 by various formulas designed to use investment income as a base for determining a workable approximation of yearly taxable income.

In 1959 a new formula was adopted and made retroactive to results of 1958. Under this formula the tax depended on both investment income and change in surplus as well as some other factors. The formula was designed to produce a total revenue of $500,000,000 as compared with about $290,000,000 for 1957.

No generally acceptable method has yet been found. Many different positions have been taken on the subject. One position is that life insurance premiums are essentially savings and should not be taxed any more than other forms of savings. Another position, taken by persons who do not appreciate the significance of life insurance reserves, is that all investment income should be taxed at the regular corporation rate and that failure to do so constitutes an unfair tax advantage to the life insurance companies.

VI. LIFE INSURANCE FOR U.S. SERVICEMEN

1. War Risk Insurance.—The original World War I insurance was issued under the provisions of a 1917 amendment to the War Risk Insurance act of 1914. War risk insurance was issued for a maximum of $10,000 on the one-year renewable term plan with the option to convert to a permanent plan at the end of the war. The maximum amount in force during the war was about $40,000,000,000 and about $4,000,000,000 worth was converted to permanent insurance after the war.

2. U.S. Government Life Insurance (U.S.G.L.I.).—This life insurance consists of two types: (1) conversions from war risk insurance; and (2) new insurance issued between World War I and World War II to active service personnel and to veterans of World War I. In the second half of the 20th century the amount of U.S.G.L.I. in force had dropped to the still very significant amount of about $1,500,000,000.

3. National Service Life Insurance (N.S.L.I.).—Under the provisions of the National Service Life Insurance act, which became law in Oct. 1940, insurance was made available to all servicemen in World War II. Originally issued for a maximum of $10,000 on the five-year term plan, it was convertible to any one of three permanent plans at any time after one year from issue. After the war the term was increased to eight years without increase in premium. In 1948 the right was granted to renew for an additional five years at the premium for the attained age.

Dividends under N.S.L.I. were very generous for two major reasons: expenses were paid by the government and not charged to the insurance fund; and claims ruled as war-connected (88% of deaths during the war) were paid directly from the treasury department and not charged to the insurance fund.

Insurance in force under N.S.L.I. reached about $140,000,000,000 during World War II, an amount approximately equal to the total life insurance then in force in all the private companies combined. In the second half of the 20th century it had dropped to about $35,000,000,000.

In April 1951 congress passed the Servicemen's Indemnity and Insurance acts, which terminated all future sales of both U.S.G.L.I. and N.S.L.I. and created a new system, retroactive to the beginning of the Korean war, of free indemnities for death during active service. The indemnity consisted of $10,000 less the amount of U.S.G.L.I. or N.S.L.I. in force.

VII. MORTALITY TABLES

The rate of mortality is the probability that a person will die within one year. The table below shows the rates of mortality at ages 20, 40, 60 and 80 according to seven of the historically more important mortality tables used for life insurance purposes.

The Northampton table, published by Richard Price in 1783, based as it was on a study of death and christening records in Northampton (no census of the population being available), was not really accurate. Mortality according to the Northampton table was excessively high, even for the 18th century.

TABLE II.—*Rates of Mortality According to Seven Mortality Tables*

Table	*Age 20*	*Age 40*	*Age 60*	*Age 80*
Northampton	.0140*	.0209	.0402	.1343
Carlisle	.0071	.0130	.0335	.1217
Actuaries'	.0073	.0104	.0303	.1404
British Offices' O^M	.0040	.0092	.0289	.1384
American Experience	.0078	.0098	.0267	.1445
1941 C.S.O.	.0024	.0062	.0266	.1319
1958 C.S.O.	.0018	.0035	.0203	.1100

*One hundred and forty out of 10,000 persons age 20 will die within one year.

The Carlisle table, published by Joshua Milne in 1815, was based on two censuses and the death records for two parishes in Carlisle. The table has been very extensively used.

The Actuaries' table was based on a detailed study of mortality among policyholders of British companies. The table was published in 1843. It is sometimes called the Combined Experience table and also the Seventeen Offices' Experience.

The British Offices' Life tables (1893) were based on the experience of 60 British companies from 1863 to 1893. The study showed rates of mortality separately for different classes of policies and for both sexes. The best known and most important of these tables was the O^M table, based on the experience of male holders of whole life participating policies; it remained the standard table from 1903 until supplanted in 1935 by the A1924–29 tables, followed by the A1949–52 tables of mortality for lives insured and the A(55) tables in respect of life office annuitants.

The American Experience table was constructed about 1860 and first published under its present name in 1868. Sheppard Homans, the table's author, once stated publicly that the experience of Mutual Life of New York was the main basis for the table but that the table was not intended to be an accurate interpretation of that experience. Until 1948, most U.S. companies used the American Experience table for reserve and nonforfeiture calculations.

The 1941 C.S.O. table was based on American life insurance experience for the period 1930–40. The 1958 C.S.O. table was based on experience for the period 1950–54.

See also references under "Life Insurance" in the Index.

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See also various papers in Institute of Actuaries, *Journal;* Faculty of Actuaries, *Transactions* (published irregularly); Society of Actuaries, *Transactions*. Useful yearbooks include the *Insurance Blue Book and Guide* (London) and the *Life Insurance Fact Book* (New York). (RT. E. L.)

LIFESAVING: *see* ARTIFICIAL RESPIRATION; DROWNING AND LIFESAVING; LIFEBOAT AND LIFESAVING.

LIFE SPAN. The span of life is a biological trait whose observed expression, the length of life (longevity), or age at death

of an animal or plant, reflects the lethal effect of environmental factors that continually act upon each individual from conception until death. Although evidence supports the belief that the span of life is genetically determined, the nature of the genetic mechanism is unknown.

The life span frequently is erroneously thought to be synonymous with: (1) the average length of life, or average life span, and (2) the expectation of life. The average length of life and expectation of life are both *group* characteristics. (Under normal conditions some members of the group will live longer than the average, some will live a shorter time than the average, and some may have a duration of life equal to the average.) In contrast, the span of life is the maximum age beyond which an *individual* cannot live, given even the most favourable conditions.

Because of the special approaches to the life span of various organisms this article is divided into three major portions, with their subsections, as follows:

I. Human Beings
1. Terms and Concepts
2. Studies on Longevity
3. Actual *v.* Possible Life Span
II. Subhuman Animals
1. Maximum and Average Longevity
2. Individual *v.* Colony
3. Environmental Influences
4. Patterns of Survival
III. Plants
1. Problem of Defining Age
2. Life Span in Certain Groups
3. Growing Season of Seed Plants
4. Longevity of Seeds
5. Changes Accompanying Aging

I. HUMAN BEINGS

The human life span may conveniently be designated by its maximum limit; as, for example, a life span of 100 years. The term, unless modified, here refers to maximum longevity.

1. Terms and Concepts.—The average length of life is the number of years lived by a group of persons, divided by the number of persons in the group. It may refer to the average length of life of the members of a group or cohort of persons (*e.g.*, presidents of the United States elected prior to 1900, or veterans of World War I), who are traced until the last member has died and whose deaths usually occur during a period of several years; it also may refer to the average age at death of persons who die during the same period of time (*e.g.*, the average age at death of persons dying in England and Wales during a calendar year).

The expectation of life is a hypothetical number computed from a mortality table. It represents the average number of years that a group of persons, all born at the same time, would be expected to live if they were subject to a fixed set of age-specific death rates from birth until the last person of the group had died. It may be computed for persons of any specified age, but the expectation of life at birth is the number most often cited (*see* LIFE EXPECTANCY).

The span of life is a theoretical number whose exact value cannot be determined from existing knowledge. Presumably there is a maximum life span for the human race, but until there is discovered some property of protoplasm that definitely limits the possible duration of human life, the exact duration of man's span of life will remain unknown.

At first thought, this statement seems irrational. Surely no human being can live 1,000 years. Even though all may agree that the likelihood of an individual living 1,000 years is infinitesimal, there is no scientific proof that this statement is, or is not, true. The indeterminacy of the maximum limit of human life may be made more comprehensible if one chooses a number that may appear to many as a more reasonable limit.

Since there is no verified instance of a person having lived 150 years, this number may, for purposes of illustration, be arbitrarily accepted as the maximum limit of the span of human life. But if the possibility is admitted that an individual may live exactly 150 years, there is no valid reason for rejecting the possibility that some other individual may live 150 years and one minute. And if 150 years and one minute is accepted, why not 150 years and two minutes, and so on? Thus, based on existing knowledge of longevity, a precise figure for the span of human life cannot be given.

2. Studies on Longevity.—Much of the information concerning the inheritance of longevity has come from the study of genealogical records. Among the more important studies are those by M. Beeton and Karl Pearson, B. Stoessiger and S. J. Holmes, based on the genealogical records of nobility and landed gentry; Alexander Graham Bell's analysis of the Hyde family; E. B. Wilson and Carl Doering's study of the Peirce genealogy; and I-Chin Yuan's investigation of the records of a Chinese family for the period 1365 to 1914.

The early genealogical studies were criticized on the grounds that the downward trend in the death rate (attributable generally to scientific advancements) introduced a spurious positive correlation in statistics derived from records extending over long periods of time. It was argued that in some instances records were included of persons who, at the time of the study, had not had the opportunity of living out their possible life span. Yuan, however, excluded all persons born after 1819. His findings supported those of previous investigators in showing that the expectation of life of sons of long-lived (longevous) parents, *i.e.*, those living to age 70 years or older, was greater than that of sons of shorter-lived parents, *i.e.*, those having attained less than age 50 at the time of death.

Raymond Pearl attempted to avoid the defects of genealogical studies by collecting records of the family histories of 365 nonagenarians and of a comparison group of 143 individuals of varying ages, selected because all of their six immediate ancestors were dead. Pearl introduced the concept of "total immediate ancestral longevity," or TIAL—the sum of the ages at death of the two parents and the four grandparents of a given person—as a measure of longevity. This number is unlikely to be greater than 600 or less than 90. The average TIAL of the nonagenarians and centenarians definitely exceeded that of the comparison group. This held true not only for the six immediate ancestors as a group, but also for each category—father, mother, paternal and maternal grandparents. Pearl also computed the expectation of life for sons of fathers that were classified into three groups by age at death; (1) under age 50; (2) from age 50 to age 79; and (3) age 80 or over. At birth the expectation of life for the three groups of sons was 47.0, 50.5 and 57.2 years, respectively. The same relative ranking continued through the lifetime of the sons, their expectation of life at age 40 being 27.3, 28.9 and 32.0 years, respectively.

Taken at their face value, these data show clearly that longevous persons had parents and grandparents who lived longer than the parents and grandparents of shorter-lived persons. But Pearl's study, like those of earlier investigators, is open to criticism. The comparison group consisted of persons not selected because of longevity, all of whose six immediate ancestors were dead, and who themselves had died at various ages. The failure to impose a lower limit for the age of members of the comparison group greatly increased the likelihood that the average TIAL for this group would be less than that for the longevous group. If all of the parents and grandparents of a person aged 20 are dead, some of them must have died at a relatively young age. Since four persons in the comparison group were less than 20 years of age, the results of Pearl's study must have been influenced by the method of selecting that group.

Pearl recognized this bias and attempted to correct for it. He concluded that it could not account for all of the difference in the length of life of the ancestors of the longevous and comparison groups, and that the data taken as a whole supported the belief that heredity is an important determinant of the longevity of individual human beings.

Since longevity is so important in life insurance underwriting, several studies have been made of the relationship between heredity and the life span by an analysis of life insurance records. The data from these records have a number of defects that limit their usefulness for this purpose. Persons considered to be poor risks

because of ill health or a family history of disease usually are excluded. The studies were based upon the age of the parents as shown in the application for insurance. But in many cases one or both parents of the policyholder are alive at the time the application is prepared, so that their age at death is unknown.

These defects limit the value of life insurance records for the investigation of the relationship between the length of life of parents and their children. Analyses of life insurance data showed that policyholders, both of whose parents were living when the policy was written, live longer than those whose parents were dead when the policy was written. These results are in conformity with those obtained from genealogical records and family histories.

Each of the various types of studies of the inheritance of longevity—genealogical records, life insurance records and family histories of the general population—has limitations that restrict the generality of the findings. Nevertheless the principal studies indicate that the children of longevous parents are more likely to be longevous than are the children of short-lived parents. Conversely the immediate ancestors—parents and grandparents—of longevous persons on the average are older at death than are the immediate ancestors of persons who die at a relatively young age. These studies support the conclusion, mentioned earlier, that longevity is determined in part by heredity.

3. Actual *v.* Possible Life Span.—It should be observed that this conclusion relates to the inheritance of longevity—the observed expression of the span of life—and not to the span of life itself. The actual length of life is shorter than the possible life span, since the former reflects the effect of unfavourable or morbid environmental factors. It is not practicable to observe directly the effect of heredity upon the human life span, but existing knowledge supports the belief that heredity is the most important determinant of the length of the span of life.

In the absence of any biological data from which the maximum limit of the span of life can be determined precisely, an estimate of this limit must be obtained from observation of the actual length of life of persons who already have died. But such observations cannot establish a fixed limit for the span of life.

The estimation of the length of the span of life from observed data is a form of sampling from a large but incomplete population. The tabulation of the ages at death of a large number of persons from a large general population, such as the population of the United States, will give an asymmetrical frequency distribution with two modes, or peaks of highest frequency: the first at age zero last birthday, and the second between ages 75 and 80 years. The frequency distribution is bounded by age zero at the lower limit but there is no boundary at the upper limit.

The number of deaths of persons whose length of life is near the upper limit of this frequency distribution (*e.g.*, 100 years or more) varies from year to year. The age of the oldest person dying also varies from year to year.

The number of deaths of centenarians depends in part upon the number of deaths counted. For example, during the 16-year period 1930–1945, 1,611 deaths of centenarians were registered in England and Wales. This is slightly smaller than the number (1,631) registered in the United States in one year (1956). In neither country were the ages at death verified, so that the true numbers of centenarians almost certainly deviate from those given in the official vital statistics.

Only a very small proportion of the deaths that have occurred throughout the history of the human race have been registered. The potential number of future deaths greatly exceeds the number that already has occurred. Statistical theory supports the expectation that as the total number of deaths continues to increase the death will be recorded of a person whose length of life will be longer than that of any person previously known.

Observation of the length of life of persons who had died can show that it is possible for a human being to live to the oldest age recorded as of any specified date, and can provide an estimate of the relative frequency or probability of that event. Such observations, however, do not provide a logical basis for fixing any age as the maximum possible limit of the life span.

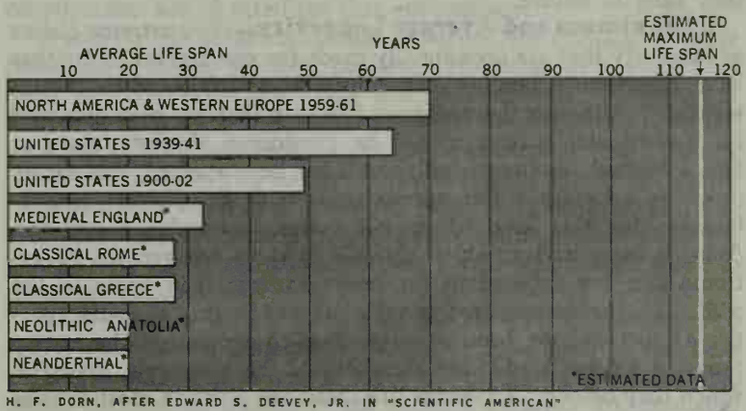
The continuation of the world-wide decline in the death rate will naturally result in an increase in the number of persons who live until age 100 years or more. Only 7 of every 100 white female babies who are subject throughout their lifetime to the death rates in the United States registration area during 1900–02 would be expected to attain age 85. On the other hand, more than three times as many, or 24 out of every 100, white female babies subject throughout their lifetime to the death rates recorded in the United States during 1956 would be expected to celebrate their 85th birthdays. In other words, 417,000 of the 1,738,000 white female babies born in the United States during 1956 could expect to live at least 85 years even if there should be no further decrease in the death rate. About 6,000 of these should live a century or more.

Comparable mortality rates exist in all of North America, Australia, New Zealand, central and northwest Europe, and soon may be found also in all of Europe. Since the number of persons who may live to an advanced age, such as 110 or 115 years, is directly related to the number of persons who live to age 100, an increase in the latter number will increase the probability that the death of an individual attaining some greater age (*e.g.*, 115 years) will be recorded at some future date.

Many instances have been recorded of persons alleged to have died at an age considerably greater than 100 years. Statements concerning the age at death of biblical characters such as Methuselah can be dismissed, since scientific verification is impossible. Three of the most frequently cited cases of more recent times are: Thomas Parr, who died in Nov. 1635 at the alleged age of 152 years; Henry Jenkins, who died in Dec. 1670 at the alleged age of 169 years; and Catherine, countess of Desmond, who died in 1604 at the alleged age of 140 years. William Harvey, the famous English physician, performed an autopsy on Thomas Parr and the account of the autopsy was cited for many years as evidence that Harvey—in his paper—had confirmed Parr's age. Quite apart from the fact that it is impossible to determine accurately the age of a person by an autopsy, Harvey made no attempt to verify Parr's age but merely referred to the current estimates. Subsequent investigations have revealed that no proof exists of the age at death of any of these three individuals and that their reported ages were based solely upon hearsay.

An example with more definite documentation is that of Christian Jacobsen Drakenberg, stated to have been born on Nov. 18, 1626, and to have died on Oct. 9, 1772, aged 145 years and 325 days. An extensive biographical sketch appears in the *Dansk Biografisk Leksikon,* and the authenticity of his age has been attested to by many persons including two celebrated Scandinavian actuaries and statisticians, Harald L. W. Westergaard and J. F. Steffensen. However, later investigations cast doubt upon the authenticity of the persons stated to have certified to Drakenberg's date of birth. Furthermore it is difficult to accept the statements concerning Drakenberg's age at death, since this age is more than 30 years greater than the next oldest verified age at death—a difference that in itself casts doubt on its authenticity.

In 1939 W. G. Bowerman stated that the oldest known age attained by an insured life or an annuitant in Great Britain or America was 107 years. Bowerman cited eight individuals for whom, in his opinion, records substantiated the fact that each had lived more



H. F. DORN, AFTER EDWARD S. DEEVEY, JR. IN "SCIENTIFIC AMERICAN"

AVERAGE AND MAXIMUM LIFE SPAN OF MAN

than 108 years. Seven of these were females. Six of the eight were more than 110 years old at death. The oldest was Pierre Joubert, who was born July 15, 1701, and died Nov. 16, 1814, aged 113 years and 124 days. This is the oldest age at death that has been generally accepted as authentic. It is possible that Drakenberg may have lived longer than this, but his exact age at death has not been reliably determined.

It may be concluded that the span of human life is at least 114 years, but that this is not the maximum upper limit. This does not mean that the span of life of each individual now living or to be born in the future is at least 114 years. The span of life, since it is determined by heredity, varies from one individual to another as do other genetically determined traits.

A significant proportion of human embryos and fetuses die before birth (*see* ABORTION). Other infants at birth have defects that limit their span of life to a few years. Some malformations, *e.g.*, certain cardiovascular defects, are developmental rather than genetic in the strict sense of the word and can be corrected so that the length of life of such persons is extended.

In the past the length of life of most individuals has been considerably shorter than their possible span of life because of unhealthful environmental factors. As these factors are increasingly brought under control or eliminated the actual length of life will approach more closely the span of life.

At the end of the 18th century the expectation of life at birth in North America and northwestern Europe was about 35 or 40 years. By 1960 it had just exceeded 70 years. At some future date the death of a person at an authenticated age of more than 114 years can be expected.

There is no evidence that the span of human life has increased since the beginning of recorded history. Neither is there any evidence that the death rate of centenarians has decreased. The remarkable increase in the average length of life during the past 2,000 years—from 20–25 years to 70 years under favourable conditions—has increased the likelihood that a person may live to the maximum limit of his span of life. The expected increase in the number of centenarians results from a decrease in the death rate at ages under 100 years and not from any demonstrable increase in the maximum length of the span of life.

See also DEATH RATE. (H. F. DN.)

II. SUBHUMAN ANIMALS

Much of what is known about the length of life of animals derives from observations of domesticated species or animals in laboratories and zoos. One has only to consider how few animals reveal their age to realize the difficulties involved in answering the apparently simple question of how long they live in nature. In many fishes, a few kinds of clams and an occasional species of other groups, growth is seasonal, so that annual zones of growth, much like tree rings, are produced in some part of the organism. Among game species, methods of determining relative age by indicators such as the amount of tooth wear or changes in bone structure have yielded valuable information. Bird bands and other identifying marks also make age estimation possible. But one of the consequences of the fact that animals move is that virtually nothing is known about the life span of most species as they exist in nature.

1. Maximum and Average Longevity.—The extreme claims of longevity that are occasionally made for one species or another have consistently been proven empty when subjected to critical scrutiny. Although the maximum life span that has been observed for a particular species cannot be considered absolute, since at best a limited number of individuals has been studied, this datum probably provides a fair approximation of the greatest age attainable for this kind of animal under favourable conditions. Animals in captivity, which provide most of our records of extreme age, are exposed to far fewer hazards than those in the wild. In the accompanying table of maximum longevity, particular species have been so selected as to encompass the known range of longevity of other members of the taxonomic group to which they belong. (Average life spans are given in most articles on specific animals.)

Very few generalizations about maximum life span can be made. Many animals are capable of living several years or decades. Ages of more than 100 years are well established only among the turtles. There are indications that large animals can live longer than smaller ones, but many exceptions to such a rule exist. The box turtle and water turtle, for example, are similar in size—as are the European and spotted salamander—yet their life spans differ markedly. There also are indications that extreme longevity is a characteristic of certain large taxonomic groups, *e.g.*, the reptiles; but every such group also includes some short-lived species.

*Maximum Longevity of Animals in Captivity**

Animal	Life Span in Years	Animal	Life Span in Years
Mammals:		Amphibians:	
Bat (*Eptesicus fuscus*)	2	European Black salamander (*Salamandra atra*)	3
Grizzly bear (*Ursus horribilis*)	31	Spotted salamander (*Ambystoma maculatum*)	25
Cat (*Felis catus*)	21	Frog (*Rana* species)	5–15
Chimpanzee (*Pan troglodytes*)	37	Fishes:	
Dog (*Canis familiaris*)	34	Eel (*Anguilla rostrata*)	6
Elephant, Indian (*Elephas maximus*)	57	Goldfish (*Carassius auratus*)	25
Goat (*Capra hircus*)	18	Sturgeon (*Acipenser transmontanus*)	50
Golden hamster (*Mesocricetus auratus*)	1.8	Insects:	
Horse (*Equus caballus*)	62	Ant (*Lasius* species)	15
Lion (*Panthera leo*)	29	Buprestid beetle (*Buprestis splendens*)	30
Mouse (*Mus musculus*)	3	Fruit fly (*Drosophila melanogaster*)	0.1
Ox (*Bos taurus*)	30	Spiders:	
Squirrel, gray (*Sciurus carolinensis*)	15	Bird spider (*Avicularis avicularis*)	15
Wild boar (*Sus scrofa*)	27	House spider (*Tegenaria civilis*)	0.01
Birds:		Crustaceans:	
Blue jay (*Cyanocitta cristata*)	4	Crayfish (*Astacus fluviatilis*)	30
Canary (*Serinus canaria*)	24	Water flea (*Daphnia magna*)	0.2
Macaw (*Ara macao*)	64	Mollusks:	
Nightingale (*Luscinia luscinia*)	3.8	Clams, various species	1–10
Pigeon (*Columba livia domestica*)	35	Snails, various species	1–30
Titmouse (*Parus major*)	9	Annelid worms:	
Reptiles:		Earthworm (*Lumbricus terrestris*)	10
Alligator (*Alligator mississipiensis*)	56	Medicinal leech (*Hirudo medicinalis*)	27
Garter snake (*Thamnophis sirtalis*)	6	Rotifers:	
Box turtle (*Terrapene carolina*)	123	Various species	0.03–0.1
Giant tortoise (*Testudo elephantopus*)	177		
Water turtle (*Pseudemys scripta*)	7		

*Condensed and adapted from W. S. Spector (ed.), *Handbook of Biological Data* (1956).

Not only do different species differ in longevity but wide variations commonly exist among individuals of the same species. Knowledge of maximum length of life is therefore not nearly so meaningful as is information about average longevity (for which *see* articles on the various animals). Better yet is a set of data that describes the probability of death for individuals of any age in any environment. Before examining what is known about life span in this statistical sense, it is essential that one take a closer look at the meaning of life span itself.

2. Individual *v.* Colony.—The concept of life span implies that there is an individual whose existence has a definite beginning and end. What constitutes the individual in most cases presents no problem: among organisms that reproduce sexually the individual is a certain amount of living substance capable of maintaining itself alive, and endowed with hereditary characteristics that are in some measure unique. In some organisms, however, extensive and apparently indefinite growth and reproduction may occur by division of a single parent organism. If these divisions are incomplete, a colony results. If the parts separate from each other, separate organisms, genetically identical but perhaps exposed to very different conditions of life, are formed. Among the one-celled Protozoa it may be impossible to distinguish between parent and daughter organisms. If we are to consider life span in such animals, the individual must be arbitrarily defined, for the organisms are continually dividing. In a strict sense, life span in these animals is not comparable to that of sexually produced forms.

The end of the animal, or death, results when irreversible changes have occurred to such an extent that the individual no longer actively retains its organization. There is a brief period when it is

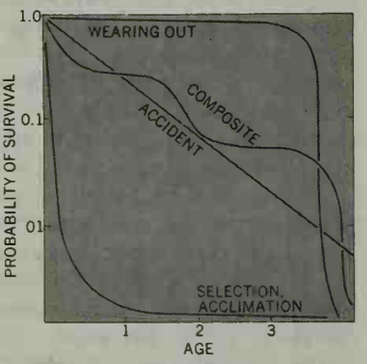
impossible to say whether the organism is still alive. This time is so short relative to the total length of life that it creates no great problem in determining life span. Death, as defined, is an attribute of the individual as a whole. Although it is possible to maintain parts of higher organisms alive indefinitely, the majority of species of animals undergo processes of deterioration with time. (The nature of these aging phenomena is discussed in DEATH [BIOLOGICAL]). Some animals, however, seem to be potentially immortal. Unless some accident puts an end to life, they are thought capable of surviving indefinitely. This faculty has been attributed to certain fishes and other reptiles, which appear to be capable of unlimited growth (*q.v.*). Without examining the various causes of death in detail, a distinction can be made between death as the result of internal changes, *i.e.*, aging, and death caused by some purely external factor. It is worth noting that the absence of aging processes is correlated with the absence of individuality. Many of those animals wherein the individual is hard to define do not age.

The beginning of the individual can be closely defined by the formation of the fertilized egg; or, in asexual species, by the time when physical separation of the new organism occurs. In practice, birth is commonly considered the beginning of the life span. However, the timing of birth is so different in various kinds of animals that it is only a poor criterion for this purpose. In many marine invertebrates the hatching larva consists of a relatively few cells, not nearly so far along toward adulthood as a newborn mammal. Likewise among the mammals there are large variations. A kangaroo at birth is little more than an inch long, scarcely comparable to a newborn deer. If life spans of different kinds of animals are to be compared, it is essential that these variations be eliminated.

3. Environmental Influences.—Life span usually is measured in units of time. Although this may seem eminently logical, certain difficulties may arise. In cold-blooded animals in general the rate of metabolism that determines the various life processes varies with the temperatures to which they are exposed. If aging depends on the expenditure of a fixed amount of vital energy, an idea first proposed by Max Rubner in 1908, life span will vary tremendously depending on temperature or other external variables that influence life span. There is considerable evidence attesting to the partial cogency of this argument. Cold-blooded invertebrates do live longer at low than at high temperatures, so long as a certain range is not exceeded. Rats in the laboratory live longest on a somewhat restricted diet that does not permit maximum metabolic rate. Of perhaps even greater significance is the fact that many animals undergo dormant periods. Many mammals hibernate; a number of arthropods have life cycles that include periods of diapause during which development becomes arrested. Under both conditions the metabolic rate becomes very low. It is certainly questionable whether such periods should be included in computing the life span of a particular organism. Comparisons between species, some of which have such inactive periods while others do not, certainly are dangerous. It is possible that life span would be measured more adequately by total metabolism; however, data for this purpose are almost entirely lacking.

Length of life is controlled by a multitude of factors, which collectively may be termed environment, operating on a genetic system that determines how the individual will respond. It is impossible to list all the environmental factors that may lead to death. For analytical purposes it is, however, useful to make certain formal separations. Every animal is exposed to: (1) a pattern of numerous events, each with a certain probability of killing the individual at any moment, and, in the aggregate, causing a total probability of death or survival; (2) climatic and other changes in the habitat modifying the frequency with which the various potentially lethal events occur; and (3) progressive systemic change, inasmuch as growth, reproduction, development and senescence are characteristics intrinsic in the organism and capable of modifying the effects of various environmental factors.

Consider a group of similar animals of the same age. Although no two individuals can have precisely the same environment, let it be assumed that the environment of the group remains effectively constant. If these animals also undergo no progressive physiological changes, the factors causing death will produce a death rate that remains constant in time. Under these conditions, it will take the same amount of time for the population to become reduced to one-half its former number, no matter how many animals remain at the beginning of the period considered. The animals therefore survive according to the pattern of the accident curve of the figure. This is the sense in which many of the lower animals are immortal. Although they die, they do not age; how long they have already lived has no influence on their further life expectation. The situation is equivalent to that observed in the decay of a radioactive substance, wherein one can determine a half-life that indicates the rate of transformation of its atoms.



TYPES OF SURVIVORSHIP CURVES (NUMBERS ARE IN RELATIVE UNITS)

Another group of animals may consist of individuals that differ markedly in their responses to the constant environment. They may be genetically different, or their previous development may have caused variations to arise. Those individuals that are most poorly suited to the new environment will die, leaving survivors that are better adapted. The same result can also be achieved in other ways. If the environment varies geographically, those individuals which happen to find areas in which existence can be maintained will survive, while the remainder will die. Or, as a result of their own properties, animals in a constant environment may acclimate in a variety of ways, thus adjusting to the existing conditions. The pattern of survival that results in each of these cases is one in which the death rate declines with time, as illustrated by the selection-acclimation curve.

4. Patterns of Survival.—In the absence of death from other causes, all members of a population may exist in their environment until senescence sets in. This causes a decline in the ability of individuals to survive. In a sense they can be considered to wear out as does a machine. Their survival is best described by the wearing-out curve. Individual differences among members of the population determine the degree of curvature of the survival line. The more the population varies, the less abrupt is the transition from total survival to total death.

Under the actual conditions of existence of animals the three types of survivorship outlined above all enter as components of the realized survival pattern. Thus in animals that are carefully maintained in the laboratory, survival is approximately that depicted in the wearing-out curve. Environmental accidents can be kept to a minimum under these conditions, and during the major part of the life span survival is almost complete. In all known cases, however, the early stages of the life span are characterized by a noticeable contribution of the selection-acclimation curve. This must be interpreted as a result of developmental changes that accompany the early life of the individuals, and of selective processes that operate on those organisms whose genetic constitutions are ill fitted for that environment.

In some of the larger mammals in nature, the existing evidence points to a similar survival pattern. However, in a variety of other animals, including fishes and invertebrates, mortality of the young stages is so high that the selection-acclimation curve predominates. One estimate places the mortality of the Atlantic mackerel during its first 90 days of life as high as 99.9996%. Since some mackerel do live for several years, a mortality rate that decreases with age is indicated. Similar considerations probably apply to all those animals that have larval stages that serve as dispersal mechanisms.

When the postjuvenile portion of the life span is considered by itself, a number of animals for which such information has been gathered—including primarily fishes and birds—have survivorship curves that are dominated by the accident pattern. In these species in nature, death from old age apparently is rare. Their chance

of surviving to an advanced age is so small that it may be statistically negligible. In modern times human predation is a large factor in the mortality of these species in many cases. Since deaths from fishing and hunting are largely independent of age, once an animal has reached a certain minimum size, such a factor only makes the survival curve steeper, but does not change its shape. One consequence of such increased mortality is that fewer old and large individuals are noticed in a population.

More complex survival patterns, such as the hypothetical one illustrated by the composite curve, undoubtedly exist. They should be looked for in those species in which extensive reorganization of the animal is part of the normal life cycle. In effect these animals change their environment radically, in some cases several times during a lifetime. The frog offers a familiar example. During its period of early development and until shortly after hatching, the animal is subject to major internal and some external change. As a tadpole it is adjusted to an aquatic, herbivorous life. The metamorphosis to the terrestrial, carnivorous adult form is accompanied by varied physiological stresses that must be expected to produce a temporary increase in mortality rate. In some insects the eggs, larvae, pupae and adults are exposed to and respond to quite different environments. In these species a survivorship pattern even more complex than that described by the composite curve may exist.

The same species will exhibit changed survival in different environments. In captivity an animal population may approach the wearing-out curve; in its natural habitat survivorship may vary with age in a quite different way. Although one can assign a maximum potential life span to an individual—while realizing that this maximum may not be attained—it is impossible to specify the shape of the survivorship curve unless the environment is also specified. This is another way of saying that life span is the joint property of the animal and the environment in which it lives.

See also DEATH (BIOLOGICAL). (P. W. F.; X.)

III. PLANTS

Plants grow old as surely as do animals; however, a generally accepted definition of age in plants has not yet been realized. If the age of an individual plant is that time interval between the reproductive process which gave rise to the individual and the death of the individual, the age attained may be given readily for some kinds of plants but not for others.

1. Problem of Defining Age.—An English oak that has 1,000 annual rings in the trunk is 1,000 years old. But how old is an Indian lotus plant that germinated from a seed which, containing the embryo lotus plant, had been lying in peat deposits for 1,000 years?

How old is a cultivated banana plant? Cultivated bananas produce seeds incapable of germination. Propagation of bananas is carried out by separating offshoots from a mature plant. The offshoot matures and in turn produces new offshoots. This process of growth and development has been continuing for thousands of years uninterrupted by sexual reproduction.

The mushroom caps that appear in some fairy rings persist for only a few days, but the network of fungus filaments in the soil (the mycelia) may be as old as 400 years. Because of important differences in structure, the life span of higher plants cannot be compared with that of higher animals. Normally, embryonic cells (that is, cells capable of changing in form or becoming specialized) cease to exist very early in the life of an animal. In plants, however, embryonic tissue—the plant meristems—may contribute to growth and tissue formation for a much longer time, in some cases throughout the life of the plant. Thus the oldest known trees, bristlecone pines of California and Nevada, have one meristem (the cambium) that has been adding cells to the diameter of these trees for, in many cases, more than 4,000 years, and another meristem (the apical) that has been adding cells to the length of these trees for the same period. These meristematic tissues are as old as the plant itself; they were formed in the embryo. The wood, bark, leaves and cones, however, live for only a few years. The wood of the trunk and roots, although dead, remains part of the tree indefinitely, but the bark, leaves and cones are continually dying and sloughing off.

2. Life Span in Certain Groups.—Because reproductive processes and vegetative structures vary greatly among the major plant groups, the life span of each must be considered separately.

Blue-Green Algae.—Among living things, blue-green algae have one of the longest fossil records. Sexual reproduction in this group is not known; multiplication is only by cell division and fragmentation of the algal filaments. Since there is no fusion of sex cells, each new individual is a continuation of an already existing one. For this reason some botanists have said that blue-green algae have indefinitely long life spans.

Diatoms.—Each diatom consists of a cell that secretes two half shells. One of the half shells fits into the other to make a miniature pill box that encloses the cell substance. When cell division takes place, one of the new cells receives the larger shell, the other the smaller. Each new cell then secretes a smaller half shell to fit into the existing half shell. The smaller shells may expand in some species, but for others, each division results in one offspring being smaller than the parent. The trend toward reduction in size ends with sexual reproduction or a discarding of the old shells with increase in size of the cell. In either case there is a clear ending to the old generation of cells and a beginning of a new generation. Reduction in size can continue past the point of reversal by sexual reproduction or discard of shells. In this event the cell that has reached minimum size dies. For many species of diatoms, then, there is a fairly definite life span, which depends upon the number of cell divisions that have taken place.

Bacteria.—For these forms, as for many other one-celled organisms, there is a problem as to what, in the absence of injury, constitutes death. Some students of microorganisms regard the appearance of a lifeless residue as a mark of death. When a bacterial cell is subjected to certain unfavourable conditions, it dies, and the entire cell comprises a lifeless residue. Sometimes a portion of the cell becomes a spore, a resistant structure that may be capable of resuming growth after many years of inactivity. The longevity of an individual cell, however, is figured from the time of the appearance of the cell by division until the cell itself divides. This interval is sometimes as brief as 20 min.

Brown Algae.—One of the giant seaweeds (*Macrocystis*) of the Pacific coastal zones may attain a length of 200 ft. Estimates of the time required to reach this length range from 100 to 800 years.

Mosses.—Only a few mosses possess structures that enable an estimate of their age to be made. The haircap moss (*Polytrichum*) grows through its own stem tip each year leaving a ring of scales which marks the annual growth. Three to five years' growth in this moss is common, but life spans of ten years have been recorded. The lower portions of such a moss are dead, though intact. Peat moss (*Sphagnum*) forms extensive growths that fill acid bogs with a peaty turf consisting of the dead lower portions of mosses whose living tops continue growing. Mosses that become encrusted with lime (calcium carbonate) and form "tufa" beds several metres thick also have living tips and dead lower portions. On the basis of their observed annual growth some tufa mosses are estimated to have been growing for as long as 2,800 years.

Ferns.—No reliable method for determining the age of ferns exists. On the basis of size attained and growth rate, however, some tree ferns are thought to be several decades old.

Club Mosses.—Some club mosses have a "storied" growth pattern similar to that of the haircap moss. Under favourable conditions some specimens live five to seven years.

Higher Plants.—The woody seed plants, such as conifers and broadleaf trees, are the most amenable to determination of age. In temperate regions, where each year's growth is brought to an end by cold or dryness, every growth period is limited by an annual ring—a new layer of wood added to the diameter of the tree. These rings may be counted on the cut ends of a tree which has been felled, or a special instrument, an increment borer, can be used to obtain a cylinder of wood for the purpose of counting and studying growth rings. In the far north growth rings are so close together that they are difficult to count. In the moist tropics growth is continuous so that no rings are formed.

Often the age of a tree is estimated on the basis of its diameter, especially when the average annual increase in diameter is known. The source of greatest error in this method is the not infrequent fusing of the trunks of more than one tree. Thus the famous Montezuma cypress of Santa María del Tule, a little Mexican village near Oaxaca, is 31 m. in circumference, measured $1\frac{1}{4}$ m. above the ground. This tree, described by Cortés, was earlier estimated on the basis of its great thickness to be 6,000 years old; later studies, however, proved it to be actually three trees grown together. Estimates for the age of English yews have been as high as 3,000 years; these figures also have been found to be based upon the fusion of close-growing trunks, none of which is more than 250 years old. Increment borings of bristlecone pines have shown several specimens in Inyo National forest, California, to be 4,600 years old; a champion oldster, about 4,900 years old, was felled in the summer of 1964 in Nevada's Humboldt National forest as part of a scientific study.

3. Growing Season of Seed Plants.—*Annuals.*—Plants, usually herbaceous, that live for only one growing season and produce flowers and seeds in that time are called annuals. They may be represented by such plants as corn and marigolds, which spend a period of a few weeks to a few months rapidly accumulating food materials. As a result of hormonal changes—brought about in many plants by changes in environmental factors such as day length and temperature—vegetative (leaf-producing) meristems change abruptly to flower-producing meristems. The formation of flowers, fruits and seeds rapidly uses up food reserves and the vegetative portion of the plant usually dies. Although the exhaustion of food reserves often accompanies death of the plant, it is not necessarily the cause of death.

Biennials.—These plants, too, are usually herbaceous. They live for two growing seasons. During the first season, food is accumulated, usually in a thickened root (beets, carrots); flowering occurs in the second season. As in annuals, flowering exhausts the food reserves, and the plants die after the seeds mature.

Perennials.—These plants have a life span of several to many years. Some are herbaceous (iris, delphinium), others are shrubs or trees. The perennials differ from the above-mentioned groups in that the storage structures are permanent, or are renewed each year. Perennials require from one to many years growth before flowering. This preflowering (juvenile) period is usually shorter in trees and shrubs with shorter life spans than in those with longer life spans. The long-lived beech tree (*Fagus sylvatica*), for example, passes 30–40 years in the juvenile stage, during which time there is rapid growth but no flowering.

Some important crop plants—cotton, for example—are perennials in their native tropical regions, but are capable of blooming and producing seeds or other useful parts in their first year. Such plants are often grown as annuals in the temperate zones.

4. Longevity of Seeds.—Although there is great variety in the longevity of seeds, the dormant embryo plant contained within the seed will lose its viability (ability to grow) if germination fails to occur within a certain time. The reports of the sprouting of wheat taken from Egyptian tombs are unfounded, but some seeds do retain their viability a long time. Indian lotus seeds (actually fruits) have the longest known retention of viability (*see* above). On the other hand, seeds of some willows lose their ability to germinate within a week after they have matured.

The loss of viability of seeds in storage, although hastened or retarded by environmental factors, is the result of changes that take place within the seed itself. The changes that have been investigated are: exhaustion of food supply; gradual denaturing or loss of vital structure by protoplasmic proteins; breakdown of enzymes; accumulation of toxins resulting from the metabolism of the seed. Some self-produced toxins may cause mutations that hamper seed germination. Since seeds of different species vary greatly in structure, physiology and life history, no single set of age factors can apply to all seeds.

5. Changes Accompanying Aging.—Tissues of higher plants are laid down in meristems, areas of continuous cell division, in the stem root tips and elsewhere. All the specialized cells of leaves, fruits and other plant parts eventually undergo senescence and die. During senescence the ability of cell membranes to retain or allow passage of certain substances changes, exudation of cell materials occurs, the cementing materials between cells break down chemically, air spaces become liquid logged and cell proteins become denatured.

Maximum Ages for Some Seed Plants

Plant	Maximum age in years		Locale of verified specimen
	Estimated	Verified	
Conifers			
Common juniper (*Juniperus communis*)	2,000	544	Kola peninsula, northeastern Russia
Norway spruce (*Picea abies*)	1,200	350–400	Eichstätt, Bavaria
European larch (*Larix decidua*)	700	417	Riffel alp, Switz.
Scotch pine (*Pinus sylvestris*)		584	
Swiss stone pine (*Pinus cembra*)	1,200	750	Riffel alp, Switz.
White pine (*Pinus strobus*)		400–450	
Bristlecone pine (*Pinus aristata*)		4,900	Wheeler peak, Humboldt National forest, Nevada
Sierra redwood (*Sequoia gigantea*)	4,000	2,200–2,300	Northern California
Flowering plants			
Monocots			
Dragon tree (*Dracaena draco*)	200*		Tenerife, one of the Canary Islands
Solomon's-seal (*Polygonatum*)	17†		
Dicots			
Dwarf birch (*Betula nana*)		80	Eastern Greenland
European beech (*Fagus sylvatica*)	900	250	Montigny, Normandy, France
English oak (*Quercus robur*)	2,000	1,500	Hasbruch forest, Lower Saxony
Bo tree (*Ficus religiosa*)	2,000–3,000‡		Buddh Gaya, India; Anuradhapura, Ceylon
Linden (*Tilia*)		815	Lithuania
English ivy (*Hedera helix*)	440		Ginac, near Montpellier, France

*Exaggerated estimates for this historic specimen reach 6,000 years. †Scars on rootstock counted. ‡According to Buddhist and Roman history.

The meristems themselves usually remain unchanged in appearance. Only when a shoot tip meristem becomes a flower does an apparent change take place. Functional changes, however, are thought by many botanists to occur with age. The functional change may be in the meristem cells themselves, which utilize salts, carbohydrates, nitrogenous materials and hormones in one way during juvenile stages and in another way during adult stages; or the meristem may remain physiologically the same but the materials coming to it from the rest of the plant may change with age of the plant.

For all plants, the transition from vegetative growth to flowering (adult) is sharp, but conditions within the plant move gradually toward the flowering state. In English ivy, mulberry, acacia and eucalyptus, leaf shape changes. Characteristics of juvenile and adult stages have also been distinguished for apples, apricots, pecans, beech, oaks, rubber (*Hevea*) and citrus. Juvenile oaks retain their leaves longer in the winter than do adult oaks; young citruses are thorny, whereas adult citruses are thornless or nearly so. It is often possible to observe juvenile and adult areas on a single plant. Thus in some specimens of beech and oak, during the early winter, leaves may be seen on the inner branches, which still exhibit their juvenile characteristics, while the outer branches, which are adult, are barren.

English ivy grows from seed as a creeping, nonflowering vine with five-lobed leaves and aerial roots; after about ten years, erect flowering branches with oval leaves and no aerial roots are formed. Heavy pruning or treatment with the hormone gibberellic acid may cause the adult form to produce juvenile shoots. In many woody plants cuttings from juvenile portions form roots more readily than cuttings from adult portions. (L. KA.)

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LIFT: *see* ELEVATOR.

LIGHT, subjectively, the experience aroused in visual function (*see* VISION). This article deals with light as a form of physical energy and is concerned with what is generally called physical optics. For more practical applications and optical instruments which are not here discussed in detail, *see* INTERFEROMETER; MICROSCOPE; OPTICS; PHOTOMETRY; REFRACTOMETER; TELESCOPE.

The subject of how light originates is treated under SPECTROSCOPY; this article is chiefly concerned with the behaviour of light after it has been emitted. This treatment of physical optics will deal almost entirely with the wave theory of light. Its corpuscular nature is recognized, but more fully treated under QUANTUM MECHANICS.

Following are the main sections and divisions of the article:

I. Introduction
  1. Light Waves and Photons
  2. Types of Radiation
  3. The Appearance of Ordinary Things
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III. Waves and Interference
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VIII. Dispersion
  1. Free Vibrations of the Atom
  2. Forced Vibrations of the Atom
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IX. Modern Views on the Nature of Light

I. INTRODUCTION

It might perhaps be expected that this discussion should begin by saying what light really is; but this is not possible, since light is essentially more primitive than any of the terms that might be used in an effort to explain it. The nature of light is describable only by enumerating its properties and founding them on the simplest possible principles. As these principles transcend ordinary experience they must be cast in a purely logical (mathematical) form. But that is never enough, for, though logic indicates proper deductions, it fails to specify what will be interesting, and what direction the theory will take. In choosing this direction much help is derived from analogies and models which are often loose and incomplete but without which a useful understanding of the subject cannot be acquired.

1. Light Waves and Photons.—In the history of the theory of light two very different models have competed from the outset. On the one hand light was pictured as a wave motion of some sort, and on the other as a flight of fast-moving particles. During the 19th century the wave model gained almost universal acceptance, thanks to a remarkable series of experimental and theoretical developments. These culminated in J. Clerk Maxwell's celebrated demonstration of the electromagnetic-wave character of light. At the opening of the 20th century, however, a number of light properties were discovered which apparently can be explained only by a corpuscular theory. The nature of these theorized corpuscles, now called photons, appears considerably more subtle than first was imagined, but they seem to possess energy and momentum localized in discrete packets (or quanta) so that in this respect at least they are imagined to resemble ordinary particles. The existence of these two models, each partially successful in explaining the behaviour of light, presented a formidable dilemma. It has led to a realization of the inadequacy of any models of such fundamental entities as light and the elementary particles of matter. The interpretation of this dual character of light (also of matter, which has wave properties as well) has been an important achievement of quantum mechanics.

In phenomena that suggest the existence of photons, the property most readily measured is the energy believed to be associated with the photons. The different colours of light are held to represent photons of different energy, those of blue light having nearly twice the energy of the red. The link between the corpuscular and wave models lies in the fundamental postulate of quantum theory that the energy of the photons is directly proportional to the frequency ν of the light waves. Frequency fixes the wave length, or the distance between successive crests, so that on the wave picture the various pure colours correspond to various wave lengths. Several of the wave phenomena of light can be used to measure the wave length, in some cases with a remarkable accuracy that can exceed one part in 10,000,000. This is in spite of the fact that the wave length itself is very minute, amounting to only one fifteen-thousandth of a centimetre for red light. When light is dispersed into a spectrum, as by a prism, the range of colours between red and violet represents wave lengths covering somewhat less than one octave. It is therefore not surprising to find invisible radiations with both longer and shorter wave lengths than those that can be seen.

2. Types of Radiation.—It is customary to include in the term light various types of invisible radiation, because in all other respects their behaviour is similar to that of visible light. These are the ultraviolet and infrared radiations, which lie just beyond the limits of the visible spectrum, and, more remotely, on the side of the ultraviolet, the X-rays and the γ-rays (*see* RADIOACTIVITY); also, on the side of the infrared, the electromagnetic vibrations used in radar, radio and television. All these radiations have an important property in common: an equal speed of propagation. The most accurate measures of the velocity of light (*see* LIGHT, VELOCITY OF) assign the value $(2.997925 \pm 0.000003) \times 10^{10}$ cm. per second. The distinctions among the various types of radiation are merely for convenience and are based upon the different methods used for production and detection. They all represent a single phenomenon, and the differences lie only in the matter of wave length (or frequency) and the energy of the photons.

It is not convenient to use the same units of wave length throughout such an enormous range. It is customary to measure radio waves in metres and radar waves in centimetres. The infrared rays are measured in units called microns or μ, the thousandth of a millimeter, but for light the unit universally used is the angstrom unit (Å), which is 10^{-8} cm. or 10^{-10} m. This unit

is also most frequently used for X-rays, though in precision work X-units of 10^{-11} cm. have been introduced. Much of this discussion applies to the whole range, but there are differences, and when these occur consideration shall be restricted to the case of light (visible, ultraviolet and infrared).

3. The Appearance of Ordinary Things.—Although many branches of science start with familiar and crude observations, it soon becomes necessary to discuss much more recondite questions; this leads to an elaboration of theory until the most important things in it are quite different from what is familiar. This situation is true of light; for example, the most familiar thing about light is that it goes in straight lines, and hardly any ordinary experiences disagree. But by more refined experiments it is easy to show that light is sometimes bent (diffracted); such cases prove more important to the theory than the commonplace observations. Almost the only examples of these phenomena (diffraction and interference) which are a matter of common experience are the iridescent colours that appear on soap bubbles and on the surface of greasy water, and the coloured patterns seen when a bright light is observed through a fine mesh screen.

Thus the theory of light is not much concerned with the appearance of ordinary things. In things people see, they may distinguish between the luminous and the nonluminous. The nonluminous objects are visible only by light reflected from some luminous source as the sun or a lamp, and their different appearances are attributable solely to the different ways in which they reflect light. Thus a black object is one that reflects relatively little light; a coloured object is one that reflects some colours but not others. This is easily shown by illuminating a piece of red paper with light passed through a green glass, when it will appear black because there is no red light for it to reflect. White being a mixture of all the colours, a white object is one that reflects all colours about equally, and so it looks coloured if illuminated only by a coloured light. When two pigments are mixed the resulting colour will be that which they both can reflect and may be quite different from the colour seen when two coloured lights are superimposed on a white screen; for example, if the light from red and green lamps is compounded in this way the result is a brilliant yellow, but red and green paints when mixed give a dark muddy colour because there is little light that they can reflect in common (*see* COLOUR).

Many nearly transparent substances appear opaque because they are not homogeneous, so that the entering light is reflected and refracted many times until it is thoroughly scattered. The most obvious example of this is ground glass, but the same is largely true of paper and white wood. An easy test of whether a substance is opaque in this way or by an inherent opacity to light is to see whether it is of the same colour for reflected and transmitted light. A sheet of red paper looks red whether we look at it under a light or through it at a light; in both cases each reflection in the tangled fibres reduces the amount of green and blue light by absorption, so that only the red emerges. On the other hand, if a substance is truly opaque the result will be quite different. For example, gold reflects yellow light more effectively than other colours, and thus appears yellow with reflected light. With a very thin sheet of gold the transmitted light will be bluish green.

II. HISTORY

The ancients were acquainted with mirrors and with the burning glass, but their theories of optics were typically metaphysical rather than scientific. The Pythagoreans believed in an emission theory, supposing that objects emitted particles that bombarded the eye; the Platonists complicated the matter by supposing that vision was produced by an interaction among rays emitted by the sun, particles emitted by objects and the eye itself. Among these speculations there seems to have been only one real scientific law: Hero of Alexandria saw that the equality of the angles of incidence and reflection at a mirror could be expressed by saying that the ray took the shortest possible course between object and eye. This law is the first statement of the general principle of least action that now dominates not only geometrical optics but also dynamics.

The earliest Renaissance developments were practical, such as the invention of spectacles and later of the telescope. The first great theoretical advance was the discovery of the law of refraction by Willebrord Snell in 1621 but not published until after his death. This law asserts that when a ray of light passes from one medium to another, the plane of the two rays contains the normal to the surface, and the sines of the angles of incidence and refraction are in a constant ratio called the refractive index. René Descartes was led by a metaphysical argument to maintain that light was some sort of pressure in a medium (in a very indefinite way this resembles the wave theory of the 1960s) and thought that the velocity of light must be greater in a denser medium. This view was opposed by Pierre de Fermat, also on metaphysical grounds; modern theory supports Fermat's claims, though not his reasoning. Fermat asserted that nature performs its operations always by the most direct path, and that therefore a ray of light between two places must take the shortest possible time. However, there are many examples, both for reflection and refraction, in which the time of transit is not a minimum, but a maximum. The generalization of Fermat's principle of least time subsequently made by Sir William Rowan Hamilton merely states that the actual path shall be stationary with respect to other closely adjacent paths. This can be written $\delta\int_A^B \frac{ds}{v} = \delta\tau = 0$, where ds is an element of path traversed with velocity v, and $\delta\tau$ is the difference between the value of time τ for the actual path and for an infinitely near path. In terms of index of refraction μ this is $\delta\int_A^B \frac{c}{v}\,ds = \delta\int_A^B \mu\,ds = 0$. Snell's law then implies that the velocity of light is inversely proportional to the refractive index of the medium, in agreement with Fermat's conclusion.

1. The Age of Newton and Huygens.—The first great era in the theory of light was the second half of the 17th century. Francesco Maria Grimaldi discovered and named the phenomenon of diffraction: light going through a fine slit cannot be prevented from spreading on the farther side, and no matter how small the sources of light, the edge of a shadow cannot be perfectly sharp. Robert Hooke independently discovered the same thing and offered a theory that posited wave fronts and considered light as some sort of oscillation; but it was more than a century before it was seen that the strongest possible argument for this theory lay in the phenomena of diffraction. During the same era Ole Roemer measured the velocity of light for the first time by comparing the calculated and observed times of the eclipses of Jupiter's satellites.

Of all the founders of the theory of light, undoubtedly the greatest were Sir Isaac Newton and Christiaan Huygens. Newton discovered the theory of the spectrum; by passing a fine beam of sunlight through a glass prism he resolved it into its component colours. It had already been known that white light was resolved into colours on passing through glass or water (for example, the rainbow had been explained in terms of such operations), but it was supposed that the medium had produced a definite alteration in the light. Newton showed that, if the light passed through a second prism reversed, the coloured lights would recombine into white, but that similarly treating a single colour selected from the spectrum left it unchanged. He was thus led to the currently accepted explanation of white light as a compound of all the colours.

Newton also investigated the colours of thin plates or films such as soap bubbles. He placed a slightly convex lens on a flat piece of glass and observed it under white light. At the central point of contact nothing is reflected, but around this point, where the surfaces are separated by a very thin wedge of air, there appears a succession of brilliantly coloured rings, first black, then faint blue, strong white, orange, red, dark purple, violet, blue, faint green, vivid yellow, and so on. The rings become narrower and fainter as distance from the centre increases and soon become invisible. These are not the colours of the spectrum; their origin is better appreciated by considering the case where the illumination is monochromatic (of a single spectral colour). This produces a dark centre surrounded by a large number of rings of the colour used. The sizes of the rings depend on the colour of the light; they are

closer together for blue than for red. The rings in white light then can be explained as resulting from a superposition of all the colours; not very far from the centre so many of the coloured rings overlap that they become blurred.

Newton was very cautious in making theories, but he attributed the rings to "fits" of reflection and transmission, an idea that is quite similar to the notion of phases in wave theory. He criticized the wave theory as failing to explain rectilinear propagation, and his followers (interpreting his views in a much narrower way than he intended) adopted a complete corpuscular theory of light which held the field for more than a century. They supposed that light consists of minute particles, or corpuscles, and attempted to explain all of its behaviour in terms of varying corpuscular properties. The theory implies that the velocity of light must be proportional to the refractive index, not inversely proportional as in Fermat's principle and the wave theory. This distinction later provided a critical test which condemned their extreme view.

Huygens is the real founder of the wave theory of light. He based his belief primarily on the idea that, if a beam of light were like a flight of arrows, then when two beams cross there should be collisions among the arrows. His explanation of reflection and refraction lies at the foundation of modern methods. The general idea is that light is a disturbance in a medium; the character of the disturbance need not be specified. In rough terms, think of the medium as a jelly which is distorted to move its particles from their usual places. Any disturbance then acts as a centre that propagates a spherical wave of disturbance which expands at a constant speed. When the initial disturbance is not confined to a single point, each point is regarded as a source, and the subsequent disturbance is the geometrical envelope of the spheres surrounding all these sources. Refraction is explained by supposing that the velocity of light varies in different media. Consider light obliquely incident on a flat surface, say of water (fig. 1). The velocity of propagation outside is c, the velocity of light in the air; in the water it is v, a slower velocity. The advancing disturbance is at one moment spread as a pulse over the surface AB. Each point of AB gives out a spherical pulse, and, to reconstruct the wave later, spheres of equal radii may be drawn around all the points of AB. One such set of spheres will give the line CD as its envelope, and this shows that the light goes in the direction AC outside the water. But if the construction is repeated starting at CD allowance must be made for the fact that the velocity is less in water than in free space. Thus, corresponding to the sphere of radius DF about D, draw round C a sphere of radius CE = (v/c)DF, and it is evident that EF will be more nearly parallel to the surface than was CD. After this both spheres are in the water and the propagation goes straight again on to GH. This construction of Huygens immediately gives Snell's law of refraction, because sin ACM/sin GCN = DF/CE = c/v, and the refractive index is simply the ratio of velocities. The construction fails in the case of very oblique incidence if v is greater than c, for then the circle around C may have a radius actually greater than CF itself. Refraction is then impossible, and all the light is reflected. A simpler construction applies for reflection; the same principle also explains diffraction, but Huygens did not find this out.

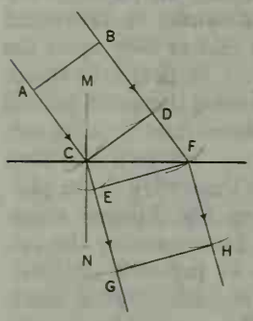

FIG. 1.—HUYGENS' CONSTRUCTION FOR REFRACTION

Certain crystals of calcium carbonate, called calcite or Iceland spar, have the extraordinary property of double refraction: objects viewed through them appear double. A crystal of calcite resembles a cube that has been compressed along one of its diagonals. Imagine a narrow beam of light incident on one face perpendicularly. If the crystal were glass the beam would emerge from the opposite face in the same line. Actually two beams emerge, one in the same way as for glass, but the other in a new line parallel to the first (fig. 2). These two beams are called the ordinary and extraordinary rays. Huygens applied his wave construction to explain them by supposing that two surfaces must be constructed around each point, one a sphere which would give the ordinary ray, but the other a spheroid with its axis of revolution determined by the crystal axis (that is, by the shortened diagonal of the cube) which would give the extraordinary ray. This is illustrated in fig. 3. Around the points C and D we draw not only a sphere but also a spheroid, which is such that the two surfaces touch at the points that lie in the direction of the crystal axis (the point K in fig. 3). The envelope of the spheres is the plane EF, the direction of motion of which shows the path of the ordinary ray, while the plane GH is the envelope of the spheroids and its motion shows the path of the extraordinary ray. Observe that the latter ray is not perpendicular to the wave front. The ray must here be conceived as the direction in which the energy flows.

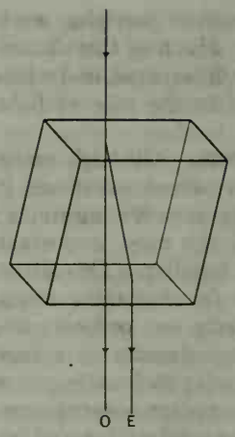

FIG. 2.—DOUBLE REFRACTION, SHOWING TWO RAYS EMERGING WHEN A SINGLE LIGHT RAY STRIKES A CALCITE CRYSTAL PERPENDICULARLY

Huygens also discovered, though he did not explain, the phenomenon of polarization. If we rotate our crystal about an axis in the direction of the beam and observe the projections of the two rays on a screen, the ordinary ray will stay fixed, and the extraordinary, which will be equally bright, will rotate round it. But now suppose that we isolate the ordinary ray and pass it in the same way through a second crystal. In general it will give rise to two rays, ordinary and extraordinary, but this time they will usually be of unequal brightness. If the two crystal axes are parallel, the extraordinary ray will be absent altogether, but as the second crystal is turned it will gradually grow in brightness at the expense of the ordinary, until, when the crystal has turned through a right angle, the ordinary ray will be entirely extinguished. Rotation through a further right angle will restore the ordinary ray and destroy the extraordinary. A similar rule applies for the extraordinary ray from the first crystal; it usually gives both types, but only an extraordinary ray when the crystals have their axes parallel. Newton recognized the essential features of the matter in saying that a ray of light may have "sides"; in fact that this light differs from ordinary light as a thin lath differs from a round stick. This characteristic is now described by the word polarization. The idea of transverse vibrations had not yet been formulated, and no further advance was made for more than a century.

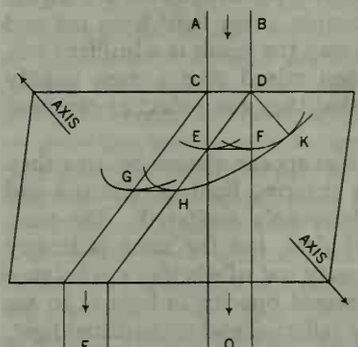

FIG. 3.—HUYGENS' CONSTRUCTION FOR DOUBLE REFRACTION

Each point of C and D sends out a sphere and spheroid wave. The spheres give the ordinary ray through EF; the spheroids the extraordinary ray through GH

The Huygens wave construction explains what some may regard as a philosophic difficulty in Fermat's principle. According to this principle the rays of light between two points A and G (fig. 1) adopt that path which takes the shortest time; and though the only way we have ordinarily of determining a minimum is to try a number of paths and see which is quickest, the ray appears to adopt the right course without any alternative trials. The wave construction explains this, for it shows that the wave is, so to speak, trying alternative routes, and is adopting the shortest because the waves in other paths cancel out, by the phenomenon of interference, to be described later.

In spite of these great advances, the state of knowledge at the end of the 17th century was really insufficient to give a decision between the two theories; there was hardly the beginning of a mathematical wave theory as yet, and it is perhaps not surprising that the corpuscular theory of light gained the upper hand. The 18th century was singularly barren for optics, and the only first-class discovery appeared strongly to support this theory. This was the dis-

covery of stellar aberration, by James Bradley (*see* ABERRATION [OF LIGHT]), which for corpuscles is immediately explained by the idea of relative motion; with waves, though a crude explanation is feasible, the present solution was only obtained in the 20th century with the advent of relativity concepts.

2. The Age of Fresnel.—The second great period of discovery coincided with the beginning of the 19th century, and the first successes fell to Thomas Young. He adopted the wave principle of Huygens, but extended its application. Thus Huygens had only considered waves of the form that we should now call pulses, but Young made use of continuous periodic waves, and so was enabled to explain Newton's rings. He clearly stated the general principle of superposition: "when two undulations from different origins coincide, either perfectly or very nearly in direction, their joint effect is a combination of the motions belonging to each." This principle is quite general, but Young perceived that interesting results would follow only when the two sources are coherent, that is to say, when two beams from the same source are brought to superposition, for only thus could the irregularities in the process of emission be the same for both. He therefore set up what proved to be one of the classical experiments underlying optical theory.

Two holes are made close together in a screen, and light from a distant point passes through them to illuminate another screen. If the holes are large there will be two patches of light on the screen, but when the holes are made smaller diffraction occurs, the rays of light spread and the patches are larger instead of smaller. When the holes are very small the patches overlap and are crossed by a number of fine bands. To understand this, suppose the light to be monochromatic (of a single wave length) so that the vibrations of the light wave are in the form of a traveling sine curve. The source of light is equidistant from the two holes A and B (fig. 4), so that at those points the waves are in the same phase (shown

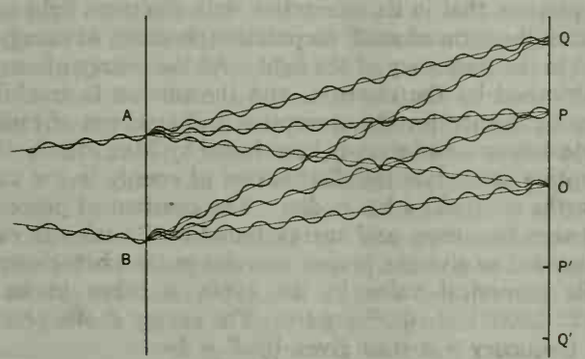

FIG. 4.—YOUNG'S INTERFERENCE EXPERIMENT

Monochromatic light falls on the two holes A, B. Point O is equidistant from them, so that the waves reinforce each other. P is ½ wave length nearer to A than to B, so that the waves cancel out, while Q is a whole wave length nearer, and they reinforce again. Bright bands will appear at O and Q,Q', and darkness at P,P'

diagrammatically in the figure). On passing through the small hole, each beam emerges as a spherical wave. At the central point O of the screen the distances to A and B are equal so that the phases agree at every moment; the effects from the two holes will reinforce one another and O will be illuminated. Consider however a point P which is ½ wave length nearer to A than to B. Here the waves from A and B are at all times in opposite phases (in the diagram when one wave is at the top the other is at the bottom, etc.) and so cancel, with darkness as the result. At the point Q, which is a whole wave length nearer to A than to B, the waves will reinforce each other again, because one wave is always exactly a wave length behind the other, and there will be light. Proceeding in this way the whole field is seen to be covered by alternate bright and dark bands. In the case of white light there will be a few coloured bands in the middle and the rest will look white; the colours can be worked out in just the same way as with Newton's rings. Young's interference pattern is by no means easy to observe, as it requires very careful adjustments because of the exceedingly short wave length of visible light. To give an idea of its magnitude, if the holes are 1 mm. apart and the screen is at a distance of 1 m., then for red light the bright bands are 0.6 mm. apart.

The investigation of polarization received a great impetus when É. L. Malus discovered that sunlight reflected from glass may be polarized. Sir David Brewster found that the reflected light was completely polarized when the reflected and refracted rays were perpendicular to one another. He discovered experimentally the formulas for the intensity of the two polarized components of light reflected from a transparent substance. If i is the angle of incidence and r that of refraction, the fraction reflected is $\sin^2(i-r)/\sin^2(i+r)$ or $\tan^2(i-r)/\tan^2(i+r)$, according to the direction of polarization. These expressions are usually called Fresnel's sine and tangent formulas. In the special case where $i+r=90°$ the tangent expression vanishes and the reflected light is completely polarized. Brewster also made the important discovery that some crystals exhibit double refraction of a different type from that of calcite. In these crystals there are two directions for which the light does not become polarized. That is, instead of the single axis shown in fig. 3, such crystals have two, and are called biaxial. We may also mention the discovery by F. Arago of gyration (formerly called "optical activity"); a beam of polarized light sent through a quartz crystal along the axis, or through a sugar solution, emerges with the plane of polarization rotated by an amount proportional to the length of the path.

The greatest investigator of this period was Augustin Jean Fresnel, and in his hands optical theory attained the outline which it has kept ever since. First he adapted Huygen's construction to explain diffraction, and thereby established the usefulness of the wave theory. He demonstrated the remarkable bright spot exactly in the centre of the shadow of a circular screen, and verified the interference of two beams of light. Fresnel's work on the optical effects of moving bodies (including the motion of the earth) had a great influence in connection with relativity theory. Next he made the discovery (with Arago) that two beams of differently polarized light, even from the same source, cannot be made to interfere. At this period the vibrations of light were thought to resemble those of sound, so that there seemed to be no room for polarization in the theory, but Young hit on the solution that the vibrations were transverse, so that a wave of light may have sides, as Newton had said. Fresnel next turned to double refraction and solved the problem by uniting into a single system both Huygens' uniaxial and Brewster's biaxial types. Finally he deduced theoretically the laws of refraction and reflection, and obtained the sine and tangent formulas to which we have referred. Fresnel's work and the enormous progress he made is especially remarkable since the mathematical theory of waves was only in its infancy, and a dynamical theory of continuous media hardly existed.

3. The Dynamical Theories of the 19th Century.—After the discoveries of Fresnel, the need to build a proper dynamical formulation was the chief preoccupation of theorists during most of the 19th century. It was felt necessary to make a model of some sort of matter which should behave like the optical medium. The model suggested was that of an elastic solid. Augustin Cauchy, Franz Neumann and others used it in explaining the phenomena for a single medium, but the theories got into difficulty when it came to the passage of light from one medium to another.

The work of George Green on the propagation of waves in elastic solids is the real beginning of the modern mathematical theory of waves. A solid can undergo strain (be altered in form or position) by compression without other change of form, or it may be sheared as when a square becomes a rhombus, or, without changing its shape, it may be rotated in position. The last type of strain can take place without the necessity of internal forces, but the first two require them. The solid will have two elastic constants corresponding to these forces (we are thinking of an isotropic body, not a crystal which may possess 21), and can propagate a longitudinal wave corresponding to compression, and a transverse wave corresponding to shear. Green showed that a transverse elastic wave passing from one medium to another must give rise to a longitudinal wave, and for this the theory of light, as it existed then, had no explanation. Green's calculus firmly established the conditions a valid theory must satisfy. Inspired by Green's methods, Sir George Stokes gave a rigorous solution of the problem of diffraction in place of Fresnel's approximate geometrical method.

A valid formulation for the dynamic theory of light was made by

James MacCullagh on the assumption that the ether (*see* ETHER [IN PHYSICS]) had no resistance to compression or shear, but did resist rotation. However, no known substance has such properties, and for this reason his equations were regarded with great suspicion and their importance was not appreciated till long afterward. During the 19th century there were many attempts, especially by Lord Kelvin (then W. Thomson), to imagine a substance which should satisfy all the necessary conditions, but they gave little satisfaction. The modern theory was finally formulated after 1860 by James Clerk Maxwell, who showed that electric oscillations must involve emitted waves which would have the same transverse character and would travel with the same velocity as light. He therefore identified light with electric waves, and gave the complete system of equations (then seen to be identical with MacCullagh's) which determine the behaviour of light. This theory has firmly held the field ever since, and Maxwell's name ranks as high as any among the contributors to optical theory. The completeness of his theory, and perhaps the familiarity that grows with the lapse of time, for many years overcame the objection that no known matter conforms to the same rules of vibration as the ether. Numerous experiments to detect the ether failed until the theory of relativity showed the ether to be a superfluous concept. It has quietly gone the way of caloric and phlogiston.

4. The Experimental Discoveries of the 19th Century.—During the period of these great theoretical investigations the experimental side had not been neglected. Joseph von Fraunhofer studied diffraction in a rather different way from Fresnel, and constructed gratings by winding wire between two fine screws and by ruling lines with a diamond on glass. With these he analyzed the solar spectrum, and his work is thus the origin, both in subject matter and in method, of the modern science of spectroscopy. Nicol's prism (described below in connection with fig. 13) made it easy to produce polarized light, and was for a long time the standard instrument in the study of polarization. Stokes began the study of ultraviolet light, rendering its effect visible by fluorescence (*see* LUMINESCENCE); it is now more usually investigated by photography. Michael Faraday discovered the theoretically very important phenomenon of magnetic gyration: when a transparent substance is in a strong magnetic field, a beam of polarized light passing through it along the direction of the field has its direction of polarization rotated. This was the earliest connection discovered between light and electricity (1845). Armand Fizeau and Léon Foucault developed methods of measuring the velocity of light accurately, and showed that light travels more slowly in water than in air, as is demanded by the wave theory.

We must also mention the slow development of the theory of dispersion; *i.e.*, the dependence of the refractive index on the wave length. Fresnel and Cauchy had attributed it to the coarse-grainedness of the refracting medium, from which it followed that the refractive index could be expanded in powers of the inverse square of the wave length. This is often possible, but the inadequacy of the theory was seen when F. P. Leroux discovered the phenomenon of "anomalous dispersion" (which is not really at all anomalous) in finding substances which refract the red more than the blue. A hint of the modern theory was given by Maxwell, but its real development is attributable to W. Sellmeier, who showed that dispersion was an example of the general phenomenon of resonance. At the end of the 19th century Hendrik Lorentz revised Maxwell's theory, introducing the idea of electrons and improving Sellmeier's dispersion formula.

During the closing decades of the 19th century an aspect of the wave theory which has had results of the most far-reaching importance was much studied experimentally. Fresnel had with partial success treated the optical theory of media in motion, but many difficulties remained with regard to the movement of the earth as a whole. Stellar aberration suggested a fixed ether through which the earth moved, but then it seemed possible that for terrestrial experiments this motion ought to be detectable. Because of the great velocity of light, none of these experiments was easy, but all gave negative results; particular mention may be made of an experiment (*see* MICHELSON-MORLEY EXPERIMENT) which was of such accuracy that, though it depended on the square of the ratio of the earth's velocity in its path about the sun to that of light, it definitely established no measurable effect of motion relative to a supposed ether. The mathematical theory was developed by Sir Joseph Larmor and Lorentz to deal with this matter, and a very profound interpretation, given to it by Lorentz, led to the promulgation of the theory of relativity by Albert Einstein (*see* RELATIVITY).

5. Developments in the Early 20th Century.—As the 20th century opened, it seemed that optical theory had attained a completeness and perfection which hardly left room for further development. But this complacent view faced a series of rude shocks as previously unknown phenomena concerned with the interaction of light and matter were discovered. These apparently could not be reconciled with the theory of electromagnetic waves, but required a modified corpuscular theory. Yet the classical wave picture was so thoroughly successful in dealing with most optical effects that there could be no question of its being supplanted. The way in which these two views of the nature of light have been reconciled is indicated below.

Relatively few experimental discoveries led to the theory of photons or light quanta, although as a result of the formulation of the quantum theory in 1926 it became clear that they are essential in explaining the emission, transmission and absorption of light by matter. The discovery which showed most clearly the inadequacy of the electromagnetic theory was that of the photoelectric effect (*see* PHOTOELECTRICITY). Philipp Lenard in 1899 had shown that electrons ejected from a polished metal plate when light falls upon it have velocities that are uninfluenced by the intensity of the light. Greater intensity merely increases the number of electrons. Altering the wave length of the light does affect the velocity, in that the energy of the electrons is inversely proportional to the wave length when the latter is sufficiently short. These facts led Einstein in 1905 to propose that in its interaction with electrons light is concentrated in the form of small corpuscles (photons) of energy proportional to the frequency of the light. All the energy of one photon is absorbed by the electron, and the photon is annihilated. Less direct evidence for the absorption and emission of radiation in discrete amounts had already been found by Max Planck (1900) in attempting to explain the distribution of energy in the various wave lengths emitted by hot bodies. The constant of proportionality between frequency and energy found by Planck was exactly the one needed to give the proper energies in the photoelectric effect. Its numerical value in the 1960s is taken to be $h = (6.6256 \pm 0.0002) \times 10^{-27}$ erg sec. The energy E of a photon in light of frequency ν is then given by $E = h\nu$.

Other corpuscular effects appeared in rapid succession. The explanation of the spectrum of hydrogen by Niels Bohr in 1913 was based on the assumption that the frequency is determined by equating the change in energy of the atom to the photon energy $h\nu$. In X-rays the existence of a sharp upper limit to the frequency of the continuous radiation showed that the energy of the electrons striking the target, if completely converted into radiation, could only yield a certain maximum ν determined by $E = h\nu$. Again, the lowering of the frequency of X-rays when they are scattered by matter was interpreted by A. H. Compton as caused by the loss of energy when a photon rebounds from a collision with an electron. Evidence that photons have momentum was strikingly displayed in this experiment. (*See* COMPTON EFFECT.) These investigations have been followed by many others that are readily interpreted in terms of photons but that are inexplicable in a wave theory.

It is important to notice the characteristic realms of optical phenomena in which the wave and photon models find their applicability. Such readily observed properties as rectilinear propagation, reflection and refraction fit well with either picture. Interference and diffraction, however, which are cases of the interaction of light with light, are explainable better by waves. The wave theory is also tenable in dealing with the transmission of light through matter, provided that the light is of not too high a frequency nor too close to characteristic absorption frequencies of the material. Thus the electromagnetic theory gives a good account of dispersion, polarization and double refraction, as will be shown in the following sections. The corpuscular properties of light come into

special prominence when matter interacts with light of high frequency (photons of high energy). As wave length becomes shorter the wave properties steadily give place to corpuscular properties. At the short wave lengths (X-rays and γ-rays) it is often difficult to detect the wave properties, although the interference of X-rays and γ-rays has been beautifully demonstrated. Radio waves, at the other extreme, can be treated purely as electromagnetic vibrations, and their corpuscular properties are of no importance.

Light occupies an intermediate position on the electromagnetic spectrum and displays wave properties under certain conditions, but corpuscular properties under others. The fact that corpuscular properties remained undiscovered until comparatively recently is an indication that in its commonest aspects light is most suitably represented as a wave motion.

III. WAVES AND INTERFERENCE

Beyond the familiar form of surface waves in water, the term waves is extended to cover any vibratory effect propagated through a medium. For example, if we take a long stretched string and strike it near one end, a small hump will form and will travel down the string. Though the position of the hump on the string is changing all the time, the geometrical form is unchanging; thus it can be said that the disturbance or wave goes at a certain speed. If x denotes the distance of any point on the string from the point of reference, or the origin, and ϕ the displacement of the string at that point, the motion is described by the differential equation

$$\frac{\partial^2\phi}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2\phi}{\partial t^2}$$

the solution of which is $\phi = f(x - ct)$. This expresses the fact that, whatever the initial form, the form at time t is the same with the origin shifted a distance ct, where c is the velocity of the disturbance.

1. General Characteristics of Waves.—The vibration of a string is especially simple because the wave undergoes no change of form; on the other hand, such waves as those in water alter shape as they travel and it is no longer possible to speak of a definite velocity. It is therefore necessary to analyze such waves into definite types which can be studied separately; the type which is most useful is the sine curve. This is a consequence of the principle of superposition enunciated by Young; mathematically this principle follows from the fact that the differential equations of wave motion are linear, so that if we have two solutions of a wave problem we can derive a third by taking their sum. Thus any problem can be solved by expressing the initial state as a sum (or more usually an integral) of sine curves of various wave lengths, then solving the motion for each of these separately and finally recombining them. This is the only method available for water waves; and though plane waves of light are propagated in free space without change of form, any obstacle or refractive medium destroys this simplicity and makes analysis necessary.

In discussing the general characteristics of waves we may conveniently think of a stretched string, but when the appropriate name is given to the dependent variable ϕ everything we shall say applies equally well to water waves, sound or light. Thus, ϕ in the string means the displacement of the string sideward, in water waves the elevation of the surface above its average height, and for sound it might mean the variable part of the air pressure; for light we specialize it rather more and identify it with the electric force. In all these cases the typical solution is

$$\phi = A\cos[2\pi(\nu t - x/\lambda) - \epsilon]$$

First considering the motion of a particle of the string, we keep x constant and see how ϕ depends on t. It is a pure harmonic vibration of amplitude A and frequency ν, frequency meaning the number of vibrations per second. The expression

$$2\pi(\nu t - x/\lambda) - \epsilon$$

regarded as an angle, is the phase at the time t at the distance x from the origin. It can be interpreted very simply by the consideration that, when a point describes a circle at uniform speed, its projection on a diameter describes a harmonic motion; then the angle between this diameter and the radius through the point is the phase angle. The term phase, though quite precise, is often used in a looser sense, because its absolute value does not matter, whereas differences in phase are of the very greatest importance in deciding the character of a wave. We next examine the shape of the string at any instant of time and see that it is a sine curve of wave length λ. The amplitude, frequency, wave length and phase are the four quantities characteristic of any wave.

The wave is progressive because of the phase relations between the various points of the string. If at any instant we compare the phases at x and $x + a$, we see that the latter is an angle $2\pi a/\lambda$ behind, and that at a time $a/\lambda\nu$ later it will have arrived at the phase which was at x initially. We therefore take $\lambda\nu = V$ as the wave velocity or phase velocity; it is the rate at which the crests move. Though phase velocity plays an important part in wave theory, it is misleading to think of it as a real velocity. For example, no effect of any kind can be propagated with a speed greater than c, the velocity of light *in vacuo*, but there are circumstances to be described later for which the phase velocity of light is considerably higher. When we say that no effect can travel faster than c, we are thinking of the rate at which waves advance into a previously undisturbed region; but phase velocity has a meaning only in connection with a sine curve, which extends indefinitely in both directions, so that there is no undisturbed region.

In the case of water waves, and perhaps of electric waves of very long period, we can observe the crests and so can see directly the wave velocity and measure the amplitude, but in general it is impossible to do this. Usually we observe only some dynamical effect, such as that which occurs when the rays of light impinge on the retina of the eye. The exact form of this effect is special to each type of wave, but the effect depends on the energy of the waves, and this is proportional to the average value of the square of the amplitude of the wave variable ϕ. This quantity is the intensity; it is often quite unnecessary to know the factor of proportionality associated with it. Amplitude can be deduced from the intensity but nothing can be said about the phase; this is because only by altering the phase can the wave medium do work on the observing instrument. Only by spoiling the phase can we observe the wave.

The case of waves in three dimensions is more complicated than that in one. In thinking about them the most important idea is that of the wave front, which is any continuous surface over which the phases are all the same. For mathematical treatment such waves are sometimes resolved into sets of plane waves going in all directions, but it is more often convenient to make use of spherical waves. It can be shown that, if a three-dimensional medium propagates plane waves according to the rule

$$\phi = A\cos[2\pi(\nu t - x/\lambda) - \epsilon]$$

then it can propagate a spherical wave of the form

$$\phi = (A/r)\cos[2\pi(\nu t - r/\lambda) - \epsilon]$$

where r is the distance from the origin. The wave fronts are spheres around the origin as centre, and the wave represents an emission from a point source at the origin. The amplitude A/r decreases as the wave spreads out, and is always proportional to the inverse distance. The intensity is therefore proportional to the inverse square of the distance, and this is the fundamental law of photometry.

2. The Velocity of a Group of Waves.—Much of optical theory can be developed by the consideration of pure monochromatic waves, and experimental methods have tended to move in directions for which these suffice. The monochromatic wave, however, gives a very incomplete account of events, because it ranges over an infinite extent of time and space, whereas we usually want to know about events in some limited region. For instance, in Huygens' construction for double refraction the extraordinary wave has its front parallel to the ordinary, yet the rays go in a different direction. Even in the simpler case of plane waves of unlimited breadth there is a similar complication when the wave velocity depends on the wave length, as is the case in refracting media. Let us take a group of approximately monochromatic

waves of limited length, and find the group velocity with which it travels as a whole. To construct such a group we take a sine curve multiplied by a factor such that the waves are not of uniform height, but fall away gradually to zero on both sides of the centre. The solution then shows that, though the crests travel forward with the wave velocity appropriate to the wave length, they alter in height as they go, and after a time the crest which was highest at first will have become quite inconspicuous, while another wave originally quite small will have grown up and taken its place as the highest crest. Thus the group as a whole has a velocity different from that of its component waves. The group velocity U is derived from the wave or phase velocity V by the formula $d(kV)/dk$, where k is the reciprocal of the wave length. The phenomenon of group velocity in water is easily observed from the deck of a ship, for after a very short time a large wave under observation becomes quite small while another behind it has grown at its expense. For water the wave velocity is proportional to the square root of the wave length, and our formula then shows that the group velocity is half the wave velocity. For other types of wave it may be greater than the wave velocity. Only in the case where the wave velocity is independent of the wave length is it equal to the group velocity; in this case any wave can be propagated without change of form.

The most important application of the idea of group velocity to optics arises in the measurement of the velocity of light. Every type of measure depends in some way on interrupting the light and thus gives the group velocity. Failure of A. A. Michelson to recognize the distinction between group and phase velocities introduced errors into his otherwise careful measurements of the velocity of light. In free space the wave velocity of light does not depend on the wave length and so is the same as the group velocity, but this is not so in other cases. The superiority of the wave theory of light over the corpuscular theory was held proved when Foucault showed directly that light goes more slowly through water than air; but he did not in fact prove it, for the refractive index depends on wave velocity, and his work dealt with group velocity. However, since either can be deduced from the other, it is easy to verify the correctness of his result indirectly. In much of optics these considerations do not arise, and so they are frequently forgotten.

3. The Pressure of Light.—In the course of his theoretical investigations Maxwell discovered the pressure of light. He derived this effect from the electromagnetic theory, but as a matter of fact it can be shown to follow from any wave theory, and was foreseen in the 18th century by Leonhard Euler. If plane waves fall perpendicularly it may be shown that they exert on a surface a pressure equal to the density of energy in the waves. This is exceedingly difficult to observe, as the pressure is very small in practical cases, and led to the invention of the radiometer by Sir William Crookes. In this instrument freely moving vanes are coated with black on one side and are polished on the other. The black side absorbs the radiation while the reflecting side sends it back; thus there is more energy (a greater pressure) in the space in front of the reflecting side. When the radiometer is illuminated it does turn, but the wrong way! This is the result of a rather complicated effect depending on the heating of the residual gas in the vessel, and in order to observe the pressure of radiation much more delicate means are required. It was eventually measured by P. N. Lebedev by improving the radiometer to eliminate the effect of the gas. There are also indirect methods by which the pressure of light can be verified, chief among which is the thermodynamic law for the emission of radiation (*see* HEAT). Light pressure plays scarcely any part in our common experience, but it grows to enormous values in the hot interiors of stars and plays a dominating part in controlling their state. To it is ascribed the behaviour of comets' tails; and detectable variations in the motion of the balloon satellite, Echo I, are ascribed to light pressure. The pressure due to sunlight at the earth's surface is about 4×10^{-5} dynes/cm.^{2}

4. The Doppler Effect.—When monochromatic light passes through any fixed optical system one property that is always conserved is the frequency of the vibrations; but this frequency can be changed if the light is reflected by a moving mirror, or if there is a difference in the motions of source and observer. This change of frequency is called the Doppler effect (*q.v.*), after its discoverer, and is easily explained by the wave theory. Consider a fixed source emitting light of frequency ν toward an observer who is receding at velocity v. The successive crests of the light waves will reach him at longer intervals than if he were at rest, and a simple calculation shows that he will receive them with a frequency $\nu\,(1 - v/c)$; the light will appear to him slightly redder than it would if he were at rest. If he is approaching, it will appear bluer, and if his motion is oblique to the direction of the source, the change of frequency will depend on the component of his velocity in the line of sight. Pronounced Doppler effects are observed in the radio signals received from man-launched satellites by which the signal velocities are measured. When light is reflected from a receding mirror it has to traverse the increasing distance twice over, and so the effect is doubled, and the frequency of the reflected light is $\nu\,(1 - 2v/c)$. These values are not quite precise when v is large. The Doppler effect is used in astronomy to discover the velocity of stars in the line of sight, and thus for example to calculate the motion of the components of a double star which are so close together that they cannot be seen separately. The red shift of the lines in the spectra of distant spiral nebulae is usually interpreted as a Doppler effect resulting from the expansion of the universe. (*See* COSMOLOGY: *The 20th Century: Red Shifts.*) If this is correct, it would indicate that the most distant nebula known in the early 1960s is receding from us at a speed of some $0.46c$, or 86,000 mi. per sec. R. Minkowski interprets this to mean a source 5×10^9 light-years away. Studies of the Doppler effect in radar signals reflected from Venus (1961) indicate that the planet's period of rotation is slightly longer than its period of revolution about the sun, thus making the sun appear to rise in the west.

If the Doppler equation is corrected for relativity, the frequency ν_1 observed from a source of frequency ν which approaches with velocity v is $\nu_1 = \nu \dfrac{\sqrt{1 - v^2/c^2}}{1 - v/c}$.

5. The Colours of Thin Plates.—When white light is reflected from a film of a transparent material, interference occurs between the light reflected from the top and bottom surfaces. This gives rise to colours, as in Newton's rings, which have an explanation similar to the coloured bands obtained in Young's experiment. In the present case, however, waves from a large number of coherent sources, instead of from only two, are superimposed, as a result of the multiple reflections within the film.

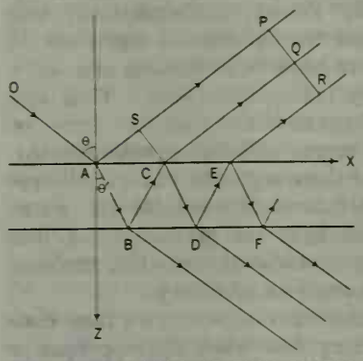

FIG. 5.—COLOURS OF THIN PLATES

The total amount of light reflected will depend on the phase differences of AP, CQ, ER, and these will vary with the colour and inclination of the light

In Huygens' construction for reflection and refraction, when a beam of light falls on a surface, part is directly reflected and part is refracted. Consider now a thin plate, say a soap film, under monochromatic light (fig. 5). The beam refracted at the first surface comes to the second, and a portion emerges, while the rest is reflected back. This second part comes back to the first face, and part of it emerges while part is again reflected. Thus, if we want to know the total amount reflected, we have to consider the compounded effects of all the waves arising from direct reflection and any number of internal reflections. In order to explain the process, fig. 5 has been drawn as though the rays AP, CQ, ER . . . were a considerable distance apart. They are actually considered extremely close together, for the film is supposed to be thin, and many of them will be brought together by the lens of the eye of the observer. Evidently this is similar to Young's experiment in which we have to consider the phases of the various waves. If these phases agree we shall have a brilliant

reflection; otherwise it will be feeble. The phases agree for only one colour at a time, and so the film looks coloured though it is illuminated by white light. In order to explain this examine the process of refraction somewhat more closely.

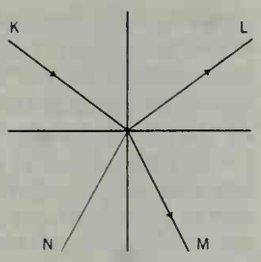

FIG. 6.—REFLECTION AND REFRACTION AT AN INTERFACE

First consider a single interface illuminated obliquely by a plane wave of light K (fig. 6). This will be broken into a reflected wave L and a refracted wave M. The strengths of these can be calculated exactly in the detailed theory (they are given by Fresnel's sine and tangent formulas), but are not needed here. Let us say that, if K has unit amplitude, then L has amplitude r and M has amplitude t. We shall assume (from the more detailed theory) that there is no change of phase at the interface. We also must consider the effect of a beam coming to the surface from the other side. Let us suppose that the reversed wave M would give a transmitted wave along K of amplitude t' and a reflected wave along N of amplitude r'. Now, if all the parts of a system are simultaneously reversed in their motions, the system will retrace its course to the point from which it started. Thus, if we take a wave r along L reversed and simultaneously t along M reversed, they will give rise to unit amplitude along K reversed and no wave along N. The wave r from L gives r^2 along K and rt along N, while t from M gives tt' along K and tr' along N. We thus have the two equations $r^2 + tt' = 1$, $rt + tr' = 0$. The last implies that r' must be equal to r, but that there is a change of phase of 180° at the interface upon reflection from below; we can allow for it completely by simply writing $-r$ for r'. In fig. 5 the reflected ray AP has amplitude r, the ray AB has amplitude t. Of this a fraction r' is reflected at B, so that tr' arrives at C and CQ has amplitude $tr't'$, while CD has tr'^2. Similarly ER will have tr'^3t' and so on. On the other side the waves emerging at B, D, F will have amplitudes tt', tr'^2t', tr'^4t', etc. We must now compare the various phases of the paths OAP, OABCQ, etc. Let θ be the angle of incidence and θ' that of refraction, and n the refractive index. If we allow for the difference of the wave velocity in the film, the phase difference for a singular pair of internal reflections will be $\frac{2\pi}{\lambda}$ $(n.\mathrm{ABC} - \mathrm{AS})$, where S is the foot of the perpendicular from C on AP. This is equal to $2 \cdot \frac{2\pi}{\lambda}$ $bn \cos\theta'$, if b is the thickness of the film; we shall denote it by 2δ. Thus, if the phase at P is ϵ, that at Q is $\epsilon - 2\delta$ and therefore that at R is $\epsilon - 4\delta$, and so on. The whole reflected wave thus has amplitude

$$r\cos\epsilon + tt'r'\cos(\epsilon - 2\delta) + tt'r'^3\cos(\epsilon - 4\delta) + \cdots$$

This series is now summed and reduces, with the help of the relations between r, r', etc., to

$$\frac{2r\sin\delta}{1 - 2r^2\cos 2\delta + r^4}[-\sin(\epsilon - \delta) + r^2\sin(\epsilon + \delta)]$$

and the resulting intensity follows by squaring and averaging over all values of ϵ. The fraction of the incident wave reflected is

$$4r^2\sin^2\delta/[(1 - r^2)^2 + 4r^2\sin^2\delta]$$

It can be shown similarly that the fraction transmitted is

$$(1 - r^2)^2/[(1 - r^2)^2 + 4r^2\sin^2\delta]$$

For a soap film the coefficient r is not very large. The chief effect is present when $\sin\delta$ vanishes—that is, when $bn\cos\theta'$ is any multiple of half a wave length—for at such an angle of incidence there will be no reflection at all. Hence, when a film is under white light, some of the colours will be absent from the reflection and just these will be present in excess in the transmission. Therefore the light reflected by and transmitted through the film will show the complementary colours. The case of Newton's rings is very similar; the film of air between the two glass surfaces widens outward from the point where the glasses touch, so that b passes progressively through values where there is no reflection for each colour in turn.

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NEWTON'S RINGS

These interference effects have been put to practical use in the various types of interferometer. The Fabry and Perot interferometer uses multiple reflections between two lightly silvered glass plates set accurately parallel. Because of the considerably larger reflection coefficient r the transmitted interference rings are quite narrow. The thickness b of the air plate is one to five centimetres, with the result that a telescope must be used to observe the complete ring system. In the Lummer-Gehrcke plate the internal reflections occur at an angle close to the critical angle for total reflection, thus affording a large r without the necessity of silvering. These instruments are the most powerful tools for the study of spectra, although the modern diffraction grating is a close competitor. In the Michelson interferometer two beams with widely different paths are brought together by two mirrors to produce interference. The effects are in many ways similar to those from a film or plate of air with thickness determined by the distance between one of the mirrors and the virtual image of the other. (*See* INTERFEROMETER.)

The interferometer can be used to measure how nearly any spectral line is monochromatic. If the wave emitted by an atom were literally a sine curve, this would imply that it is infinitely long (the mere fact of switching the light on and off assures that it is not), but in fact the trains of waves given out by the atoms have a limited length that can be measured by finding how large a difference of path the interfering beams may have before the rings disappear entirely. With ordinary light sources this maximum path difference is about 70 cm., implying that after an atom has executed roughly 1,000,000 vibrations it changes phase arbitrarily before emitting again. However, with the gaseous optical masers of the 1960s it has become possible to make extended sources of radiation much more monochromatic. With spectral lines only 10^{-8} Å wide, coherence for one millisecond is possible; that is, for nearer 10^{12} vibrations.

IV. DIFFRACTION

There is no basic difference between diffraction and interference, but only a difference in emphasis. Thus the term diffraction is used for phenomena connected with the spreading of waves on passing through a slit, shadow formation, etc., explained as the joint effect of the interference of all the secondary waves emanating from the exposed part of the wave front. The term interference is usually applied to simpler cases, as in Young's experiment, where waves from a finite number of separate but coherent sources are superimposed. When we described Young's experiment, we regarded the two holes in the screen as secondary sources of light emitting spherical waves but having been illuminated by a single (coherent) source. A similar construction was applied in Huygens' description of refraction, and may also be used in free space. We shall do this as a preliminary to describing the formation of shadows.

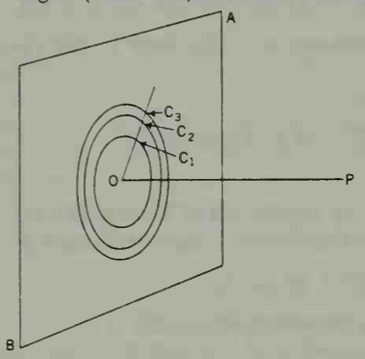


FIG. 7.—FRESNEL'S ZONES

A wave is advancing from plane AB to P. The circle round O is the first zone; the rings outside, the succeeding ones. Zones give nearly the same effect at P, but with alternating signs

1. Fresnel's Construction.—In fig. 7 we have a plane wave with front at AB progressing toward P. At P it will be a plane wave too, with phase $\frac{2\pi}{\lambda} \cdot \mathrm{OP}$ behind that at O, but we are now supposing that we can take each point in the plane AB as the source of secondary waves, and that the wave at P is due to the superposition of all these waves. In the plane AB there are circles around O of radii OC_1, OC_2 . . . etc., such that

$$\mathrm{PC}_1 - \mathrm{PO} = \frac{1}{2}\lambda,\ \mathrm{PC}_2 - \mathrm{PO} = \lambda,\ \mathrm{PC}_3 - \mathrm{PO} = \frac{3}{2}\lambda,\ \text{etc.}$$

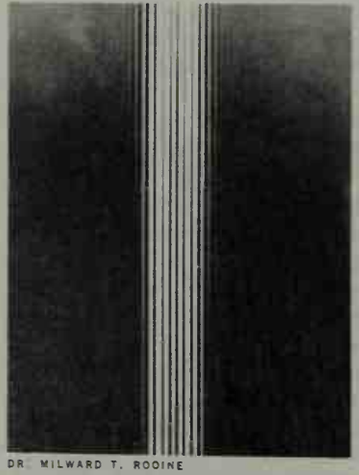
The central circle and the ring spaces around it are called Fresnel zones and are all of nearly the same area. Each point is supposed to emit light that will arrive at P with a phase depending on the distance to P. The phases of the waves arriving at P from a single Fresnel zone are all the same within half a vibration. At the moment when the phase arriving from O is just 90° all the phases from points in the central zone will lie between 90° and −90°, and they will all make a positive contribution. Those from the second zone will all make a negative contribution, from the third positive and so on. We may represent the total effect as due to the sum of the effects of all the zones, written as

$$m_1 - m_2 + m_3 - m_4 + \ldots$$

Each of these quantities is nearly the same because of the nearly equal areas of the zones, but they slowly diminish because of the increasing obliquity, as we shall see. To allow for this decrease we sum the zones in the form

$$\tfrac{1}{2}m_1 + (\tfrac{1}{2}m_1 - m_2 + \tfrac{1}{2}m_3) + (\tfrac{1}{2}m_3 - m_4 + \tfrac{1}{2}m_5) + \ldots$$

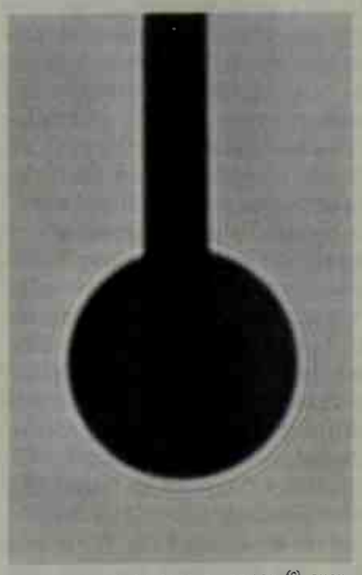
and then, the decrease in the m values being assumed to take place at a constant rate, all the bracketed terms cancel, and the effect at P is equal to half that of the first zone. This argument is of course not a proof, but the full proof requires more sophisticated mathematics than can be given here.



DR. MILWARD T. ROOINE

INTERFERENCE PATTERN FROM FRESNEL BIPRISM

In spite of its incompleteness our argument brings out two very important facts. First, since each point of AB has been supposed to give out a complete spherical wave, we should expect the absurd result that there would be emission in the backward direction toward the image point of P in the plane AB. The full solution shows that the amplitude of the secondary wave emitted at angle θ to the primary front involves an obliquity factor $1 + \cos\theta$ that vanishes in the backward direction. Secondly, we should expect the phase of the wave at P to correspond to the average of all the phases in the first Fresnel zone, whereas empirically it corresponds to that of the point O. To put this right we make the rule that the secondary waves are to have their phases advanced 90°, or a quarter wave length, in front of the primary wave causing them. These rules have important consequences; for, when we have a thin sheet of matter in the plane AB, its particles will scatter the incident light in much the same way as we have been considering, but in this case neither of the two effects will come in. There will be light scattered backward, which constitutes the reflected wave, and the light scattered forward will be a quarter wave length behind the primary wave; this is the most primitive description of refraction.



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DIFFRACTION SHADOW OF A STEEL BALL

The construction of the Fresnel zones explains the bright spot in the centre of the shadow of a circular disk. For, if the screen cuts out the first n zones, the wave at P will now be $m_{n+1} - m_{n+2} + \ldots$, and the sum will be $\frac{1}{2}m_{n+1}$. To exhibit this effect the circle has to be cut with great accuracy, for if half of it is even a single zone wrong the amplitude at P will vanish. The same idea has been carried further in the construction of zone plates. If we make a screen that cuts out every alternative zone, we shall get an effect proportional to $m_1 + m_3 + m_5 + \ldots$, which will be enormously greater than the effect without screen. Zone plates have been made by drawing them in black on paper and then photographing down to a small scale. A brilliant spot will then be found at a point on the axis. The zone plate illustrates wave principles admirably, but has found no practical application.

2. The Formation of Shadows.—We may apply the same wave construction to explain the formation of shadows. In fig. 8, AC is a screen with straight edge at C, and we consider the light falling on different points of the screen MN. The wave front is supposed parallel to ACB, and the screen blocks out the part AC, so that we have to consider only the secondary waves emitted by the part CB. First take P, the geometrical edge of the shadow; Fresnel zones for this point will consist of a semicircle, with C as centre, and half-rings surrounding it. Each will therefore give half the effect of the whole zone, and the resulting amplitude at P will be just half as great as if P were fully illuminated. The corresponding intensity is thus one quarter as great. For a point Q we make the Fresnel construction starting at D; as Q moves away from P the sizes of the exposed parts of the zones diminish steadily, and we therefore conclude that the intensity falls steadily from $\frac{1}{4}$ to zero. For a point R outside the shadow we make the construction in the way we did before for free space. There will then be a circle surrounded by rings, but the line through C cuts across them in such a way that some are incomplete. Suppose the R is just so far from P that the central circle is complete but is touched by the line C. Then the central zone gives its full contribution, but the second gives less than its full contribution, as do all the later ones. Consequently there is less to subtract than usual from the central zone,

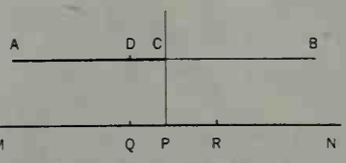

FIG. 8.—THE FORMATION OF SHADOWS

AC cuts off the light from part of the screen MN; P is the geometrical edge of the shadow, and the actual illumination in its neighbourhood is shown in fig. 9

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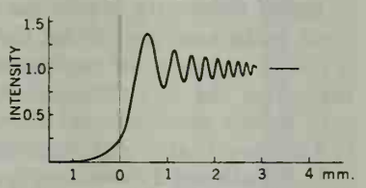
DIFFRACTION PATTERNS MADE BY CIRCULAR APERTURES

and the light at R will be actually brighter than if there were no screen. Similarly if the circle and the first ring are complete, but the second ring is cut by the line C, the second ring will give a diminished positive contribution and the light will be fainter again. Thus outside the shadow there are a series of alternating maxima and minima of intensity gradually fading into uniform illumination at a distance from the shadow. These light and dark bands are known as diffraction fringes.

The scale of the phenomenon depends on the wave length of the light λ and the distance CP. The intensity at a point R will depend on the value of $PR/\sqrt{\lambda \cdot CP}$. For example, if CP is 1 m. and $\lambda = 5 \times 10^{-5}$ cm. for yellow light, the first maximum and first minimum will occur at distances 0.061 cm. and 0.094 cm. outside the geometrical edge, and will have 1.37 and 0.78 the intensity of the incident wave. Fig. 9 shows how the intensity changes near the edge of the shadow. When the incident light is white the corresponding effect can be calculated by the superposition of all the colours; at the point of geometrical shadow the light will again be white and of quarter intensity, and outside this there will first be a blue fringe. A similar process can be applied to work out the illumination due to a slit. If the slit is many wave lengths wide it can be regarded merely as two straight edges, while if it is only a small fraction of a wave length there will be no shadow at all, but a uniform illumination. For intermediate cases there will be a rather complicated succession of fringes depending on the ratios of the wave length, breadth of slit and distance of screen. In any given case the results may be calculated.



FROM A. SCHUSTER AND J. W. NICHOLSON, "THEORY OF OPTICS," EDWARD ARNOLD & CO.

FIG. 9.—THE EDGE OF A SHADOW, SHOWING HOW ILLUMINATIVE INTENSITY RISES FROM ZERO INSIDE TO UNITY OUTSIDE

3. The Fraunhofer Diffraction Phenomena.—There is another way, attributable to Joseph von Fraunhofer, in which diffraction may be studied; this is in fact more important than Fresnel's method in the theory of optical instruments. In this method parallel light again falls on a slit or hole, but, instead of being seen on a screen, the light is now observed through a telescope focused for infinity. The telescope brings all the rays going in a given direction into focus at a point where a photographic plate may be placed; alternatively the real image may be viewed through a magnifying lens. If the slit is narrow enough, or the hole sufficiently small, the naked eye may replace the telescope. Then the slit or other aperture must be placed immediately before the eye which is focused on a small source some distance away. For observing diffraction by a slit, a single-filament lamp makes a good source. To deduce what will be seen under these conditions, we must find the intensities of the waves passing through a slit in various directions.

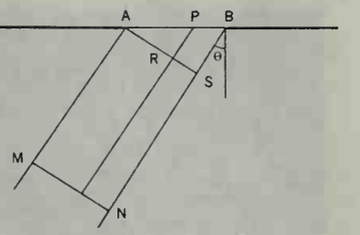
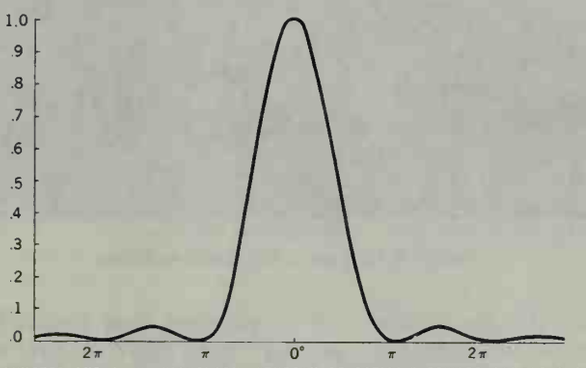


FIG. 10.—DIFFRACTION BY A SLIT

In fig. 10, AB is a slit, and we want to know what intensity goes in the direction AM at angle θ. We break the light at the slit into secondary waves; the one arising at P has to go a distance $PR = AP \sin\theta$ farther than that from A. If the phase of the wave from A is ϵ, that from P is $\epsilon - \frac{2\pi}{\lambda} s \sin\theta$, where $s = AP$.



FROM A. SCHUSTER AND J. W. NICHOLSON, "THEORY OF OPTICS," EDWARD ARNOLD & CO.

FIG. 11.—CHART SHOWING FRAUNHOFER DIFFRACTION BY A SLIT. THE CURVE $y = (\sin^2 x)/x^2$. THE y AXIS INDICATES THE INTENSITY OF LIGHT AT ANGLE θ WHERE SIN θ IS PROPORTIONAL TO x

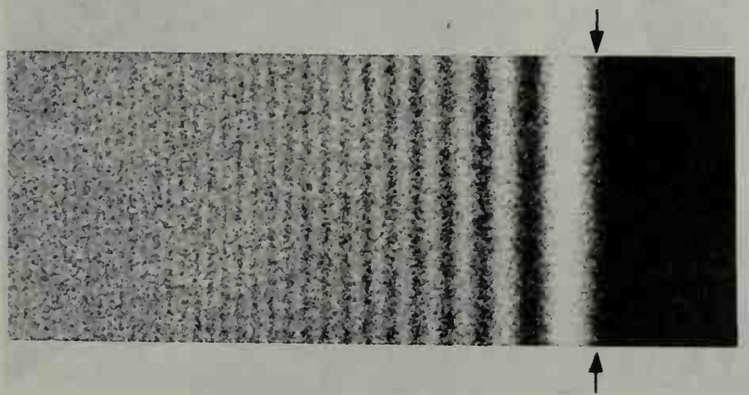
For a slit of breadth l the whole effect will be

$$\int_0^l \cos[\epsilon - \frac{2\pi}{\lambda} s \sin\theta]ds$$

If this is integrated, squared and averaged, we find the intensity proportional to

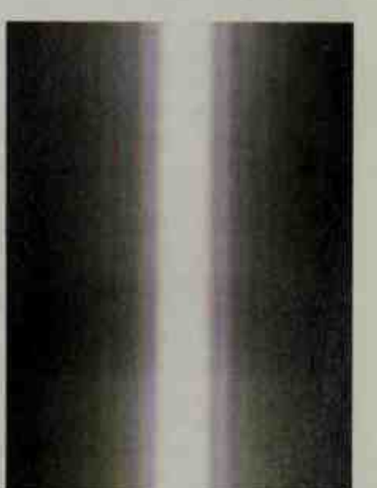
$$\left[\sin\left(\frac{\pi}{\lambda} l \sin\theta\right) \Big/ \left(\frac{\pi}{\lambda} l \sin\theta\right)\right]^2$$

The form of the curve $y = (\sin^2 x)/x^2$ is shown in fig. 11, so that to find how the observed intensity depends on the angle θ we need only to equate x with $(\pi l \sin\theta)/\lambda$. Then if f is the focal length, the image corresponding to θ will be formed at a distance approximately $f \sin\theta$ from the axis of the telescope. From the curve we see there is a very strong maximum at $\theta = 0$, and that no light goes in the directions given by $\sin\theta = n\lambda/l$; that is, when BS, in fig. 10, is any multiple of the wave length. About halfway between these directions of no light there are much weaker secondary maxima; even the first is less than one-twentieth of the central maximum. When the slit



FROM BRUNO ROSSI, "OPTICS," ADDISON-WESLEY, READING, MASS., 1957

DIFFRACTION AT A STRAIGHT EDGE. (ARROWS INDICATE BOUNDARY OF THE GEOMETRIC SHADOW)



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DIFFRACTION BY A SINGLE SLIT SHOWING SEVERAL MAXIMA AND MINIMA

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DIFFRACTION BY A SQUARE APERTURE

is broad the whole figure will be crowded close together. In a narrow slit that is exactly one wave length broad the first zero will be at 90°; in any case nothing beyond that angle could be observed. If it is two wave lengths broad, the first zero will fall at 30° and there will be a secondary feeble maximum at about 50°.

A similar construction can be applied for a hole; for a small rectangular hole the diffraction pattern is broad in the direction in which the hole is narrow, and vice versa. In the case of a circular hole the pattern consists of a bright central circle surrounded by fainter rings. If the hole has radius R and the telescope has focal length f, the bright centre is surrounded by the first dark ring of radius $0.61 \times f\lambda/R$, and five-sixths of the total light falls inside it. The first bright ring has radius $0.82 \times f\lambda/R$, and at its brightest point the intensity is only about one-sixtieth of that at the centre of the central spot. The diffraction pattern of a circular hole is of great importance in the theory of telescopes.

The theory of Fraunhofer diffraction is fundamental to understanding the action of the diffraction grating. The grating is essentially a large number of narrow slits parallel to one another and spaced at equal distances a. The diffraction pattern consists of a number of very sharp and intense maxima at angles θ such that $\sin \theta = 0, \pm \lambda/a, \pm 2\lambda/a, \ldots$, called the central image, first order, second order, ... The positions of these depend on the wave length λ, and therefore when the light striking the grating contains various wave lengths they are dispersed into several spectra, one for each order. As these maxima are line images parallel to the slits of the grating, the common terminology of spectral lines naturally arises. Two wave lengths very close together may be separated because of the sharpness of the maxima, that are as wide as the diffraction maximum formed by a single slit of width equal to the total width of the grating. For this reason gratings have largely replaced prisms for the study of complicated spectra.

4. The Nature of White Light.—It has been customary since the time of Newton to say that white light is a compound of all the colours, but the diffraction grating suggests quite another point of view. Imagine that the incident light is a plane wave consisting of a single thin pulse. Each slit of the grating diffracts this pulse in all directions, and, if we observe from a given direction, we shall receive in turn the pulses which have come through each slit. They will be evenly spaced and will be farther apart as the angle of observation becomes broader. At each position θ there will be something very like a monochromatic wave; more precisely it is a periodic wave composed of wave lengths $a \sin \theta$ and all its submultiples; *i.e.*, out of the superposition of the light of the first, second and higher orders appropriate to the angle θ. Thus, it might be said that the coloured light has been created by the spectroscope. This is a point of view well worth keeping in mind, for in many branches of physics we determine some property by an experiment and then attribute it to the system, overlooking the fact that it may be the experiment itself that has evoked the property. In the present case the two points of view are reconciled since the pulse can be analyzed mathematically into an integral composed of lights of all wave lengths, and in this sense it is correct to say that white light contains all the colours, even though it is unnatural to attribute any periodic quality to a single pulse. The situation is comparable with sound: a sudden shout or sharp pulse of sound may have no recognizable pitch, but it may cause the undamped strings of a piano to respond generally over a wide range of pitches.

It may appear that the argument is special to the case of resolution by a grating, and that the spectrum of white light formed by a prism proves that the colours were there originally. Closer examination shows this to be wrong, though the argument is not so simple; by considering the property of group velocity it can be shown that the prism will convert a single pulse into successions of pulses differently spaced for the different directions. The outcome of the argument is that the analysis of light into wave lengths is chiefly a matter of mathematical convenience; but this is enhanced by the fact that gases usually emit spectra consisting of very nearly pure monochromatic lines, so that it also turns out to be a practically important analysis.

5. Resolving Power.—It is of great importance when working with any optical instrument to know its resolving power. Thus the resolving power of a telescope indicates the distance there must be between two stars before they can be seen as two and not one.

(LEFT) BY COURTESY OF BAUSCH & LOMB, INC., ROCHESTER, NEW YORK; (RIGHT) FRITZ GORO—LIFE MAGAZINE © 1944, TIME INC.

DISPERSION OF LIGHT: (LEFT) BY A DIFFRACTION GRATING; (RIGHT) BY A PRISM. NOTE: RED IS MORE DIVIDED BY GRATING THAN BY PRISM

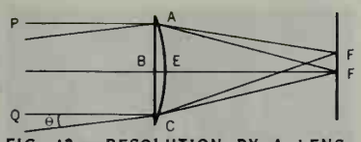


FIG. 12.—RESOLUTION BY A LENS. THE POWER OF RESOLVING THE IMAGES F AND F′ DEPENDS ON THE SIZE OF THE LENS AC, NOT ON THE FOCAL LENGTH EF

For a microscope it determines the fineness of recognizable detail in the object, and for a spectroscope the smallest difference in wave length. Resolving power must be distinguished from magnification, for, although it is possible to magnify the images indefinitely, the only effect is to make a small indistinct image into a large indistinct image. It is as though the image were painted on a sheet of rubber; stretching the sheet reveals no more detail. Diffraction theory determines resolving power; we shall illustrate this by considering telescopes.

The principle of the lens is usually discussed in geometrical terms, but it is quite simple to work it out with the wave theory. In fig. 12 plane waves fall perpendicularly on the lens in the beam, PA, QC. The central ray through BE is retarded in the glass, but not so the extreme rays at A and C. The focus F is the point where all the secondary waves from AEC are in phase; the retardation of the central ray is balanced by the longer path of the extreme ones. The waves at AB are in phase, and the phase changes from there to F are given respectively by AF and $n \cdot \mathrm{BE} + \mathrm{EF}$, where n is the refractive index of the lens. Let BE be d, AB be r and EF be f, supposed much larger, then we have

$$d(n-1) + f = \sqrt{(f^2 + r^2)}$$

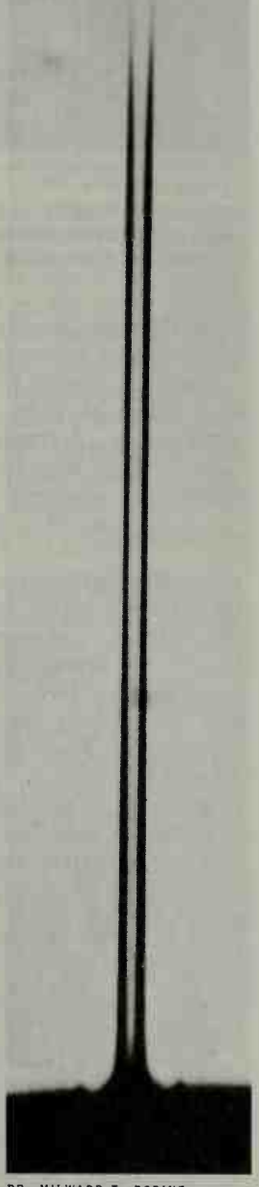
whence, approximately, $f = \frac{r^2}{2d} \frac{1}{n-1}$,

which determines the focal length of a plano-convex lens in terms of its curvature. If another set of waves at a small angle θ falls on the lens, their focus F′ can be found by the consideration that the waves from A and C must be in phase, while F′ is near F in a plane at right angles to the axis of the lens. We thus find that $\mathrm{FF}' = f \sin \theta$, a familiar result in geometrical optics.

Supposing that the two waves are from stars, we inquire under what conditions they will be resolved. The image of the first star at F is not a point because of diffraction. We can roughly estimate its size since there will be points near F for which the waves from A and C and from other portions of the lens, though not perfectly in phase, are so little out of phase that there still will be a marked intensity. This is a question of the diffraction image of a circular hole and we have seen that the radius of the central spot is $0.61f\lambda/r$. If the centre of the image of the second star is much closer than this, we shall have only one bright spot and shall not be able to distinguish two stars. Thus the angular distance that can be resolved is $0.61\lambda/r$. For visible light and with the radius of the telescope in millimetres this gives for the angle in minutes of arc

$$\left(\frac{1.17}{r}\right)'$$

Notice that the resolving power in no way depends on the magnification but only on the diameter of the object glass. If the telescope has a short focal length the magnification will be small; but as long as the diameter is large the resolution will be good, and the small magnification can be overcome by the use of a stronger eyepiece. There is one qualification, for we have assumed that the whole object glass is operative in bringing rays to the eye. When the magnification is not very great the pupil of the eye may become the effective limitation and not the object glass; in such cases the resolving power will depend on the diameter of that part of the object glass from which light enters the pupil.



DR. MILWARD T. RODINE

SHADOW OF A NEEDLE SHOWING DIFFRACTION

The tendency to make larger and larger telescopes stems partly from their ability to collect more light, but much more from their increased resolving power. An extreme example is given by the measurement of the diameters of stars. Stars are so distant that no existing telescope can resolve the separate parts of their surfaces, and the disk seen is never perceptibly larger than that which would be produced by a geometrical point. But if there were a telescope 50 ft. in diameter, the resolving power should be sufficient to show the disk of a large star in the same way that an ordinary telescope does for a planet. It is not practicable to make such a telescope, but it is also not necessary; required are but two little pieces of such a telescope at the points A and C in fig. 12. In principle this is the way in which it has been found possible to measure the diameters of Betelgeuse and other stars (*see* INTERFEROMETER: *Michelson's Stellar Interferometer*).

The eye is an instrument similar to the telescope. Taking the diameter of the pupil as 2 mm., the same calculation shows that its resolving power should be 0.42′. The actual limit, about 1′, is not very different and is no doubt affected by the structure of the retina. A similar limit would apply for any eye constructed on the same principle as man's; but insects' eyes are compound, being composed of a very large number of very small independent facets. There can be no phase relations between separate facets, so that the resolving power can depend only on the size of each separately. It thus seems improbable that an insect can discriminate visually between objects less than some degrees apart.

The resolving power of the microscope presents a different problem because it is used for observation of nonluminous objects usually under parallel or not very convergent light. If the lens can receive light from the object over a range of 180° (and for a good microscope it very nearly does), then some rough impression of form can be detected for an object half the size of a wave length. By immersing the object in a refractive medium the wave length is shortened and the resolution improved, and it may be further improved by the use of ultraviolet light.

In the case of spectroscopes two factors besides diffraction must be taken into account. First, we remember that the width of each line is affected by the width of the spectroscope slit; but this limitation may be obviated by so narrowing the slit that it contributes negligibly to the width of the diffraction pattern. The second factor is the dispersion, which determines how far apart the centres of two lines of different wave length will lie. Obviously if the lines have a given breadth, determined by diffraction of a beam of width corresponding to that emerging from the prism or grating, the resolving power will increase in direct proportion to the dispersion. For interferometers, resolving power is not limited by diffraction; very high resolution can be reached with small equipment.

V. POLARIZATION AND ELECTROMAGNETIC THEORY

In our discussion of earlier work on polarization, both interference and diffraction were explained by regarding light as a wave, without specifying what it is that vibrates and how it does so. In fact all that we have so far said would, with suitable changes of scale, be just as true for sound as for light. But in the phenomena of double refraction this is not so; they are explicable only if the vibrations are transverse. Though we saw that, in spite of many attempts, no material model could be found which would carry waves in the way that ether was supposed to carry light, still it is quite possible to visualize polarization. A string stretched horizontally may vibrate in a vertical or horizontal plane or simultaneously in both; at any instant a point of the string is displaced from its position of rest in a direction perpendicular to the line of the string, and this position can be indicated by drawing a line in the direction of and length of the displacement. When a light wave is traveling through space, we can also represent it at any point and time by drawing a line of definite direction and length. Unlike the case of the string, here the length is only diagrammatic

and can be represented on any scale, as long as we adopt the same scale for other points. This line is called the light vector, and the wave is said to be transverse, because the light vector is always found to be at right angles to the direction of the wave; that is to say, it lies somewhere in the plane of the wave front. The reason for this will appear when we come to the electromagnetic theory; we shall first describe the main properties of polarization without justifying them.

1. Types of Polarized Light.—Suppose a wave of plane monochromatic light advancing perpendicular to a piece of paper. At any point in the paper we draw the light vector, and it will go through a series of changes, returning to its original value in the period of the waves. We can represent any motion by giving the xy co-ordinates of the end of the light vector; for monochromatic light these must be sine or cosine functions of the time. If ν is the frequency we therefore take

$$X = A\cos(2\pi\nu t - \alpha),\ Y = B\cos(2\pi\nu t - \beta)$$

as the general description of the light vector. We first consider a few special cases. If $B = 0$ we have a vibration in which the vector always lies in the direction of x and ranges between $\pm A$. This we call plane polarized in the direction x. Similarly if $A = 0$ we have light plane polarized in the direction y. If we have $\alpha = \beta$, we see that at any time $Y/X = B/A$, so that again we have plane polarized light, in direction arc tan (B/A) and with amplitude $\sqrt{(A^2 + B^2)}$. Next consider the case $B = A, \beta = \alpha + \frac{\pi}{2}$.

Then $X^2 + Y^2 = A^2$, so that the vector of constant magnitude describes a circle; this is therefore called circularly polarized light. Either left- or right-handed rotation is possible. In the general case we can find the locus of the light vector by eliminating t and get $\frac{X^2}{A^2} + \frac{Y^2}{B^2} - 2\frac{XY}{AB}\cos(\alpha - \beta) = \sin^2(\alpha - \beta)$. This is an ellipse with axes determined as to position and magnitude by A, B and $\alpha - \beta$. The most general type of light is therefore called elliptically polarized, and we recognize our previous types as degenerate ellipses.

We next consider the propagation of such waves; that is to say, the phase relations of the light vectors for different positions of the wave front. Our wave is now written as

$$X = A\cos[2\pi\nu\ (t - z/c) - \alpha],\ Y = B\cos[2\pi\nu(t - z/c) - \beta]$$

and the character of the polarization is the same for all values of z, since it will depend on A, B and

$$(2\pi\nu z/c + \alpha)\ -\ (2\pi\nu z/c + \beta)\ = \alpha - \beta$$

Next we take t as fixed and consider the way the light vector is arranged for various values of z. We may liken it to the stretched string. If $B = 0$ it will be in the shape of a sine curve in the plane of xz with wave length c/ν, and similarly whenever $\alpha = \beta$, though for a different plane. If $\beta = \alpha + \frac{\pi}{2}$ and $B = A$, the locus is a screw, or helix, of radius A and pitch equal to the wave length c/ν. If the axes are right-handed, so that a man standing with his head toward y and looking forward along z has x on his left, the light is by convention called left circularly polarized, even though the screw is right-handed. This convention refers to the sense of rotation of the vector at a given point in space as seen by an observer looking toward the light. Here it is a counterclockwise or left-handed rotation. If instead $\beta = \alpha - \pi/2$, the rotation is clockwise and the light is said to be right circularly polarized. The distinction between right and left circularly polarized light plays a leading part in the phenomenon of gyration.

It remains only to define the intensity. At any point this is given as the average value of the square of the light vector; in the cases we have considered it is the average value of $X^2 + Y^2$. When the waves are traveling in an arbitrary direction instead of along z, we may have three components of the light vector, and the value of $X^2 + Y^2 + Z^2$ is to be averaged over the time.

PHOTOGRAPH BY CHARLES D. REILLY © ENCYCLOPÆDIA BRITANNICA, INC.

BENDING OF PLASTIC BAR BETWEEN CROSSED POLAROIDS SHOWS STRAIN PATTERNS IN PHOTOELASTICITY

We must also consider the nature of ordinary unpolarized light. This has no "sides" and is symmetrical about the direction of propagation. In this it is like circularly polarized light; but we shall see that circularly polarized light can easily be converted into plane polarized, whereas for ordinary light this is not so by the same process. Hence the explanation of its symmetry must be found in another way. If the light is rigorously monochromatic, the phases of the components of the light vector are maintained forever, and such light must therefore be either plane, circularly or elliptically polarized. In nature, however, no light is rigorously monochromatic, for the Michelson interferometer fails to show interference for path differences of more than about 1,000,000 wave lengths. This enables us to explain unpolarized light as being polarized light of which the direction of polarization is changed frequently and at random. The optical maser has increased these natural path differences greatly. We suppose each atom to emit a polarized monochromatic wave which lasts for a time corresponding to 1,000,000 wave lengths, and then changes and emits one of a different polarization. The length of time of each separate type is so short that we cannot distinguish them but merely get an average (of all the different types) which will be symmetrical about the direction of propagation.

The most general kind of light consists of a mixture of unpolarized light with light that is polarized, either plane, elliptically or circularly. A theorem due to Sir George Stokes states than any beam of light may be exactly described by four numbers called Stokes's parameters. These are

$$I = [X^2 + Y^2]_{\text{Av.}} \qquad U = [2XY\cos(\alpha - \beta)]_{\text{Av.}}$$
$$Q = [X^2 - Y^2]_{\text{Av.}} \qquad V = [2XY\sin(\alpha - \beta)]_{\text{Av.}}$$

where the brackets indicate time averages. Evidently I measures the intensity of the beam, while Q, U and V specify its state of polarization. For unpolarized light the latter quantities fluctuate rapidly and average to zero. For any completely polarized beam, however, they have constant values. Then $I^2 = Q^2 + U^2 + V^2$, and the intensity need not be known independently of the other parameters. Plane polarized light vibrating along x has $I = Q = X^2$ and $U = V = 0$, circularly polarized light $I = V = 2X^2$, $Q = U = 0$, etc. The Stokes parameters are additive; that is, if two noncoherent light beams are superimposed, each parameter is the sum of the corresponding ones for the separate beams. Thus the general type of partially polarized light may be resolved into two parts, one of which represents a polarized beam of intensity $Q^2 + U^2 + V^2$, the other an admixture of unpolarized light given by the difference $I - (Q^2 + U^2 + V^2)$. We shall see later what types of experiments must be performed in order to determine the Stokes parameters for a light beam.

In describing plane polarized light we have said that it is polarized in the direction x when the light vector vibrates along x. Unhappily there is some confusion in terminology. When polarization was first discovered the convention was adopted that the light of the ordinary ray in double refraction is polarized in the plane through the axis of the crystal and the direction of propagation. It later appeared that the light vector must be perpendicular to

this plane, so that the old convention would have described the light as polarized in the plane of yz, which we shall call polarized in the direction x. For most optical effects the behaviour is determined by the direction of the vector and not by the direction of propagation of the wave, so that it is practically inconvenient to mention two directions when one direction would do. We shall describe plane polarized light by the direction of the light vector; thus, in double refraction we shall say that the ordinary ray is polarized at right angles to the crystal axis. To avoid confusion with the older terminology, it seems desirable to avoid any reference to a plane of polarization, which we shall do by referring to the direction of polarization.

2. Methods of Producing Polarization.—The polarization of light transmitted by certain crystals was important historically, but polarization may be produced in other ways. Chief among them is reflection at a transparent surface set at a suitable angle. At other angles there is an incomplete polarization, which is sometimes very troublesome in experiments; for as light passes through any system of lenses or mirrors, it is almost impossible to prevent its becoming polarized, and this may easily obscure the study of its original polarization. We may also mention the polarization of scattered light, as from the sky. Again, in diffraction of light by a slit, the two components behave rather differently, and so the light is slightly polarized. The theory we have given is sufficiently correct for small angles, and we shall not consider the modification that is required for more exact results. Perhaps most interesting of all is in the Zeeman effect (*q.v.*). Here the spectral lines of an atom become displaced and split when the atom is in a strong magnetic field; the split components are polarized in definite ways that give much information about the mechanics of the atom.

There are two standard instruments for converting ordinary unpolarized light into plane polarized light: the nicol and the sheet polarizer. The former, devised in 1828 by William Nicol, uses the principle of double refraction. One of the two polarized beams is removed by total reflection (fig. 13). For over a century the nicol and its modifications were used almost exclusively in optical instruments involving the production or detection of polarized light. Beginning in 1932, however, a technique was developed by Edwin Land for producing thin sheets of a material which polarizes by virtue of a property called dichroism. Dichroic crystals exhibit a different degree of absorption for vibrations in two mutually perpendicular directions. Hence under suitable conditions one of these may be almost entirely eliminated from the transmitted light. Dichroic sheet polarizers have replaced nicols in many applications.

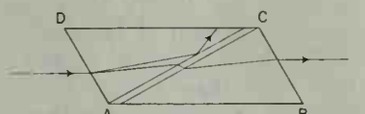


FIG. 13.—THE NICOL PRISM

In the construction of a nicol, a rhomb of calcite which is about three times as long as it is broad is sawed across the line AC (fig. 13), and, after the cut has been polished, the faces are cemented together with Canada balsam. The ends AD and BC are also cut to a slightly different angle (68° instead of 72°). A wave entering parallel to the axis of the prism is doubly refracted so that the two waves go in somewhat different directions, the ordinary wave being most bent. Canada balsam has a refractive index that falls between those of the ordinary and extraordinary waves, and as the ordinary wave meets the balsam layer very obliquely it becomes totally reflected and falls on the side DC, which is blackened to absorb it. Nearly all of the extraordinary wave passes through, so that the emergent light is plane polarized. A nicol will polarize light only over a limited range of angles of incidence. The limits are set by the condition that on one side both rays are reflected at AC and lost, and on the other that a certain part of the unwanted ordinary ray is transmitted; under favourable conditions the range of angles may be 30°. The slight adjustment of the slopes of the end faces mentioned above is to extend this range equally on both sides. A typical experiment with polarized light involves the use of two nicols. The simplest example is the direct use of two crossed nicols. The first produces polarized light by eliminating one component; the second is placed with its axis in the same line as the first but is turned through 90°, so that the extraordinary wave in the first nicol is now the ordinary one and so is not transmitted. This device has been used for secret signaling. The signaler rotates his nicol through 90°, and though to the naked eye his lamp appears to burn steadily, if it is viewed through a fixed nicol it will go out.

The main limitation of the nicol is its restricted size. It is difficult to find calcite crystals sufficiently large and clear to polarize a beam much more than an inch wide. Sheet polarizers can have areas measured in square feet, a development which increased the technical uses for polarized light. For example, the glare of the headlights of approaching automobiles may be eliminated by covering both the lights and the windshields with such sheets, their axes of transmission both being tilted at 45° clockwise from the vertical. Then the driver may see the light from his own headlights, but that from an oncoming vehicle will have its direction of polarization crossed with the axis of transmission of his windshield and will be seen only faintly. Dichroic polarizers consisting of single crystals of the mineral tourmaline had long been used instead of nicols in some applications. Using the same principle in a different way, sheet polarizers were first made of a suspension of submicroscopic crystals in a cellulosic matrix, the axes of all the needlelike crystals being aligned parallel to one another. These were crystals of herapathite, which is much more strongly dichroic than tourmaline. Later it was found that a better polarizer can be made by stretching a sheet of polyvinyl alcohol and then treating it with iodine. Another polarizer, which has nearly as good polarizing properties and is more stable to heat and radiation, is produced by merely dehydrating a stretched sheet of polyvinylene. One drawback of sheet polarizers is the limited region of the spectrum over which the polarization is reasonably complete. The polyvinyl alcohol type covers the entire range of visible colours very well, so that when a bright light is viewed through two sheets in the crossed position only a feeble blue colour is seen. In other types, the polarization may extend over only a certain part of the visible spectrum; this may actually be put to advantage in such applications as the projection of stereoscopic pictures.

3. The Analysis of Polarized Light.—Polarization is chiefly, though by no means exclusively, studied by using the property of double refraction in crystals. When a wave goes through a crystal its light vector is resolved in two directions, mutually perpendicular and perpendicular to the direction of propagation, and the components in these directions have different wave velocities. Suppose that we have a plate with parallel faces perpendicular to z and that the wave is going through it along z, while the two special directions are x and y. In such a plate the light vector will be given by

$$X = A\cos[2\pi\nu(t - z/a) - \alpha],\ Y = B\cos[2\pi\nu(t - z/b) - \beta]$$

where a and b are the wave velocities for vibration in the directions x and y. If the incident light is plane polarized along x or y the wave will go through unchanged, but if it is polarized, say at angle γ on entering the plate at $z = 0$, we shall have $\alpha = \beta$ and $A = C\cos\gamma$, $B = C\sin\gamma$. If the plate is of thickness l the light will emerge from the farther side as

$$X = C\cos\gamma\cos[2\pi\nu(t - l/a) - \alpha],\ Y = C\sin\gamma\cos[2\pi\nu(t - l/b) - \alpha]$$

Thus X and Y are no longer in the same phase, and the light is now elliptically polarized. If we had started with elliptically polarized light, the emergent light would in general be elliptically polarized, but in a new direction. In special cases it might become plane polarized; this illustrates the principle of the quarter-wave plate, an important instrument used in the study of polarized light. A quarter-wave plate is made by taking l so that $2\pi\nu l/a - 2\pi\nu l/b = 90°$. If the incident light is elliptically polarized, with the axes of the ellipse along x and y, we may write it as

$$X = A\cos(2\pi\nu t - \alpha),\ Y = B\sin(2\pi\nu t - \alpha)$$

After passing through the quarter-wave plate the emergent light will be

$$X = A\cos(2\pi\nu t - \alpha'),\ Y = B\cos(2\pi\nu t - \alpha')$$

and it is now plane polarized. As a case of special importance, if

the incident light is circularly polarized, the emergent will be plane polarized at 45° to the x direction, and its right- or left-handedness will be indicated according to whether the direction is between x and $+y$ or x and $-y$. Quarter-wave plates are usually made of mica, which is easily cleft into thin sheets. These sheets exhibit a rather weak double refraction, so that a quarter-wave plate is not inconveniently thin. As mica is rather soft, it is often mounted between two sheets of glass marked to indicate the direction of the crystal axis.

To determine the state of polarization of any light beam, we must first find whether it contains some unpolarized light. If it is completely polarized the vibration is in general elliptical, and it may be made into plane polarized light by a quarter-wave plate set at the proper angle. It can then be extinguished by a nicol. When this condition is found, the crystal axis of the quarter-wave plate coincides with the major or minor axis of the ellipse. Two data are thus obtained: the orientation of the plate, which tells the position of the axes of the ellipse, and the angle which it makes with the nicol, the tangent of which gives the ratio of these axes. These data suffice to determine two of Stokes's four parameters, the other two representing the total intensity of the light and the admixture of unpolarized light. If some unpolarized light is present, it will be impossible to extinguish the light by any orientations of the quarter-wave plate and nicol. One setting of the plate may be found, however, which gives the largest variation of intensity as the nicol is rotated. The ratio of the maximum and minimum intensities will then give a measure of the degree of polarization of the original beam.

The quarter-wave plate is most useful for analyzing elliptically polarized light when we already know the position of the axes of the ellipse, as is the case in some important experiments; in other cases the making of two adjustments simultaneously is troublesome. The alternative instrument is called the compensator. In this the analysis is in two fixed perpendicular directions, instead of along the axes of the ellipse, and we measure the relative lengths of the components of the light vector in those two directions and their phase difference. The essential part of the compensator consists of two thin wedges of quartz, a crystal with rather weak properties of double refraction. One wedge is cut so that the crystal axis lies in a line parallel to the edge, and the other so that it is at right angles to the edge and parallel to the face (fig. 14, where lines and dots indicate the directions of the axes). In the first wedge incident light will be broken into two components, of which one will have a higher phase velocity; but when the light enters the second wedge this will change about, so that, if the thicknesses are exactly equal as at the centre A, there will be no resultant changes of phase. Thus, incident plane polarized light will emerge plane polarized at A. At any other point B this will not be so, because the light will have gone farther through one crystal than through the other. If elliptically polarized light is incident, there will be places where the transmitted light is plane polarized, and so, if we use an analyzing nicol set at the proper angle, we may observe the field crossed by dark bands. If one wedge is screwed over the other by means of the micrometer screw M, the bands will shift because of the changing differences in the thickness of the wedges. The reading consists in seeing how far the screw must be turned to bring one of the bands to the centre. This measures the phase difference in the components of the light vector along and across the wedge, while the ratio of their amplitudes is given by the setting of the nicol.

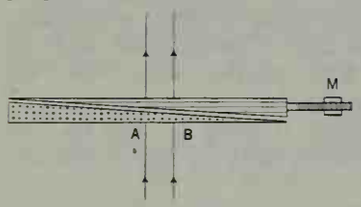


FIG. 14.—COMPENSATOR. WITH DOTS AND LINES TO INDICATE CRYSTAL AXES OF QUARTZ WEDGES. M IS MICROMETER SCREW

4. The Electromagnetic Equations.—Maxwell made the discovery that the equations governing the behaviour of electric waves are equally applicable to light; this provides a strict formulation for the whole theory, including polarization. For the derivation of the theory of electric waves *see* the article ELECTRICITY; we shall assume it as given and show how it applies for light.

Consider first the case of free space. At every point there may be an electric force **E** and a magnetic force **H**. Each has both direction and magnitude and they can be most conveniently described by the components E_x, E_y, E_z and H_x, H_y, H_z along the directions x, y, z. The vector notation is well adapted to expressing their relations. In this notation

$$\frac{\partial E_x}{\partial x}+\frac{\partial E_y}{\partial y}+\frac{\partial E_z}{\partial z}$$

is written div **E** (called the divergence) while the three quantities

$$\frac{\partial E_z}{\partial y}-\frac{\partial E_y}{\partial z},\ \frac{\partial E_x}{\partial z}-\frac{\partial E_z}{\partial x},\ \frac{\partial E_y}{\partial x}-\frac{\partial E_x}{\partial y}$$

are the components of curl **E**. A vector equation involving curl is thus three equations, when written in terms of the components.

The curl equations are

$$\frac{1}{c}\frac{\partial \mathbf{E}}{\partial t}=\text{curl }\mathbf{H},\ \text{div }\mathbf{E}=0$$

$$-\frac{1}{c}\frac{\partial \mathbf{H}}{\partial t}=\text{curl }\mathbf{E},\ \text{div }\mathbf{H}=0$$

In these equations c is originally a rather abstruse quantity: the ratio of a charge measured in electrostatic units to the same charge measured in electromagnetic units. It is a velocity, and one of the strongest evidences for the electromagnetic theory of light is that, when purely electrical methods are used to determine the ratio, it is found to be the same as the velocity of light. We shall give a few examples of solutions, but before doing so we must complete the theory by giving the rule for intensity. In our previous account of intensity we left a factor of proportionality undetermined because we had no other phenomenon to link with light; thus there was no way of fixing the absolute values. Now, however, we can imagine that we might ideally measure the electric force in light with an electrometer, and we can therefore make our definition absolute. Electrical theory assigns a value to the flux of energy (*i.e.*, to the rate at which energy is carried across unit area in unit time) that is a suitable measure for intensity. It is called the Poynting vector, after its discoverer, and is $\frac{c}{4\pi}[\mathbf{E},\mathbf{H}]$ where $[\mathbf{E},\mathbf{H}]$ is a vector product with component $E_yH_z-E_zH_y$, along x, etc.

One of the solutions of the electromagnetic equations may be verified to be

$$E_x=A\cos\frac{2\pi}{\lambda}(ct-z),\ E_y=0,\ E_z=0$$

$$H_x=0,\ H_y=A\cos\frac{2\pi}{\lambda}(ct-z),\ H_z=0$$

We see in the first place that we have a wave traveling along z with velocity c, and purely electrical experiments have shown c to be equal to the velocity of light. Second, we see that it is a transverse wave, but it is ambiguous whether the electric or magnetic force is the light vector. A similar solution is

$$E_x=0,\ E_y=B\cos\frac{2\pi}{\lambda}(ct-z),\ E_z=0$$

$$H_x=-B\cos\frac{2\pi}{\lambda}(ct-z),\ H_y=0,\ H_z=0$$

and this evidently represents the other polarized component. A third solution can be formed by superposing these two, or by superposing them with a phase difference between E_x and E_y. The intensity in such a case would be $\frac{c}{8\pi}(A^2+B^2)$.

We must now consider whether the electric or magnetic force is the light vector. Since both always occur in the wave, a theory

could be constructed in which either was so taken, and it would be a matter of convenience which we choose. A number of phenomena show that the electric force is the more important, primarily because matter involves electrons rather than magnetic particles. We may give as one example the case of standing waves. When a plane wave of monochromatic light falls perpendicularly on a mirror and is reflected straight back, the incident and reflected waves interfere with one another and produce a system of stationary oscillations. These may be described by

$$E_x = A\cos\frac{2\pi}{\lambda}(ct - z) - A\cos\frac{2\pi}{\lambda}(ct + z)$$

$$= 2A\sin\frac{2\pi}{\lambda}ct\cdot\sin\frac{2\pi z}{\lambda}$$

$$H_y = A\cos\frac{2\pi}{\lambda}(ct - z) + A\cos\frac{2\pi}{\lambda}(ct + z)$$

$$= 2A\cos\frac{2\pi}{\lambda}ct\cdot\cos\frac{2\pi z}{\lambda}$$

We see that at points where z is any multiple of half a wave length E_x vanishes all the time, whereas H_y vanishes all the time at points where z is an odd multiple of quarter of a wave length. Suppose that our mirror is coated with a nearly transparent photographic film, of some depth, which is afterward developed and examined in section. Then we shall find places where it is fogged by the action of the light vector, and others where it is unaffected; the positions of these will tell us that it is the electric force that is effective and not the magnetic. From this and similar cases we conclude that it is best to take the electric force as the light vector.

VI. REFRACTION AND DOUBLE REFRACTION

We have already made use of the idea that the optical effect of a transparent medium can be represented by a refractive index. An explanation of refraction also involves atomic processes that we can discuss. We shall be content for the most part with the description of experimental results; to work them out in detail would involve rather elaborate mathematics.

1. The Electromagnetic Equations for Refracting Media.—The natural starting point for our discussion is the extension of the electromagnetic theory to cover electrical waves propagated through matter. When a static electric force acts on matter it may produce two effects: If the matter is a conductor, a current will flow according to Ohm's law; this is expressed by defining a current density $\mathbf{j}$ (a vector with components $\mathbf{j}_x$, $\mathbf{j}_y$, $\mathbf{j}_z$) which is given by $\mathbf{j} = \sigma\mathbf{E}$, where σ is the specific conductivity of the medium. If the matter is an insulator, the electric force displaces the electricity in the atoms in a way that may be compared to the compression of a spring; a new quantity has to be introduced to express this, which is called the dielectric displacement. In isotropic media, such as water or glass, the dielectric displacement bears a constant ratio to the electric force. We write $\mathbf{D} = \epsilon\mathbf{E}$, and call ϵ the dielectric constant. Electromagnetic theory then shows that the equations for free space must be altered to accommodate either or both of these properties of matter. We now write

$$\frac{1}{c}\frac{\partial\mathbf{D}}{\partial t} + \frac{4\pi}{c}\mathbf{j} = \text{curl } \mathbf{H},\ \text{div } \mathbf{D} = 0$$

Matter also has magnetic properties, and this suggests that the other equations should be changed as well. It is found however to be unnecessary, for the alternations of force in light are so rapid that the magnetic properties have no time to follow. Thus we adhere to

$$-\frac{1}{c}\frac{\partial\mathbf{H}}{\partial t} = \text{curl } \mathbf{E},\ \text{div } \mathbf{H} = 0$$

These equations together determine the behaviour of light in most types of matter, but we must remember that we always have to make observations outside, and therefore need to know how the light will pass from one medium to another. Electrical theory again provides the answer; when light goes through a boundary between two media, at every point of the surface and at every instant of time, the tangential components of electric and magnetic force just on one side of the boundary must each be equal to the tangential components of the corresponding forces just on the other side.

2. Refraction in Transparent Media.—In a nonconducting isotropic medium, the equations assume the form

$$\frac{\epsilon}{c}\frac{\partial\mathbf{E}}{\partial t} = \text{curl } \mathbf{H},\ -\frac{1}{c}\frac{\partial\mathbf{H}}{\partial t} = \text{curl } \mathbf{E}$$

It is easy to verify that these are satisfied by

$$E_x = A\cos\frac{2\pi}{\lambda}\left(\frac{c}{\sqrt{\epsilon}}t - z\right),\quad E_y = 0,\quad E_z = 0$$

$$H_x = 0,\ H_y = A\sqrt{\epsilon}\cos\frac{2\pi}{\lambda}\left(\frac{c}{\sqrt{\epsilon}}t - z\right),\ H_z = 0$$

The electric force is transverse to the waves and the wave velocity is $c/\sqrt{\epsilon}$, so that the medium has refractive index $\sqrt{\epsilon}$. An apparent difficulty at once arises, for our result seems to imply that the refractive index should not depend on the colour of the light. This will be explained when we come to the atomic theory, where it will appear that the dielectric constant depends on the frequency of the inducing electric force.

We next consider the passage of light from one medium to another. Suppose that they have refractive indexes of n and n', and first suppose n to be the lesser; in the case of free space it will be unity. To find the formulas for refraction and reflection we take a given incident wave and assume that there are reflected and refracted waves, making no assumptions about their wave lengths or directions. The boundary conditions then require that the sum of the tangential components of incident and reflected forces at the boundary in the first medium are everywhere and at every time equal to the corresponding forces in the refracted wave on the other side of the boundary. These conditions lead to the law that the frequencies of all three waves must be equal, so that the wave length of the refracted wave is $\lambda n/n'$. Then follows the law that the angle of reflection is equal to the angle of incidence θ, while the angle of refraction θ' is given by $n\sin\theta = n'\sin\theta'$. These rules can be deduced merely from the existence of boundary conditions and would be the same whatever the form of those conditions.

Next, with the special conditions of the electrical theory, we can find the amplitudes of the reflected and refracted waves. Taking the component in which the electric force is polarized perpendicular to the plane of incidence, we find as amplitude of the reflected wave $\sin(\theta - \theta')/\sin(\theta + \theta')$, while the component polarized in the plane of incidence gives $\tan(\theta - \theta')/\tan(\theta + \theta')$. These are exactly Fresnel's sine and tangent formulas; their squares give the intensities of reflection. The intensities of the refracted wave may also be given, but are not so important.

In considering how the reflection varies with the angle of incidence, take the sine formula first. For perpendicular incidence the formula becomes indeterminate, but may be shown to equal $(n' - n)/(n' + n)$. For water the refractive index is about $1\frac{1}{3}$, and so, when light falls perpendicular on water, the amplitude of the reflected wave is one-seventh that of the incident; thus the intensity is only about 2%. With increasing angle of incidence, the reflection increases somewhat (for incidence on water at 45° it becomes about 5%), and, as the incidence approaches grazing, it increases rapidly up to unity (perfect reflection). The phase of the reflected light is always opposite to that of the incident. The tangent formula behaves quite differently. For perpendicular incidence it has the same value, but it starts diminishing, and finally vanishes at the polarizing angle, when $\tan\theta = n'/n$, at which angle the reflected and refracted waves are perpendicular to one another. For water this angle of incidence is about 54°. After this it increases again and reaches unity at grazing incidence. The phase is the same as that of the incident light up to the polarizing angle, and from there onward differs from it by 180°.

These phenomena have been much studied experimentally. The

behaviour of a transparent medium depends only on its refractive index, which is most accurately determined by the refractometer (essentially, a prism of the substance), so that experiments on reflection do not provide new information, but serve as a very valuable check on the theory. Suppose, for example, that we illuminate a glass surface obliquely with light polarized in some direction neither in nor perpendicular to the plane of incidence. To find the reflection this light must be resolved into two components, one of which obeys the sine and the other the tangent formula. They will be unequally reflected, but in neither case is the phase changed at the reflection (or only through 180°, which does not matter); and so the reflected light will again be plane polarized, but in a new direction. If the light is incident at the polarizing angle, the reflected light will contain only the component polarized in the direction at right angles to the plane of incidence. If ordinary light is incident the same is true, and this process is often used for obtaining polarized light. The most refined experiments have revealed that the polarization is never perfect, but the unwanted component can usually be attributed to the presence of grease on the surface. If elaborate precautions are taken to remove this grease the effect becomes very small, but it never quite vanishes. This is probably because the surface atoms are necessarily in a different state from those inside, so that it is not possible for a medium to remain truly homogeneous up to the boundary.

We have described what happens when the incident light is in the medium of lower refractive index. In the contrary case the intensity of reflection follows similar rules for the two components, but with one very important difference. In this case the angle of refraction is larger than the angle of incidence, and the reflection becomes complete for both polarized components when the refracted ray is at 90°, at which point the inclination of the incident ray is given by $\sin\theta = n'/n$. This value of θ is called the critical angle. For greater angles of incidence the phenomenon of total internal reflection supervenes, and must now be considered.

When $\sin\theta > n'/n$ there is no angle θ' for which the equation $n\sin\theta = n'\sin\theta'$ can be satisfied, and so there can be no progressive wave in the second medium. The appropriate solution involves instead a real exponential factor. If the boundary is the plane $z = 0$, and if the incident wave is at angle θ, its phase will be given by $\cos\frac{2\pi}{\lambda}\left(\frac{ct}{n} - x\sin\theta - z\cos\theta\right)$, and the appropriate solution in the second medium is $e^{-(2\pi/\lambda)z\sqrt{(\sin^2\theta - n'^2/n^2)}}\cos\frac{2\pi}{\lambda}\left(\frac{c}{n}t - x\sin\theta - \epsilon\right)$, which evidently fits the boundary condition and may be verified to satisfy the wave equations. The real exponential implies that the disturbance drops to a very small fraction of its original intensity in a single wave length. The reflected wave is found to have amplitude equal to that of the incident, but with a changed phase, and the change is unequal for the two polarizations. Thus, if incident plane polarized light is totally reflected, the emergent light is polarized elliptically. Working on this principle, Fresnel devised an instrument known as the Fresnel rhomb, which turns plane polarized light into circularly polarized light.

For water and air the angle of total reflection is about 49°. Thus, when the surface of a glass of water is viewed obliquely from below, it looks like mercury. Total reflection has a curious effect on the field of view of a fish, for however close it is to the surface, everything outside the water must be crowded into a cone of angle 49°, the edge of which will represent the horizon; while, because of total reflection, the fish will be able to see the bottom, except for parts nearly underneath, quite as well reflected in the surface as directly. Total internal reflection is much used in optical instruments, as it provides more perfect reflection than any metallic coating. In many types of binocular the rays are internally reflected no less than four times between the two lenses of each telescope (*see* BINOCULAR INSTRUMENT).

3. Refraction in Absorbing Media.—To discuss the passage of light through metals, we take both a dielectric constant and a conduction current; by Ohm's law, the latter will be proportional to the electric force. The first electromagnetic equation is now

$$\frac{\epsilon}{c}\frac{\partial \mathbf{E}}{\partial t} + \frac{4\pi\sigma}{c}\mathbf{E} = \text{curl } \mathbf{H}$$

while the others are unchanged. The presence of the conduction term has an effect similar to what we found in total internal reflection, for it compels us to introduce a real exponential. For a wave of frequency ν going along z a solution can be found in which

$$E_x = e^{-2\pi\nu\kappa z/c}\cos 2\pi\nu(t - nz/c)$$

provided that n and κ satisfy the equations

$$n^2 - \kappa^2 = \epsilon,\ n\kappa = \sigma/\nu$$

where n is the refractive index, and κ is called the absorption coefficient. Considered at a given instant, the wave is a damped sine curve of wave length $c/n\nu$ and the amplitude decreases to a fraction $e^{-\kappa/n}$ of itself for each successive crest. For metals κ/n is quite large, so that the light can penetrate only a very short distance. The value of n could be determined experimentally from the deflection of light by a prism, if one could be made so thin as to transmit light, and κ could be determined by finding how much the light is attenuated in passing through a plate. In view of the extreme opacity of metals such methods are very troublesome, and it is more convenient to deduce n and κ from experiments on reflection.

The principle of reflection is just the same as for transparent media, but the details are very different because of the real exponential in the internal wave. There is a change of phase in the reflected wave, and it is different for the two polarizations. Consequently, if plane polarized light is reflected, it becomes elliptic; the study of this ellipticity is the most powerful method of evaluating n and κ. In the case of perpendicular incidence it can be shown that the intensity reflected is $(n^2 + \kappa^2 + 1 - 2n)/(n^2 + \kappa^2 + 1 + 2n)$. For all metals κ is considerably larger than n, and so the reflection is not far from complete. We also see how it comes about that strong absorption, or large κ, means strong reflection. The refractive indexes of metals vary over a much wider range than those of transparent substances. Thus, while the latter range roughly between 1 and 2.4, silver has refractive index 0.18, associated with absorption coefficient 3.67. More remarkable is sodium, which, if it can be used untarnished, is an even better reflector than silver. For the yellow light characteristic of sodium we have $n = 0.005$ and $\kappa = 2.61$, and 99.7% of the light is reflected at perpendicular incidence. In so far as wave velocity has a meaning in such a substance, the wave velocity is 200 times the velocity of light.

Other substances besides metals are opaque, quite apart from the opacity due to the repeated scattering of light. Indeed ordinary transparent substances are always opaque for light of some part of the spectrum, and for such light they behave much like metals. In particular, light which is strongly absorbed will be strongly reflected. H. Rubens took advantage of this fact in his study of *reststrahlen* or rest-rays, which consist of light in the extreme infrared. For example, rock salt absorbs light of wave lengths around 50μ, and so reflects it strongly, although the crystal is transparent to other wave lengths. If then the light from a lamp emitting all wave lengths is reflected to and fro several times by rock salt mirrors, the other wave lengths will be eliminated and the reflected light will be nearly pure. After the last reflection its wave length is determined by means of a grating. Unlike the case of metals, here the process of absorption has been fairly completely explained with important consequences for the theory of the solid state.

4. Double Refraction.—In crystals the atoms are packed together in a regular manner, and this packing implies that they fall into rows in certain directions. Consequently the physical characteristics of the crystal will differ for different directions, and it is said to be anisotropic. The geometrical theory of crystal-

lography only permits of certain definite types of packing, classified according to the types of symmetry they possess. In electricity and optics we need to know how the anisotropy will affect the relation between electric force and dielectric displacement. It can be shown that in general the displacement need not be in the same direction as the force, but that there must always be three mutually perpendicular directions in the crystal for which they are in the same direction. We take these directions for our axes, and have

$$D_x = \epsilon_1 E_x, \quad D_y = \epsilon_2 E_y, \quad D_z = \epsilon_3 E_z$$

But the crystal symmetry may impose a further restriction. Thus in the regular system of crystals, the three mutually perpendicular axes are equivalent to one another, so that all physical properties in these three directions must be the same; therefore ϵ_1, ϵ_2, ϵ_3 must be equal. For electrical and optical purposes only, the regular system is therefore isotropic. In the hexagonal, tetragonal and trigonal systems there is an axis of six-, four- or threefold symmetry, and, if this is taken as the z axis, it follows that $\epsilon_1 = \epsilon_2$, though they need not equal ϵ_3. Calcite and quartz both belong to this type. In all other crystal classes all three ϵ values may be different. We thus have three types of crystal: the regular, the uniaxial and the biaxial. The regular behaves for light as though it were isotropic; we shall deal with the uniaxial as a special case of the biaxial (*see* CRYSTALLOGRAPHY: *Optical Crystallography*).

For a transparent crystal the electromagnetic equations assume the form

$$\frac{1}{c}\frac{\partial \mathbf{D}}{\partial t} = \text{curl } \mathbf{H}, \quad \text{div } \mathbf{D} = 0$$

$$-\frac{1}{c}\frac{\partial \mathbf{H}}{\partial t} = \text{curl } \mathbf{E}, \quad \text{div } \mathbf{H} = 0$$

together with $D_x = \epsilon_1 E_x$, $D_y = \epsilon_2 E_y$, $D_z = \epsilon_3 E_z$.

The question can be discussed to yield the same results with either E, H or D as the primitive quantity, but it is most convenient to take D. This is the light vector used by Fresnel in his original theory, before it was given an electrical meaning. The process of solution consists first in eliminating E and H in terms of D, and then fitting a plane wave of arbitrary direction to satisfy the equations for D. If l,m,n are the direction cosines of the wave front and L,M,N those of the light vector, and if the wave velocity is V, the wave will be of the form

$$D_x = LS, \quad D_y = MS, \quad D_z = NS$$

where $$S = A \cos\frac{2\pi}{\lambda}(Vt - lx - my - nz)$$

In giving the results of the substitution we shall write α^2, β^2, γ^2 for c^2/ϵ_1, c^2/ϵ_2, c^2/ϵ_3. Then it is found that the wave velocity V must satisfy the equation

$$\frac{l^2}{V^2 - \alpha^2} + \frac{m^2}{V^2 - \beta^2} + \frac{n^2}{V^2 - \gamma^2} = 0$$

This is a quadratic equation in V^2, and we conclude that for a given direction of the wave front there are two wave velocities. Associated with each of these values there are definite values of L,M,N that determine the polarizations of the two waves. They are at right angles to one another and to the direction of the wave. A simple example is given by a wave going along the direction of z, where the two velocities are α and β and the directions of polarization x and y. Another example is given by a uniaxial crystal where $\alpha = \beta$. The wave velocities are then given by

$$V = \alpha \text{ and } V^2 = \alpha^2 n^2 + \gamma^2(l^2 + m^2)$$

Thus the ordinary wave has velocity independent of the direction; its light vector lies in the plane perpendicular to the axis. The extraordinary wave is polarized in a direction contained by the axis and the wave direction; its velocity depends on the wave direction and ranges between γ and α. The values of the wave velocities for different directions can be best appreciated with the normal velocity surface. This is a two-sheeted surface constructed by laying off in every direction from an origin two radii proportional to the two wave velocities, which are the phase velocities of plane waves perpendicular or normal to the plane. Its general form can be seen from fig. 15 which shows a perspective drawing of a portion of it; the complete surface is obtained by reflection in the principal planes. The figure is drawn on the assumption that $\alpha > \beta > \gamma$, and the two sheets meet in four conical points, one in each quadrant of the plane of xz; that is, in the plane perpendicular to the intermediate axis. Waves going in the directions of these conical points will have the same velocity whatever their polarization, and so for these directions light will not be polarized. These are the two optic axes which give rise to the name biaxial. Uniaxial crystals represent a degenerate case in which the two optic axes have approached one another; the normal velocity surface becomes a sphere and an oval surface, which touch along the direction of the axis. The normal velocity surface does not show how the waves corresponding to the two sheets are polarized, but Fresnel gave a very convenient construction. An ellipsoidal surface is obtained by laying off a radius in each direction l, m, n according to the rule

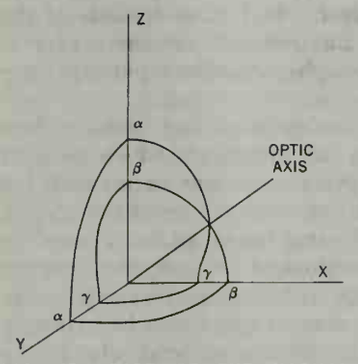


FIG. 15.—PART OF THE NORMAL VELOCITY SURFACE OF A BIAXIAL CRYSTAL

$$r^2 = \alpha^2 l^2 + \beta^2 m^2 + \gamma^2 n^2$$

When this surface is cut by a plane parallel to the wave front, the longest and shortest radii of the section give the two values of the wave velocity, and their directions give the polarizations. The two circular sections of the ellipsoid are perpendicular to the optic axes.

The phenomena we have so far described suffice to explain many of the features of crystal optics; in particular they are all that is required to understand the action of quarter-wave plates, nicols and other polarizing instruments, but they do not explain how things seen through a crystal look double. To understand this we have to consider rays, not plane waves of indefinite breadth. In making Huygens' construction it would be wrong to draw the normal velocity surface round each point and base the construction of fig. 3 on this, for the normal velocity surface is only a diagram describing how plane waves can go, and does not represent the front of a wave emitted from a point. To find the form of this wave front, we imagine that at every point of the normal velocity surface a plane is drawn perpendicular to the radius vector. All these planes will envelop a surface called the ray velocity surface. Like the normal velocity surface, it consists of two sheets and has four conical points lying in the same plane, but now at different angles; these are called the ray axes. Its shape is simpler, however, since the cross sections are ellipses and circles rather than the ovals of fig. 15. Huygens' construction is done with the ray velocity surface, not the normal velocity surface. For uniaxial crystals the ray velocity surface degenerates to a sphere and a spheroid touching the sphere at the ends of the axis.

Double refraction involves much complicated geometry, and the conquest of the subject by Fresnel was one of the greatest feats in physics. Remarkable effects can be obtained by illuminating crystals with suitably polarized light. For example, there is the curious phenomenon of conical refraction which was discovered theoretically by Sir William Hamilton and later empirically verified. When a narrow beam is sent along the axis of a biaxial crystal, the direction for the ray becomes indeterminate so that it can be anywhere on a certain cone. On emergence at the other side this cone is made into a cylinder by the surface refraction, and if this falls on a screen we get a ring of light. Superimposed on this is a narrow dark ring caused by the dispersal of the axial ray into the infinite number of directions represented by the cone.

Double refraction is invariably present in crystals that are not of the regular system, but the effect is often quite small. Even in

a crystal such as calcite (that strongly exhibits double refraction) the two principal indexes are 1.66 and 1.49 so that their difference is considerably less than the refractive effect of either (which may be represented by its difference from unity). In uniaxial crystals and in biaxial crystals of the orthorhombic system the axes are fixed by the crystal symmetry, though the principal wave velocities may vary with the colour. In biaxial crystals of the monoclinic and triclinic systems the principal axes may vary in position as well, and the most complicated colour patterns may be produced.

Coloured crystals, if they are doubly refracting, usually show dichroism, a change of colour with the direction in which the light traverses the crystal. The absorption coefficient varies with the inclination between the light vibrations and the axes of the crystal, just as do the other quantities affecting propagation. Hence the colour, which depends upon the portions of the spectrum that are weakened by absorption, will change with the direction of observation. The commonest example is tourmaline, which is extremely opaque to light of any colour that vibrates perpendicular to the optic axis, but transmits light of a greenish hue rather freely if its vibrations are parallel to that axis. As the crystal is turned from a position in which the light travels perpendicular to the axis to one in which it travels along the axis, the colour therefore changes from green to black, with a series of intermediate hues.

Double refraction also occurs when an isotropic solid is under stress, and indeed the chance stresses in badly annealed glass sometimes cause trouble in experiments with polarized light. On the other hand advantage has been taken of the effect, for by making a transparent model, say of a girder, it is possible to find the stresses set up in it by the appropriate forces in cases where the shape is too complicated for direct calculation. It is only necessary to illuminate the model with the plane polarized light and to view it through a nicol that is crossed with the polarizer. Light is observed in the regions of stress because the vibrations are rendered elliptical by the double refraction. This phenomenon is the basis of photoelasticity (*see* MATERIALS, STRENGTH OF: *Experimental Stress Analysis*). Another occurrence of double refraction is the Kerr effect (there is a second effect of magnetic type also named after this investigator). When light is sent through the glass of a charged electric condenser, double refraction occurs, so that the component polarized in the direction of the electric force has wave velocity slightly different from that transversely polarized; the effect is proportional to the square of the electric force across the condenser. The extreme rapidity with which the effect follows the applied electric field furnishes a valuable means of suddenly interrupting a beam of light. With nitrobenzene between the plates of a condenser placed between crossed nicols, light will be transmitted when the condenser is charged, but will be extinguished in about 4×10^{-9} seconds when it is discharged. This is the principle of the Kerr electro-optic shutter, which has been used to study the transient phenomena in an electric spark, as well as in the measurements of the velocity of light. Yet another case, predicted and discovered by W. Voigt, is a very small double refraction when light traverses matter placed in a strong magnetic field. This effect, observed when the light travels perpendicular to the field, is associated with magnetic gyration which we shall discuss later.

5. Natural Optical Gyration.—Double refraction is not the only optical effect exhibited by crystals. The symmetrical properties of a crystal correspond to rotation and reflection. Most crystals have some symmetry elements of both types, but some only have rotations, so that the crystal is not identical with its mirror image. The simplest geometrical form with this peculiarity is the screw, which cannot be superposed on its mirror image; we therefore liken this type of crystal to a screw. Quartz is such a substance; there exist two types of quartz crystals, which we may call right- and left-handed. Circularly polarized light has the same screwlike quality, and we should therefore expect that a right-handed crystal would react differently to right- and left-handed circularly polarized light. It is in fact found that the wave velocities are different; this is the basis of the theory of optical gyration.

Suppose that n_r and n_l are the refractive indexes for the two types of circularly polarized light of frequency ν. Then the right-handed wave will be

$$E_x = A \cos 2\pi\nu(t - n_r z/c),\ E_y = -A \sin 2\pi\nu(t - n_r z/c)$$

and the left-handed

$$E_x = A \cos 2\pi\nu(t - n_l z/c),\ E_y = +A \sin 2\pi\nu(t - n_l z/c)$$

Suppose that at the plane $z = 0$ we have light polarized along the direction x. This is given by simply adding these two solutions together, and then at any value of z we shall have

$$E_x = 2A \cos 2\pi\nu\left[t - \frac{n_r + n_l}{2}\frac{z}{c}\right]\cos \pi\nu(n_l - n_r)z/c$$

$$E_y = 2A \cos 2\pi\nu\left[t - \frac{n_r + n_l}{2}\frac{z}{c}\right]\sin \pi\nu(n_l - n_r)z/c$$

This means that at the point z we can regard the light as plane polarized in a direction inclined to x at the angle $\pi\nu(n_l - n_r)z/c$. The phenomenon is observed by sending plane polarized light through the medium and seeing how an analyzing nicol must be placed in order to extinguish the light. The gyrational constant is the rotation of the direction of polarization produced by a thickness of one centimetre of the substance.

In quartz the gyration is very strong, being 217° per centimetre for yellow light, but is complicated by double refraction of the uniaxial type, and it is only for light going very nearly along the crystal axis that it can be observed. There are also crystals of the regular system which exhibit the effect; for example in sodium chlorate it is present for all directions. It is also shown by liquids with molecules that contain a chemically asymmetric atom; such a liquid is isotropic in that all directions are equivalent, but is not, molecularly speaking, identical with its mirror image; it refracts the two types of circularly polarized light differently. Since many sugars contain an asymmetric carbon atom, measurement of the gyration is a very convenient and common method of estimating the strength of a sugar solution. Dextrose and levulose, as their names imply, produce gyration in opposite senses.

VII. THE ATOMIC THEORY OF REFRACTION

We have so far treated refraction as an effect of matter in bulk without considering how it comes about. The gross effect must be a superposition of the effects of the separate atoms and molecules. The light arising from an atom is a spherical wave with the atom in its centre. In discussing diffraction we described a spherical wave emerging from a point source with amplitude inversely proportional to the distance. Though that sufficed to give the outline of the theory, it took no account of polarization, and it must be further refined. We build the complete theory by considering what types of electromagnetic waves can emerge from a point.

1. Types of Spherical Waves.—The transverse nature of light makes it impossible to have a wave going out uniformly in all directions. To give the mathematical form of the simplest possible wave let

$$S = \frac{A}{r}\cos\frac{2\pi}{\lambda}(ct - r),\ \text{where } r = \sqrt{(x^2 + y^2 + z^2)}$$

and A is a constant. Then the electric and magnetic forces are given by

$$E_x = \left(\frac{1}{c^2}\frac{\partial^2}{\partial t^2} - \frac{\partial^2}{\partial x^2}\right)S,\ E_y = -\frac{\partial^2}{\partial x \partial y}S,\ E_z = -\frac{\partial^2}{\partial x \partial z}S$$

$$H_x = 0,\ H_y = -\frac{1}{c}\frac{\partial^2}{\partial t \partial z}S,\ H_z = \frac{1}{c}\frac{\partial^2}{\partial t \partial y}S$$

These lead to expressions which are rather complicated in general, but simpler for points at a great distance from the source, and it will suffice to discuss the latter case. Consider a large globe, surrounding the source, marked with circles of latitude and longitude, the pole being the axis of x. The observer is on this sphere at angular distance θ from the pole. Then the wave that reaches him will have its electric force polarized to vibrate in the north and

south direction, and the magnetic force will be east and west and equal in magnitude. The electric force is inversely proportional to the radius of the globe and to the square of the wave length, but, most important of all, it varies as sin θ, vanishing at the pole and having its maximum at the equator. The actual value is

$$E = \left(\frac{2\pi}{\lambda}\right)^2 \frac{A}{r} \sin\theta \cos\frac{2\pi}{\lambda}(ct - r)$$

In fig. 16 (A) the observer takes up various positions on the globe (marked by his colatitude) and looks toward the centre; then the diagram shows the vibration of the electric force that will reach him.

In the classical electromagnetic theory this is the wave which would be emitted by an electron of charge e vibrating with frequency c/λ and small amplitude a along the x axis at the origin, provided that $A = ea$. If the observer were to watch this motion, he would see it in perspective, and the electric force at the observer is proportional to and in the same direction as the apparent motion of the electron. It is very convenient to have a name for this type of wave, including the complete distribution in all directions around the source; in view of the motion of the emitting electron we shall call it a line wave.

If the emitting electron describes a small circle in the yz plane instead of a line we have what we may call a circle wave. This can be regarded as two superposed line waves along y and z, with phases differing by a quarter period. The pole of the circle is perpendicular to the poles of both lines. Fig. 16 (B) shows the electric force as seen by the observer for various positions on the globe. Its form again resembles the perspective view he would have of the electron. At either of the poles he receives circularly polarized light, and it is important to notice that they will be of opposite types, one right-handed and the other left-handed. For other directions the light is elliptically polarized and becomes plane polarized at the equator. The intensity is twice as great at the poles as at the equator.

A third type of wave is not so simple. In the electromagnetic equations there is a mathematical symmetry between the electric and magnetic forces, so that we can obtain a solution by interchanging their roles. If we construct a wave by adding to the ordinary line wave a small "magnetic" line wave with the same pole and the same frequency, we obtain a wave in which the light is everywhere of the same intensity as for a line wave, but is elliptically polarized with axes in constant ratio and lying in the directions of the circles of latitude and longitude. Such a wave is illustrated in fig. 16 (C). In this case, unlike the circle wave, the light vector turns in the same direction in both hemispheres. Thus the whole wave has the same screwlike character and we shall call it a screw wave. The screw wave cannot be emitted by any motion of an electron. It would be emitted if there were a single magnetic pole moving with the electron, but such a thing does not exist, and in fact the wave can arise only from a screwlike system such as a molecule with a chemically asymmetric atom.

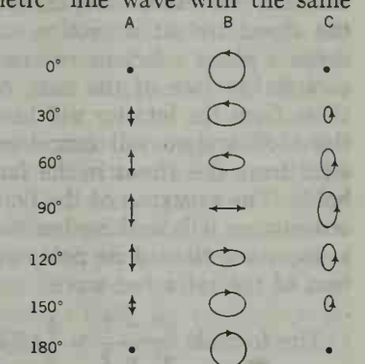


FIG. 16.—VIBRATIONS IN SPHERICAL WAVES

The observer, on a sphere in colatitude on the left, looks toward the centre. The amplitude and polarization of light received are shown. (A) Line wave, (B) circle wave, (C) screw wave

2. The Scattering of Light.—When light falls on an atom it sets the electrons in motion to re-emit light. The character of this scattered light will depend on the nature of the atom as well as the incident light. But the effect of a single atom is too small to be observable, so that we must use a large number; the compounding of their effects produces complications. The scattering of light by matter is a more primitive quality than is refraction, and it is best to reduce everything into terms of scattering before we approach the theory of the behaviour of the single atom. An atom may emit light in different ways under the stimulus of light. Thus certain substances respond by fluorescing; that is, by absorbing light of one wave length and re-emitting light of a longer wave length. In the phenomenon of resonance radiation the re-emitted light has the same wave length as that absorbed, but there is no constant phase relation between the incident and scattered light. Both phenomena may be regarded as an absorption and simultaneous re-emission of light, and are outside our scope. We shall also exclude Raman scattering, in which alterations of wave length occur such that the various frequencies of the scattered light represent combinations between the frequency of the incident light and the different possible frequencies of rotation and vibration of the molecule. These are analogous to the combination tones that are heard when two musical notes are sounded together (*see* RAMAN EFFECT).

Atoms most universally react by emitting waves of the same frequency as, and in definite phase relation to, the incident light. This process, to which we shall limit the term scattering, is responsible for refraction, double refraction and gyration. Refractive effects are all due to interference between the original and the scattered waves, and, since the refraction is independent of the brightness of the light, the wave scattered by an atom must be proportional in amplitude to the incident force. For ordinary light the wave length is far greater than the size of the atom; hence at any instant the atom is practically in a uniform field of force, and the scattered wave will depend only on the incident polarization and frequency, but not at all on the direction of its wave front. Apart from these restrictions there is great liberty of choice for the form of the scattered spherical wave. For some purposes we have to assume circle waves and screw waves, but both ordinary and double refraction are fully explained with ordinary line waves; moreover for transparent substances the line wave is exactly in phase with the incident. All these results can be deduced by assuming completely general types of spherical waves and then seeing what limitations will produce various refractive effects. Here we shall pursue the opposite course, assume the form of the scattered wave and show that our assumption is verified. For refraction in a transparent medium, we can assume that under incident light of amplitude E_0 the wave scattered by an atom is a line wave of the form we gave with ${}_\rho E_0$ written for A, and with pole along the direction of E_0. Then ρ, which depends only on the nature of the atom and on the frequency of the incident light, is the scattering constant of the atom.

3. The Light of the Sky.—The most primitive exhibition of scattering is found in such phenomena as the light of the sky (*see* SKY). Supposing that the observer looks at a point not very near the sun, the light that he sees will have been scattered through a broad angle, and the phase of the light path, sun–atom–observer, will be different for each atom. Consequently the waves from the separate atoms do not reinforce one another. If the atoms were arranged with perfect regularity their waves would arrive at the eye with regular differences of phase to destroy one another, and the sky would look black; however, the uniform density of gases is due to the unsystematic regularity produced by the enormous number of atoms. The atoms of gas have no ordered positions as in a crystal; hence the brightness of sky light will depend on compounding a large number of similar waves of quite arbitrary phases and taking the average value of the result. Consider a set of n atoms, each giving a wave of the same magnitude, but with phases $\epsilon_1, \epsilon_2 \ldots \epsilon_n$. The resultant amplitude will be proportional to $\cos\epsilon_1 + \cos\epsilon_2 + \ldots + \cos\epsilon_n$. The intensity is the square of this sum and will consist of terms such as $\cos^2\epsilon_1$ and others such as $2\cos\epsilon_1\cos\epsilon_2$. The latter are as likely to be negative as positive, so that they will average out, but the former has average value $\frac{1}{2}$ for each separate term. Thus the average intensity scattered by the n atoms is just n times that scattered by one. To know the brightness of the sky we only need to calculate the intensity scattered by a single atom and multiply by the number of atoms in the field of view.

We will suppose that N is the total number of atoms in a small solid angle, the illumination from which is to be found. Then, from the formula for line waves, we shall have an intensity proportional to $NE_0^2\rho^2/\lambda^4$, where E_0^2 is the intensity of the direct

sunlight. The scattering constant ρ of the atom does not depend very much on the wave length as long as we consider visible light, and we can say that the light scattered is inversely proportional to the fourth power of the wave length. This explains the blue sky even though sunlight is weaker in the blue part of the spectrum than in the red, for the wave length of red light is about 1.8 times that of blue; thus the factor λ^{-4} is about 10 times as large for blue light as for red.

Another property of sky light is its polarization. Consider a point of the sky at right angles to the sun. The unpolarized light from the sun may be resolved into two polarized components, one of which has electric force pointing at the observer. The line waves induced by this component will have the observer at their poles and so will send no light toward him. He will only receive the light of the other component, polarized perpendicular to the line joining the sun to the point observed. At other angles both components are present, one in constant intensity and the other proportional to the squared cosine of the angular distance from the sun. If the sky is observed at right angles to the sun with a nicol, it will be found that the polarization is not complete. This is partly to be attributed to rays that have been scattered several times on their way to the eye, and also to the fact that, though we have spoken only of atoms, the air is composed largely of diatomic molecules for which the line wave need not have its pole exactly coincident with the direction of the incident force. There is also usually a complication due to dust, which acts by direct reflection and makes the sky much brighter near the sun than at broad angles.

A most interesting application of the theory of sky light was made by Lord Rayleigh (3rd baron). The barometer shows the mass of the atmosphere, and so, by a direct comparison between the brightness of the sky and that of the sun, it is possible to deduce how much light is scattered by one cubic centimetre of air at ground level. In fact, if N is the number of atoms in one cubic centimetre, we can evaluate $N\rho^2$. We can also find $N\rho$ by a study of refraction, and hence we can estimate N. The process led to one of the earliest reliable determinations of the fundamental constant of Amedeo Avogadro, the number of molecules in a gram molecule. Similar processes have since been applied in the laboratory, with the advantage that the incident light can be itself polarized, and similar results are obtained.

4. Scattering as the Cause of Refraction.—When we deduce refraction from scattering we are dealing with an incomparably greater effect than in sky light, because here there will be phase relations between the original and the scattered waves, so that we compound the effects of the separate atoms by amplitudes instead of by intensities. We suppose that light waves in matter have the same velocity as light in free space, but that they set up secondary waves from the atoms which, also proceeding with the velocity of light, interfere with one another and with the original wave. When the compound effect has been calculated, it is found that it can be expressed by altering the wave velocity of the original wave and disregarding altogether the scattered waves; in this way refraction is explained.

Take a thin sheet of atoms spread over a plane on which monochromatic light falls perpendicularly. The diagram of fig. 7 will describe the process, provided that we now regard the plane as composed of matter. Each atom will emit a line wave, and the effect at P will consist of the superposition of these waves on the original beam, which is supposed to arrive at P undisturbed. The process is very like Fresnel's discussion of diffraction, though there we imagined that the original wave was suppressed at the plane AB. Suppose that there are N atoms per unit volume, in a thin sheet of thickness l spread over the x,y plane, and let the incident wave be

$$E_x = F\cos\frac{2\pi}{\lambda}(ct - z)$$

The effects that all the atoms produce at P can be summed just as in Fresnel's construction, and the result is an amplitude

$$-2\pi FNl\rho\frac{2\pi}{\lambda}\sin\frac{2\pi}{\lambda}(ct - z)$$

The important point is that the phase differs by a quarter period from that of the original wave; this is because the scattered waves are in phase with the incident, in contrast with Fresnel's construction, in which the phase had to be advanced by a quarter wave length to get the right result. We now add the two waves together, and, taking advantage of the smallness of the scattered wave, we find

$$F\cos\frac{2\pi}{\lambda}[ct - z + 2\pi Nl\rho]$$

If we adopt the ordinary process of refraction and attribute the change of phase to the changed wave velocity during the passage through the thickness l of the sheet of matter, we should say the emergent wave was

$$F\cos\frac{2\pi}{\lambda}[ct - z + (n-1)l]$$

and so we may identify $n - 1$ with $2\pi N\rho$. This is the physical origin of refraction. We see also how the reflected wave arises, for the line wave from each atom will be exactly the same at the point which is the image of P in the plane AB as it is at P, and so the total amplitudes of the scattered waves will be the same at the two points; but for the reflected wave there is no interference with the incident light. It is easy to verify that the actual reflected intensity is that which should arise from a thin sheet of refractive index n and thickness l.

We have treated only the small effect of a thin film, and this contains the essence of the process, but it is necessary to discuss matter in bulk. Here the scattered wave from each atom complicates the waves scattered by all other atoms by acting on those atoms. Nevertheless the problem proves soluble and leads to a result not very different from the simpler case. The main difference is that we now have $\frac{n^2-1}{n^2+2} = \frac{4}{3}\pi N\rho$; in the special case when $N\rho$ is small, n is near unity, and this reduces to $n - 1 = 2\pi N\rho$ as before. The general solution for oblique incidence verifies all the formulas that are given by the ordinary bulk theory, but the idea of scattering is helpful in seeing directly how reflection and refraction come about. When light falls on a thick slab, the atoms are set in motion and their scattered waves are all in definite phase relations to one another. If we consider a point outside the face of the slab, it will receive all these waves, but those from the interior will have phases spread uniformly around the 360° and so will cancel out. Thus the reflected wave will arise from the atoms in the face where this uniformity ceases to hold. The existence of the polarizing angle becomes immediately obvious, as it is nothing but the rule that there is no emission in a line wave toward its pole, which is perpendicular to the direction of the refracted wave.

The formula $\frac{n^2-1}{n^2+2} = \frac{4}{3}\pi N\rho$ was discovered by H. A. Lorentz (by a rather different method) and becomes the foundation of the theory of dispersion. He deduced an important consequence from it. When a substance can exist in two states, ρ will be nearly the same for both and N will be proportional to the density, so that, if d is the density of either state, $\frac{n^2-1}{(n^2+2)d}$ should be the same for the two. This relation is verified by comparing the refractive index of a liquid and its vapour. Since their densities often differ by a factor of some hundreds, it is a very stringent test and is often fulfilled to within 1% to 2%. We should hardly expect perfect agreement, because the liquid molecules are perpetually disturbed by one another, so that one might expect a small change in the value of ρ attached to each molecule.

The explanation of double refraction follows a very similar course. The sheet of matter must now be supposed to react differently depending on whether the light is polarized along x or along y. In each case a line wave is emitted with pole along the

direction of the incident force, but the amplitudes differ and so the phase changes in the two components of the transmitted wave will be different. The detailed consideration of the effect for matter in bulk is more complicated, but leads to Fresnel's normal surface and all its consequences. This part of the theory is complete, but there are difficulties in giving an atomic meaning to ρ, because the adjacent atoms in a crystal are not arranged isotropically and will perturb one another in a complicated manner. As a consequence, the expression $(n^2-1)/(n^2+2)$ ceases to apply; but the full discussion can only be made by a detailed study of the theory of the solid state. With the help of this theory and a knowledge of the arrangement of the atoms in calcite it has been found possible to explain its high double refraction with fair quantitative accuracy.

5. Scattering From Absorbing Substances.—A similar process of scattering can be used to explain the action of absorbing substances, but it is necessary to take the scattered wave in a different phase from the incident. If this phase change is η, the scattered wave from the thin sheet of atoms will be

$$-2\pi FNl\rho\frac{2\pi}{\lambda}\sin\frac{2\pi}{\lambda}(ct-z-\eta)$$

If this is added on to the original wave we get

$$F(1-2\pi Nl\rho\sin\eta)\cos\frac{2\pi}{\lambda}(ct-z+2\pi Nl\rho\cos\eta)$$

The first factor means a reduction in amplitude (*i.e.*, absorption), and there is also refraction just as before. Thus by a suitable choice of ρ and η we can describe the observed behaviour of any absorbing substance. The full theory is best expressed in terms of complex quantities and leads to the equation

$$\frac{(n-i\kappa)^2-1}{(n-i\kappa)^2+2}=\frac{4\pi}{3}N\rho e^{-i\eta},\ (\text{where } i=\sqrt{-1})$$

so that we can deduce ρ and η from a knowledge of n and κ.

The idea of scattering constants is not very conveniently applied to metals, because the atoms of a metal are being constantly penetrated by free electrons, and each atom should not be regarded as a separate unit. The highly involved theory of metal optics shows that the conductivity as ordinarily measured for constant electric force can often be applied for infrared light, though the value is gradually modified at higher frequencies. In fact, silver becomes very nearly transparent at wave lengths near 3,100 Å in the ultraviolet.

6. Natural Gyration.—We have seen how gyration arises from the difference between the wave velocities of right- and left-handed circularly polarized light. This screw property can be exhibited only by molecules containing a chemically asymmetric atom. The condition is exactly that which permits the emission of a screw wave. To explain gyration it is necessary only to suppose that, under plane polarized incident light, the molecule scatters a screw wave. We take as before a thin sheet in the xy plane illuminated by plane polarized light,

$$E_x=F\cos\frac{2\pi}{\lambda}(ct-z)$$

Each molecule emits a screw wave with its axis along x. In any direction a screw wave can be resolved into a main component which is like that of a line wave and a weaker component at right angles and a quarter period behind. Take ρ for the scattering constant of the line wave and σ for the other component. Then, when we sum all the waves scattered by the molecules, the line waves will compound along x as before into

$$-2\pi FNl\rho\frac{2\pi}{\lambda}\sin\frac{2\pi}{\lambda}(ct-z)$$

along x, but there will now be a component along y of magnitude

$$-2\pi FNl\sigma\frac{2\pi}{\lambda}\cos\frac{2\pi}{\lambda}(ct-z)$$

If we add these small quantities on to the original wave we find approximately

$$E_x=F\cos\frac{2\pi}{\lambda}(ct-z+2\pi N\rho l)$$

$$E_y=-2\pi N\sigma l\cdot\frac{2\pi}{\lambda}\cdot F\cos\frac{2\pi}{\lambda}(ct-z+2\pi N\rho l)$$

This means that the light is now plane polarized at angle $-2\pi N\sigma l\cdot 2\pi/\lambda$ to the x direction. The rotation is proportional to l, the thickness of the sheet, and the other factors express the gyrational constant. The theory for matter in bulk gives a similar result, but presents it by showing that there are different refractive indexes for right- and left-handed circularly polarized light.

7. Magnetic Gyration.—In our discussion of the refraction of isotropic bodies, we saw that plane polarized light might be supposed to stimulate the atom to emit a line wave. Circularly polarized light can be constructed out of two plane polarized components at right angles and differing by a quarter period in phase, and a circle wave can be constructed out of two line waves with perpendicular poles and phases differing by a quarter period. Consequently we could have worked out the theory of refraction just as well with circularly polarized light and circle waves, and in discussing magnetic gyration it is convenient to start in this way. When an atom is in the presence of a magnetic field it behaves as though it were in rotation about an axis along the field's direction, with velocity proportional to the field strength. If then the atom is illuminated by circularly polarized light, it will react differently according as its magnetic rotation is with or against the rotation of the light vector. We may say that the atom's scattering constant will no longer be ρ, but $\rho+\tau$ and $\rho-\tau$ for the two types of circularly polarized light. Here τ will be proportional to the strength of the field, and it is usually to be regarded as much smaller than ρ.

Suppose that the incident light is

$$E_x=F\cos\frac{2\pi}{\lambda}(ct-z),\quad E_y=F\sin\frac{2\pi}{\lambda}(ct-z)$$

When the scattered wave from a thin sheet is superposed on this, we have, by the same construction as before

$$E_x=F\cos\frac{2\pi}{\lambda}[ct-z+2\pi N(\rho+\tau)l]$$

$$E_y=F\sin\frac{2\pi}{\lambda}[ct-z+2\pi N(\rho+\tau)l]$$

But if the incident light is of the opposite type it will be

$$E_x=F\cos\frac{2\pi}{\lambda}(ct-z),\quad E_y=-F\sin\frac{2\pi}{\lambda}(ct-z)$$

and the resultant wave will be

$$E_x=F\cos\frac{2\pi}{\lambda}[ct-z+2\pi N(\rho-\tau)l]$$

$$E_y=F\sin\frac{2\pi}{\lambda}[ct-z+2\pi N(\rho-\tau)l]$$

If we add these two solutions together the incident light is

$$E_x=2F\cos\frac{2\pi}{\lambda}(ct-z),\quad E_y=0$$

and the transmitted light is

$$E_x=2F\cos\frac{2\pi}{\lambda}(ct-z+2\pi N\rho l)\cos\frac{2\pi}{\lambda}(2\pi N\tau l)$$

$$E_y=2F\cos\frac{2\pi}{\lambda}(ct-z+2\pi N\rho l)\sin\frac{2\pi}{\lambda}(2\pi N\tau l)$$

so that the plane of polarization has turned through an angle $\frac{2\pi}{\lambda}(2\pi N\tau l)$. This is proportional to the thickness of the sheet and, through τ, to the strength of the magnetic field. The remaining factors are peculiar to the substance of which the sheet is made.

The constant is often called the Verdet constant, after one of the earlier investigators who measured it for a number of substances.

The magnetic gyration, discovered by Michael Faraday, is usually very small for practicable magnetic fields. It occurs in all transparent isotropic substances and for light going along the axis of uniaxial doubly refracting crystals; for other directions it is masked by the double refraction. There is a very remarkable similar effect when polarized light is reflected from the polished pole of a magnet. For perpendicular incidence the plane of polarization rotates, and for other directions there are similar more complicated changes in the rule of reflection. The Kerr effect is evidently like the magnetic gyration in transparent substances, but its theory is very incomplete.

The two types of gyration, natural and magnetic, are radically different in character, since one depends on a screw wave, the other on a circle wave. The consequence is that in natural gyration, if the light is reflected back to traverse the sheet again, its direction of polarization turns in each passage like a screw of the same type and it comes back to its original polarization. On the other hand magnetic gyration is due to a rotation, so that if the light is reflected back again it rotates in the same direction as before and the angle of turning is doubled.

VIII. DISPERSION

We have traced the optical effects of matter in bulk to their source in the atoms, and in doing so have found it necessary to use only the ordinary conceptions of the classical theory of dynamics; but as soon as we begin to consider the atoms themselves we get into difficulties, because the atom obeys quite different dynamical rules. These rules, the principal subject of the quantum theory, are fairly well understood, but since our practical experience is based on classical dynamics, they are very hard to grasp in anything but mathematical form; regarded physically they appear to contain an unsatisfying element of irrationality, which is really to be attributed to limitations in our habits of thought. For our purposes it is fortunately possible to some extent to avoid these difficulties. The quantum theory gives certain rules, very unlike those of ordinary dynamics, for the intensities and frequencies of the spectral lines emitted by an atom or a molecule, and it also predicts how such an atom will behave under the influence of light. Though both these aspects of the theory are quite different from ordinary dynamics, if we make up a purely classical model to imitate the emission (though in many other properties it will be quite wrong) it will react correctly for the scattering of light. For convenience of calculation we thus imagine that associated with each atom is a phantom virtual atom, which will suffice to work out the optical effects. An actual atom contains only a few electrons, but the virtual atom contains a virtual electron for each line of its spectrum, and the charges on the virtual electrons are usually much smaller than the known charge of an electron. Since the spectrum is composed of nearly monochromatic lines, we suppose that each virtual electron is free to execute approximately harmonic vibrations. The relation between the emission and the scattering of light by the atom is then akin to the relation of free to forced vibrations in a harmonic vibrator.

1. Free Vibrations of the Atom.—Let us suppose that we have a virtual electron of mass m vibrating along the axis of x, under a force Kx toward the origin. It will obey the equation

$$m\frac{d^2x}{dt^2} + Kx = 0, \text{ or } \frac{d^2x}{dt^2} + (2\pi\nu_1)^2x = 0 \text{ if } K = m(2\pi\nu_1)^2$$

If left entirely alone such an electron would vibrate with constant amplitude and frequency ν_1 forever; but it cannot be so regarded because the moving electricity will be perpetually changing the electric forces everywhere as a line wave. This wave will carry away energy, which is supplied at the expense of the electron, so that its amplitude must decrease. In the language of earlier theorists, the electron is always linked with the ether, and it may be shown that the reaction of the ether on it can be represented by introducing a damping term, so that the vibration is expressed by

$$m\frac{d^2x}{dt^2} + m(2\pi\nu_1)^2x = \frac{2}{3}\frac{e^2}{c^3}\frac{d^3x}{dt^3}$$

where e is the charge and c as usual the velocity of light. The new term is very small (except for penetrating X-ray frequencies), and the equation may be solved by approximation to give

$$x = Ae^{-\frac{1}{2}(e^2/mc^3)(2\pi\nu)^2t}\cos 2\pi\nu t$$

This represents a vibration which decreases during each vibration by a fraction $\frac{1}{3}\frac{e^2}{mc^3}4\pi^2\nu$, or l/λ where l is $\frac{4\pi^2}{3}\frac{e^2}{mc^2}$; for an ordinary electron it is 3.7×10^{-12} cm., and, as the charge of a virtual electron is usually smaller, the approximation is evidently justifiable for ordinary light of wave lengths about 10^{-5} cm. The line wave emitted by this electron will also be damped with the consequence that, in Michelson's interferometer, when the two light paths differ by a considerable amount the interference will become imperfect. This is empirically observed, but usually for path differences somewhat shorter than might be expected. If the light is passed through a grating we observe the same phenomenon in a slightly different way; the damping factor gives the line a finite breadth, and spectral lines are nearly always somewhat broader than is indicated by the theory of pure electromagnetic damping.

A variety of factors contributes to this broadening, such as the frequent collisions between the radiating atoms and air molecules, for these collisions will change the phases of the emitted waves and the Doppler effect of the motion of the atoms, which slightly alters the frequency. Both effects can be observed directly by alterations of pressure and temperature, but it is uncertain whether they are sufficient to explain the broadening. The question is very near the point where the classical conception of a virtual atom fails, and also near the limits of experimental technique. All that can be said is that under the most favourable conditions the damping seems not far from the value predicted by electromagnetic theory. We can avoid the question by introducing a fictitious damping factor which replaces the electromagnetic and may write as our equation

$$\frac{d^2x}{dt^2} + \sigma\frac{dx}{dt} + (2\pi\nu_1)^2x = 0$$

so that the electron's motion is resisted by a small force $m\sigma\frac{dx}{dt}$, and as long as σ is small we need not inquire into its origin.

Next suppose that the atom contains a number of virtual electrons with different frequencies, and adjust their properties so that the spectrum lines will occur in the correct relative strengths. Suppose that the first electron, with charge e_1, frequency ν_1 is vibrating with amplitude a_1. Then it emits a line wave, and, at distance r in the equator, the intensity will be proportional to $\nu_1^4e_1^2a_1^2/r^2$. To compare this intensity with that given by the second electron e_2, we have to consider their respective amplitudes. This requires an assumption of the equipartition of energy: on the average each virtual electron has the same energy. The energy of the first electron is $\frac{1}{2}m_1\left(\frac{dx_1}{dt}\right)^2 + \frac{1}{2}m_1(2\pi\nu_1)^2x_1^2$, proportional to $m_1a_1^2\nu_1^2$. Thus the intensity of the first line will depend on $e_1^2\nu_1^2/m_1$. It happens that the quantity which is most important in spectrum theory is not the intensity itself, but the intensity divided by the fourth power of the frequency. This quantity is always referred to as Einstein's B, by which letter we shall denote it. Then, for the line of frequency ν_s we so choose e_s and m_s that $e_s^2/m_s\nu_s^2$ is proportional to B_s, and the intensity is proportional to $B_s\nu_s^4$.

2. Forced Vibrations of the Atom.—When the virtual atom is exposed to light there will be an additional force acting on it. The equation of motion of the first electron will now be

$$m_1\frac{d^2x_1}{dt^2} + m_1\sigma_1\frac{dx_1}{dt} + m_1(2\pi\nu_1)^2x_1 = e_1F\cos 2\pi\nu t$$

where F is the amplitude of the incident electric force E and ν is its frequency; the direction of the wave front does not matter.

This is the equation which gives the ordinary phenomenon of resonance, and we must consider the form that its solution takes for different frequencies of the incident light. In the first place, σ plays practically no part in the solution when it is small, unless ν is very near ν_1. Excluding that case we have

$$x_1 = \frac{e_1}{m_1} \frac{F}{4\pi^2(\nu_1^2 - \nu^2)} \cos 2\pi\nu t.$$

If $\nu < \nu_1$, x_1 is in phase with the electric force E and its amplitude increases strongly as ν approaches ν_1. If $\nu > \nu_1$ the phases are opposite; the amplitude is small for large values of ν, but as ν_1 is approached from above it becomes large (*see* fig. 17). There is thus a transitional stage when ν passes through ν_1, and in this stage the amplitude of x_1 has to pass from a large positive to a large negative value. To see how it does so we must include the damping term in our equation. There is now a phase difference between x_1 and E, and the solution is

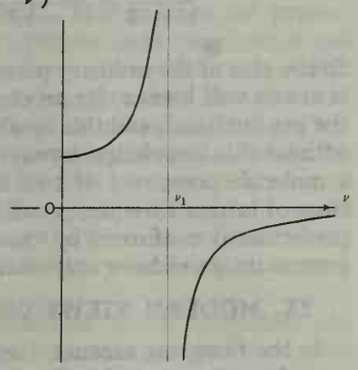


FIG. 17.—THE RESPONSE OF AN UNDAMPED RESONATOR

A periodic force throws a resonator into vibration, and for any frequency of the force the ordinate shows the amplitude of the resonator

$$x_1 = \frac{e_1}{m_1} \frac{F}{2\pi\sqrt{4\pi^2(\nu_1^2 - \nu^2)^2 + \delta^2\nu^2}} \cos(2\pi\nu t - \gamma)$$

where $\tan\gamma = \frac{\sigma\nu}{2\pi(\nu_1^2 - \nu^2)}$. If ν is much less than ν_1 the phase angle γ is practically zero, and continues so up to values differing from ν_1 by a not very large multiple of σ. From this point on, the phase grows rapidly and becomes 90° at $\nu = \nu_1$, and then increases further, so that, at an equal distance on the other side of ν_1 it is practically 180°. The amplitude follows the course of fig. 17 nearly up to ν_1, but instead of becoming infinite it attains a very large maximum at $\nu = \nu_1$ of amount $\frac{e_1}{m_1}\frac{F}{2\pi\sigma\nu}$, and then decreases. When well beyond ν_1 it has the same course as in fig. 17, but with changed sign now because the negative value is allowed for by the phase. Fig. 18 shows the general features, but it has been necessary to take a comparatively large value of σ in order to show the form clearly. In the figure σ is $2\pi\nu_1/5$, whereas for actual spectra it is of the order of $\nu_1 \times 10^{-7}$, so that in any diagram which showed the maximum the rest of the figure would be quite invisible. It thus appears that, except for frequencies very near ν_1, the damping can be disregarded, and we shall for the most part take advantage of this simplification and use the curve of fig. 17 instead of fig. 18.

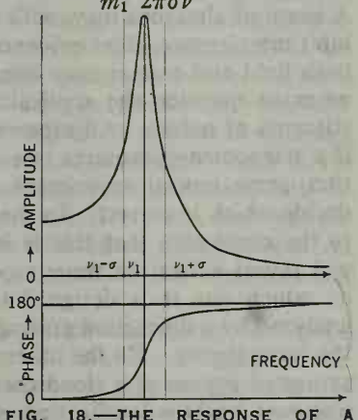


FIG. 18.—THE RESPONSE OF A DAMPED RESONATOR, THE ORDINATE OF THE UPPER CURVE SHOWING THE AMPLITUDE, THE LOWER, THE PHASE, OF THE RESONATOR

3. The Dispersion Formula.—The motion of the electron, forced in this way, will cause a line wave to be emitted with magnitude given by multiplying the amplitude of the electron's motion by its charge. Omitting the damping factor, the electron has a scattering constant

$$e_1 \cdot \frac{e_1}{m_1} \frac{1}{4\pi^2(\nu_1^2 - \nu^2)}$$

which is proportional to

$$B_1\nu_1^2/(\nu_1^2 - \nu^2)$$

The other virtual electrons will give similar effects and they are all to be superposed. Thus the virtual atom will have scattering constant proportional to

$$\rho = \frac{B_1\nu_1^2}{\nu_1^2 - \nu^2} + \frac{B_2\nu_2^2}{\nu_2^2 - \nu^2} + \cdots$$

This is the best form for theoretical purposes, but experimental work more frequently makes use of wave lengths. Rewriting the equation we have

$$\rho = \frac{B_1\lambda^2}{\lambda^2 - \lambda_1^2} + \frac{B_2\lambda^2}{\lambda^2 - \lambda_2^2} + \cdots$$

as the dispersion formula, which should apply for any wave length not too close to λ_1, λ_2, etc. The relative magnitudes of the terms are derivable from the intensities of the associated lines in emission spectra.

We may now consider the march of events when a substance is illuminated by light of progressively shorter wave length. We will suppose $\lambda_1 > \lambda_2 > \lambda_3 \ldots$. We saw that the refractive index depends on the product of ρ and the number of atoms in a cubic centimetre, but, since we have omitted a factor of proportionality already, we may also omit the factor for the number of atoms, and may equate ρ to $(n^2 - 1) / (n^2 + 2)$. For very long waves we shall have practically $(n^2 - 1) / (n^2 + 2) = B_1 + B_2 + \ldots$. If n^2 is deduced from this it should agree with the dielectric constant determined by purely electrical means. Though there is little doubt that this would be verified, optical observations are usually lacking for sufficiently long waves. As λ decreases, the first term grows in comparison with the others, because $\lambda^2 - \lambda_1^2$ gets smaller more rapidly, and just before λ_1 this term entirely dominates the refraction. At λ_1 there will be a region of absorption and on the other side the first term will be negative, the rest still positive. As λ decreases further, the first term, still negative, shrinks in importance and the second grows until it is near λ_2 when it becomes dominant. Passing beyond λ_2 it changes sign and later loses importance, its place being taken by λ_3 and so on. Finally when all the lines have been passed, $(n^2 - 1) / (n^2 + 2)$ will be negative and proportional to the square of the wave length. For a strict test of the theoretical dispersion against experiment, we should have to work out the value of n from that of $(n^2 - 1) / (n^2 + 2)$; but for a rough comparison this is not necessary. Where $(n^2 - 1) / (n^2 + 2)$ is large, so is n; when the former is negative, n is less than unity; and, if n is plotted against frequency, the curve will have the same general characteristics as has $(n^2 - 1) / (n^2 + 2)$. An example of the general course of the dependence of n on frequency is given without any quantitative accuracy in fig. 19. There are supposed to be three lines, of which the middle one is the strongest. In the neighbourhood of each line the refraction cannot be observed because of absorption. As each line is passed there is a strong decrease in the refractive index, associated with the change of phase of the corresponding virtual electron by 180°. Whether the refractive index actually falls below unity will depend on the breadth of the unobservable region and on the relative strength of this line. At frequencies above the highest frequency of the atom the refractive index will always be less than unity, and such values have been found for X-rays, though, strictly speaking, even here the atom has higher frequencies still.

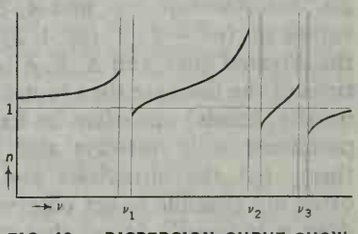


FIG. 19.—DISPERSION CURVE SHOWING THE WAY REFRACTIVE INDEX DEPENDS ON LIGHT FREQUENCY. AT ν_1, ν_2, AND ν_3 THERE WILL BE ABSORPTION

Much the most striking example of dispersion is called anomalous dispersion, though it is not at all anomalous. Some dyes strongly absorb certain colours in the spectrum while being transparent to the others; thus if the green is absorbed, the dye will look purple by transmitted light. Because of the very strong green absorption there is a reversal in the usual order of refraction. The blue light, which lies in the short wave length side of the green, is refracted much less than the yellow, which lies on the side of long

wave lengths. Fig. 20 shows with some exaggeration how a prism made of such a colour would fold the spectrum back on itself. A similar effect is observed for sodium vapour. Sodium has two very strong lines close together in the yellow, and both show anomalous dispersion. A flame containing the vapour is given the form of a prism, and white light is sent through it. This light is then sent through a spectroscope to spread out the colours in a direction at right angles to the dispersion of the prism. The colours on opposite sides of either of the sodium lines will be deflected in opposite directions by the prism, so that their images on the photographic plate are shifted up and down. The form of the dispersion curve is thus made directly evident.

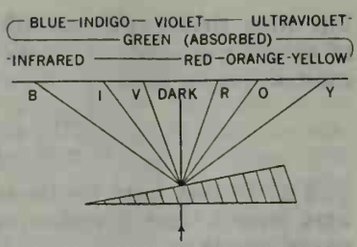


FIG. 20.—ANOMALOUS DISPERSION. ABSORPTION IN THE GREEN MAKES THE YELLOW MORE REFRACTED THAN THE BLUE

Because of the brilliance and fineness of the sodium lines, sodium vapour has been used with more success than any other medium in the study of dispersion, yielding several important results. It has been possible directly to measure the absorption of light in the immediate neighbourhood of the two lines to evaluate the damping factor σ; this was found to be in quite good agreement with the electromagnetic damping factor. Another important experiment consists in finding the absolute value of the scattering constants for these two lines of the sodium atom. The theory depends on quantum principles; loosely speaking, the two virtual electrons correspond to a single actual electron, so that, if we can make experiments in which the two lines are indistinguishable, the scattering constant should be given with the ordinary values of e and m. The straightforward way to do this is to observe the refraction with light of a very different colour, because then the difference between the influences of two such close lines would not be detectable, but this is useless because the refraction itself becomes too small. Indirect means depending on magnetic gyration have been used, and have supported the theoretical prediction that both lines are due to a single electron.

The most accurate measures of refractive index have been made with transparent substances in which the absorption occurs only far in the infrared or ultraviolet. To analyze the dispersion the usual procedure is based on the fact, that for the infrared terms, $\lambda^2/(\lambda^2 - \lambda_1^2)$ can be expanded in powers of λ^2, while for the ultraviolet terms it can be expanded in inverse powers of λ^2. A formula is therefore constructed of the type $A + C\lambda^2 + \ldots + E\lambda^{-2} + F\lambda^{-4} + \ldots$, and $A, C, E \ldots$ are fitted to the observed values of $(n^2 - 1) / (n^2 + 2)$. The term in C corresponds to the infrared lines, and A, E, F to the ultraviolet. The actual positions of the lines are then found by trial. The infrared lines (more usually, bands) can often be fixed with fair accuracy, both by experiments with rest-rays and by observing the refraction near them; but the ultraviolet are more troublesome, because it is often not possible to get observations very close to the lines. Indeed it is usually found that wave lengths and B values can be chosen with considerable latitude and yet can give all the observed results with a high degree of accuracy. The process is very laborious and has only been carried out for a few substances, such as rock salt and potassium chloride. It is found possible to represent the refraction by one term for the infrared and perhaps two in the ultraviolet, together with a third constant term which must correspond to wave lengths so short that $B_s\lambda^2/(\lambda^2 - \lambda_s^2)$ does not change perceptibly in value in the whole region accessible to observation. The ultraviolet lines are attributed to electron vibrations of some kind, but those in the infrared arise through the motions of whole atoms and have been fitted satisfactorily into the general dynamical theory of the crystalline state.

The theory of the refractive indexes of gases is distinctly more advanced, because their emission spectra can be studied without the radical change of state that would be necessary for solids. In the case of metallic vapours, such as sodium, the theory may be considered complete, though its empirical verification is difficult. The spectrum of helium is known, and the measurement of its refraction has led to an interesting result. The lines of all atomic spectra fall into series which converge toward a finite limit λ_h, but beyond this limit there is a region in which there is emission over a continuous range of wave lengths. Corresponding to this it is found that the refraction of helium requires an expression

$$\frac{n^2 - 1}{n^2 + 2} = \frac{B_1\lambda^2}{\lambda^2 - \lambda_1^2} + \cdots + \int_0^{\lambda_h} \frac{B_x\lambda^2}{\lambda^2 - x^2}dx$$

In the case of the ordinary permanent diatomic gases the spectrum is not so well known, for an electric discharge is required to make the gas luminous, and this breaks the molecules into atoms. Even without this knowledge, however, one feature can be predicted for a molecule composed of two identical atoms: the atomic vibrations of infrared frequency will have no optical effects at all. This prediction is confirmed by the dispersion formulas which for the permanent gases have only ultraviolet terms.

IX. MODERN VIEWS ON THE NATURE OF LIGHT

In the foregoing account, the principles of optics have been presented as a completed body of knowledge. In so doing, we have disregarded more recently discovered properties of light that gave rise to the quantum theory. This is because we have always been concerned with rather intense light traversing matter in bulk. Under these conditions the statistical considerations of the quantum theory may be neglected, and the electromagnetic theory gives a good account of the facts. Only when we leave the macroscopic properties of light and enter the microscopic realm, where we must consider the interaction of faint light with individual atoms, must the theory be revised. The final form of this revision was yet to be found in the 1960s but in the search for it our idea of the nature of light, and of matter as well, has undergone profound change. According to the present view, light has a dual character, such that it may be represented equally well by waves or by corpuscles (or photons). The two are merely complementary aspects of the same reality. Our discussion has concerned only the wave aspect of this duality. Hence it would not be proper to close without a brief discussion of how the idea of photons has become an integral part of the theory.

It has been found that electrons, protons, neutrons and the other elementary constituents of matter possess wavelike characteristics. A beam of electrons may, with suitable apparatus, be made to exhibit interference, clear evidence of the presence of waves. Since both light and matter may behave either as waves or corpuscles, we must question the applicability of models to such basic constituents of nature. All experience would lead us to suppose that if a phenomenon requires two different concepts for its explanation, some crucial experiment could be performed which would decide which is correct. In the present case we have been forced to the conclusion that this is impossible. Any given experiment will reveal either the wave aspect or the corpuscular, depending on which one it is designed to demonstrate. Thus if light is analyzed by a diffraction grating, the effects are those predicted by the wave theory. On the other hand if X-rays traverse the supersaturated vapour of a cloud chamber, tracks of photoelectrons are observed, and the localization of energy required to produce these can only be explained as resulting from the annihilation of photons (*see* CLOUD CHAMBERS). All attempts to design an experiment that could show either property to furnish a decision between the alternatives have proved futile. As was shown by Bohr, the reason lies in the unavoidable interaction between the mechanism of observation and the phenomenon being studied. The quantum theory therefore adopts the novel view that both the waves and the corpuscles are equally real or unreal and that it is meaningless to inquire more closely.

Quantum theory has further shown that exact calculation of the position and momentum of the particles cannot be made simultaneously, and that the limits of accuracy with which they may be specified are determined by the Planck constant h. The quantitative expression of the fact is the celebrated uncertainty principle (*q.v.*) of Werner Heisenberg. For photons and electrons the theory therefore gives no determinate spatial position, but

only the statistical distribution, or the probability that they will be found in a given region of space. The reconciliation with the wave theory comes about because this distribution is calculated with the equations of wave motion. In an interference pattern, the density of photons striking the screen, which represents the energy or intensity of the light, is thus distributed according to classical wave theory, even though the path followed by any individual photon cannot be specified. This is how the present theory allows for such contradictory properties as interference and the photoelectric effect. Diffraction experiments with feeble sources and photoelectric multiplier detectors show that the light arrives at different parts of the pattern as individual photons, but in such numbers as to give the intensity distribution called for by classical theory. It is curious that the "fits of easy reflection and transmission" with which Newton had to endow his light corpuscles were periodic in character. One may therefore regard his ideas as rather vague forerunners of the dual theory established two centuries later.

The development of wave mechanics, which represents the incorporation of the wave aspect into the mechanics of particles, was originally stimulated by the discovery of the dual character of light. This phase of quantum theory has reached a high degree of completeness, and has been extended by Paul Dirac to include the conditions imposed by the theory of relativity. The progress of the theory of light has been less rapid, and the application of quantum theory to the interaction of light with material particles has been definitely limited. A quantum theory of the electromagnetic field has been formulated by Heisenberg and Wolfgang Pauli to account for the existence of photons. It leads to restrictions on the accuracy with which the electric and magnetic fields can be simultaneously measured, similar to the uncertainty principle in quantum mechanics. There seems to be no doubt that this theory holds as long as it is limited to fairly weak electromagnetic fields in empty space. If it is restricted to the interaction of light with elementary particles in the first approximation, it can give a satisfactory account of many experimental facts. Besides such corpuscular properties as the photoelectric effect and Compton effect, many wave properties, such as interference, Doppler effect, light pressure and polarization, are readily interpreted. The theory of dispersion, and of the Raman effect (*q.v.*), have been successfully incorporated in the new theory. The spectral distribution of energy for radiation in thermal equilibrium (Planck's law) is also given satisfactorily if the photons are assumed indistinguishable from one another. This is better expressed by saying that the light corpuscles obey the Einstein-Bose statistics, as contrasted with the Fermi-Dirac statistics, which apply to the elementary particles of matter. One of the most striking triumphs of the theory has been in dealing with the conversion of radiation into matter, and vice versa, that was observed first in the creation and annihilation of positive electrons, and more recently in the creation and annihilation of protons and antiprotons.

In spite of these initial successes, which indicate that the quantum electrodynamics is at least as well founded as quantum mechanics, it has become increasingly apparent that both have limited validity. For strong electromagnetic fields and for very short wave lengths (less than the so-called Compton wave length) the theory leads to results that are definitely incorrect. Furthermore it is totally inadequate in dealing with the problem of the finite size of the electron. If the theories of light and matter are to be synthesized, a fundamentally new approach must be developed to attack those phenomena occurring within regions of space comparable with the size of the electron or of atomic nuclei.

The quantum constant h links the wave and corpuscular concepts, and its size determines the borderline between macroscopic effects where light can be treated as a continuous wave, and microscopic ones where the photon concept begins to become important. If h were infinitely small, the classical electromagnetic theory would account for all optical phenomena, since then we would always be dealing with huge numbers of photons. The same is true when the frequency ν is very small, and the energy $h\nu$ correspondingly small, as in the case of waves from a radio antenna. The electromagnetic theory is entirely tenable in explaining the emission of such radiation, and its absorption by matter. At the other extreme, where h would be large or ν very great, we have fewer but much more energetic photons and the corpuscular properties of light are very apparent. The value of h, 6.625×10^{-27} erg sec., is much nearer the infinitely small on the scale of everyday phenomena, and explains how the corpuscular behaviour of radiation escaped detection until comparatively recent years. The discovery of X-rays and γ-rays, which lie in the range of very high frequencies (and energetic photons), made the observation of corpuscular effects inevitable, and hastened our realization of the inadequacy of the wave theory in the microscopic domain.

That a definitive theory of light has yet to be formulated does not detract from the classical electromagnetic treatment given here. The subject matter has been chosen so that this treatment is not only appropriate but rigorously correct in most cases. A broad generalization known as the correspondence principle was stated by Bohr in 1916, according to which any quantum theory must agree with classical theory when the number of quanta (here photons) becomes very great. The difference between the discrete energy states then becomes vanishingly small and they merge into the continuity of classical theory. Thus macroscopic optical phenomena are governed by Maxwell's field theory and macroscopic mechanical phenomena by the mechanics of Newton and Einstein. Only in the interaction of light with structures of atomic dimensions do they fail, and even here the correspondence principle has been an invaluable guide in developing the quantum theory. We may therefore feel confident that however great the changes brought about by a new theory, and however unfamiliar the language, the older work will stand and the new theory will accommodate the wave theory of light.

A device that has promoted renewed interest in the dual nature of light in the 1960s is the optical maser. Operating on quantum principles of controlled excitation of light by optical pumping or excitation, it gives intense light of uniform phase over extended areas, thus securing a degree of coherence or unified action of countless individual atoms not previously possible. It holds great promise for studies of physical optics and for communication at optical frequencies. *See* LASER.

See also references under "Light" in the Index.

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(C. G. D.; F. A. Js.; R. M. Sn.)

LIGHT, VELOCITY OF. The velocity of light in a vacuum (symbolized as the fundamental constant c) was first estimated scientifically as roughly 180,000 mi. per second in 1676 when Ole Roemer observed fluctuations in the time of arrival of the eclipses of Io, Jupiter's first satellite. (Modern measurements give a value of about 186,282 mi. per second.) Starting at a time when the earth was closest to Jupiter, and trying to predict, on the basis of the mean eclipse period, the time of occurrence of an eclipse six and one-half months later (when the earth was its full orbital diameter more distant), Roemer found that the actual eclipse occurred with a delay, relative to this prediction, which he estimated to be of the order of 22 min. He inferred from this that light travels with a finite velocity, the delay of 22 min. representing its transit time across the diameter of the earth's orbit. More recent measurement shows this delay to be nearer 16 min. The English astronomer James Bradley in 1727 found additional evidence for the finite velocity of light in his observation of the aberration of light, a displacement of the apparent position of the stars in the direction of the earth's orbital velocity v.

A crude analogy to aberration likens the astronomer with his

telescope to a man walking through vertically falling rain and carrying a vertical pipe. If the man were stationary he would hold the pipe vertically to let the raindrops fall down the pipe without striking its walls, but if he were walking at speed v, then he would incline the tube at an angle whose tangent is v/c to the vertical (c is the velocity of the drops) in order that each drop traverse the pipe. (*See* ABERRATION [OF LIGHT].)

In 1849 the French physicist A. H. L. Fizeau was the first to estimate the velocity of light directly by measuring the time of transit of light flashes between two hills about 8.6 km. apart, near Paris. The beam of light was chopped into flashes by a rotating wheel with 720 teeth, and Fizeau measured the successive critical speeds of rotation at which a reflected flash of light was just eclipsed by rotation of succeeding teeth. Unfortunately, the exact speed at which complete eclipse occurs is ill-defined.

Rotating-Mirror Method.—The French astronomer D. F. J. Arago suggested a rotating-mirror method which permits considerably higher accuracy than the toothed wheel, and which was first used effectively by both Fizeau and J. L. Foucault in 1850. In these experiments light was reflected from a rapidly rotating plane mirror and, after traversing a path to a stationary mirror about 20 m. distant, returned to the rotating mirror. During the time of transit this mirror was found to have rotated sufficiently to displace the focused image of the light source about 0.7 mm. Foucault estimated the velocity of light to be about 298,000 km. per second. Later, the technique was improved by M. A. Cornu, Simon Newcomb and A. A. Michelson. They increased the path distance and utilized rotating polygonal mirrors of glass and steel with very accurately polished, optically plane faces and with optically accurate mutual orientations between faces. The dihedral angles between adjacent faces were equalized by interferometry to better than $\frac{1}{20}$ sec. of arc. In experiments in California reported in 1927, Michelson used a light path of 44 mi., from Mt. Wilson to Mt. San Antonio and return. His data provided an average corrected estimate of the velocity of light in a vacuum as

$$c = 299{,}798 \pm 4 \text{ km. per second} \qquad (1)$$

The length of the light path for Michelson's Mt. Wilson determinations was measured by the U.S. coast and geodetic survey in a remarkably accurate triangulation from a 40-km. base line. The length of this base was determined to an estimated error of 1 part in 11,000,000.

Group Velocity and Phase Velocity.—All methods in which a light beam is modulated or chopped into signals whose transit times are then measured yield values of the group velocity of light in the medium employed. The group velocity is to be distinguished from the phase velocity, which is the velocity of propagation of each wave crest of an infinitely long, pure, sinusoidal plane wave train. In a dispersive medium (one in which different wave lengths propagate at different phase velocities), the group velocity and phase velocity differ, and the group refractive index of the medium (for example, air) must be used in correcting the results to find the vacuum value of c, the fundamental constant. Fourier analysis shows that modulating or chopping light always introduces new frequencies. To illustrate the difference between phase velocity and group velocity, consider two superposed pure wave trains of equal amplitude and nearly equal wave length, λ and $\lambda + \Delta\lambda$, propagating in the same direction. Because of the slight difference in the two wave lengths the train will be modulated with nodes and loops as shown in fig. 1, the nodes being separated by a number, $\lambda/\Delta\lambda$, of the original wave lengths, λ. If the longer of the two wave lengths propagates at slightly higher phase velocity the crests of the wavelets in each group will be moving forward slightly faster than the group as a whole, the wavelets continually dying at the front of the group and new wavelets apparently being born at the rear. The relationship of group velocity V' to phase velocity V is then given by the equation

$$V' = V - \lambda\,(dV/d\lambda) \qquad (2)$$

Actually Michelson had used the phase velocity refractive index in reducing his 1926 results from air to vacuum. R. T. Birge detected this error, and made a correction upward of 2 km. per second in Michelson's value, obtaining the result (1) above. As Table I shows, this point was overlooked by several other workers also.

Irvine Ranch Experiment.—A rotating-mirror experiment, begun in 1929 by Michelson, F. G. Pease and F. Pearson, and completed after Michelson's death in 1931, was conducted in a vacuum over a light path in a pipe one mile long on the Irvine ranch near Santa Ana in California. Successive to-and-fro reflections between plane mirrors were employed to yield a total light path of about 10 mi. Nearly 3,000 measurements with this equipment showed a distribution with a mean value

$$c = 299{,}774 \text{ km. per second} \qquad (3)$$

The distribution exhibited, however, rather widely spreading and more or less symmetrical wings or plateaus on either side of the central peak which were decidedly non-Gaussian. The value obtained by more accurate methods, namely 299,793 km. per second, or even Michelson's slightly higher value (1), falls well inside the non-Gaussian plateau on the Irvine ranch statistical distribution. A posteriori reasons to account for the systematic errors in the Irvine ranch work are not hard to find. The base line was on very unstable alluvial soil. A correlation between fluctuations in the results and the tides on the sea coast was reported by Pease and Pearson. A far greater number of time-of-transit measurements with the rotating mirror than length measurements of the admittedly fluctuating base length were made. Base-length measurements, it appears, were all made in the daytime, whereas a great majority of the rotating-mirror measurements were made at night.

Kerr-Cell Determinations.—The Kerr cell or electrooptical shutter modulates a light beam much more rapidly than mechanical methods. In 1875 the Scottish physicist John Kerr discovered that a plate of glass subjected to a strong electric field becomes doubly refracting, a phenomenon which appears also in liquids. The Kerr cell, consisting usually of two electrical condenser plates immersed in a liquid such as nitrobenzene, is placed between a polarizer and a crossed analyzer to give complete extinction of light when the cell is not active. The light beam passes through the cell parallel to the condenser plates. When a considerable difference of potential is established between the plates, the liquid behaves optically like a uniaxial crystal with its optical axis parallel to the field direction. With the cell oriented at 45° to the plane of polarization, the incident plane vibrations from the polarizer are broken up into two equal components that are parallel and perpendicular to the electric field. These travel through the cell with different speeds so that a phase difference is introduced and the light emerges from the cell as elliptically polarized light. The horizontal component of this light is then transmitted by the analyzer. Thus in the absence of the electrical field no light is transmitted, but with application of the field the light is able to pass. A. Karolus and O. Mittelstaedt in 1925 were the first to develop this Kerr-cell method, and W. C. Anderson improved upon

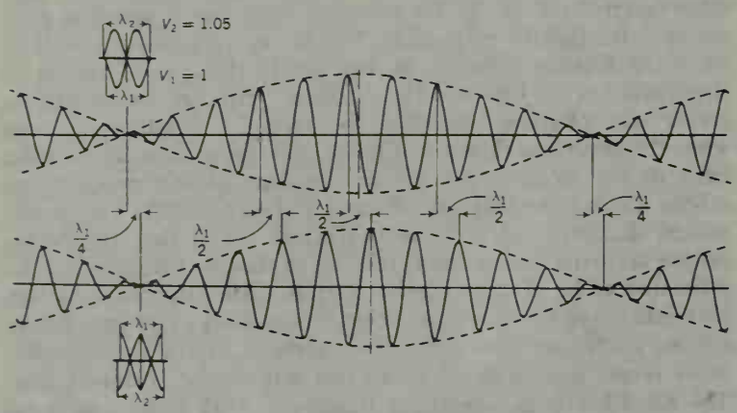


FIG. 1.—DIFFERENCES BETWEEN GROUP VELOCITY AND PHASE VELOCITY IN A DISPERSIVE MEDIUM. VELOCITY WITH WHICH NODES AND LOOPS PROPAGATE IS CALLED GROUP VELOCITY. FIGURE ILLUSTRATES EXAGGERATED CASE IN WHICH $\Delta\lambda/\lambda = 0.1$ AND CORRESPONDING $\Delta V/V = 0.05$, SO THAT GROUP VELOCITY IS ONLY HALF THE PHASE VELOCITY

it. Nearly 3,000 observations in 1941 by Anderson yielded the mean value

$$299{,}776 \pm 9 \text{ km. per second} \quad (4)$$

which agrees very well with the Irvine ranch value. The two measurements (3) and (4), with their impressively large number of replicated observations and their excellent (but apparently fortuitous) agreement, impressed physicists for about a decade. Not until 1949 was suspicion cast on the value $c = 299{,}776$ km. per second. In that year C. I. Aslakson, using shoran, a radar method of measuring the distance of an airplane from a ground station by the time of flight of a radio signal, reported a higher value of c. When signals were measured using shoran, as the airplane approached a position of exact alignment between ground stations separated by a known distance, Aslakson obtained limiting results indicating that $c = 299{,}792 \pm 3.5$ km. per second. Since then other measurements of c for electromagnetic radiation made by many observers and by much more accurate methods support the higher value $c = 299{,}793$ km. per second.

The Bergstrand Geodimeter.—E. Bergstrand developed an improved Kerr-cell modulation method of measuring the transit time of light over outdoor light paths of several kilometres with the idea of using it in high-precision geodetic surveying. An oscillator at a frequency of 8.33 mc. per second with amplitude of 2,000 v. is used to modulate the light source by means of a Kerr cell, and also modulates a detecting photomultiplier tube which receives the returning light from a distant mirror. A 50-c.p.s. alternating bias voltage of 5,000 v. with a square wave form also is applied to the Kerr cell so that the 8.33-mc. oscillations swing to and fro over the steepest and most linear region of the cell's characteristic curve of light intensity as related to applied voltage. Thus one set of alternate half waves of the oscillator gives high light transmission during one entire half cycle of the 50-c.p.s. bias voltage, while the other half cycles of the high frequency give low light transmission so as to yield a nearly pure sinusoidal variation of light intensity at 8.33 mc. During the next half cycle of the 50-c.p.s. wave, oscillations of light intensity occur with the high light-transmission maxima (of the 8.33-mc. frequency) 180° out of phase with respect to their phase during the preceding half cycle of the low frequency. If the oscillations of intensity of the returning light are in suitable phase coincidence with the electrical high frequency which modulates the plate voltage of the photomultiplier tube, the tube will supply 50-c.p.s. rectified pulses of a maximum amplitude during one set of alternate half cycles, and these are arranged to furnish a rectified pulsating signal to an amplifier. During the other set of alternate half cycles of the 50-c.p.s. biasing voltage practically no rectified signal will be available from the photomultiplier because the 8.33-mc. modulating voltage applied to its plate is in the wrong phase. Clearly, however, a shift in phase of the sinusoidal light intensity can modify this condition of extreme unbalance between the rectified signals from the two sets of alternate 50-cycle half waves. Two vacuum tubes, controlled from the 50-c.p.s. supply, switch alternate phases of this amplified signal from the photomultiplier through a D.C. meter of long period. Switches permit the operator to reverse the phases of the 50 c.p.s. which the switching tubes select and also to reverse the phase of the 8.33-mc. voltage applied to the photomultiplier tube plate. There will be some distance for the remote mirror such that the phase delay of the returning oscillations of light intensity will just yield a zero reading on the meter, and for the selected frequency of 8.33 mc. per second there will occur another such zero for every increase or decrease of about 9 m. in distance of the mirror.

Bergstrand used great care in guarding against such systematic error as that resulting from the fact that different parts of the image of the light source at the distant mirror have different phases, depending on the part from which light is emanating in the space between the Kerr-cell condenser plates.

Summary of Significant Determinations.—Table I is a list of significant determinations of the velocity of light of optical frequencies. The first 12 are taken from the 1941 review of this subject by Birge. Bergstrand's geodimeter measurements are seen to yield a value of c about 19 km. per second higher than the Michelson, Pease and Pearson or the Anderson values. The geodimeter has also been used by I. C. C. Mackenzie in Scotland with results similar to Bergstrand's. This higher value of c also, as will be seen, receives further support from high-precision work with microwaves. For purposes of comparison, an indirect determination of c by E. B. Rosa and N. E. Dorsey, obtained by measuring the ratio of an electrical charge in absolute electrostatic units to the same charge in electromagnetic units, is included. This experiment, carefully carried out at the U.S. national bureau of standards, resulted in the value, $c = 299{,}748 \pm 15$ km. per second. It does not discriminate clearly in favour of either the 299,774 value or the 299,793 value.

TABLE I.—*Determinations of the Velocity of Optical Light*

Author	Method†	Year	Corrected result (km. per second)	Standard deviation (km. per second)	Corrected by Birge (1941) for
Cornu-Helmert	TW	1875	299,990	±300	
Michelson	RM	1879	299,910	±75	
Newcomb	RM	1883	299,860	±45	
Michelson	RM	1883	299,853	±90	
Perrotin	TW	1902	299,901	±104	
Rosa-Dorsey*	REU	1906	299,784	±15	Electrical conversion factor
Michelson	RM	1927	299,798	±22	Group-velocity refractive index of air
Mittelstaedt	KC	1928	299,786	±15	Group-velocity indices of optical path
Michelson, Pease and Pearson	RM	1933	299,774	±6	
Anderson	KC	1937	299,771	±15	Group-velocity indices of optical path
Hüttel	KC	1937	299,771	±15	Group-velocity refractive index of air
Anderson	KC	1941	299,776	±9	
Bergstrand	KC	1951	299,793.1	±0.32	
Mackenzie	KC	1953	299,792.4	±0.5	

*The Rosa-Dorsey determination is listed here for purposes of comparison. It is not a determination of the velocity of optical light but of the constant, c, in Maxwell's equations (*see* LIGHT: *The Electromagnetic Equations*). There is no reason to believe that the two should differ in value, however. †TW = toothed wheel; RM = rotating mirror; REU = ratio electrical units; KC = Kerr cell.

VELOCITY DETERMINATIONS OF RADIO-FREQUENCY WAVES

The question of whether the speed of light in vacuum varies with wave length or frequency seems to have been settled long ago by observations of variable stars. Some of these are so distant that their light must take many centuries to reach the earth. Were there any difference in the propagation velocity of the light of different colours, even to so small an extent as one part per million, the apparent colour of the star would change as it waxed and waned, and no evidence for such an effect has been observed.

Additional evidence of the absence of any dispersion in the propagation of radiation of very different wave lengths across intergalactic space has been obtained as a by-product of radio astronomy. In 1951 F. G. Smith of Cambridge university succeeded in locating within an area of less than one square minute of arc an already well-known, exceedingly intense source of extragalactic radio waves in the constellation Cygnus. Walter Baade took a picture of the area with the 200-in. Palomar telescope and discovered that at this point two very distant galaxies gave evidence of being in collision. The Doppler shift toward the red of the optical spectral lines emitted from this object shows it to be 270,000,000 light years from the earth, and the 21-cm. radio line of hydrogen (discovered in the laboratory by Willis Lamb, Jr., and R. C. Retherford in 1950) emitted from this radio object was found to have exactly the same red shift. This indicates that the radio waves and the light waves have been propagated with exactly the same velocity. Recent experiments measuring the propagation velocities of radio waves and of very short wave-length gamma rays support the hypothesis that all wave lengths propagate with the same speed in vacuum.

High-precision radio-frequency measurements of c have been made by (1) W. W. Hansen and K. Bol at Stanford university, Palo Alto, Calif., using microwave cavity resonance with a cavity of fixed length; (2) L. Essen at the National Physical laboratory, Teddington, Eng., using cavity resonance in a cavity of variable length; (3) K. D. Froome, at the National Physical laboratory, using a free-space microwave interferometer; (4) Aslakson, using

the shoran radar method; (5) E. K. Plyler, L. R. Blaine and W. S. Connor, and D. H. Rank *et al.*, using infrared spectroscopic measurements of the molecular constants of carbon monoxide; and (6) E. F. Florman, using a large-scale radio interferometer at 172.8 mc. per second, set up on a dry lake bed in Arizona. (*See* Table II.)

TABLE II.—*Experimental Values of the Velocity of Electromagnetic Radiation in Vacuum*

Author	Date of publication	Method†	Velocity (Km. per second)
Aslakson	1949	Shoran	299,792 ±3.5
Hansen and Bol	1950	FLCR	299,789.3 ±1.2
Essen	1950	VLCR	299,792.5 ±1.0
Bergstrand*	1951	Geodimeter	299,793.1 ±0.32
Aslakson	1951	Shoran	299,794.2 ±1.9
Froome	1952	FSMWI	299,792.6 ±0.7
Mackenzie*	1953	Geodimeter	299,792.4 ±0.5
Froome	1954	FSMWI	299,793.0 ±0.3
Plyler, Blaine and Connor	1955	Infrared Spectroscopy	299,792 ±6.0
Florman	1955	FSMWI	299,795.1 ±1.9
Rank, Bennett and Bennett	1956	Infrared Spectroscopy	299,791.9 ±2.2
Schöldström*	1956	Geodimeter	299,792.4 ±0.4

*The measurements of Bergstrand, Mackenzie and Schöldström are at optical frequencies; all the others are for radio waves.
†FLCR = fixed-length cavity resonance; VLCR = variable-length cavity resonance; FSMWI = free-space microwave interferometer.

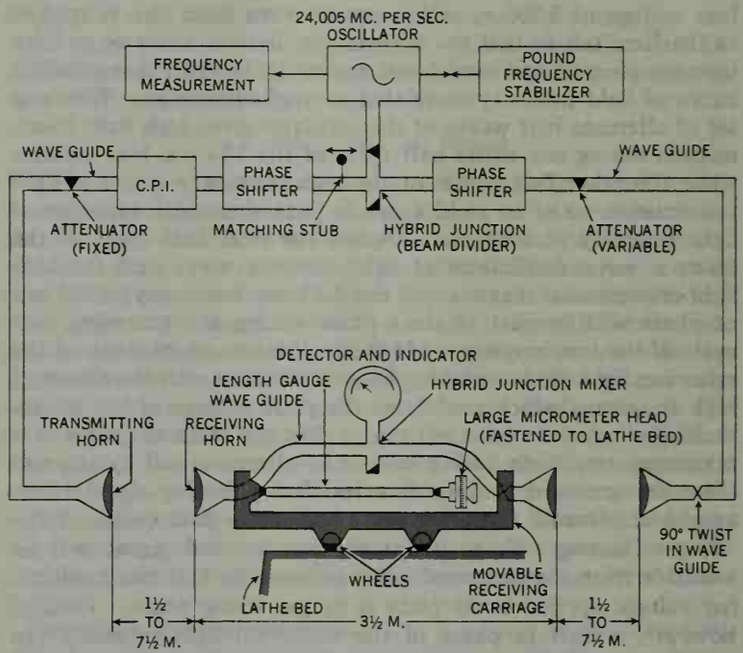
All these radio-frequency methods depend on determining a frequency v and a wave length λ associated with some electromagnetic wave phenomenon. If v and λ were the frequency and wave length of a train of infinite plane waves in free space (vacuum), then the velocity of light c would be simply given by the product $v\lambda = c$. If the waves are confined in cavities or interact with objects, or if they are neither plane nor infinite (as is usually the case), then complicated corrections are required.

The results indicate that the average value given by Birge, based chiefly on the Michelson, Pease and Pearson rotating-mirror and evacuated-tube determination and on the Anderson Kerr-cell determination (299,776 km. per second) was low by about 16 or 17 km. per second. The values in Table II are far from being of equal reliability or accuracy, nor are they all completely in agreement to within the accuracy estimated by their authors.

The Hansen and Bol Method (Fixed-Length Cavity Resonance).—In the Hansen and Bol measurement an accurately machined right circular cast-iron cylinder with optically flat removable ends was used as a resonant cavity. To reduce losses and to insure a high-Q resonance, the cavity surfaces were plated with silver. Three spacer rods, located in longitudinal holes in the cylinder wall, were used to space the surfaces of the optical flats. Convex spherical ends on each rod were zones of a common sphere. All three rods were carefully equalized so that, as long as contact was with the ends, the distance between two parallel planes (one contacting each convex surface) was independent of the orientation of the rod axis. The three rods were intercompared in a temperature-controlled oil bath by an ingenious spring-feeler multiplying gauge and were lapped to uniform length. The distance between end faces of the cavity was determined interferometrically by replacing the metal flats with glass flats. The possible difference in elastic or plastic yield at the points of contact between spacer rods and the two different kinds of flats was studied by varying the loading. The diameter of the cylindrical cavity could not be measured accurately by direct means, but the ratio of length to diameter could be determined from the ratio of the observed resonant frequencies for two modes of electrical vibration (the TE_{012} and TE_{021} modes) since one of these depends primarily on the length of the cylinder and the other primarily on its diameter. The ratio of length to diameter had been chosen to put the frequencies of the two modes only a few megacycles apart out of 3,000 mc. Perturbation produced by the probe hole through which the electromagnetic energy is introduced into the cavity produced a shift in resonant frequency which varied as the cube of the hole diameter. This permitted extrapolation to find the frequency for a vanishingly small hole. An insulating gap was allowed between the plane ends and the cylindrical walls to suppress those unwanted modes of electrical vibration for which currents would otherwise be required to flow across this gap. Correction for the gap was small and easily made.

The high-frequency currents in the conducting walls of the cavity, which accompany the electromagnetic waves, penetrate into the conductor to a very shallow depth (inversely related to the frequency of the particular mode of oscillation), known as the skin depth. The skin depth and current distribution depend also on the resistivity and dielectric constant in this shallow region. Thus, the true electrical dimensions of the cavity exceed the mechanical dimensions by an amount of the order of magnitude of the skin depth. The possible presence of a thin film of silver sulfides of unknown thickness may affect the observed resonant frequency of the cavity. Correction for this should increase the Hansen and Bol c value slightly. Also, the mechanical effect of polishing the silver-plated surface may cold-work the metal and thus greatly decrease its conductivity in an extremely shallow layer.

The Froome Method (Free-Space Microwave Interferometer).—Froome's four-horn Fraunhofer diffraction microwave interferometer is shown schematically in fig. 2. A Pound stabilized reflex klystron oscillator is the source of 24,005-mc.-per-second microwaves corresponding to a wave length of about 1.25 cm. The accuracy of frequency measurement is about 1 in 100,000,000. Energy from the oscillator passes to a hybrid junction (beam divider) from which it passes through two long wave-guide arms to the pair of transmitting horns. The matching stub and phase shifter to the left of the beam divider, together with a constant phase auxiliary interferometer (c.p.i.), alter the amplitude of the



ADAPTED FROM K. D. FROOME, NATIONAL PHYSICAL LABORATORY, "PROCEEDINGS OF THE ROYAL SOCIETY," LONDON, 1952

FIG. 2.—FREE-SPACE MICROWAVE INTERFEROMETER OF K. D. FROOME AT THE NATIONAL PHYSICAL LABORATORY, TEDDINGTON, ENG.

waves transmitted down the left wave-guide arm without introducing any change of phase. In this c.p.i. the input wave is split into two components of equal amplitude in two different paths. These components are subsequently recombined after a change in their relative phases brought about by an increase in path length for one path and an exactly corresponding decrease in path length for the other. The two equal vectors representing the phases of the two components are thus rotated in opposite directions through the same angle so that the direction (phase) of their resultant is unchanged while its amplitude is reduced. The phase shifter to the right of the beam divider, together with the variable attenuator, is to adjust and balance the position of the first interference minimum. (*See* INTERFEROMETER.)

A pair of receiving horns mounted on a movable carriage constructed almost entirely of silica tubes (for thermal stability) is arranged to travel on ways through a path of about one metre. The pair of receiving horns is centred on a straight line, the central axis running between the two stationary transmitting horns.

The two received signals are mixed to produce interference, and are detected by means of a simple superheterodyne arrangement; the output is rectified and indicated on a milliammeter. An interference minimum is indicated by minimum current through the meter and the carriage can be set on a minimum to better than one micron. Lenses introduced into the horns make the waves more nearly plane-parallel. Diffraction effects coming from the finite dimensions of the horns relative to the wave length tend to distort the wave fronts so that the relationship $\lambda v = c$ requires a correction. The seriousness of such errors diminishes as the two transmitting horns are placed farther from the receiving horns. By varying this distance an estimate for the correction can be made.

A wave-length measurement consists of determining the exact displacement of the carriage corresponding to 81 wave lengths (162 minima) measured to $\frac{1}{4}$ micron by means of end-contact gauges. This equipment was considered as merely a prototype constructed for the investigation of sources of inherent error. The conditions were chosen deliberately to cause errors; for example, the random effects arising from reflections in the rather small room. Nevertheless the apparatus was found to yield an accuracy of 1 part in 10^6 for the velocity measurements. Much better results were anticipated from equipment which would operate at 70,000 mc. per second ($\lambda = 4$ mm.) over a path difference of 1,000 minima in a much larger room. Ten observations with the prototype were reduced to yield a preliminary value for the free-space velocity of electromagnetic waves *in vacuo* of

$$c = 299{,}793.0 \pm 0.3 \text{ km. per second} \qquad (5)$$

Table II lists experimental values of c obtained for radio, microwaves and infrared radiation and, for comparison with these, the determinations with optical light by means of the geodimeter. Note that the modern determinations support the value $c = 299{,}793.0 \pm 0.3$ km. per second, as contrasted with the value about 17 km. per second lower which was thought in 1941 to be correct. *See* also ELECTRICITY: *Electromagnetic Waves;* LIGHT.

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LIGHTFOOT, JOSEPH BARBER (1828–1889), bishop of Durham and biblical critic famous for his work on the New Testament and Apostolic Fathers, was born on April 13, 1828, at Liverpool. He was educated at King Edward's school, Birmingham, where he became a devoted admirer of James Prince Lee, the headmaster. He entered Trinity college, Cambridge, in 1847, became senior classic and chancellor's medalist in 1851 and fellow in 1852. He was ordained in 1854. At the age of 34 he was appointed Hulsean professor of divinity. In 1871 he became canon of St. Paul's, having in the previous year refused nomination for the regius professorship in order that his former schoolfellow B. F. Westcott might obtain the post. The two professors undertook the bulk of the revision of the New Testament begun in 1870. In 1879, after some arduous work as a commissioner for university reform, Lightfoot was offered the see of Durham.

Lightfoot's work at Durham places him among the greatest of 19th-century Anglican bishops. He proved to be a magnificent administrator of his vast diocese, helping create the diocese of Newcastle in 1882; giving liberally to projects of church building; and entering enthusiastically into movements of social reform, especially the White Cross movement, inaugurated at Auckland in 1883. Above all, he is remembered for the Auckland brotherhood, the little group of ordinands who lived and studied with him at Auckland castle. He died in Bournemouth on Dec. 21, 1889.

Lightfoot's greatest work lay in the field of biblical exegesis. His commentaries on the Pauline Epistles—*Galatians* (1865), *Philippians* (1868), *Colossians and Philemon* (1875)—revealed an acute knowledge of Hellenistic Greek, breaking away from the tradition of reading these texts as if they had been written in the classical era. His studies of Clement of Rome (1869; revised in 1890) and Ignatius and Polycarp (1885) are still standard works. The revised edition of Clement was the first major work to be based on the newly recovered full text and, in his Ignatius, Lightfoot presented a formidable defense of the authenticity of the Ignatian epistles.

See G. R. Eden and F. C. Macdonald, *Lightfoot of Durham* (1932); A. C. Benson, *The Leaves of the Tree* (1911). (D. H. N.)

LIGHTHOUSES AND OTHER AIDS TO NAVIGATION. A lighthouse is essentially a structure from which a light is exhibited at night for the guidance of the mariner, and the earliest lighthouses were of this simple form. In fog, however, the light becomes obscured and fog (sound) signals were later introduced. Still later, radio beacons were installed at certain lighthouses as further supplementary aids to navigation for ships equipped with radio direction finders. Where a lighthouse cannot be erected at sea (for example, because of the depth of water) a floating light, either a light vessel or a lighted buoy, has to be moored to perform the function of a lighthouse. Seamarks, such as unlighted (blind) buoys, are complementary navigational aids and are also included in this article.

The several classes of lights include: main lighthouses, providing landfalls for shipping after sea crossings or marking dangerous rocks or shoals; major coastwise lights, marking headlands along coast lines; secondary lights, marking dangers on or near main shipping routes; buoys and beacons, defining estuaries and channel approaches to port and harbour entrances; and local and minor lights, defining the precincts of ports and harbours.

Light Range.—Two main factors governing the design of a lighthouse are the area to be covered by the light and the required range. The former fixes the position and the arc of visibility of the light, and the latter the height of the tower.

The geographical range of a light in clear weather depends on the height of the light and the height of the eye of the observer above sea level. The eye of an observer on the navigating bridge of a ship is assumed to be 15 ft. above sea level, and at this height the horizon is 4.44 mi. distant. The horizon range of a light 120 ft. above the water is 12.56 mi., and the effective geographical range of a light at this height is the sum of the two ranges, that is, 17 sea miles.

Most main lights are required to give as great a coverage as possible and are therefore elevated on a tower that itself serves as a daymark. Among the highest light towers in Europe are the Cordouan at the mouth of the Gironde (207 ft. above the rock) and the Kijkdun tower near Den Helder, Neth., which is 197 ft. tall. The tallest British towers are the Bishop rock (167 ft.) and the Eddystone (168 ft.). In the United States the tallest tower is one of the two towers at Cape Blanco (300 ft.) on the Pacific coast in Oregon, while Nevassa Island tower in the West Indies is 162 ft. In the Red sea the Sanganeb reef tower is 180 ft. high, while in the Persian gulf the North East Point (Jazirat Das) metal framework tower rises to 219 ft. The tower of Port Said high light (Egy.) is 193 ft. high. The highest towers in New Zealand and Australia are, respectively, Dog Island (118 ft.) and Cape Wickham on King Island, Bass strait (157 ft.). In India the height of Madras lighthouse tower is 190 ft., while in Japan a 200,000-candlepower light is mounted on top of a 456-ft. radio tower at Sendai (Honshu Island); this light has a range of 34 mi. and is used for both air and marine navigation. On islands or cliffs, however, a short tower is adequate; *e.g.,* the Barra head tower in the Hebrides, Scot., is 60 ft. but shows a light 683 ft. above sea level with a 33-mi. range in clear weather. Other examples of comparatively short towers situated well above sea level are at Tobago, West Indies (a 65-ft. tower with light at 1,295 ft.), Port Yaté, New Caledonia in the South Pacific (36-ft. tower with a 1,246-ft. light), and Deal Island, Austr., with a light exhibited at 1,000 ft. above sea level from a tower 73 ft. high.

Some lighthouses exhibit subsidiary or sector lights; *e.g.*, a red or green beam directed to indicate the position of a particular danger nearby, or a safe anchorage or channel.

Minor lighthouses of relatively low candlepower and range and with restricted arcs of visibility are normally adequate for local navigation; *i.e.*, in channels and the entrances to ports and harbours. One category is leading lights which project a narrow beam along a channel so that the mariner, by navigating to keep the beam visible, is kept in the centre of the channel. Where the small width of a channel demands, two leading lights are installed some distance apart on the centre line of the channel with the front light lower than the rear one. The mariner, by steering to keep these two range lights in line, can sail safely through the channel.

LIGHT-BEARING STRUCTURES

Early History.—While the Mediterranean volcanoes by their smoke and fires no doubt served as lighthouses to guide sailors from the earliest times, pharology, the science of lighthouse design and engineering, may be said to have had its origin in the Pharos of Alexandria (Egy.), a massive 400-ft. tower built about 280 B.C., on the summit of which a wood fire was kept burning. The Pharos of Alexandria was numbered among the Seven Wonders of the World (*q.v.; see* also ALEXANDRIA).

The customary design of lighthouses remained for centuries a solid masonry tower with a wood or coal fire, although oil lamps and candles enclosed within lanterns were used in the Mediterranean as early as the 12th century. The Romans constructed a number of lighthouses, *e.g.*, those at Ostia, Ravenna, Pozzuoli and Messina, and built the first lighthouses of western Europe at what are now Dover and Boulogne, after the conquest of Britain (A.D. 43), to assist in crossing the English channel.

These early lighthouses fell into general disuse, and while coal fires and candles were exhibited from about A.D. 1100 from monasteries and churches as a religious duty, mainly to aid local shipping, present lighthouse systems did not begin to take shape until the 16th century, when a great increase in international trade and shipping commenced.

In medieval times lighthouses were built in Italy at Meloria (1157), Leghorn (1304), Messina (1194) and Venice (1312), while the most famous of Italian lighthouses, the Lanterna of Genoa, lighted in 1544, dates from before 1161. A light in an octagonal tower was reported to have been seen by explorers in Turkey about 1550, and in Spain the tower of Corunna was shown on maps before 1600. In France, Dieppe had a light in 1389 and there was a light at Le Havre in 1540. The Roman tower at Boulogne appears to have been restored and used at various times until it collapsed in 1644, and a lighthouse existed on the islet of Cordouan off the entrance to the Gironde river before 1550.

In England, while small local lights are recorded at St. Catherines, Isle of Wight (1323), Spurn Point (1427) and Ilfracombe (1522) among other places, the first coastal light appears to have been a coal fire established at Tynemouth sometime after 1540. In Scotland lights existed at the harbour entrances to Aberdeen and Leith in the 16th century, while in Ireland a light is reputed to have been maintained by the monastery of St. Saviour Rendeuan about 1245.

In the 17th and 18th centuries numerous lighthouses were established around the coasts of Europe, including off the shores of Britain the Isle of May (1636), Eddystone (1698) and St. Agnes, Scilly Isles (1680). The last-named is still maintained as a daymark. In Sweden lights established in this period included Landsort (1669) and Djursten (1767); in Germany new lights included Wangerooge (1602) and Heligoland (1630).

The first American lighthouse was established on Little Brewster Island off Boston, Mass., in 1716, using oil as an illuminant, and the second is accepted to be Brant point lighthouse, a wooden structure at the entrance to Nantucket harbour, Mass. (1746). Further lights included those at Beavertail, near the entrance to Newport harbour, R.I. (1749), New London, Conn. (1761), Sandy Hook, N.J. (1764) and Cape Henlopen, Pa. (1765; now Delaware). The early American lighthouses were mostly constructed of timber, and the illuminants were simple oil lamps, without chimneys, mirrors or lenses. By 1820 the number of U.S. lighthouses was in excess of 50, while the number in the 1960s, major and minor, is in the region of 10,000.

The first Canadian lighthouse was probably the tower built about 1740 at Louisburg on Cape Breton Island, and this was followed by lights at Sambro Island (1758), Cape Roseway (1788) and Scatari, Cape Breton Island (pre-1777), all in Nova Scotia.

Masonry Structures.—No particular difficulties arise in the building of lighthouses on shore, and these consequently are the more numerous. Shore stations are built to resist high winds and usually consist of a cylindrical or octagonal tower, with a straight taper, surmounted by a gallery and a lantern enclosing the lighting apparatus. Below the lantern is the watch room; living accommodations usually are provided in a separate building.

Offshore lighthouses, however, which are sited at dangerous rocks and reefs must be built to withstand the tremendous wave forces encountered at exposed positions at sea. The first such "rock" tower was completed on the Eddystone rocks 13 mi. off Plymouth in the English channel by Henry Winstanley in 1698. This structure, which was made wholly of timber, disappeared together with its designer and his men in a severe storm in Nov. 1703. The second lighthouse to mark the Eddystone rocks was designed by a silk mercer named John Rudyerd. This structure was built of oak and iron, the bottom being filled in with 500 tons of granite. Completed in 1708, it was destroyed by fire in 1755.

The next Eddystone lighthouse, completed in 1759, was designed by John Smeaton, a civil engineer and fellow of the Royal society. Smeaton's tower was entirely of stone, each dovetailed into its neighbour to give the whole structure immense strength. This method of interlocking the stones became the standard practice in the construction of later wave-swept towers, including the present Eddystone structure.

When the rocks on which Smeaton's tower stood began to show signs of breaking up, the upper portion of the tower was moved to Plymouth Hoe (where it still stands as a memorial), and a new tower designed by Sir James N. Douglass, the engineer-in-chief of Trinity house, was completed on nearby rocks in 1881. In this fourth tower all the stones were dovetailed into one another on all faces, a development of the method used by Smeaton, and the tower itself rises from a solid cylindrical base. This provides a vertical wall against which the sea can break its force and be thrown back, rather than run up and around the tower itself.

(LEFT) F. E. GIBSON; (RIGHT) ACE DISTRIBUTORS LTD.

TWO ENGLISH LIGHTHOUSES: (LEFT) BISHOP ROCK LIGHT IN THE SCILLY ISLES, AN EXAMPLE OF WAVE-SWEPT MASONRY STRUCTURE; (RIGHT) DUNGENESS LIGHT, AN EXAMPLE OF A SHORE STATION

The Bell rock lighthouse, another of the world's most famous lighthouses, completed in 1811 after four years' work on the Bell or Inchcape rock, was the first lighthouse to be established in Scotland on an isolated site. Its builder, Robert Stevenson, one of a famous family of Scottish lighthouse engineers, modeled it generally on the lines of Smeaton's Eddystone, but incorporated certain improvements.

Other examples of wave-swept masonry structures are: in the United States, the Minots Ledge light on the Cohasset rocks, Boston, Mass.; The Graves, Boston bay; and Mile rocks, San Francisco; in Germany, the Rothersand lighthouse at the entrance to the Weser river; in Ceylon, the Little and the Great Basses lights; and in India, the Prongs reef lighthouse, Bombay.

Concrete Structures.—A novel method of construction was used in the building in 1960 of a new lighthouse at Dungeness on the southeast coast of England. The new tower rises 130 ft. from a white concrete base which takes the form of a spiral ramp enclosing the machinery, apparatus and control rooms. The tower is constructed from 21 precast concrete rings 5 ft. high, 6 in. thick and 12 ft. in diameter. The rings interlock with one another, top and bottom, and are equipped with a series of peripheral holes through which steel prestressing wires run from the top of the tower to the bottom, where they are anchored, under tension, in concrete blocks. Use of the prestressing wires gives the thin-walled, slender tower the necessary strength to withstand the most extreme lateral forces and eliminates the need for a heavier and more massive structure.

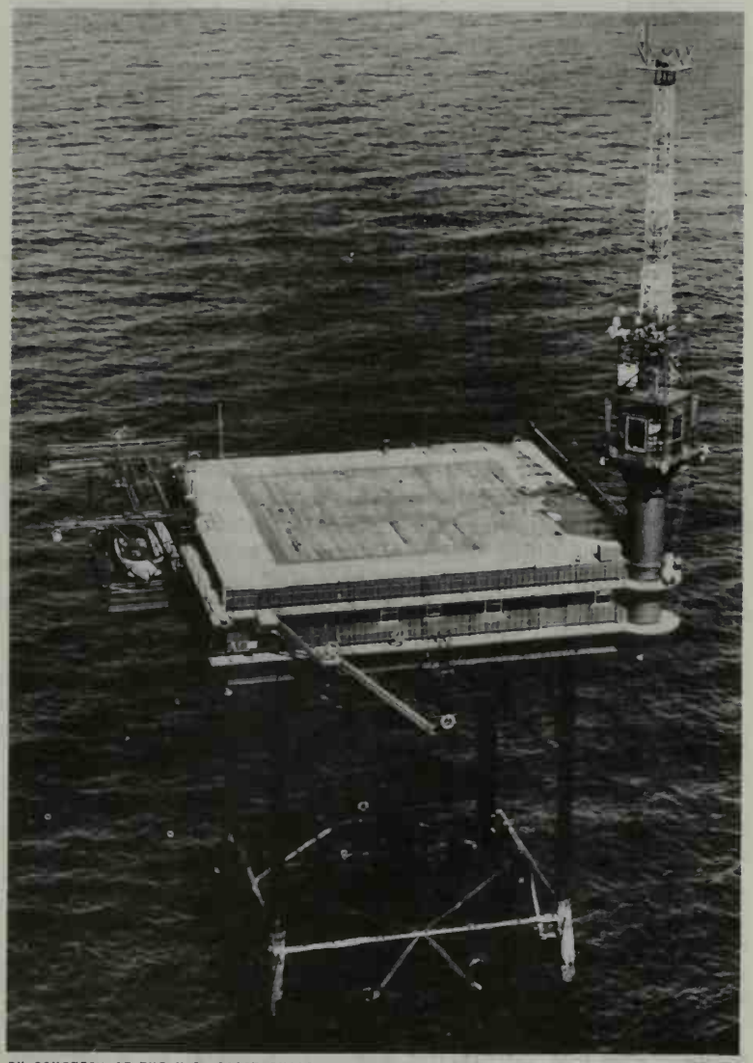
The two top rings of the tower are cast with a honeycomb of 60 apertures to house the emitters of an electric fog signal, and above these the tower widens to accommodate the lantern gallery. The black and white bands which make the tower a distinctive daytime seamark are achieved by the use of coloured cement in the manufacture of the concrete.

Openwork Pile Structures.—Traditionally lighthouses were built either on land or on solid rock foundations in the sea. In 1838, however, a lighthouse (the Maplin sands) was established in the Thames estuary, Eng., on a sandy sea bed; the structure containing the lantern and keepers' quarters was supported on iron piles screwed into the sand. The first of its kind, it formed the pattern for many similar structures (*e.g.*, Alligator reef and American shoal lights off the coast of Florida) on shoals, coral reefs and sandbanks where the sea bed may be insecure. The Maplin lighthouse was washed away in 1932 when it became undermined because of changes in the sandbanks on which it was built.

In the United States in the 1960s a construction program commenced to replace light vessels by offshore light structures to take advantage of reduced capital and maintenance costs, greater light range and more accurate position of the seamark. The first two such structures were completed in 1961 and replaced the Buzzard's bay, Mass., and Brenton reef, R.I., light vessels, respectively. Four-legged open steelwork "template" structures were used for both stations.

In the case of the Buzzard's bay light, the wrought iron template or jacket (the underwater section of the substructure) is $82\frac{1}{2}$ ft. in overall height, 50 ft. square at the top and 60 ft. square at the bottom, and projects $13\frac{1}{2}$ ft. above mean low water. The main legs consist of 33-in. steel pipes, trussed with steel pipes 10 to 18 in. in diameter to increase rigidity. Thirty-inch steel pipe piles were driven through the main legs to bedrock at about 268 ft. below mean low water. Thirty-inch steel pipe legs continue vertically upward 51 ft. from the top of the template to support a 70 × 70-ft. superstructure providing living quarters for five men, and containing the machinery room and fuel and water supply. A helicopter landing area is provided on the top deck. The overall dimension from the top of the light tower to the bottom of the piling at bedrock is 438 ft. A light of 10,000,000 candlepower is visible over a 16-mi. range; the fog signal has an audible range of 5 mi. and the radio beacon a reliable average range of 100 mi.

The Brenton reef structure, while constructed on the same lines as that at Buzzard's bay, is considerably smaller and is unmanned except in emergency. The superstructure, 30 ft. square, houses generators, compressors, fuel and water tanks, and emergency accommodation for two men. The main power source is commercial electricity via 15,000 ft. of submarine cable. There is a standby engine-generator to provide current in the event of damage to the cable. The light has over 15 mi. geographical range; the fog signal, radio-controlled from shore, has an audible range of 3 mi. and the radio beacon a reliable average range of 10 mi.



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AN EXAMPLE OF OPENWORK STRUCTURE IN THE LIGHTHOUSE IN BUZZARD'S BAY, MASS.

Caisson Foundations.—Cylinder or caisson foundations have been used in many cases where lighthouse towers have been erected on shoals or sandbanks.

The first example of such construction was the Rothersand lighthouse off the entrance to the Weser river, Ger., where the tower had to be erected on shifting sand 20 ft. below low water in an exposed position. A caisson was first sunk in 1881 at a level of 70 ft. below low-water mark, despite difficulties encountered with the shifting bottom, but the whole structure later collapsed. In 1883 another attempt with a modified type of caisson was successful, and the structure was sunk to a depth of 73 ft. below low water. The sand was pumped from the interior of the caisson foundation, which was surrounded with 74,000 cu.yd. of brushwood mattress work and stones and filled with concrete. The lighthouse was completed in 1885 with the construction of the light tower, a round iron structure from which was exhibited an electric light supplied with current by cable from the shore.

Fourteen Fathom bank in Delaware bay (1885–87) and Wolf Trap in Chesapeake bay (1893–94) are other early examples of lighthouses built on caisson foundations.

Commencing in the 1950s, a number of lighthouses were established off the coasts of Scandinavia using caisson foundations but employing modern materials and using up-to-date techniques evolved in Sweden. The caissons, made of concrete, were floated out to their sea positions and sunk onto leveled and prepared seabed sites. The extensive use of prefabricated units enabled the

tower structures to be erected, equipped with navigational aids, and brought rapidly into operation.

Among the lighthouses erected using these techniques are Storbränningen (1956) in the Gulf of Bothnia, Argos Grund (1957) in the south of the Bothnian sea, and three lights placed in the waters between Denmark and Sweden: Oskarsgrundet N.E. (1961), Kalkgrundet (1961) and Oskarsgrundet S.W. (1962). To meet special future requirements these last three structures were so constructed as to be capable of being moved to other positions, the caissons being provided with openings to enable sand and water to be pumped out and the structures refloated, then towed to and sunk at the new sites.

The telescopic principle, representing another substantial technical advance, was employed for the first time in building the Grundkallen lighthouse off the coast of Sweden, completed in 1959. Two closed-bottom concrete caissons were built, one inside the other, the outer being the foundation caisson and the inner the tower or telescopic caisson. This caisson set was towed to site, and after bedding down on the rock sea bed which had been leveled by blasting and filling with macadam, the telescopic caisson was raised up from within the outer caisson to form the light tower, by pumping in water, and was fixed in position by casting it onto the outer caisson. The space between the two caissons was filled with pebble gravel injected with cement mortar.

This telescopic method was used for the Revengegrundet lighthouse, placed 40 mi. from Stockholm, Swed., in 1961. However, the caisson set in this case consisted of three parts: the telescopic tower weighing 70 metric tons, the telescopic shaft weighing 65 metric tons and the bottom part of the supporting caisson weighing 145 metric tons. The building work commenced in Jan. 1961 and the caisson set, complete with lantern and lighting equipment, was towed to site four months later; the lighthouse, equipped with electric main light, Dalén standby light and electric fog signal, was completed and in operation in July 1961. It is unmanned and controlled from a pilot station 4 mi. distant.

Lighthouse Manning.—Shore lighthouses in Great Britain equipped with fog signals usually have a complement of three keepers who live with their families in dwellings at or near the lighthouse and take turns in keeping watch, day and night. At isolated "rock" lighthouses there are usually four keepers of whom three are always on the rock while the fourth is ashore on leave. In the United States each manned lighthouse is normally staffed by three keepers, and the manning is similar in most other lighthouse services.

Unattended Lighthouses.—While there were several forms of automatic lighting equipment in the late 19th century, the invention of the Dalén acetylene gas flashing apparatus (*see* below) early in the 20th century made possible the modern automatic unattended lighthouses, and the development of the electric filament lamp and the availability of commercially generated electricity led greatly to their increase. Until the early 1950s unattended operation had been used for minor lighthouses only, but at about this time research and development with remote control by radio link or landline enabled major lighthouses with fog signals and radio beacons to be made fully automatic.

Unmanned lights are lit at dusk and extinguished at sunrise by the operation of sun valves or time switches. Electric lights are equipped with automatic lamp changers so that when an electric lamp fails, a spare lamp is brought into focus and lit in its place; in some installations standby acetylene lighting is brought into operation automatically in the event of an electric supply failure.

Since 1953 the Kalbadagrund lighthouse in the Gulf of Finland has operated under remote control and supervision by radio link from a distance of 20 mi. The light is controlled by a sun valve, and the electric fog signal is switched on and off by radio, according to visibility at the control station. The radio beacon operates continuously. Electricity for the light, fog signal, radio beacon and the remote control system is generated at the lighthouse by four main and stand-by diesel generating sets, which start up and shut down automatically according to the needs of the station for electric current. Should faults occur in any of the navigational aids or associated machinery and equipment, indications are received automatically at the control station. Other automatic lighthouses are Dungeness, Eng. (1960); Hallgrund, Gulf of Bothnia (1952–53); Kunsgrundet, Baltic sea (1957); and Hangklip, S. Af. (1960).

BY COURTESY OF THE U.S. COAST GUARD

"AMBROSE" LIGHTSHIP, STATIONED AT THE ENTRANCE OF NEW YORK HARBOUR

Light Vessels.—Light vessels are placed in positions where, owing to depth of water, the nature of the sea bed or other local reason, it is not practicable to maintain a lighthouse. The first light vessel was the "Nore," which was stationed in the Thames estuary in 1732, soon to be followed by further vessels stationed off the east coast of England and near the Goodwin sands. Light vessels were introduced in the United States in 1820. The early light vessels were usually small converted sailing ships, and the light consisted of a number of candles in a lantern hoisted to the masthead. Soon, however, light vessels began to be built as such, and the design has progressively improved.

In Canada, the U.S., Germany and other countries, modern light vessels are equipped with propelling machinery so that they may move under their own power. This is useful where severe weather (hurricanes) is met with, or when seasonal ice closes shipping routes and light vessels return to port. In Great Britain and some other countries, however, light vessels have no propulsion machinery and are towed to and from stations as necessary.

A typical modern light vessel, manned by a master and six crew members, is a two-masted steel ship of over-all length of 130 ft., breadth 26 ft. and draft of 12 ft., exhibiting a light at about 40 ft. above the water line from a steel tower amidships, and having a compressed air (diaphone) fog signal. In some cases a radio beacon is installed, and in every light vessel there is a radiotelephone for communication with the shore and with the relief tender.

A 4-ton anchor and $1\frac{3}{4}$-in. stud-link cable is used to moor the vessel on station, and two smaller anchors stowed with quick-release gear are used as standby safeguards should the vessel break adrift or drag her main anchor. The electrical power for the ship and the navigational light, etc., is supplied from two $5\frac{1}{2}$-kw. and two 10-kw. diesel generators. Where there are engines, these are frequently dual purpose, providing power for signaling devices when on station, or propelling the ship. Compressed air for the fog signal is supplied by two diesel-driven air-compressing sets.

The navigational light is of the revolving multicatoptric type (*see* below), consisting of a number of electric filament lamps each placed at the focus of a mirror, the whole optical system being revolved by electric motors to produce a flashing character. Because a light vessel rolls and pitches, provision is made to keep the light beams horizontal: the optical apparatus is mounted on a pendulum-balanced table, and the whole assembly is carried in gimbals and is free to swing. The candle power of the light is 1,220,000, and the range is 11 mi. in clear weather.

For day recognition the names of light vessels are painted in large letters on both sides of the hull.

Both in Europe and in America light vessels are declining in

numbers, largely because of the high cost of building and maintaining them. Another disadvantage is that they must be anchored with a slack cable and are therefore never exactly on the same spot. Furthermore, lightships have to be withdrawn from some icebound waters in hard winters. They are being replaced by light towers or by large lighted bell buoys; new techniques enable light towers to be built in hitherto impossible positions.

Unmanned light vessels are sometimes placed to mark isolated dangers, or as aids to navigation where the volume of shipping does not warrant the expense of a manned light vessel. They are much smaller than manned light vessels and are equipped with automatic acetylene or electric flashing lights, and often with an automatic bell fog signal (*see* below).

ILLUMINANTS AND OPTICAL APPARATUS

Wood or coal fires in braziers on top of the tower were the most common lighthouse illuminants until well into the 18th century, although simple oil lamps and candles sheltered in lanterns were used in the Mediterranean as early as the 12th century. Clusters of candles were the illuminant in the first three Eddystone lighthouses, since coal fires in these towers would have been impracticable. Smeaton used 24 candles in a two-tier arrangement in the third Eddystone tower (1759).

Liquid-Fuel and Gas Lights.—*Argand Burner.*—Aimé Argand, a Swiss engineer, invented in 1784 the first oil burner suitable for lighthouse illumination. Oil was burned from a circular hollow wick in a glass chimney, with a current of air passing up through the centre of the wick. The Argand burner was the subject of a number of improvements, including the addition of concentric wicks until the number in some cases reached as many as ten. Fish oil, vegetable oil and mineral oil supplanted one another in Argand wick lamps, which in one form or another remained as the main lighthouse illuminant for over 100 years.

Kitson and Hood Burners.—In 1901 Arthur Kitson invented a burner in which the oil, instead of being vaporized at the wick and burned as an open flame, was vaporized in a container and then mixed with air to form an inflammable gas, which was burned in an incandescent mantle. The container in which the oil was vaporized consisted of a coiled copper tube placed above the mantle. The coil was heated by blow lamp until the system was working, after which the mantle itself gave the necessary heat to maintain a supply of oil vapour.

Kitson's burner produced three times the light of former wick-burner lamps. The system was adapted and redesigned in later years to make it more suitable for lighthouse purposes, until finally in 1921 a simpler design using the same principles was evolved by David Hood. Used with an improved type of incandescent mantle, the Hood petroleum vapour burner is still the accepted form of illuminant at lighthouses where lighting by electricity is impracticable.

Dissolved Acetylene Gas.—For unwatched lights where electricity is not available, the normal illuminant is dissolved acetylene gas. The gas is contained under pressure in cylinders and burned in conjunction with a flashing apparatus of the type invented by Nils Gustav Dalén (*q.v.*), a Swedish engineer, in 1906. The gas is burned either as an open flame or in an incandescent mantle. Such unattended acetylene lights are automatically controlled by sun valves (also invented by Dalén) or time switches which open the gas supply to the light at sunset and close it at sunrise. Installations of this type are economical in gas consumption and can operate for many months without recharging.

Electric Lights.—Electricity was first used as a lighthouse illuminant by Great Britain, in 1862, when electric carbon arc lamps were installed at Dungeness lighthouse following the experimental installation of electric arc lamps at South Foreland lighthouse in 1858. The current was generated by magneto machines driven by steam engines. The Dungeness light reverted to oil 13 years later because the lens system there proved too small for the electric system, and although several other lighthouses were later equipped to use electric arc lights, electricity did not begin to come into general use until the early 1920s, when high-power filament lamps were employed.

The first British lighthouse to use electric filament lamps was South Foreland, which in 1922 was equipped with a 4-kw. lamp. Since that time numerous lighthouses both major and minor have been converted from oil to electricity, either using commercially generated current or obtaining power from diesel generator sets, and the trend toward wider use of electricity continues.

Xenon High-Pressure Arc Lamps.—A xenon high-pressure arc discharge lamp originally designed for colour motion-picture projection was adapted for lighthouse use by Great Britain in 1961. A powerful electric arc maintained in a small quartz bulb containing inert gas under pressure is a very efficient device for converting electrical energy into light. The small point light source enables a small optical system to be used, and at Dungeness the lamp, which is flashed on and off to give the desired character, is contained in a simple fixed drum lens of only 500 mm. diameter. The intensity of the light from this small optical system is about 300,000 candlepower, which is about the same as is obtained from the older, larger and more expensive rotating optical systems. As a further application of the xenon lamp, trials were in progress in 1963 with a continuously burning lamp in a small rotating optic of about 12 in. diameter, giving an intensity of 500,000 candlepower with a 500-watt lamp and about 4,000,000 candlepower with a 2-kw. lamp.

Mercury Arc Lamps.—One of the most modern American lighthouses, on Oak Island, N.C., uses a novel optical apparatus incorporating mercury arc lamps and including two lighting systems, one of high and the other of low intensity. Each system consists of four commercial type searchlights, and both systems revolve on the same shaft, driven by electric motors.

The low-intensity system consists of 1-kw. electric filament lamps in four 24-in. searchlights giving 1,400,000 effective candlepower, and this system operates when visibility is such that a small monitor light 4 mi. distant can be seen from the lighthouse. When the monitor light becomes invisible from the lighthouse, the high-intensity system is brought into operation. This system consists of 2.5-kw. mercury short-arc lamps in four 36-in. searchlights giving an effective fixed-intensity beam candlepower of 14,000,000. The light exhibits a character of four quick flashes each of .04 sec. duration, spaced one second apart and repeated every ten seconds. The low-intensity light is used about 88% of the time, and the high-intensity beam is capable of ensuring that the light is visible from 19 mi., the geographical range, for about 95% of the time.

Research on New Light Sources.—Solar energy as a possible source of power for lighthouses and for lights with small power requirements, such as lighted buoys, became the subject of research in Japan, Germany, Great Britain and the United States in the 1960s. An experimental low-intensity light using electrical power obtained from batteries of solar cells was established in a specially built lighthouse on an islet in the Japanese Inland sea.

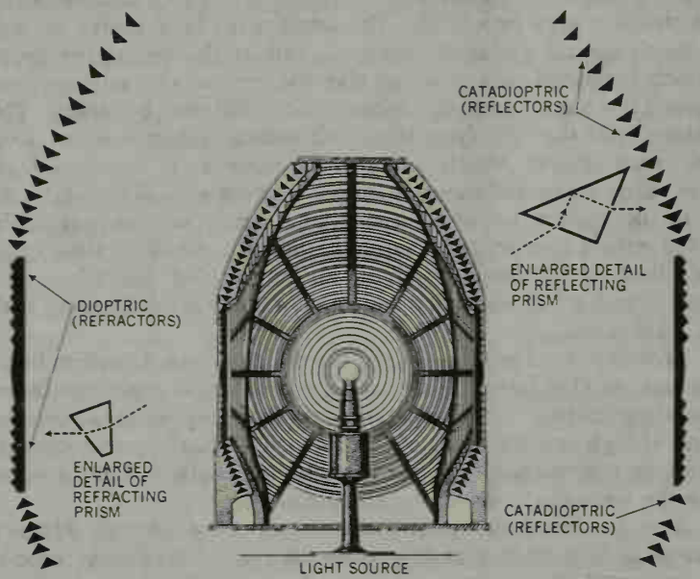
Reflectors and Refractors.—In common lighthouse practice, a system utilizing the simple laws of reflection is called a catoptric system; one using the laws of refraction is called a dioptric system, while one employing the laws of both refraction and reflection in glass is termed catadioptric.

Catoptric Systems.—As early as 1763 in England the flat-wick, oil-burning lamps in Merseyside lighthouses were fitted with crude reflectors, but with the introduction of Argand's improved circular-wick burner, parabolic metal reflectors were placed behind the lamp to concentrate the light in a pencil beam. The catoptric system is still used in the revolving optics of light vessels.

Dioptric and Catadioptric Systems.—The next great advance in the development of lighthouse illuminating apparatus occurred in 1822 when Augustin Fresnel (*q.v.*), a French physicist, made use of the refractive properties of glass to produce light beams. He designed an annular lens panel consisting of a central lens ("bull's eye") with concentric prismatic rings assembled around it. Each succeeding ring was ground to the profile of the outer part of a lens having the same diameter and aperture as the ring and the same focal length as the central lens. When an illuminant was placed at the common focus of such a lens panel, a concentrated beam of light was projected. Fresnel mounted a number of such

panels on a carriage which revolved around an oil-wick burner, and so produced the first flashing light with a steady light source.

To meet the need for a steady all-round beam of light, Fresnel then constructed a cylindrical (drum) lens in which the central lens section was shaped as a continuous horizontal belt or drum, and all prism segments above and below it were cylindrical rings parallel with it, so that the light beam was a pillar of light visible at equal strength all round the horizon. Fresnel's drum lens is commonly used in minor lighthouses in conjunction with a flashing light source.



PRINCIPAL PARTS OF THE FRESNEL CATADIOPTRIC

In order to collect all the useful rays of light in the vertical plane, Fresnel first added above and below his lens panel silvered glass mirrors in conjunction with small lenses. Later, however, the principles of internal reflection in prisms came to be understood, and triangular upper and lower prisms were then added whereby the light rays were both refracted and internally reflected, thus steepening the angle of incidence at which the rays could be collected, and made to emerge horizontally, parallel to those of the lens panel beam. The principles of Fresnel's lens systems continue to be used in modern lighthouses.

SIGNALING SYSTEMS

Radio Signals.—Radio beacons are maintained at many lighthouses (and on light vessels) as additional navigational aids for vessels fitted with radio direction finders. Each radio beacon transmits radio signals comprising Morse identification letters and a long steady note to enable ships to take a bearing. By obtaining bearings on two or more stations a vessel can ascertain its position with an accuracy of about 0.5 mi. at 50 mi. range.

The beacons are arranged in groups of up to six which transmit on the same channel on a time-shared basis; thus in a six-beacon group each beacon transmits for one minute and is silent for five. This method of operation demands a high degree of accuracy from the timing mechanism to avoid overlap, and developments in electronic engineering have been applied to produce electronic clock coders capable of an accuracy to within one second per week, to replace chronometers, pendulum clocks and electromechanical coders used in radio beacon systems. (*See* NAVIGATION: *Electronic Aids Common to Marine and Air Navigation* and *Electronic Aids for Marine Use*).

Radio beacons in northwest Europe are sited and operate by international agreement under the 1951 Paris Regional arrangement. Most European stations operate in both clear weather and fog, while in America they operate for two ten-minute periods each hour in clear weather and continuously in periods of reduced visibility.

Sound Signals.—The earliest fog signals were manually sounded bells and gongs. These were succeeded by explosive signals, normally 4-oz. charges suspended from a jib arm off the lantern gallery and exploded by electric detonators. The main disadvantage of the explosive fog signal is its infrequency, usually one report every 5 min., and this type is rapidly being replaced by compressed air signals and, particularly, by the electric signal.

Compressed air signals are generally either sirens or diaphones, the former comprising a rotor and stator and the latter, a Canadian invention, a reciprocating piston and cylinder. Slots or ports in the rotor or piston correspond with similar ports in the stator or cylinder, allowing pulses of air to pass through at a rate regulated by the rotor or piston speed. Each type is fitted with a horn or resonator designed to distribute the sound either in a particular direction or, as in the case of some off-shore lighthouses, to give an all-round signal. The diaphone, the more powerful of the two types, can be readily distinguished by the grunt with which its signal terminates. Ranges of up to 9 mi. can be obtained from large-size diaphones.

The tyfon, a compressed-air fog signal developed in Sweden, has a vibrating diaphragm and emits a powerful, medium-pitched note similar to a ship's fog signal. It is most economical in compressed air consumption, and its compressing plant, smaller than that for siren or diaphone, requires comparatively little room. For this reason it is particularly suitable for lighthouses where space is limited.

An electric fog signal consists of a diaphragm or series of diaphragms vibrated by an alternating current at a frequency chosen to give the most audible note. The sound from each diaphragm is distributed by a horn or resonator. A number of such emitter units, similar to those employed in public address systems, may be arranged in a stack somewhat like the cells of a honeycomb. By arranging the emitter units one above the other, spaced half a wave length apart, the sound can be concentrated into a beam with a minimum of vertical dissipation. The width of the beam in the horizontal direction is determined by the arrangement of the vertical columns of emittors around the horizontal arc.

In some locations, fog signals are operated automatically, and some form of fog detector must be used. A fog detector invented and used in Great Britain employs the principle of the back scattering of light which occurs in mist or fog, and by means of optical and electronic techniques is capable of switching the fog signal on and off as visibility falls below and rises above a predetermined limit. This fog detector is a self-contained unit, but there are other types, one of which is made in Germany, which require the projection toward them of a beam of light from a distant point.

Light and Fog Signal Characteristics.—The development of catoptric and dioptric systems with revolving optics enabled lights, which earlier had been fixed, to be given distinguishing characters (periods of light and eclipse) so that each light could be identified by the mariner by reference to published light lists and charts.

There are five basic types of light characters: (1) fixed—showing a continuous light; (2) flashing—with periods of darkness longer than flashes of light; (3) group flashing—with a group of two or more flashes at regular intervals; (4) occulting—with periods of light as long as the dark periods, or longer; (5) group occulting—with groups of two or more periods of light followed by equal or shorter periods of darkness at regular intervals. Characters are assigned to all lights exhibited from lighthouses, light vessels and lighted buoys, and distinctive codes are similarly given to fog signals at lighthouses and on light vessels.

BUOYS AND BEACONS

The earliest seamarks were no doubt beacons, either cairns of stones or wooden spars erected ashore, or rocks and sandbanks, and buoys made of wood and anchored by rope. Present-day beacons may be masonry or steel structures and are sometimes erected not primarily as seamarks themselves but as reference points for the accurate positioning of buoys, where natural marks do not exist. Buoys are generally constructed of wrought iron or mild steel, although in the 1960s lighthouse authorities began to experiment with navigational buoys made of fibreglass.

No standard buoyage systems existed before 1882 when, as a result of an international conference, a uniform system was laid

down which dealt with colours, shapes and sizes of buoys. Under the auspices of the League of Nations an international agreement was completed in May 1937 which laid down two uniform buoyage systems, the cardinal and the lateral, and these systems, or variations or combinations of them, are in general use throughout the world.

In the cardinal system, which is in force largely in the Baltic and is also used by France, the colour, shape and topmark of a buoy broadly indicate the compass bearing of the danger from the buoy. In the lateral system, buoys are laid out along shipping channels, the colour, shape and the character of lights of buoys indicating how the buoys should be passed by shipping; *i.e.,* to port, to starboard or on either side for safe navigation through the channels. The lateral system is used throughout Great Britain and forms of it are used in Canada, the United States and South America.

Unlighted buoys are by far the most numerous. In the United States buoys of three different above-water shapes are used: nun buoys, which are triangular in silhouette; can buoys, which are rectangular in silhouette; and spar buoys, which appear as a slightly tapered elongated cylinder. Port-hand buoys are black, starboard-hand buoys are red, and mid-channel buoys (which may be passed on either side) are painted in alternate black and red horizontal stripes. In Great Britain starboard-hand buoys are conical and black, port-hand buoys are can-shaped and red, and middle-ground buoys are spherical with either red and white or black and white horizontal stripes, depending on which side the main channel lies. Buoys marking wrecks are always painted green and, if lighted, show a green light. Around the European continent spherical buoys with a domed top, pillar buoys with a tall centre structure rising from the floating body and topmark buoys surmounted by a shape of directional significance, are used.

The first lighted buoy was laid in the Thames estuary in 1880. Standard lighted buoys in Great Britain burn acetylene gas in 200-mm. open-flame burners, giving an intensity of about 100 candelas, and can operate for 18 months from a pair of acetylene cylinders. In some European countries propane gas is used, while in Canada and the United States both battery-operated electric and acetylene-gas buoy lights are in service. Electrically lit buoys were introduced in the United States in 1930 and by the 1960s over half of the gas buoy lights had been replaced.

High-focal-plane lighted buoys are placed at the more important buoy stations and provide a service approaching that of a light vessel. From such buoys the light is exhibited at a height of some 20 ft., thus giving a visibility range much greater than that of a standard lighted buoy, and either a wave-actuated bell (or whistle) or an automatic bell signal is installed. The latter is operated by carbonic-acid gas pressure and is heard even in a dead calm sea, when a wave-operated bell would be silent. The automatic bell is coded to give an identifiable character; *e.g.,* one stroke every 20, 30 or 40 sec.

The use of radar as an aid to navigation has led to the fitting of many buoys (and occasionally other seamarks) with radar reflectors. These are of metal and so shaped as to increase the radar response in every direction. They enable the buoy to be picked up at greater range on ships' radar screens.

Increasing use is made of reflective material on buoys, enabling them to be more easily seen by day in poor visibility and, in the case of unlighted buoys, more easily located at night with the use of ships' searchlights.

ADMINISTRATION

The principal maritime countries have central authorities for the installation and maintenance of coast lights and fog signals, buoys and beacons. In Canada the lighthouse service is maintained by the ministry of marine, and in the United States it is one of the responsibilities of the coast guard. The French lighthouse and beacon service is part of the ministry of public works and transportation, and in the German Federal Republic the federal ministry of transport controls navigational aids. The maritime safety board under the jurisdiction of the ministry of transport is responsible for the lighthouse service in Japan. In India the responsible government organization is the department of lighthouses and lightships. The coastal lights of Australia were taken over from the various states by the government (commonwealth lighthouse service) in 1911, but local lights (*i.e.,* in harbours and rivers) remain under states' control. In Great Britain the coastal lights are maintained by three general lighthouse authorities; *i.e.,* Trinity house, London (England and Wales), the commissioners of northern lighthouses (Scotland) and the commissioners of Irish lights. Trinity house also has statutory control over local lights in England and Wales, and certain jurisdiction over the coastal lights of Scotland and Ireland.

In nearly all countries the lighthouse services are maintained from government funds raised by taxes. In Great Britain, however, the lighthouse services are maintained from the General Lighthouse fund, a self-supporting fund managed by the ministry of transport, which derives its revenue from light dues charged on British and foreign shipping using British ports.

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(A. R. W. R.)

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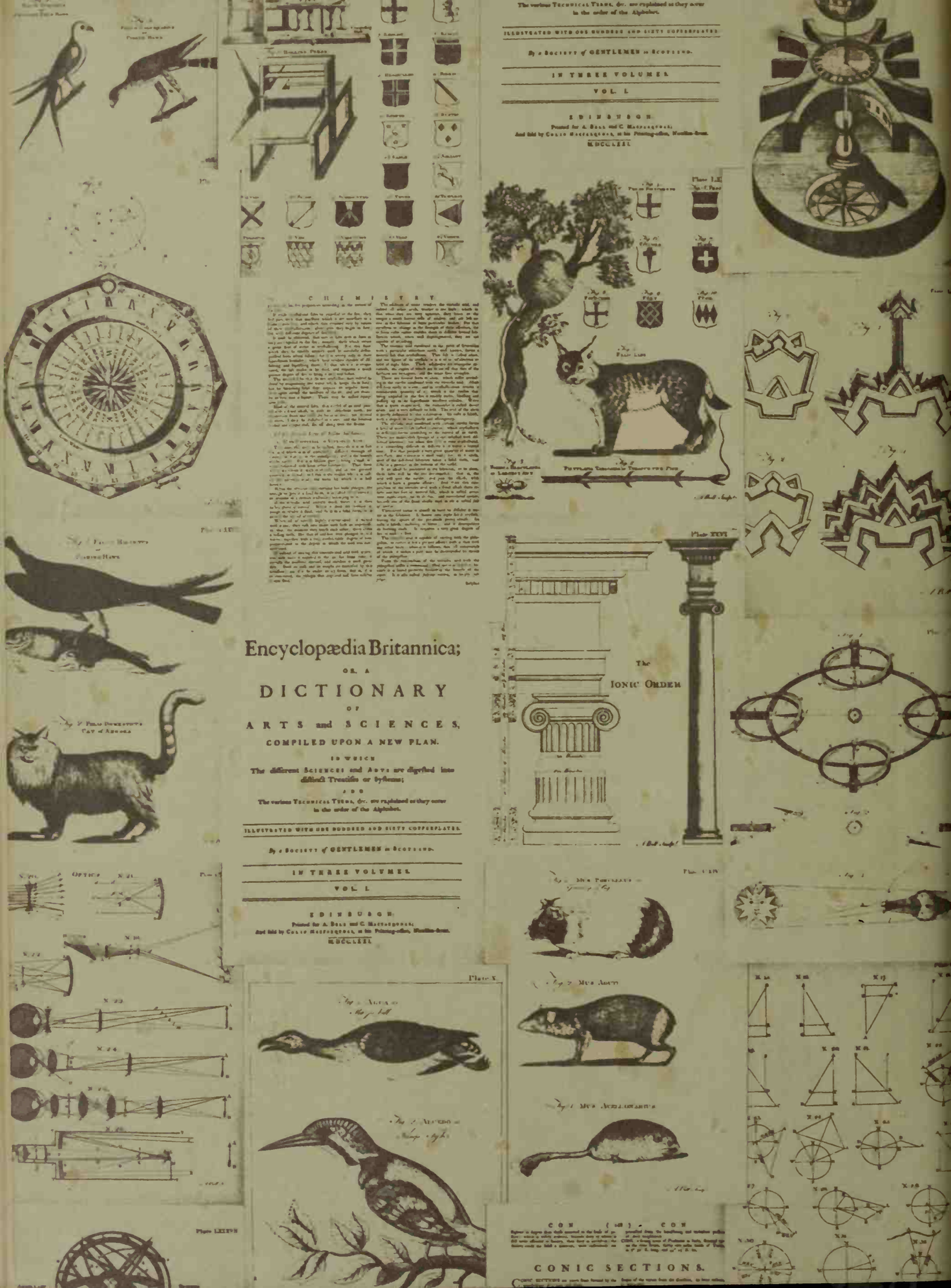

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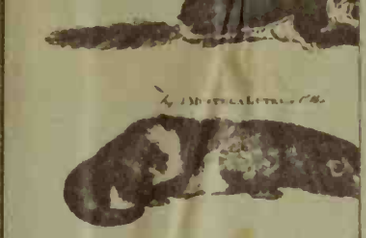

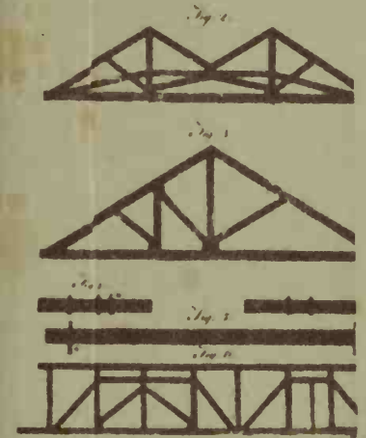

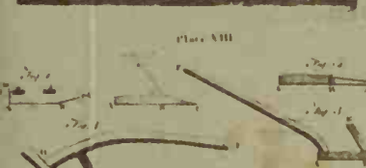

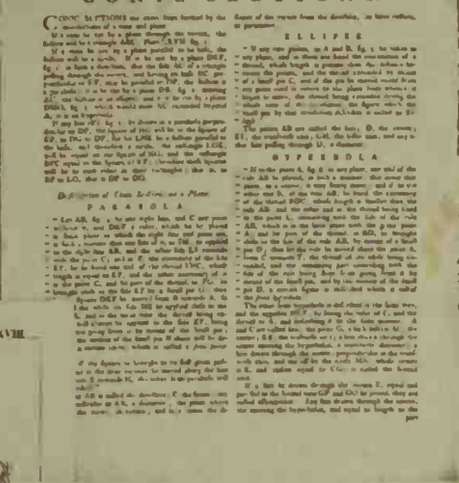

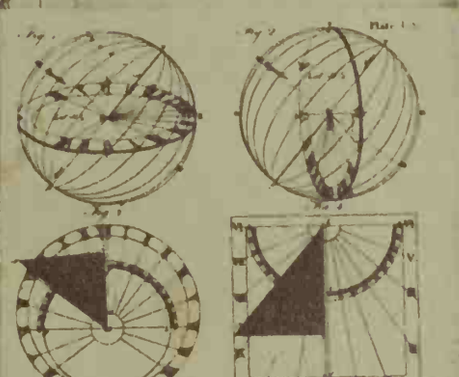

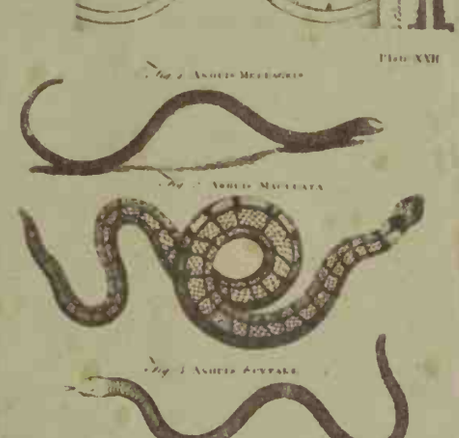

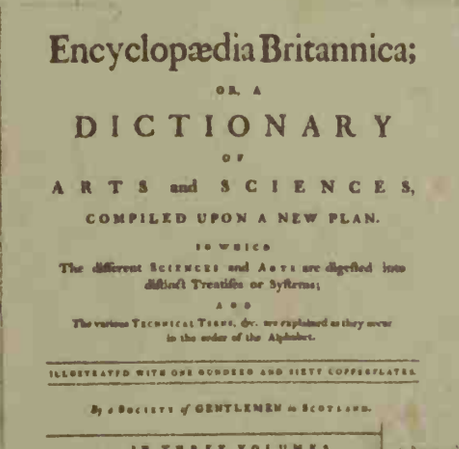

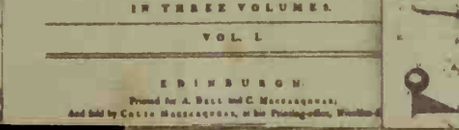

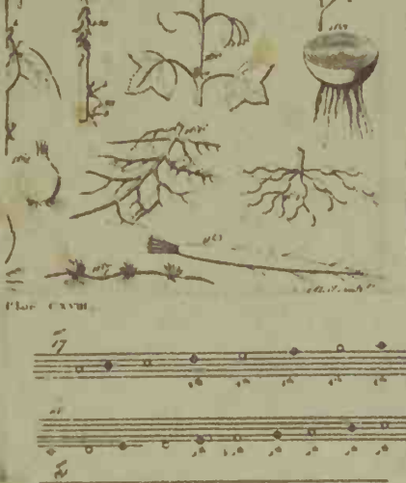

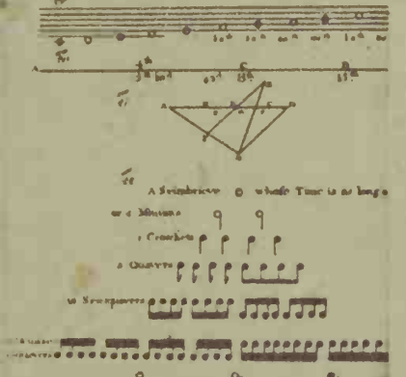

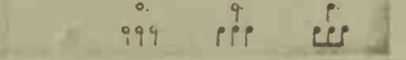

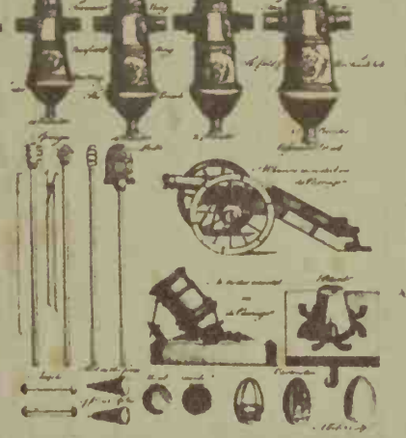

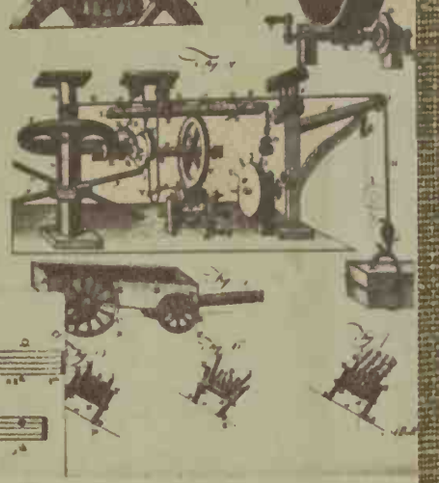

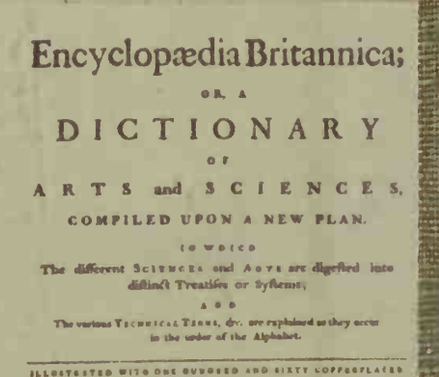

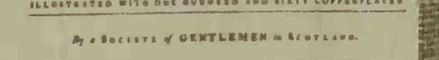

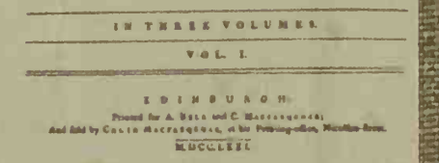

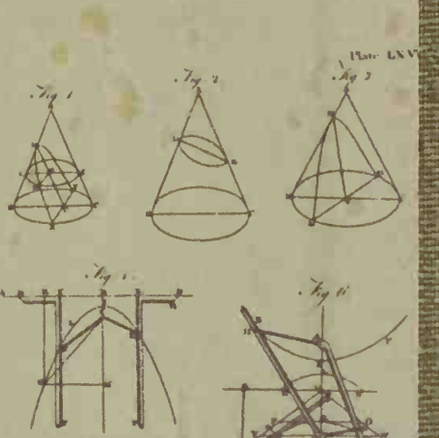

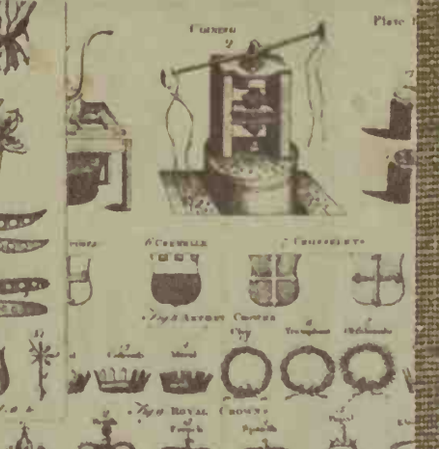

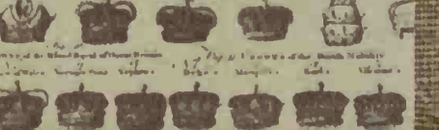

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